EGYPTIAN BACCALAUREATE • 2026

MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 01

Algebraic Proofs

5 Concepts | 444 questions

B5 Landscape | one question per teaching page

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Chapter 01 | Algebraic Proofs

CLASSROOM ROUTE

Concept 1 | Binomial and Multinomial Theorems — 70 questions

Official lessons: 1-1, 1-2, 1-3

Concept 2 | Polynomial Division — 60 questions

Official lessons: 1-4, 1-5

Concept 3 | Rational Expressions — 110 questions

Official lessons: 1-6, 1-7, 1-8

Concept 4 | Identities and Proofs — 106 questions

Official lessons: 1-9, 1-10, 1-11, 1-12

Concept 5 | Inequalities — 98 questions

Official lessons: 1-13, 1-14, 1-15, 1-16

The Formula Bank changes at each Concept boundary.

Concept 1 | Binomial and Multinomial Theorems — **OFFICIAL LESSONS 1-1, 1-2, 1-3**

Binomial and Multinomial Theorems

Equation-first recall | use the same rail beside every question in this Concept

Binomial

$$n\,\mathrm{C}\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,\mathrm{C}\,r\, n-r\,\mathrm{C}\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Start with the family cue, write the first move, then use the working grid.

Concept 1 | Binomial and Multinomial Theorems

C01-T01-COMBINED | V01

Q001 | CHALLENGE MCQ C01-T01-C01

For $(2x-3)^5$, find the coefficient of x^3 and the sum of all coefficients without writing the full expansion:

A Coefficient = 720; sum = −1

B Coefficient = 720; sum = 1

C Coefficient = 540; sum = −1

D Coefficient = 240; sum = 32

WORKING AREA

FORMULA BANK

Binomial

$$nCra^r b^{n-r}$$

Multinomial / Trinomial

$$nCrn-rCsa^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

C01-T01-COMBINED | V02

Q002 | CHALLENGE MCQ C01-T01-C02

Find the coefficient of x^2y^3z in $(x+y+z)^6$, then find the coefficient of x^2yz^3 in $(x-2y+z)^6$:

A First = 60; second = -120

B First = 60; second = 120

C First = 120; second = -60

D First = -60; second = -120

WORKING AREA

FORMULA BANK

Binomial

$$nCra^rb^{n-r}$$

Multinomial / Trinomial

$$nCrn-rCsa^rb^sc^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

C01-T01-COMBINED | V03

Q003 | CHALLENGE MCQ C01-T01-C03

For $(x^2 + x + 1)^4$, find the greatest coefficient and verify it by identifying the coefficient of x^4:

A Greatest coefficient = 19

B Greatest coefficient = 16

C Greatest coefficient = 20

D Greatest coefficient = 24

WORKING AREA

FORMULA BANK

Binomial

$$nCra^r b^{n-r}$$

Multinomial / Trinomial

$$nCrn-rCsa^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V01

Q004 | WRITTEN C01-T01-S03

Expand $(x+2)^5$ using the Binomial Theorem.

WORKING AREA

FORMULA BANK

Binomial

$$nCra^r b^{n-r}$$

Multinomial / Trinomial

$$nCrn-rCsa^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V01

Q005 | MCQ C01-T01-S05

Expand $(3x-2)^4$ using the Binomial Theorem:

A $81x^4-216x^3-96x+16$

B $81x^4-216x^3+432x^2-96x+16$

C $-(3x-2)^4$

D $81x^4-216x^3+216x^2-96x+16$

WORKING AREA

FORMULA BANK

Binomial

$$n\mathrm{C}r\,a^r b^{n-r}$$

Multinomial / Trinomial

$$n\mathrm{C}r\,n-r\mathrm{C}s\,a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V01

Q006 | WRITTEN C01-T01-S09

Expand $(x+2)^6$ using the Binomial Theorem.

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\; n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V01

Q007 | MCQ C01-T01-S2a

Expand $(x+1)^4$ using the Binomial Theorem:

A x^4+4x^3+4x+1

B $x^4+4x^3+6x^2+4x+1$

C $x^4+4x^3+12x^2+4x+1$

D $-(x+1)^4$

WORKING AREA

FORMULA BANK

Binomial

$$n\mathrm{C}r\,a^r b^{n-r}$$

Multinomial / Trinomial

$$n\mathrm{C}r\,n-r\mathrm{C}s\,a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V01

Q008 | MCQ C01-T01-S2b

Expand $(a+b)^4$ using the Binomial Theorem:

A $a^4+4a^3b+4ab^3+b^4$

B $a^4+4a^3b+12a^2b^2+4ab^3+b^4$

C $a^4+4a^3b+6a^2b^2+4ab^3+b^4$

D $-(a+b)^4$

WORKING AREA

FORMULA BANK

Binomial

$$n\mathrm{C}r\,a^r b^{n-r}$$

Multinomial / Trinomial

$$n\mathrm{C}r\,n-r\mathrm{C}s\,a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V01

Q009 | WRITTEN

C01-T01-S2c

Expand $(a-2b)^4$ using the Binomial Theorem.

WORKING AREA

FORMULA BANK

Binomial

$$n\mathrm{C}r\,a^r b^{n-r}$$

Multinomial / Trinomial

$$n\mathrm{C}r\,n-r\mathrm{C}s\,a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V01

Q010 | MCQ

C01-T01-S2d

Expand $(x-2)^5$ using the Binomial Theorem:

A $x^5 - 10x^4 + 40x^3 - 80x^2 + 80x - 32$

B $x^5 - 10x^4 + 40x^3 - 80x^2 - 32$

C $x^5 - 10x^4 + 40x^3 - 80x^2 + 160x - 32$

D $-(x-2)^5$

WORKING AREA

FORMULA BANK

Binomial

$n \mathrm{C} r a^r b^{n-r}$

Multinomial / Trinomial

$n \mathrm{C} rn - r \mathrm{C} s a^r b^s c^{n-r-s}$

Expansion check

$r + (n - r) = n$

Concept 1 | Binomial and Multinomial Theorems

F01 | V01

Q011 | WRITTEN C01-T01-S2e

Expand $(3x + 2y)^5$ using the Binomial Theorem.

WORKING AREA

FORMULA BANK

Binomial

$$nCra^r b^{n-r}$$

Multinomial / Trinomial

$$nCrn - rCsa^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V01

Q012 | WRITTEN

C01-T01-S2f

Expand $(2a^2 - 1)^5$ using the Binomial Theorem.

WORKING AREA

FORMULA BANK

Binomial

$$nCra^r b^{n-r}$$

Multinomial / Trinomial

$$nCrn - rCsa^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V01

Q013 | WRITTEN

C01-T01-S2g

Expand $(x-3)^6$ using the Binomial Theorem.

WORKING AREA

FORMULA BANK

Binomial

$$nCra^r b^{n-r}$$

Multinomial / Trinomial

$$nCrn-rCsa^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V01

Q014 | WRITTEN C01-T01-S2h

Expand $(2x - 3y)^6$ using the Binomial Theorem.

WORKING AREA

FORMULA BANK

Binomial

$$nCra^r b^{n-r}$$

Multinomial / Trinomial

$$nCrn - rCsa^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V01

Q015 | WRITTEN C01-T01-S2i

Expand $\left(x+\frac{1}{3}\right)^{6}$ using the Binomial Theorem.

WORKING AREA

FORMULA BANK

Binomial

$$n\,\mathrm{C}\,r a^{r} b^{n-r}$$

Multinomial / Trinomial

$$n\,\mathrm{C}\,r\, n-r\,\mathrm{C}\,s a^{r} b^{s} c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V01

Q016 | MCQ C01-T01-P0101

Expand $(x+3)^3$ using the Binomial Theorem:

A x^3+9x^2+27

B $x^3+9x^2+27x+27$

C $x^3+9x^2+54x+27$

D $-(x+3)^3$

WORKING AREA

FORMULA BANK

Binomial

$$n\mathrm{C}r\,a^r b^{n-r}$$

Multinomial / Trinomial

$$n\mathrm{C}r\,n-r\mathrm{C}s\,a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V01

Q017 | MCQ

C01-T01-P0103

Expand $(a+2b)^5$ using the Binomial Theorem:

A $a^5+10a^4b+40a^3b^2+80ab^4+32b^5$

B $a^5+10a^4b+40a^3b^2+160a^2b^3+80ab^4+32b^5$

C $-(a+2b)^5$

D $a^5+10a^4b+40a^3b^2+80a^2b^3+80ab^4+32b^5$

WORKING AREA

FORMULA BANK

Binomial

$$n\mathrm{C}r\,a^r\,b^{n-r}$$

Multinomial / Trinomial

$$n\mathrm{C}r\,n-r\mathrm{C}s\,a^r\,b^s\,c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V01

Q018 | MCQ C01-T01-P0107

Expand $(x+2)^2$ using the Binomial Theorem:

A x^2+4

B x^2+8x+4

C $-(x+2)^2$

D x^2+4x+4

WORKING AREA

FORMULA BANK

Binomial

$$n\mathrm{C}r\,a^r b^{n-r}$$

Multinomial / Trinomial

$$n\mathrm{C}r\,n-r\mathrm{C}s\,a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V01

Q019 | MCQ

C01-T01-P0108

Expand $(a-b)^3$ using the Binomial Theorem:

A $a^3-3a^2b+3ab^2-b^3$

B $a^3-3a^2b-b^3$

C $a^3-3a^2b+6ab^2-b^3$

D $-(a-b)^3$

WORKING AREA

FORMULA BANK

Binomial

$$n\mathrm{C}r\,a^r b^{n-r}$$

Multinomial / Trinomial

$$n\mathrm{C}r\,n-r\mathrm{C}s\,a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V01

Q020 | MCQ

C01-T01-P0109

Expand $(2x+1)^5$ using the Binomial Theorem:

A $32x^5+80x^3+40x^2+10x+1$

B $32x^5+80x^4+80x^3+40x^2+10x+1$

C $32x^5+160x^4+80x^3+40x^2+10x+1$

D $-(2x+1)^5$

WORKING AREA

FORMULA BANK

Binomial

$$n\mathrm{C}r\,a^r b^{n-r}$$

Multinomial / Trinomial

$$n\mathrm{C}r\,n-r\mathrm{C}s\,a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V02

Q021 | WRITTEN C01-T01-S10

Expand $(3a - 2b)^5$ using the Binomial Theorem.

WORKING AREA

FORMULA BANK

Binomial

$$n\,\mathrm{C}\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,\mathrm{C}\,r\; n-r\,\mathrm{C}\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V02

Q022 | MCQ

C01-T01-P0102

Expand $(2x-1)^4$ using the Binomial Theorem:

A $16x^4 - 32x^3 - 8x + 1$

B $16x^4 - 32x^3 + 48x^2 - 8x + 1$

C $16x^4 - 32x^3 + 24x^2 - 8x + 1$

D $-(2x-1)^4$

WORKING AREA

FORMULA BANK

Binomial

$$n\,\mathrm{C}\,r\,a^r\,b^{n-r}$$

Multinomial / Trinomial

$$n\,\mathrm{C}\,r\,n-r\,\mathrm{C}\,s\,a^r\,b^s\,c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V02

Q023 | MCQ

C01-T01-P0110

Expand $(x-3)^4$ using the Binomial Theorem:

A $x^4 - 12x^3 - 108x + 81$

B $x^4 - 12x^3 + 54x^2 - 108x + 81$

C $x^4 - 12x^3 + 108x^2 - 108x + 81$

D $-(x-3)^4$

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r\,a^r\,b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\,n-r\,C\,s\,a^r\,b^s\,c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V02

Q024 | MCQ

C01-T01-P0111

Expand $(2a+b)^3$ using the Binomial Theorem:

A $8a^3+6ab^2+b^3$

B $8a^3+24a^2b+6ab^2+b^3$

C $8a^3+12a^2b+6ab^2+b^3$

D $-(2a+b)^3$

WORKING AREA

FORMULA BANK

Binomial

$$n\,\mathrm{C}\,r\,a^r\,b^{n-r}$$

Multinomial / Trinomial

$$n\,\mathrm{C}\,r\,n-r\,\mathrm{C}\,s\,a^r\,b^s\,c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V03

Q025 | MCQ

C01-T01-P0106

Expand $(2a^2 + 3)^4$ using the Binomial Theorem:

A $16a^8 + 96a^6 + 216a^2 + 81$

B $16a^8 + 96a^6 + 432a^4 + 216a^2 + 81$

C $16a^8 + 96a^6 + 216a^4 + 216a^2 + 81$

D $-(2a^2 + 3)^4$

WORKING AREA

FORMULA BANK

Binomial

$$n\,\mathrm{C}\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,\mathrm{C}\,r\; n-r\,\mathrm{C}\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

F01 | V03

Q026 | MCQ

C01-T01-P0114

Expand $(3a^2 - 2)^3$ using the Binomial Theorem:

A $27a^6 - 54a^4 - 8$

B $27a^6 - 54a^4 + 36a^2 - 8$

C $27a^6 - 54a^4 + 72a^2 - 8$

D $-(3a^2 - 2)^3$

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\,n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

F02 | V01

Q027 | WRITTEN C01-T01-S01

Find the coefficient of a^3b^2 in the expansion of $(a+b)^5$.

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\,n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F02 | V01

Q028 | WRITTEN

C01-T01-S02

Find the coefficient of x^4y^2 in the expansion of $(x-2y)^6$.

WORKING AREA

FORMULA BANK

Binomial

$$n\,\mathrm{C}\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,\mathrm{C}\,r\; n-r\,\mathrm{C}\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F02 | V01

Q029 | WRITTEN C01-T01-S04

Find the coefficient of x^4 in the expansion of $(2x^2 - 3)^7$.

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\; n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

F02 | V01

Q030 | WRITTEN C01-T01-S06

Find the coefficient of x^6y in the expansion of $(2x-3y)^7$.

WORKING AREA

FORMULA BANK

Binomial

$$nCra^rb^{n-r}$$

Multinomial / Trinomial

$$nCrn-rCsa^rb^sc^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F02 | V01

Q031 | MCQ C01-T01-S07

Find the coefficient of x^2 in the expansion of $(3x-2)^5$:

A 720

B -720

C -1440

D -719

WORKING AREA

FORMULA BANK

Binomial

$$n\,\mathrm{C}\,r\,a^r\,b^{n-r}$$

Multinomial / Trinomial

$$n\,\mathrm{C}\,r\;n-r\,\mathrm{C}\,s\,a^r\,b^s\,c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F02 | V01

Q032 | WRITTEN

C01-T01-S08

Find the coefficient of a^6 in the expansion of $(3a^2 - 2)^8$.

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\,n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

F02 | V01

Q033 | MCQ C01-T01-S1a

Find the coefficient of x^4y^4 in the expansion of $(2x - y)^8$:

A 1120

B -1120

C 2240

D 1121

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\,n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

F02 | V01

Q034 | MCQ C01-T01-S1b

Find the coefficient of ab^3 in the expansion of $(3a + b)^4$:

A -12

B 12

C 24

D 13

WORKING AREA

FORMULA BANK

Binomial

$$n\,\mathrm{C}\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,\mathrm{C}\,r\; n-r\,\mathrm{C}\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

F02 | V01

Q035 | MCQ C01-T01-S1c

Find the coefficient of x^3y^2 in the expansion of $(x-4y)^5$:

A -160

B 320

C 160

D 161

WORKING AREA

FORMULA BANK

Binomial

$$n\mathrm{C}r\,a^r b^{n-r}$$

Multinomial / Trinomial

$$n\mathrm{C}r\,n-r\mathrm{C}s\,a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F02 | V01

Q036 | MCQ C01-T01-S1d

Find the coefficient of x^4 in the expansion of $(3x+1)^5$:

A -405

B 810

C 406

D 405

WORKING AREA

FORMULA BANK

Binomial

$$n\mathrm{C}r\,a^r b^{n-r}$$

Multinomial / Trinomial

$$n\mathrm{C}r\,n-r\mathrm{C}s\,a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F02 | V01

Q037 | WRITTEN

C01-T01-S1e

Find the coefficient of a in the expansion of $(2a-3)^4$.

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\,n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F02 | V01

Q038 | WRITTEN

C01-T01-S1f

Find the coefficient of x^3 in the expansion of $(3x + 2)^5$.

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\; n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

F02 | V01

Q039 | WRITTEN

C01-T01-S1g

Find the coefficient of x^6 in the expansion of $(2x^2 - 1)^6$.

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\; n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

F02 | V01

Q040 | MCQ

C01-T01-S1h

Find the coefficient of x^4 in the expansion of $\left(3x^2-1\right)^5$:

A 90

B -180

C -89

D -90

WORKING AREA

FORMULA BANK

Binomial

$n \mathrm{C} r a^r b^{n-r}$

Multinomial / Trinomial

$n \mathrm{C} r n-r \mathrm{C} s a^r b^s c^{n-r-s}$

Expansion check

$r+(n-r)=n$

Concept 1 | Binomial and Multinomial Theorems

F02 | V01

Q041 | WRITTEN C01-T01-S1i

Find the coefficient of x^6 in the expansion of $(3x^2 + 2)^6$.

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\; n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

F03 | V01

Q042 | WRITTEN C01-T01-S30

If $(x+1)^5 = a_0 + a_x + \ldots$, find the sum of its coefficients.

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\,n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r + (n-r) = n$$

Concept 1 | Binomial and Multinomial Theorems

F04 | V01

Q043 | MCQ C01-T01-P0401

Find the coefficient of xyz in the expansion of $(x+y+z)^3$.:

A 6

B -6

C 3

D 12

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\,n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F05 | V01

Q044 | MCQ C01-T01-S40

Find the coefficient of a^4b^3c in the expansion of $(a+b+c)^8$:

A -280

B 560

C 280

D 281

WORKING AREA

FORMULA BANK

Binomial

$$n\mathrm{C}r\,a^r\,b^{n-r}$$

Multinomial / Trinomial

$$n\mathrm{C}r\,n-r\mathrm{C}s\,a^r\,b^s\,c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F05 | V01

Q045 | MCQ C01-T01-S42

Find the coefficient of a^3bc^2 in the expansion of $(a+b+c)^6$:

A 60

B -60

C 120

D 61

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\,n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F05 | V01

Q046 | MCQ C01-T01-S43

Find the coefficient of $a^2b^2c^2$ in the expansion of $(a+b+c)^6$:

A -90

B 90

C 180

D 91

WORKING AREA

FORMULA BANK

Binomial

$$n\mathrm{C}r\,a^r b^{n-r}$$

Multinomial / Trinomial

$$n\mathrm{C}r\,n-r\mathrm{C}s\,a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F05 | V01

Q047 | MCQ C01-T01-S5a

Find the coefficient of xy^5z in the expansion of $(x+y+z)^7$:

A 42

B -42

C 84

D 43

WORKING AREA

FORMULA BANK

Binomial

$$n\mathrm{C}r\,a^r b^{n-r}$$

Multinomial / Trinomial

$$n\mathrm{C}r\,n-r\mathrm{C}s\,a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F05 | V01

Q048 | WRITTEN C01-T01-S5b

Find the coefficient of x^4y^2z in the expansion of $(x+y+z)^7$.

WORKING AREA

FORMULA BANK

Binomial

$$nCra^rb^{n-r}$$

Multinomial / Trinomial

$$nCrn-rCsa^rb^sc^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F05 | V01

Q049 | WRITTEN

C01-T01-S5c

Find the coefficient of $x^2y^3z^2$ in the expansion of $(x+y+z)^7$.

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\; n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F05 | V01

Q050 | WRITTEN

C01-T01-S5d

Find the coefficient of x^6yz^2 in the expansion of $(x+y+z)^9$.

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\; n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F05 | V01

Q051 | WRITTEN

C01-T01-S5e

Find the coefficient of $x^3y^3z^3$ in the expansion of $(x+y+z)^9$.

WORKING AREA

FORMULA BANK

Binomial

$$n\,\mathrm{C}\,r\,a^r\,b^{n-r}$$

Multinomial / Trinomial

$$n\,\mathrm{C}\,r\,n-r\,\mathrm{C}\,s\,a^r\,b^s\,c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F05 | V01

Q052 | WRITTEN

C01-T01-S5f

Find the coefficient of $x^2y^4z^3$ in the expansion of $(x+y+z)^9$.

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\; n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F05 | V02

Q053 | MCQ C01-T01-S41

Find the coefficient of a^4b^3c in the expansion of $(a-2b+3c)^8$:

A 6720

B -13440

C -6719

D -6720

WORKING AREA

FORMULA BANK

Binomial

$$nCra^rb^{n-r}$$

Multinomial / Trinomial

$$nCrn-rCsa^rb^sc^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F05 | V02

Q054 | MCQ

C01-T01-S44

Find the coefficient of $a^2b^2c^2$ in the expansion of $(a+3b-2c)^6$:

A -3240

B 6480

C 3240

D 3241

WORKING AREA

FORMULA BANK

Binomial

$$n\mathrm{C}r\,a^r\,b^{n-r}$$

Multinomial / Trinomial

$$n\mathrm{C}r\,n-r\mathrm{C}s\,a^r\,b^s\,c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F05 | V02

Q055 | MCQ C01-T01-S45

Find the coefficient of ab^2c^3 in the expansion of $(a+3b-2c)^6$:

A 4320

B -8640

C -4319

D -4320

WORKING AREA

FORMULA BANK

Binomial

$$n\,\mathrm{C}\,r\,a^r\,b^{n-r}$$

Multinomial / Trinomial

$$n\,\mathrm{C}\,r\,n-r\,\mathrm{C}\,s\,a^r\,b^s\,c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F05 | V02

Q056 | WRITTEN

C01-T01-S5g

Find the coefficient of $a^2b^3c^2$ in the expansion of $(a+2b-3c)^7$.

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\,n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F05 | V02

Q057 | WRITTEN

C01-T01-S5h

Find the coefficient of abc^5 in the expansion of $(a + 2b - 3c)^7$.

WORKING AREA

FORMULA BANK

Binomial

$$n\,\mathrm{C}\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,\mathrm{C}\,r\; n-r\,\mathrm{C}\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

F05 | V02

Q058 | WRITTEN

C01-T01-S5i

Find the coefficient of a^2b^4c in the expansion of $(a+2b-3c)^7$.

WORKING AREA

FORMULA BANK

Binomial

$$nCra^rb^{n-r}$$

Multinomial / Trinomial

$$nCrn-rCsa^rb^sc^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

F05 | V02

Q059 | WRITTEN

C01-T01-S5j

Find the coefficient of $a^2b^2c^4$ in the expansion of $(2a - b + 3c)^8$.

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\,n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

F05 | V02

Q060 | WRITTEN C01-T01-S5k

Find the coefficient of a^4bc^3 in the expansion of $(2a - b + 3c)^8$.

WORKING AREA

FORMULA BANK

Binomial

$$n\,\mathrm{C}\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,\mathrm{C}\,r\, n-r\,\mathrm{C}\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

F05 | V02

Q061 | WRITTEN

C01-T01-S5I

Find the coefficient of $a^3b^3c^2$ in the expansion of $(2a - b + 3c)^8$.

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\,n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

F06 | V02

Q062 | WRITTEN

C01-T01-S60

Find the greatest coefficient in the expansion of $(x^2 + x + 1)^4$.

WORKING AREA

FORMULA BANK

Binomial

$$n\,C\,r a^r b^{n-r}$$

Multinomial / Trinomial

$$n\,C\,r\, n-r\,C\,s a^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

C01-T01-QUIZ | C01-T01-QUIZ-MCQ

Quiz M1 | QUIZ MCQ

C01-T01-Q01

The coefficient of x^4 in $(2x-3)^5$ is:

A -240

B 240

C -120

D 120

WORKING AREA

FORMULA BANK

Binomial

$$n\mathrm{C}r\,a^r b^{n-r}$$

Multinomial / Trinomial

$$n\mathrm{C}r\,n-r\mathrm{C}s\,a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

C01-T01-QUIZ | C01-T01-QUIZ-MCQ

Quiz M2 | QUIZ MCQ

C01-T01-Q04

The coefficient of $x^2y^2z^2$ in $(x+y+z)^6$ is:

A 30

B 60

C 90

D 120

WORKING AREA

FORMULA BANK

Binomial

$$n\mathrm{C}r\,a^r b^{n-r}$$

Multinomial / Trinomial

$$n\mathrm{C}r\,n-r\mathrm{C}s\,a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

C01-T01-QUIZ | C01-T01-QUIZ-MCQ

Quiz M3 | QUIZ MCQ

C01-T01-Q07

The coefficient of x^6 in $(3x^2 - 2)^6$ is:

A −4320

B −2160

C 2160

D 4320

WORKING AREA

FORMULA BANK

Binomial

$$n \mathrm{C} r a^r b^{n-r}$$

Multinomial / Trinomial

$$n \mathrm{C} r \, n-r \mathrm{C} s a^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 1 | Binomial and Multinomial Theorems

C01-T01-QUIZ | C01-T01-QUIZ-MCQ

Quiz M4 | QUIZ MCQ

C01-T01-Q10

The coefficient of x^5 in $(2x^2+1)^4$ is:

A 0

B 8

C 16

D 32

WORKING AREA

FORMULA BANK

Binomial

$$n\mathrm{C}r\,a^r b^{n-r}$$

Multinomial / Trinomial

$$n\mathrm{C}r\,n-r\mathrm{C}s\,a^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

C01-T01-QUIZ | C01-T01-QUIZ-WRITTEN

Quiz W1 | QUIZ WRITTEN C01-T01-Q11

Expand $(2x-1)^4$ fully.

WORKING AREA

FORMULA BANK

Binomial

$$nCra^r b^{n-r}$$

Multinomial / Trinomial

$$nCrn-rCsa^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

C01-T01-QUIZ | C01-T01-QUIZ-WRITTEN

Quiz W2 | QUIZ WRITTEN C01-T01-Q12

Find the coefficient of x^4 in $(3x^2+2)^5$. Show the exponent check.

WORKING AREA

FORMULA BANK

Binomial

$$nCra^r b^{n-r}$$

Multinomial / Trinomial

$$nCrn-rCsa^r b^s c^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

C01-T01-QUIZ | C01-T01-QUIZ-WRITTEN

Quiz W3 | QUIZ WRITTEN C01-T01-Q14

Find the coefficient of x^2y^3z in $(x-2y+z)^6$.

WORKING AREA

FORMULA BANK

Binomial

$$nCra^rb^{n-r}$$

Multinomial / Trinomial

$$nCrn-rCsa^rb^sc^{n-r-s}$$

Expansion check

$$r+(n-r)=n$$

Concept 1 | Binomial and Multinomial Theorems

C01-T01-QUIZ | C01-T01-QUIZ-WRITTEN

Quiz W4 | QUIZ WRITTEN C01-T01-Q15

Find the greatest coefficient in $(x^2 + x + 1)^4$. Show enough work to justify the maximum.

WORKING AREA

FORMULA BANK

Binomial

$$n \mathrm{C} r a^r b^{n-r}$$

Multinomial / Trinomial

$$n \mathrm{C} r \, n-r \mathrm{C} s a^r b^s c^{n-r-s}$$

Expansion check

$$r + (n - r) = n$$

Concept 2 | Polynomial Division OFFICIAL LESSONS 1-4, 1-5

Polynomial Division

Equation-first recall | use the same rail beside every question in this Concept

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Start with the family cue, write the first move, then use the working grid.

Concept 2 | Polynomial Division

C01-T02-COMBINED | V01

Q001 | CHALLENGE MCQ C01-T02-C07

Find the quotient and the remainder when $2x^3 + x^2 - 7x + 3$ is divided by $x^2 + x - 2$. Then verify the result using $A = B \times Q + R$:

A $Q = 2x - 2, \quad R = -2x + 2$

B $Q = 2x - 1, \quad R = -2x + 1$

C $Q = 2x - 1, \quad R = 2x - 1$

D $Q = 2x, \quad R = -2x + 1$

WORKING AREA

FORMULA BANK

Division identity
$A(x) = B(x)Q(x) + R(x)$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$

Concept 2 | Polynomial Division

C01-T02-COMBINED | V01

Q002 | CHALLENGE MCQ C01-T02-C08

Find the polynomial A when it is divided by $x^2 - 2x + 3$, the quotient is $3x - 1$, and the remainder is $x + 2$. Then divide your answer back to check it:

A $3x^3 - 7x^2 + 12x - 1$

B $(3x - 1) \times (x^2 - 2x + 3)$

C $3x^3 - 7x^2 + 10x - 5$

D $x^2 + 2x + 4$

WORKING AREA

FORMULA BANK

Division identity
$A(x) = B(x)Q(x) + R(x)$

Remainder theorem
$R = P(a)$ when divisor $= x - a$

Recovery
$Q = \frac{A - R}{B}$ $B = \frac{A - R}{Q}$

Concept 2 | Polynomial Division

C01-T02-COMBINED | V01

Q003 | CHALLENGE MCQ C01-T02-C09

When $x^3 + 5x^2 + 7x - 7$ is divided by B, the quotient is $x + 3$ and the remainder is $2x - 4$. Find B. Then verify the degree condition:

A $\dfrac{x^3 + 5x^2 + 9x - 11}{x + 3}$

B $-x^2 - 2x + 1$

C $\dfrac{x^3 + 5x^2 + 5x - 3}{x + 4}$

D $x^2 + 2x - 1$

WORKING AREA

FORMULA BANK

Division identity
$A(x) = B(x)Q(x) + R(x)$

Remainder theorem
$R = P(a)$ when divisor $= x - a$

Recovery
$Q = \dfrac{A - R}{B}$ $B = \dfrac{A - R}{Q}$

Concept 2 | Polynomial Division

C01-T02-COMBINED | V01

Q004 | CHALLENGE MCQ C01-T02-C10

A cuboid has volume $2x^3 + 9x^2 + 4x - 15$ and base area $x^2 + 2x - 3$. Write its height in terms of x. State the mathematical check Which of the following is correct?:

A $2x^3 + 10x^2 + 6x - 18$

B $2x + 6$

C $2x + 5$

D $\dfrac{1}{2x+5}$

WORKING AREA

FORMULA BANK

Division identity
$A(x) = B(x)Q(x) + R(x)$

Remainder theorem
$R = P(a)$ when divisor $= x - a$

Recovery
$Q = \dfrac{A-R}{B}$ $B = \dfrac{A-R}{Q}$

Concept 2 | Polynomial Division

C01-T02-COMBINED | V01

Q005 | CHALLENGE MCQ C01-T02-C11

Find the quotient and the remainder when $3x^4-x^3+2x^2-4x+1$ is divided by x^2-2x+2. Decide whether the result is exact and justify from R:

A $Q = 3x^2 + 5x + 5, \quad R = -2x - 10$

B $Q = 3x^2 + 5x + 6, \quad R = -2x - 11$

C $Q = 3x^2 + 5x + 6, \quad R = 2x + 11$

D $Q = 3x^2 + 5x + 7, \quad R = -2x - 11$

WORKING AREA

FORMULA BANK

Division identity
$A(x) = B(x)Q(x) + R(x)$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$Q = \frac{A-R}{B} \qquad B = \frac{A-R}{Q}$

Concept 2 | Polynomial Division

C01-T02-COMBINED | V01

Q006 | CHALLENGE MCQ C01-T02-C12

Find the quotient and the remainder when $x^4 - 3x^2 + 2x + 6$ is divided by $x + 2$. Explain why a zero placeholder is needed:

A $Q = x \times (x^2 - 2x + 1), \quad R = 6$

B $Q = x \times (x^2 - 2x + 1), \quad R = -6$

C $Q = x^3 - 2x^2 + x + 1, \quad R = 6$

D $Q = x^3 - 2x^2 + x - 1, \quad R = 7$

WORKING AREA

FORMULA BANK

Division identity
$A(x) = B(x)Q(x) + R(x)$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$

Concept 2 | Polynomial Division

F01 | V01

Q007 | WRITTEN

C01-T02-S05

Find the quotient and the remainder when $x^2 - 5x + 1$ is divided by $x - 2$.

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F01 | V01

Q008 | WRITTEN

C01-T02-S06

Find the quotient and the remainder when $x^3 - 4x + 1$ is divided by $x - 3$.

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F01 | V01

Q009 | MCQ C01-T02-O01

Find the quotient and the remainder when $3x^3 + 2x^2 - 7x + 5$ is divided by $x - 2$:

A $Q = 3x^2 + 8x + 9, \quad R = -23$

B $Q = 3x^2 + 8x + 10, \quad R = 23$

C $Q = 3x^2 + 8x + 8, \quad R = 24$

D $Q = 3x^2 + 8x + 9, \quad R = 23$

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F01 | V01

Q010 | MCQ

C01-T02-O03

Find the quotient and the remainder when $x^3 + 6x^2 - 4$ is divided by $2x - 3$:

A $Q = \frac{x^2}{2} + \frac{15x}{4} + \frac{37}{8}, \quad R = \frac{111}{8}$

B $Q = \frac{x^2}{2} + \frac{15x}{4} + \frac{45}{8}, \quad R = \frac{103}{8}$

C $Q = \frac{x^2}{2} + \frac{15x}{4} + \frac{45}{8}, \quad R = -\frac{103}{8}$

D $Q = \frac{x^2}{2} + \frac{15x}{4} + \frac{53}{8}, \quad R = \frac{103}{8}$

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F01 | V01

Q011 | MCQ C01-T02-O51

Find the quotient and the remainder when $3x^3 - 4x^2 + 2x + 7$ is divided by $x - 1$:

A $Q = x \times (3x - 1), \quad R = 9$

B $Q = 3x^2 - x + 1, \quad R = 8$

C $Q = 3x^2 - x + 1, \quad R = -8$

D $Q = 3x^2 - x + 2, \quad R = 8$

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F01 | V01

Q012 | MCQ

C01-T02-O52

Find the quotient and the remainder when $2x^4 + x^3 - 5x + 4$ is divided by $x + 2$:

A $Q = 2x^3 - 3x^2 + 6x - 17, \quad R = 38$

B $Q = 2x^3 - 3x^2 + 6x - 17, \quad R = -38$

C $Q = 2x^3 - 3x^2 + 6x - 16, \quad R = 38$

D $Q = 2x^3 - 3x^2 + 6x - 18, \quad R = 39$

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F01 | V02

Q013 | MCQ

C01-T02-O05

Find the quotient and the remainder when $4x^4 - 3x^3 + x - 6$ is divided by $x - 2$:

A $Q = 4x^3 + 5x^2 + 10x + 21, \quad R = -36$

B $Q = 4x^3 + 5x^2 + 10x + 22, \quad R = 36$

C $Q = 4x^3 + 5x^2 + 10x + 20, \quad R = 37$

D $Q = 4x^3 + 5x^2 + 10x + 21, \quad R = 36$

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F01 | V02

Q014 | MCQ

C01-T02-O07

Find the quotient and the remainder when $2x^3 - 9x + 1$ is divided by $3x - 2$:

A $Q = \frac{2x^2}{3} + \frac{4x}{9} - \frac{100}{27}, \quad R = -\frac{92}{27}$

B $Q = \frac{2x^2}{3} + \frac{4x}{9} - \frac{73}{27}, \quad R = -\frac{119}{27}$

C $Q = \frac{2x^2}{3} + \frac{4x}{9} - \frac{73}{27}, \quad R = \frac{119}{27}$

D $Q = \frac{2x^2}{3} + \frac{4x}{9} - \frac{46}{27}, \quad R = -\frac{119}{27}$

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F02 | V01

Q015 | WRITTEN C01-T02-S01

Find the quotient and the remainder when $2x^3 - 5x^2 - 2$ is divided by $2x^2 - x - 1$.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F02 | V01

Q016 | WRITTEN C01-T02-S03

Find the quotient and the remainder when $2x^3 - 13x + 1$ is divided by $x^2 + 2x - 3$.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F02 | V01

Q017 | WRITTEN C01-T02-S07

Find the quotient and the remainder when $2x^3 - 3x^2 + 3x + 4$ is divided by $x^2 - 2x + 3$.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F02 | V01

Q018 | WRITTEN C01-T02-S09

Find the quotient and the remainder when $x^3 - 7x + 6$ is divided by $x^2 + 2x - 3$.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F02 | V01

Q019 | MCQ

C01-T02-O09

Find the quotient and the remainder when $x^3 + 2x^2 - 5x + 4$ is divided by $x^2 + x - 2$:

A $Q = x + 1, \quad R = 4x - 6$

B $Q = x + 2, \quad R = -4x + 6$

C $Q = x, \quad R = -4x + 7$

D $Q = x + 1, \quad R = -4x + 6$

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F02 | V01

Q020 | MCQ

C01-T02-O11

Find the quotient and the remainder when $x^4 - 3x^3 + 2x - 5$ is divided by $x^2 + 2x - 1$:

A $Q = x^2 - 5x + 10, \quad R = -25x + 7$

B $Q = x^2 - 5x + 11, \quad R = -25x + 6$

C $Q = x^2 - 5x + 11, \quad R = 25x - 6$

D $Q = x^2 - 5x + 12, \quad R = -25x + 6$

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F02 | V01

Q021 | MCQ

C01-T02-O53

Find the quotient and the remainder when $2x^3 + x^2 - 4x + 5$ is divided by $x^2 - 2x + 2$:

A $Q = 2x + 5, \quad R = -2x + 5$

B $Q = 2x + 6, \quad R = 2x - 5$

C $Q = 2x + 4, \quad R = 2x - 4$

D $Q = 2x + 5, \quad R = 2x - 5$

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F02 | V01

Q022 | MCQ

C01-T02-O54

Find the quotient and the remainder when $x^4-2x^3+5x^2-x+3$ is divided by x^2+3x-1:

A $Q = x^2 - 5x + 22, \quad R = -69x + 24$

B $Q = x^2 - 5x + 20, \quad R = -69x + 25$

C $Q = x^2 - 5x + 21, \quad R = -69x + 24$

D $Q = x^2 - 5x + 21, \quad R = 69x - 24$

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F02 | V01

Q023 | MCQ

C01-T02-O55

Find the quotient and the remainder when $3x^3 - 5x + 2$ is divided by $x^2 - x - 1$:

A $Q = 3x + 2, \quad R = x + 6$

B $Q = 3x + 3, \quad R = x + 5$

C $Q = 3x + 3, \quad R = -x - 5$

D $Q = 3x + 4, \quad R = x + 5$

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F02 | V01

Q024 | MCQ

C01-T02-O56

Find the quotient and the remainder when $2x^4 - x^3 + 4x^2 - 7$ is divided by $x^2 + x + 3$:

A $Q = 2x^2 - 3x + 1, \quad R = 8x - 10$

B $Q = 2x^2 - 3x + 1, \quad R = -8x + 10$

C $Q = 2x^2 - 3x + 2, \quad R = 8x - 10$

D $Q = x \times (2x - 3), \quad R = 8x - 9$

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F02 | V02

Q025 | WRITTEN C01-T02-S08

Find the quotient and the remainder when $6x^3 - 8x^2 + 5$ is divided by $2x^2 - 2x - 5$.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F02 | V02

Q026 | WRITTEN C01-T02-S10

Find the quotient and the remainder when $3x^4 - 5x^3 + x - 1$ is divided by $-x^2 + 3x + 2$.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F02 | V02

Q027 | MCQ

C01-T02-O13

Find the quotient and the remainder when $4x^3 - x^2 + 8x - 3$ is divided by $2x^2 + x - 4$:

A $Q = 2x - \frac{3}{2}, \quad R = -\frac{35x}{2} + 9$

B $Q = 2x - \frac{1}{2}, \quad R = \frac{35x}{2} - 9$

C $Q = 2x - \frac{5}{2}, \quad R = \frac{35x}{2} - 8$

D $Q = 2x - \frac{3}{2}, \quad R = \frac{35x}{2} - 9$

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F02 | V02

Q028 | MCQ C01-T02-O15

Find the quotient and the remainder when $x^3 - 8x + 2$ is divided by $x^2 - 4$:

A $Q = x - 1, \quad R = -4x + 3$

B $Q = x, \quad R = -4x + 2$

C $Q = x, \quad R = 4x - 2$

D $Q = x + 1, \quad R = -4x + 2$

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F02 | V02

Q029 | MCQ

C01-T02-O57

Find the quotient and the remainder when $5x^3 - 4x^2 + x - 6$ is divided by $2x^2 - x + 1$:

A $Q = \frac{5x}{2} - \frac{3}{4}, \quad R = \frac{9x}{4} + \frac{21}{4}$

B $Q = \frac{5x}{2} + \frac{1}{4}, \quad R = -\frac{9x}{4} - \frac{21}{4}$

C $Q = \frac{5x}{2} - \frac{7}{4}, \quad R = -\frac{9x}{4} - \frac{17}{4}$

D $Q = \frac{5x}{2} - \frac{3}{4}, \quad R = -\frac{9x}{4} - \frac{21}{4}$

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F02 | V02

Q030 | MCQ

C01-T02-O58

Find the quotient and the remainder when $3x^4 + 2x^3 - x^2 + 5$ is divided by $4x^2 + x - 2$:

A $Q = \frac{3x^2}{4} + \frac{5x}{16} + \frac{67}{64}, \quad R = \frac{37x}{64} + \frac{163}{32}$

B $Q = \frac{3x^2}{4} + \frac{5x}{16} - \frac{61}{64}, \quad R = \frac{37x}{64} + \frac{195}{32}$

C $Q = \frac{3x^2}{4} + \frac{5x}{16} + \frac{3}{64}, \quad R = \frac{37x}{64} + \frac{163}{32}$

D $Q = \frac{3x^2}{4} + \frac{5x}{16} + \frac{3}{64}, \quad R = -\frac{37x}{64} - \frac{163}{32}$

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F02 | V03

Q031 | MCQ

C01-T02-O17

Find the quotient and the remainder when $3x^3 + 4x^2 - x + 9$ is divided by $2x^2 - x + 3$:

A $Q = \frac{3x}{2} + \frac{11}{4}, \quad R = \frac{11x}{4} - \frac{3}{4}$

B $Q = \frac{3x}{2} + \frac{15}{4}, \quad R = -\frac{11x}{4} + \frac{3}{4}$

C $Q = \frac{3x}{2} + \frac{7}{4}, \quad R = -\frac{11x}{4} + \frac{7}{4}$

D $Q = \frac{3x}{2} + \frac{11}{4}, \quad R = -\frac{11x}{4} + \frac{3}{4}$

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F02 | V03

Q032 | MCQ

C01-T02-O19

Find the quotient and the remainder when $6x^3 - 5x + 1$ is divided by $2x^2 + 3x - 2$:

A $Q = 3x - \frac{11}{2}, \quad R = \frac{29x}{2} - 7$

B $Q = 3x - \frac{9}{2}, \quad R = \frac{29x}{2} - 8$

C $Q = 3x - \frac{9}{2}, \quad R = -\frac{29x}{2} + 8$

D $Q = 3x - \frac{7}{2}, \quad R = \frac{29x}{2} - 8$

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F03 | V01

Q033 | WRITTEN C01-T02-S02

Find the quotient and the remainder when $-9a^2-9ax+4x^2$ is divided by $-3a+x$. Treat it as a polynomial in x; other letters are constants.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A-R}{B} \qquad B = \frac{A-R}{Q}$$

Concept 2 | Polynomial Division

F03 | V01

Q034 | WRITTEN C01-T02-S04

Find the quotient and the remainder when $-5a^3+5a^2x-3ax^2+x^3$ is divided by $-2a+x$. Treat it as a polynomial in x; other letters are constants.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A-R}{B} \qquad B = \frac{A-R}{Q}$$

Concept 2 | Polynomial Division

F03 | V01

Q035 | WRITTEN

C01-T02-S11

Find the quotient and the remainder when $-6a^2-5ax+4x^2$ is divided by $-2a+x$. Treat it as a polynomial in x; other letters are constants.

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ when divisor $= x - a$

Recovery

$$Q = \frac{A-R}{B} \qquad B = \frac{A-R}{Q}$$

Concept 2 | Polynomial Division

F03 | V01

Q036 | WRITTEN C01-T02-S12

Find the quotient and the remainder when $-a^3 + a^2x + ax^2 + x^3$ is divided by $2a + x$. Treat it as a polynomial in x; other letters are constants.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ when divisor $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F03 | V01

Q037 | WRITTEN

C01-T02-S13

Find the quotient and the remainder when $3a^3 - 2ax^2 + x^3$ is divided by $a + x$. Treat it as a polynomial in x; other letters are constants.

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F03 | V01

Q038 | MCQ

C01-T02-O21

Find the quotient and the remainder when $-2a^3 + 7a^2x - 4ax^2 + x^3$ is divided by $-a + x$. Treat it as a polynomial in x; other letters are constants:

A $Q = 4a^2 - 3ax + x^2, \quad R = -2a^3$

B $Q = 4a^2 - 3ax + x^2 + 1, \quad R = 2a^3$

C $Q = 4a^2 - 3ax + x^2 - 1, \quad R = 2a^3 + 1$

D $Q = 4a^2 - 3ax + x^2, \quad R = 2a^3$

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F03 | V01

Q039 | MCQ

C01-T02-O23

Find the quotient and the remainder when $x^2 + 3xy - 4y^2$ is divided by $x + y$. Treat it as a polynomial in x; other letters are constants:

A $Q = x + 2y - 1, \quad R = -6y^2 + 1$

B $Q = x + 2y, \quad R = -6y^2$

C $Q = x + 2y, \quad R = 6y^2$

D $Q = x + 2y + 1, \quad R = -6y^2$

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F03 | V02

Q040 | WRITTEN C01-T02-S14

Find the quotient and the remainder when $x^3 + 3x^2y - 2y^3$ is divided by $x + y$. Treat it as a polynomial in x; other letters are constants.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F04 | V01

Q041 | WRITTEN C01-T02-S16

Find the polynomial A when it is divided by $x^2 - 2x - 1$, the quotient is $x + 3$, and the remainder is $-2x + 5$.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F04 | V01

Q042 | WRITTEN C01-T02-S20

Find the polynomial A when it is divided by $x^2 - 2x - 1$, the quotient is $2x - 3$, and the remainder is $-2x$.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F04 | V01

Q043 | WRITTEN C01-T02-S21

Find the polynomial A when it is divided by $x^2 - 3x + 2$, the quotient is $2x + 6$, and the remainder is $2x - 3$.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F04 | V01

Q044 | WRITTEN C01-T02-S22

Find the polynomial A when it is divided by $2x^2 - x + 2$, the quotient is $2x - 1$, and the remainder is 2.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F04 | V02

Q045 | WRITTEN C01-T02-S18

Find the polynomial A when it is divided by $2x^2 + x + 1$, the quotient is $3x + 2$, and the remainder is $-2x + 6$.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F05 | V01

Q046 | WRITTEN C01-T02-S17

When $4x^3 + 8x - 9$ is divided by B, the quotient is $2x - 3$ and the remainder is $x + 15$. Find B.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F05 | V01

Q047 | WRITTEN C01-T02-S19

When $x^3 - x^2 + 3x + 1$ is divided by B, the quotient is $x^2 - 2x + 5$ and the remainder is -4. Find B.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F05 | V02

Q048 | WRITTEN C01-T02-S23

When $2x^3+x^2-3x+5$ is divided by B, the quotient is $x+1$ and the remainder is $-5x+2$. Find B.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A-R}{B} \qquad B = \frac{A-R}{Q}$$

Concept 2 | Polynomial Division

F05 | V02

Q049 | WRITTEN C01-T02-S24

When $6x^3 + 11x^2 - 2$ is divided by B, the quotient is $2x^2 + 3x - 1$ and the remainder is -1. Find B.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F05 | V02

Q050 | WRITTEN C01-T02-S25

When $2x^3 + 4x^2 + 7$ is divided by B, the quotient is $x + 2$ and the remainder is $3x + 13$. Find B.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F05 | V03

Q051 | WRITTEN C01-T02-S26

When $x^4 + x^2 + 3x - 1$ is divided by B, the quotient is $x^2 + x + 1$ and the remainder is $3x - 2$. Find B.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

F06 | V01

Q052 | WRITTEN C01-T02-S15

A cuboid has volume $4x^3 + 4x^2 - 9x - 9$ and base area $2x^2 - x - 3$. Write its height in terms of x.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

C01-T02-QUIZ | C01-T02-QUIZ-MCQ

Quiz M1 | QUIZ MCQ C01-T02-Q01

For $x^2 - 5x + 1$ divided by $x - 2$, what is R?:

A -5

B -1

C 5

D 1

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

C01-T02-QUIZ | C01-T02-QUIZ-MCQ

Quiz M2 | QUIZ MCQ C01-T02-Q04

In a polynomial in x, a is treated as... Which of the following is correct?:

A *anothervariabletodivideby*

B a constant coefficient

C *zero*

D the divisor

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

C01-T02-QUIZ | C01-T02-QUIZ-MCQ

Quiz M3 | QUIZ MCQ C01-T02-Q07

To recover B from $A = B \times Q + R$, use... Which of the following is correct?:

A $B = A \times Q + R$

B $B = \dfrac{A + R}{Q}$

C $B = \dfrac{A - R}{Q}$

D $B = \dfrac{Q}{A - R}$

WORKING AREA

FORMULA BANK

Division identity
$A(x) = B(x)Q(x) + R(x)$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$Q = \dfrac{A - R}{B}$ $B = \dfrac{A - R}{Q}$

Concept 2 | Polynomial Division

C01-T02-QUIZ | C01-T02-QUIZ-MCQ

Quiz M4 | QUIZ MCQ C01-T02-Q10

If B has degree 2, a valid remainder can have degree...:

A 3

B 2

C 1

D 4

WORKING AREA

FORMULA BANK

Division identity

$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem

$R = P(a)$ **when divisor** $= x - a$

Recovery

$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

C01-T02-QUIZ | C01-T02-QUIZ-WRITTEN

Quiz W1 | QUIZ WRITTEN C01-T02-Q11

Divide $3x^3 - 5x^2 + 2x - 7$ by $x - 2$. State Q, R, and verify $A = B \times Q + R$.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

C01-T02-QUIZ | C01-T02-QUIZ-WRITTEN

Quiz W2 | QUIZ WRITTEN C01-T02-Q12

Recover A when B=$x^2 - x - 2$, Q=$2x + 3$, R=$-x + 1$.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

C01-T02-QUIZ | C01-T02-QUIZ-WRITTEN

Quiz W3 | QUIZ WRITTEN C01-T02-Q14

A cuboid has volume $4x^3 + 4x^2 - 9x - 9$ and base area $2x^2 - x - 3$. Find its height.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 2 | Polynomial Division

C01-T02-QUIZ | C01-T02-QUIZ-WRITTEN

Quiz W4 | QUIZ WRITTEN C01-T02-Q15

Divide $x^4 - 2x^3 + 3x - 1$ by $x^2 - x + 1$ and explain why the remainder is valid.

WORKING AREA

FORMULA BANK

Division identity
$$A(x) = B(x)Q(x) + R(x)$$

Remainder theorem
$R = P(a)$ **when divisor** $= x - a$

Recovery
$$Q = \frac{A - R}{B} \qquad B = \frac{A - R}{Q}$$

Concept 3 | Rational Expressions OFFICIAL LESSONS 1-6, 1-7, 1-8

Rational Expressions

Equation-first recall | use the same rail beside every question in this Concept

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Start with the family cue, write the first move, then use the working grid.

Concept 3 | Rational Expressions

C01-T03-COMBINED | V01

Q001 | CHALLENGE MCQ C01-T03-C01-MCQ

After simplifying this transfer chain before substitution, which result is correct for 2 ()?:

A $\frac{2x(x+3)}{(x-3)(x-1)}$

B $\frac{-2x^2-6x}{x^2-4x+3}$

C $\frac{4x^2+12x}{x^2-4x+3}$

D $\frac{x^2+3x}{x^2-4x+3}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

C01-T03-COMBINED | V01

Q002 | CHALLENGE MCQ C01-T03-C02-MCQ

After simplifying this transfer chain before substitution, which result is correct for 3 ()?:

A $\dfrac{-3x^2+3x+18}{x^2+3x}$

B $\dfrac{3(x-3)(x+2)}{x(x+3)}$

C $\dfrac{6x^2-6x-36}{x^2+3x}$

D $\dfrac{3x^2-3x-18}{2x^2+6x}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

C01-T03-COMBINED | V01

Q003 | CHALLENGE MCQ C01-T03-C03-MCQ

After simplifying this transfer chain before substitution, which result is correct for 4 ()?:

A $\frac{-8x^2+24x+32}{x^2-5x+6}$

B $\frac{16x^2-48x-64}{x^2-5x+6}$

C $\frac{8(x-4)(x+1)}{(x-3)(x-2)}$

D $\frac{4x^2-12x-16}{x^2-5x+6}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

C01-T03-COMBINED | V01

Q004 | CHALLENGE MCQ C01-T03-C04-MCQ

After simplifying this transfer chain before substitution, which result is correct for 8 ()?:

A $-\frac{8}{x}$

B $\frac{16}{x}$

C $\frac{4}{x}$

D $\frac{8}{x}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

C01-T03-COMBINED | V01

Q005 | CHALLENGE MCQ C01-T03-C05-MCQ

After simplifying this transfer chain before substitution, which result is correct for 9 ()?:

A $\frac{9(x-1)(x^4+x^3+x^2+x+1)}{2}$

B $-\frac{9x^5}{2}+\frac{9}{2}$

C $9x^5-9$

D $\frac{9x^5}{4}-\frac{9}{4}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

C01-T03-COMBINED | V01

Q006 | CHALLENGE MCQ C01-T03-C06-MCQ

After simplifying this transfer chain before substitution, which result is correct for 10 ()?:

A $\dfrac{-10x^3+10x^2+160x-160}{x^3-5x^2+6x}$

B $\dfrac{10(x-4)(x-1)(x+4)}{x(x-3)(x-2)}$

C $\dfrac{20x^3-20x^2-320x+320}{x^3-5x^2+6x}$

D $\dfrac{5x^3-5x^2-80x+80}{x^3-5x^2+6x}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q007 | WRITTEN C01-T03-S-WU1A

Simplify $\frac{12ab^5}{9a^3b^2}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q008 | WRITTEN C01-T03-S-TR1A

Simplify $\frac{6x^2y^3}{20x^3y}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q009 | WRITTEN C01-T03-S-EX1A

Simplify $\frac{6a^2bc^2}{8ab^4c^2}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q010 | WRITTEN

C01-T03-S-EX1B

Simplify $\frac{2a^2b}{8a^3b^3}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q011 | MCQ

C01-T03-S-WU1A-MCQ

After reducing coefficients and powers, which result is correct for $3\left(\frac{12ab^5}{9a^3b^2}\right)$?:

A $-\frac{4b^3}{a^2}$

B $\frac{4b^3}{a^2}$

C $\frac{8b^3}{a^2}$

D $\frac{2b^3}{a^2}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q012 | MCQ

C01-T03-S-TR1A-MCQ

After reducing coefficients and powers, which result is correct for $3\left(\frac{6x^2y^3}{20x^3y}\right)$?:

A $\frac{9y^2}{10x}$

B $-\frac{9y^2}{10x}$

C $\frac{9y^2}{5x}$

D $\frac{9y^2}{20x}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q013 | MCQ

C01-T03-S-EX1A-MCQ

After reducing coefficients and powers, which result is correct for $4\left(\frac{6a^2bc^2}{8ab^4c^2}\right)$?:

A $\frac{3a}{b^3}$

B $-\frac{3a}{b^3}$

C $\frac{6a}{b^3}$

D $\frac{3a}{2b^3}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q014 | MCQ C01-T03-S-EX1B-MCQ

After reducing coefficients and powers, which result is correct for $2\left(\frac{2a^2b}{8a^3b^3}\right)$?:

A $-\frac{1}{2ab^2}$

B $\frac{1}{2ab^2}$

C $\frac{1}{ab^2}$

D $\frac{1}{4ab^2}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q015 | MCQ C01-T03-O01-MCQ

After reducing coefficients and powers, which result is correct for $2\left(\frac{18a^3b^2}{24ab^5}\right)$?:

A $\frac{3a^2}{2b^3}$

B $-\frac{3a^2}{2b^3}$

C $\frac{3a^2}{b^3}$

D $\frac{3a^2}{4b^3}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q016 | MCQ

C01-T03-O02-MCQ

After reducing coefficients and powers, which result is correct for $3\left(\frac{-15x^4y^3}{20x^2y}\right)$?:

A $\frac{9x^2y^2}{4}$

B $-\frac{9x^2y^2}{4}$

C $-\frac{9x^2y^2}{2}$

D $-\frac{9x^2y^2}{8}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q017 | MCQ C01-T03-O03-MCQ

After reducing coefficients and powers, which result is correct for $4\left(\frac{45a^2b^4c}{60a^5bc^2}\right)$?:

A $-\frac{3b^3}{a^3c}$

B $\frac{6b^3}{a^3c}$

C $\frac{3b^3}{a^3c}$

D $\frac{3b^3}{2a^3c}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q018 | MCQ C01-T03-O04-MCQ

After reducing coefficients and powers, which result is correct for $2\left(\frac{14x^5y^2}{21x^2y^4}\right)$?:

A $-\frac{4x^3}{3y^2}$

B $\frac{8x^3}{3y^2}$

C $\frac{2x^3}{3y^2}$

D $\frac{4x^3}{3y^2}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q019 | MCQ C01-T03-O05-MCQ

After reducing coefficients and powers, which result is correct for $3\left(\frac{32a^4}{48ab^2}\right)$?:

A $\frac{2a^3}{b^2}$

B $-\frac{2a^3}{b^2}$

C $\frac{4a^3}{b^2}$

D $\frac{a^3}{b^2}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q020 | MCQ

C01-T03-O06-MCQ

After reducing coefficients and powers, which result is correct for $4\left(\frac{27x^3y^5}{36xy^2}\right)$?:

A $-3x^2y^3$

B $3x^2y^3$

C $6x^2y^3$

D $\frac{3x^2y^3}{2}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q021 | MCQ C01-T03-O07-MCQ

After reducing coefficients and powers, which result is correct for $2\left(\frac{-42a^2c^3}{56a^5c}\right)$?:

A $\frac{3c^2}{2a^3}$

B $-\frac{3c^2}{a^3}$

C $-\frac{3c^2}{2a^3}$

D $-\frac{3c^2}{4a^3}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q022 | WRITTEN

C01-T03-S-EX2A

Simplify $\frac{a^3b^2}{3c} \times \frac{9c^3}{a^4b^2}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q023 | WRITTEN

C01-T03-S-EX2B

Simplify $\frac{6bc^3}{5a^2} \times \frac{10a^4}{3b^3}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q024 | MCQ

C01-T03-S-EX2A-MCQ

After reducing coefficients and powers, which result is correct for $4\left(\frac{a^3b^2}{3c} \times \frac{9c^3}{a^4b^2}\right)$?:

A $-\frac{12c^2}{a}$

B $\frac{24c^2}{a}$

C $\frac{12c^2}{a}$

D $\frac{6c^2}{a}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q025 | MCQ

C01-T03-S-EX2B-MCQ

After reducing coefficients and powers, which result is correct for $2\left(\frac{6bc^3}{5a^2} \times \frac{10a^4}{3b^3}\right)$?:

A $-\frac{8a^2c^3}{b^2}$

B $\frac{16a^2c^3}{b^2}$

C $\frac{4a^2c^3}{b^2}$

D $\frac{8a^2c^3}{b^2}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q026 | MCQ

C01-T03-O08-MCQ

After reducing coefficients and powers, which result is correct for $3\left(\frac{6a^2b}{5c} \times \frac{15c^2}{4ab^3}\right)$?:

A $-\frac{27ac}{2b^2}$

B $\frac{27ac}{b^2}$

C $\frac{27ac}{4b^2}$

D $\frac{27ac}{2b^2}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q027 | MCQ C01-T03-O09-MCQ

After reducing coefficients and powers, which result is correct for $4\left(\frac{9x^3y}{14a^2} \times \frac{21a^3}{6xy^2}\right)$?:

A $\frac{9ax^2}{y}$

B $-\frac{9ax^2}{y}$

C $\frac{18ax^2}{y}$

D $\frac{9ax^2}{2y}$

WORKING AREA

FORMULA BANK

Restrictions

denominator $\neq 0$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q028 | MCQ C01-T03-O10-MCQ

After reducing coefficients and powers, which result is correct for $2\left(\frac{-8ab^2}{3c^2} \times \frac{12c^3}{-5a^2b}\right)$?:

A $-\frac{64bc}{5a}$

B $\frac{64bc}{5a}$

C $\frac{128bc}{5a}$

D $\frac{32bc}{5a}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q029 | MCQ C01-T03-O11-MCQ

After reducing coefficients and powers, which result is correct for $3\left(\frac{10x^2y^3}{9ab} \times \frac{27a^2b^2}{25xy}\right)$?:

A $-\frac{18abxy^2}{5}$

B $\frac{36abxy^2}{5}$

C $\frac{18abxy^2}{5}$

D $\frac{9abxy^2}{5}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V01

Q030 | WRITTEN

C01-T03-S-WU1B

Simplify $\frac{x^2-4}{3x^2+7x+2}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V01

Q031 | WRITTEN C01-T03-S-TR1B

Simplify $\frac{2x^2-3x-5}{x^2+3x+2}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V01

Q032 | WRITTEN C01-T03-S-EX1C

Simplify $\frac{x^2+3x}{x^2-9}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V01

Q033 | WRITTEN C01-T03-S-EX1D

Simplify $\frac{x^2+x-2}{x^2-5x+4}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V02

Q034 | WRITTEN C01-T03-S-EX1E

Simplify $\frac{2x^2-4xy+2y^2}{x^3+3x^2y-4xy^2}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V03

Q035 | WRITTEN

C01-T03-S-EX1F

Simplify $\frac{x^3-1}{x^2+2x-3}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F03 | V01

Q036 | WRITTEN

C01-T03-S-TR2A

Simplify $\frac{x^2-11x+24}{x^2-6x-16} \times \frac{x^2+2x}{x^2-6x+9}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F03 | V01

Q037 | WRITTEN

C01-T03-S-EX2D

Simplify $\frac{x+1}{x^2-4} \times \frac{x^2-2x-8}{x^2+x}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F03 | V01

Q038 | WRITTEN C01-T03-S-EX2E

Simplify $\frac{x^2-9}{x^2-2x} \times \frac{x^2-7x+10}{x^2+x-12}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F03 | V02

Q039 | WRITTEN

C01-T03-S-EX2F

Simplify $\frac{x^2+x-6}{2x^2+x-6} \times \frac{x^2+6x+8}{3x^2-5x-2}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F04 | V01

Q040 | WRITTEN C01-T03-S-WU2

Simplify $\frac{x^2-4x-5}{2x^2+5x+2} \div \frac{x^2-x-20}{2x^2-5x-3}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F04 | V01

Q041 | WRITTEN C01-T03-S-TR2B

Simplify $\frac{x^2-9}{x^2-x-2} \div \frac{2x^2+5x-3}{x+1}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F04 | V02

Q042 | WRITTEN C01-T03-S-EX2C

Simplify $\frac{2xy}{3ab} \div \frac{8x^3y}{9a^2b^3}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F04 | V03

Q043 | WRITTEN C01-T03-S-EX2G

Simplify $\frac{2x^2-x-10}{x^2-2x-3} \div \frac{x^2+x-2}{x^2-6x+9}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F04 | V03

Q044 | WRITTEN

C01-T03-S-EX2H

Simplify $\frac{x^2-3x-10}{2x^2+3x-2} \div \frac{x^2-2x-15}{6x-3}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F04 | V03

Q045 | WRITTEN C01-T03-S-EX2I

Simplify $\frac{x^2-y^2}{x^2-2xy+y^2} \div \frac{x^2+xy}{x-y}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F05 | V01

Q046 | WRITTEN C01-T03-S-CH1

Simplify $\frac{x^3+8}{x^2-x-6} \times \frac{x^2-6x+9}{x^2-2x+4} \div \frac{2x-6}{x^5-1}$ for $x = \sqrt{123}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

C01-T04-COMBINED | V01

Q047 | CHALLENGE WRITTEN C01-T04-C01

Simplify $\left(\frac{x+1}{x-2}-\frac{2}{x+3}+\frac{3}{x+3}-\frac{1}{x-2}\right)$; state every excluded value.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q048 | WRITTEN

C01-T04-S-EX1

Simplify
$\frac{x^2-4}{x+1}+\frac{3}{x+1}$.

WORKING AREA

FORMULA BANK

Restrictions
denominator $\neq 0$

Multiply / divide
$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract
$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q049 | MCQ C01-T04-O01

Simplify
$\frac{x^2+2x+3}{x+1}+\frac{2x-1}{x+1}$:

A $\frac{x^2+5x+3}{x+1}$

B $\frac{x^2+3x+1}{x+1}$

C $\frac{x^2+4x+2}{x+1}$

D $-\frac{x^2+4x+2}{x+1}$

WORKING AREA

FORMULA BANK

Restrictions
$$\text{denominator} \neq 0$$

Multiply / divide
$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract
$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q050 | MCQ

C01-T04-O02

Simplify
$\frac{2x^2-5}{x^2-4}+\frac{x+6}{x^2-4}$:

A $\frac{3x^2+x-3}{(x-2)(x+2)}$

B $\frac{x^2+x+5}{(x-2)(x+2)}$

C $-\frac{2x^2+x+1}{(x-2)(x+2)}$

D $\frac{2x^2+x+1}{(x-2)(x+2)}$

WORKING AREA

FORMULA BANK

Restrictions
$$\text{denominator} \neq 0$$

Multiply / divide
$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract
$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q051 | MCQ

C01-T04-O03

Simplify

$$\frac{3x^2+x-2}{(x-2)(x+1)}+\frac{4x-3}{(x-2)(x+1)}:$$

A $\frac{3x^2+5x-5}{(x-2)(x+1)}$

B $\frac{4x^2+4x-7}{(x-2)(x+1)}$

C $\frac{2x^2+6x-3}{(x-2)(x+1)}$

D $-\frac{3x^2+5x-5}{(x-2)(x+1)}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q052 | MCQ

C01-T04-O04

Simplify

$$\frac{x^3-1}{x+2}+\frac{2x^2+x+4}{x+2}:$$

A $\frac{x^3+2x^2+2x+5}{x+2}$

B $\frac{x^3+2x^2+x+3}{x+2}$

C $\frac{x^3+2x^2+1}{x+2}$

D $-\frac{x^3+2x^2+x+3}{x+2}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q053 | WRITTEN

C01-T04-S-EX2

Simplify

$$\frac{3}{x^2+x}-\frac{-x+3}{x^2+x}.$$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q054 | MCQ C01-T04-O07

Simplify
$\frac{x^2+4x+4}{x+2} - \frac{x+4}{x+2}$:

A $\frac{x(x+3)}{x+2}$

B $\frac{x^2+4x+2}{x+2}$

C $\frac{x^2+2x-2}{x+2}$

D $-\frac{x(x+3)}{x+2}$

WORKING AREA

FORMULA BANK

Restrictions
denominator $\neq 0$

Multiply / divide
$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract
$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q055 | MCQ

C01-T04-O08

Simplify

$$\frac{3x^2-2x+1}{x^2-1}-\frac{2x-5}{x^2-1}:$$

A $\frac{4x^2-4x+5}{(x-1)(x+1)}$

B $\frac{3x^2-4x+6}{(x-1)(x+1)}$

C $\frac{2x^2-4x+7}{(x-1)(x+1)}$

D $-\frac{3x^2-4x+6}{(x-1)(x+1)}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q056 | MCQ

C01-T04-O09

Simplify
$$\frac{x^2-6x+8}{(x-1)(x+2)}-\frac{x^2-3x+2}{(x-1)(x+2)}:$$

A $\frac{x^2-2x+4}{(x-1)(x+2)}$

B $-\frac{x^2+4x-8}{(x-1)(x+2)}$

C $-\frac{3(x-2)}{(x-1)(x+2)}$

D $\frac{3(x-2)}{(x-1)(x+2)}$

WORKING AREA

FORMULA BANK

Restrictions
$$\text{denominator} \neq 0$$

Multiply / divide
$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract
$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q057 | MCQ C01-T04-O10

Simplify

$$\frac{2x^3+x}{x-3}-\frac{x^2+7}{x-3}:$$

A $\frac{2x^3-x^2+2x-10}{x-3}$

B $\frac{2x^3-x^2-4}{x-3}$

C $\frac{2x^3-x^2+x-7}{x-3}$

D $-\frac{2x^3-x^2+x-7}{x-3}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V01

Q058 | WRITTEN

C01-T04-S-WU1

Simplify
$$\frac{x+4}{x^2-2x}-\frac{3}{x^2-3x+2}.$$

WORKING AREA

FORMULA BANK

Restrictions
$$\text{denominator} \neq 0$$

Multiply / divide
$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract
$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V01

Q059 | WRITTEN

C01-T04-S-TR1

Simplify

$$\frac{x-1}{x^2+4x+3}+\frac{2}{x^2+5x+6}.$$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V01

Q060 | MCQ

C01-T04-O13

Simplify

$$\frac{x-1}{(x+1)(x+3)}+\frac{2x+1}{(x+3)(x+5)}:$$

A

$$\frac{x^3+12x^2+30x+11}{(x+1)(x+3)(x+5)}$$

B

$$\frac{3x^2+7x-4}{(x+1)(x+3)(x+5)}$$

C

$$-\frac{x^3+6x^2+16x+19}{(x+1)(x+3)(x+5)}$$

D

$$-\frac{3x^2+7x-4}{(x+1)(x+3)(x+5)}$$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V01

Q061 | MCQ C01-T04-O14

Simplify
$\frac{x+3}{(x+2)(x+4)} + \frac{x-2}{(x+4)(x+6)}$:

A
$\frac{x^3+14x^2+53x+62}{(x+2)(x+4)(x+6)}$

B
$-\frac{x^3+10x^2+35x+34}{(x+2)(x+4)(x+6)}$

C
$\frac{2x^2+9x+14}{(x+2)(x+4)(x+6)}$

D
$-\frac{2x^2+9x+14}{(x+2)(x+4)(x+6)}$

WORKING AREA

FORMULA BANK

Restrictions
denominator $\neq 0$

Multiply / divide
$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract
$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V01

Q062 | MCQ

C01-T04-O15

Simplify
$\frac{3x+2}{(x+1)(x+4)} + \frac{x+5}{(x+4)(x+7)}$:

A
$\frac{x^3+16x^2+68x+47}{(x+1)(x+4)(x+7)}$

B
$-\frac{x^3+8x^2+10x+9}{(x+1)(x+4)(x+7)}$

C
$-\frac{4x^2+29x+19}{(x+1)(x+4)(x+7)}$

D
$\frac{4x^2+29x+19}{(x+1)(x+4)(x+7)}$

WORKING AREA

FORMULA BANK

Restrictions
denominator $\neq 0$

Multiply / divide
$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract
$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V01

Q063 | MCQ

C01-T04-O16

Simplify
$$\frac{x+1}{(x+2)(x+5)}+\frac{4x-3}{(x+5)(x+8)}:$$

A
$$\frac{5x^2+14x+2}{(x+2)(x+5)(x+8)}$$

B
$$\frac{x^3+20x^2+80x+82}{(x+2)(x+5)(x+8)}$$

C
$$-\frac{x^3+10x^2+52x+78}{(x+2)(x+5)(x+8)}$$

D
$$-\frac{5x^2+14x+2}{(x+2)(x+5)(x+8)}$$

WORKING AREA

FORMULA BANK

Restrictions
$$\text{denominator} \neq 0$$

Multiply / divide
$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract
$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V01

Q064 | MCQ

C01-T04-O17

Simplify
$\frac{2x+1}{(x+3)(x+6)} + \frac{x+4}{(x+6)(x+9)}$:

A
$\frac{x^3+21x^2+125x+183}{(x+3)(x+6)(x+9)}$

B
$\frac{3x^2+26x+21}{(x+3)(x+6)(x+9)}$

C
$-\frac{x^3+15x^2+73x+141}{(x+3)(x+6)(x+9)}$

D
$-\frac{3x^2+26x+21}{(x+3)(x+6)(x+9)}$

WORKING AREA

FORMULA BANK

Restrictions
denominator $\neq 0$

Multiply / divide
$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract
$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V01

Q065 | MCQ

C01-T04-O18

Simplify

$$\frac{x-2}{(x+1)(x+5)}+\frac{3x+1}{(x+5)(x+8)}:$$

A

$$\frac{x^3+18x^2+63x+25}{(x+1)(x+5)(x+8)}$$

B

$$-\frac{x^3+10x^2+43x+55}{(x+1)(x+5)(x+8)}$$

C

$$\frac{4x^2+10x-15}{(x+1)(x+5)(x+8)}$$

D

$$-\frac{4x^2+10x-15}{(x+1)(x+5)(x+8)}$$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V02

Q066 | WRITTEN

C01-T04-S-TR2

Simplify $\frac{x}{x-1} - \frac{2}{x^2-1}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V02

Q067 | WRITTEN

C01-T04-S-EX3

Simplify
$\frac{x+2}{x} - \frac{x-2}{x-1}$.

WORKING AREA

FORMULA BANK

Restrictions
denominator $\neq 0$

Multiply / divide
$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract
$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V02

Q068 | WRITTEN

C01-T04-S-EX5

Simplify $\dfrac{2}{x-1}+\dfrac{3}{x^2+5x-6}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V02

Q069 | MCQ

C01-T04-O23

Simplify

$$\frac{x+2}{(x+1)(x+3)} - \frac{2}{x+1} :$$

A $\dfrac{x^2+3x-1}{(x+1)(x+3)}$

B $-\dfrac{x^2+5x+7}{(x+1)(x+3)}$

C $-\dfrac{x+4}{(x+1)(x+3)}$

D $\dfrac{x+4}{(x+1)(x+3)}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V03

Q070 | WRITTEN

C01-T04-S-EX4

Simplify $\frac{1}{x+2}+\frac{1}{x-2}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V03

Q071 | WRITTEN

C01-T04-S-EX10

Simplify

$$\frac{x+4}{x^2+2x}-\frac{x+5}{x^2+x-2}.$$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V03

Q072 | WRITTEN

C01-T04-S-EX11

Simplify

$$\frac{x+8}{x^2+x-2}-\frac{x+5}{x^2-1}.$$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F03 | V01

Q073 | WRITTEN

C01-T04-S-EX6

Simplify
$\frac{x-3}{x^2+x}+\frac{x}{x^2-1}$.

WORKING AREA

FORMULA BANK

Restrictions
denominator $\neq 0$

Multiply / divide
$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract
$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F03 | V02

Q074 | WRITTEN

C01-T04-S-EX7

Simplify $\dfrac{4x}{x^2-1}-\dfrac{x-1}{x^2+x}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F03 | V02

Q075 | WRITTEN

C01-T04-S-EX8

Simplify

$$\frac{1}{x^2+5x+6}+\frac{1}{x^2+7x+12}.$$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F03 | V02

Q076 | WRITTEN

C01-T04-S-EX9

Simplify
$$\frac{x-1}{x^2+3x+2}-\frac{x-3}{x^2+4x+3}.$$

WORKING AREA

FORMULA BANK

Restrictions
$$\text{denominator} \neq 0$$

Multiply / divide
$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract
$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F04 | V01

Q077 | MCQ

C01-T04-O53

A learner combines $\frac{2x-1}{(x-1)(x+2)} - \frac{x+4}{x+2}$. Correct the numerator line, then simplify the expression:

A $\frac{1}{(x-1)(x+2)}$

B $-\frac{x^2+x-3}{(x-1)(x+2)}$

C $-\frac{2x^2+2x-5}{(x-1)(x+2)}$

D $\frac{x^2+x-3}{(x-1)(x+2)}$

WORKING AREA

FORMULA BANK

Restrictions

denominator $\neq 0$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F05 | V01

Q078 | WRITTEN

C01-T04-S-CH1

Simplify

$$\frac{x^3+8x}{x^2-x-2}-\frac{8}{x-2}.$$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

C01-T05-COMBINED | V01

Q079 | CHALLENGE WRITTEN C01-T05-C01

Simplify the single-inner fraction together with the reciprocal-pair quotient; state the full domain.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V01

Q080 | WRITTEN

C01-T05-S-WU1

Simplify

$$\frac{1}{1-\frac{1}{x-1}}.$$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q081 | WRITTEN

C01-T05-S-TR1

Simplify $\dfrac{1}{1-\dfrac{x}{x+1}}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q082 | MCQ

C01-T05-O01

Simplify

$$\frac{1}{1-\dfrac{x+2}{x+1}} :$$

A $-x$

B $-x-2$

C $x+1$

D $-x-1$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q083 | MCQ C01-T05-O02

Simplify $\dfrac{1}{1-\dfrac{x+3}{x+2}}$:

A $-x-2$

B $-x-1$

C $-x-3$

D $x+2$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q084 | MCQ

C01-T05-O03

Simplify $\dfrac{1}{1-\dfrac{2x+1}{x+1}}$:

A $-\dfrac{1}{x}$

B $-\dfrac{x+1}{x}$

C $-\dfrac{2x+1}{x}$

D $\dfrac{x+1}{x}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q085 | MCQ C01-T05-O04

Simplify $\dfrac{1}{1-\dfrac{2x+3}{x+1}}$:

A $\dfrac{1}{x+2}$

B $-\dfrac{2x+3}{x+2}$

C $-\dfrac{x+1}{x+2}$

D $\dfrac{x+1}{x+2}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q086 | MCQ C01-T05-O05

Simplify $\dfrac{1}{1-\dfrac{3x+1}{x+2}}$:

A $\dfrac{x-3}{2x-1}$

B $-\dfrac{3x+1}{2x-1}$

C $\dfrac{x+2}{2x-1}$

D $-\dfrac{x+2}{2x-1}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q087 | MCQ

C01-T05-O06

Simplify

$$\frac{1}{1-\frac{x+4}{x+3}} :$$

A $-x-3$

B $-x-2$

C $-x-4$

D $x+3$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F01 | V02

Q088 | MCQ

C01-T05-O07

Simplify $\dfrac{1}{1-\dfrac{2x+5}{x+1}}$:

A $\dfrac{3}{x+4}$

B $-\dfrac{x+1}{x+4}$

C $-\dfrac{2x+5}{x+4}$

D $\dfrac{x+1}{x+4}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V01

Q089 | WRITTEN

C01-T05-S-WU2

Simplify

$$\frac{1}{1-x}+\frac{1}{1+x}\Big/\left(\frac{1}{1-x}-\frac{1}{1+x}\right).$$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V01

Q090 | MCQ

C01-T05-O15

Simplify
$\frac{1}{x+1}+\frac{1}{x+4}\Big/\left(\frac{1}{x+1}-\frac{1}{x+4}\right)$:

A $\frac{2x+5}{3}$

B $\frac{2(x+4)}{3}$

C $\frac{2(x+1)}{3}$

D $-\frac{2x+5}{3}$

WORKING AREA

FORMULA BANK

Restrictions
$$\text{denominator} \neq 0$$

Multiply / divide
$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract
$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V01

Q091 | MCQ C01-T05-O19

Simplify
$\frac{1}{x+1}+\frac{1}{x+5}\Big/\left(\frac{1}{x+1}-\frac{1}{x+5}\right)$:

A $\frac{x+3}{2}$

B $\frac{x+5}{2}$

C $\frac{x+1}{2}$

D $-\frac{x+3}{2}$

WORKING AREA

FORMULA BANK

Restrictions
denominator $\neq 0$

Multiply / divide
$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract
$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V02

Q092 | WRITTEN

C01-T05-S-TR2

Simplify

$$\frac{1}{x+2}+\frac{1}{x-2}\Big/\left(\frac{1}{x+2}-\frac{1}{x-2}\right).$$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V02

Q093 | MCQ C01-T05-O13

Simplify $\frac{1}{x+1}+\frac{1}{x+3}\Big/\left(\frac{1}{x+1}+\frac{1}{x+3}\right)$:

A 2

B 0

C 1

D -1

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V02

Q094 | MCQ C01-T05-O14

Simplify $\frac{1}{x+2}+\frac{1}{x+5}\Big/\left(\frac{1}{x+2}+\frac{1}{x+5}\right)$:

A 2

B 0

C -1

D 1

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V02

Q095 | MCQ

C01-T05-O16

Simplify
$\frac{1}{x+3}+\frac{1}{x+6}\Big/\left(\frac{1}{x+3}+\frac{1}{x+6}\right)$:

A 2

B 1

C 0

D -1

WORKING AREA

FORMULA BANK

Restrictions
$$\text{denominator} \neq 0$$

Multiply / divide
$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract
$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F02 | V03

Q096 | WRITTEN

C01-T05-S-EX3

Simplify

$$\frac{1}{x+y}+\frac{1}{x-y}\Big/\left(\frac{1}{x+y}-\frac{1}{x-y}\right).$$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F03 | V01

Q097 | WRITTEN

C01-T05-S-TR3

Simplify $\dfrac{1}{1-\dfrac{1}{1-\dfrac{1}{x}}}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F03 | V02

Q098 | WRITTEN

C01-T05-S-EX5

Simplify $\dfrac{1}{1-\dfrac{1}{1+\dfrac{1}{x}}}$.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

F04 | V01

Q099 | WRITTEN

C01-T05-S-EX2

Simplify
$\left(1+\frac{x-y}{x+y}\right)\Big/\left(1-\frac{x-y}{x+y}\right)$.

WORKING AREA

FORMULA BANK

Restrictions
$$\text{denominator} \neq 0$$

Multiply / divide
$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract
$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F05 | V01

Q100 | WRITTEN

C01-T05-S-EX1

Simplify
$\left(x-\frac{2}{x-1}\right)\Big/\left(\frac{x}{x-1}-2\right)$.

WORKING AREA

FORMULA BANK

Restrictions
denominator $\neq 0$

Multiply / divide
$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract
$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F05 | V02

Q101 | WRITTEN

C01-T05-S-EX4

Simplify
$\left(\frac{x+1}{x-1}-\frac{x-1}{x+1}\right)\Big/\left(\frac{x+1}{x-1}+\frac{x-1}{x+1}\right)$.

WORKING AREA

FORMULA BANK

Restrictions
denominator $\neq 0$

Multiply / divide
$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract
$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

F06 | V01

Q102 | WRITTEN

C01-T05-S-CH1

Simplify

$$\frac{1}{1+\dfrac{1}{1+\dfrac{1}{1+x}}}.$$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

C01-T03-QUIZ | C01-T03-QUIZ-MCQ

Quiz M1 | QUIZ MCQ C01-T03-Q01

Simplify $\frac{x^2-4}{3x^2+7x+2}$:

A $\frac{x-2}{3x+1}$

B $\frac{x+2}{3x+1}$

C $\frac{x-2}{3x+2}$

D $\frac{x^2-4}{3x+1}$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

C01-T04-QUIZ | C01-T04-QUIZ-MCQ

Quiz M2 | QUIZ MCQ C01-T04-Q01

Simplify $\frac{x+1}{x-2}+\frac{2}{x-2}$:

A $\frac{x+3}{x-2}$

B $\frac{x-1}{x-2}$

C $\frac{x+1}{2x-4}$

D $\frac{x+3}{x+2}$

WORKING AREA

FORMULA BANK

Restrictions

denominator $\neq 0$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

C01-T04-QUIZ | C01-T04-QUIZ-MCQ

Quiz M3 | QUIZ MCQ

C01-T04-Q10

In $\frac{3}{x^2+x} - \frac{3-x}{x^2+x}$, the numerator after the minus sign is... Which of the following is correct?:

A $3-(3-x)$

B $3-3-x$

C $3+3-x$

D $3-x$

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

C01-T05-QUIZ | C01-T05-QUIZ-MCQ

Quiz M4 | QUIZ MCQ C01-T05-Q10

Which statement is safe when simplifying a compound fraction?:

A Multiply top and bottom by the same inner denominator

B Add all denominators

C Cancel terms across +

D Drop all restrictions

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

C01-T03-QUIZ | C01-T03-QUIZ-WRITTEN

Quiz W1 | QUIZ WRITTEN

C01-T03-Q11

Simplify $\frac{x^2-9}{x^2-2x-3} \times \frac{x^2-4}{x^2+x-6}$ and state the original restrictions.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 3 | Rational Expressions

C01-T04-QUIZ | C01-T04-QUIZ-WRITTEN

Quiz W2 | QUIZ WRITTEN C01-T04-Q11

Simplify $\frac{x^2-4}{x+1}+\frac{3}{x+1}$ and state the original restriction.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

C01-T04-QUIZ | C01-T04-QUIZ-WRITTEN

Quiz W3 | QUIZ WRITTEN C01-T04-Q15

Simplify $\dfrac{x^2-y^2}{x^2-2xy+y^2}-\dfrac{x+y}{x-y}$ in x and y.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B}\times\frac{C}{D}=\frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B}\pm\frac{C}{D}=\frac{AD\pm BC}{BD}$$

Concept 3 | Rational Expressions

C01-T05-QUIZ | C01-T05-QUIZ-WRITTEN

Quiz W4 | QUIZ WRITTEN C01-T05-Q15

Explain why $(x^2-16)/(x-4)=x+4$ is not an identity for every real x.

WORKING AREA

FORMULA BANK

Restrictions

$$\text{denominator} \neq 0$$

Multiply / divide

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Add / subtract

$$\frac{A}{B} \pm \frac{C}{D} = \frac{AD \pm BC}{BD}$$

Concept 4 | Identities and Proofs — **OFFICIAL LESSONS 1-9, 1-10, 1-11, 1-12**

Identities and Proofs

Equation-first recall | use the same rail beside every question in this Concept

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Start with the family cue, write the first move, then use the working grid.

Concept 4 | Identities and Proofs

C01-T06-COMBINED | V01

Q001 | CHALLENGE WRITTEN C01-T06-C01

$2x^2 + 3x + 1 = (x + 1)(ax + b) + c$. Find a,b,c.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q002 | WRITTEN

C01-T06-S-WU1

$x^2 + 6 = a(x+1)^2 + b(x+1) + c$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q003 | WRITTEN

C01-T06-S-TR1

$x^2 - x - 3 = a(x-1)^2 + b(x-1) + c$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q004 | MCQ C01-T06-O01

For the identity $x^2 + 6x + 5 = a(x+2)^2 + b(x+2) + c$, the ordered tuple (a, b, c) is:

A $(2,\ 2,\ -3)$

B $(0,\ 2,\ -3)$

C $(1,\ 2,\ -3)$

D $(1,\ 3,\ -3)$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q005 | MCQ C01-T06-O02

For the identity $2x^2 + 9x + 8 = a(x+3)^2 + b(x+3) + c$, the ordered tuple (a, b, c) is:

A $(3, -3, -1)$

B $(1, -3, -1)$

C $(2, -3, -1)$

D $(2, -2, -1)$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q006 | MCQ C01-T06-O03

For the identity $3x^2 + 28x + 65 = a(x+4)^2 + b(x+4) + c$, the ordered tuple (a, b, c) is:

A $(4,\ 4,\ 1)$

B $(2,\ 4,\ 1)$

C $(3,\ 5,\ 1)$

D $(3,\ 4,\ 1)$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q007 | MCQ C01-T06-O04

For the identity $x^2 + 5x + 3 = a(x + 5)^2 + b(x + 5) + c$, the ordered tuple (a, b, c) is:

A $(1, -5, 3)$

B $(2, -5, 3)$

C $(0, -5, 3)$

D $(1, -4, 3)$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q008 | WRITTEN

C01-T06-S-EX1

$a(x+1)-b(x+5)=8x$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q009 | MCQ C01-T06-O07

For the identity $a(x+1)-b(x+3)=x-1$, the ordered tuple (a,b) is:

A $(2,\ 1)$

B $(3,\ 1)$

C $(1,\ 1)$

D $(2,\ 2)$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q010 | MCQ C01-T06-O08

For the identity $a(x+2)-b(x+4)=5x+14$, the ordered tuple (a,b) is:

A $(4,\ -2)$

B $(3,\ -2)$

C $(2,\ -2)$

D $(3,\ -1)$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q011 | MCQ

C01-T06-O09

For the identity $a(x+3)-b(x+5)=x-3$, the ordered tuple (a,b) is:

A $(5,\ 3)$

B $(3,\ 3)$

C $(4,\ 4)$

D $(4,\ 3)$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q012 | MCQ C01-T06-O10

For the identity $a(x+4)-b(x+6)=9x+44$, the ordered tuple (a,b) is:

A $(6,\ -4)$

B $(4,\ -4)$

C $(5,\ -3)$

D $(5,\ -4)$

WORKING AREA

FORMULA BANK

Proof route

LHS $\longrightarrow$ RHS

Useful identities

$$(a\pm b)^2=a^2\pm 2ab+b^2$$

Rational identity

$$\frac{A}{B}=\frac{AC}{BC}\quad (C\neq 0)$$

Concept 4 | Identities and Proofs

F01 | V03

Q013 | WRITTEN

C01-T06-S-EX2

$(x + a)(b + 3) = 4x + 12$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V03

Q014 | MCQ

C01-T06-O13

For the identity $(x + a)(b + 4) = 3x + 6$, the ordered tuple (a, b) is:

A $(3, -1)$

B $(2, -1)$

C $(1, -1)$

D $(2, 0)$

WORKING AREA

FORMULA BANK

Proof route

LHS $\longrightarrow$ RHS

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V03

Q015 | MCQ C01-T06-O14

For the identity $(x + a)(b + 5) = 5x + 15$, the ordered tuple (a, b) is:

A $(4,\ 0)$

B $(2,\ 0)$

C $(3,\ 0)$

D $(3,\ 1)$

WORKING AREA

FORMULA BANK

Proof route

LHS ⟶ RHS

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V03

Q016 | MCQ C01-T06-O15

For the identity $(x + a)(b + 6) = 7x + 28$, the ordered tuple (a, b) is:

A $(5,\ 1)$

B $(3,\ 1)$

C $(4,\ 1)$

D $(4,\ 2)$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V04

Q017 | WRITTEN

C01-T06-S-EX3

$2x^2 + 5x + 4 = (x + 1)(ax + b) + c$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V04

Q018 | WRITTEN

C01-T06-S-EX4

$(ax + b)(x + 1) = 4x^2 + cx + 1$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V04

Q019 | WRITTEN

C01-T06-S-EX5

$2x^2 - 7x + 8 = (x - 3)(ax + b) + c$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V04

Q020 | MCQ

C01-T06-O18

For the identity $(ax-1)(x+1)+c=x^2-3$, the ordered tuple (a,c) is:

A $(2,\ -2)$

B $(1,\ -2)$

C $(0,\ -2)$

D $(1,\ -1)$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V04

Q021 | MCQ C01-T06-O19

For the identity $(ax + 2)(x + 2) + c = 2x^2 + 6x + 3$, the ordered tuple (a, c) is:

A $(3, -1)$

B $(1, -1)$

C $(2, -1)$

D $(2, 0)$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V04

Q022 | MCQ

C01-T06-O20

For the identity $(ax + 3)(x + 3) + c = 3x^2 + 12x + 9$, the ordered tuple (a, c) is:

A $(4,\ 0)$

B $(3,\ 0)$

C $(2,\ 0)$

D $(3,\ 1)$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F02 | V01

Q023 | WRITTEN

C01-T06-S-WU2

$$\frac{3x+1}{(x+2)(x-3)} = \frac{a}{x+2} + \frac{b}{x-3}$$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F02 | V01

Q024 | WRITTEN

C01-T06-S-EX7

$$\frac{x+8}{(x-2)(x+3)} = \frac{a}{x-2} + \frac{b}{x+3}$$

WORKING AREA

FORMULA BANK

Proof route

LHS $\longrightarrow$ RHS

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F02 | V02

Q025 | WRITTEN

C01-T06-S-TR2

$$\frac{1}{(2x-1)(x+1)} = \frac{a}{2x-1} + \frac{b}{x+1}$$

WORKING AREA

FORMULA BANK

Proof route

LHS ⟶ RHS

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F02 | V03

Q026 | WRITTEN

C01-T06-S-EX6

$$\frac{a}{x-1}+\frac{b}{x-5}=\frac{5x-1}{(x-1)(x-5)}$$

WORKING AREA

FORMULA BANK

Proof route

LHS $\longrightarrow$ RHS

Useful identities

$$(a\pm b)^2=a^2\pm 2ab+b^2$$

Rational identity

$$\frac{A}{B}=\frac{AC}{BC}\quad (C\neq 0)$$

Concept 4 | Identities and Proofs

F03 | V01

Q027 | WRITTEN

C01-T06-S-EX8

$$\frac{3x-8}{3x^2+5x-2}=\frac{a}{x+2}+\frac{b}{3x-1}$$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B}=\frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F03 | V02

Q028 | WRITTEN

C01-T06-S-CH1

$$f(t) = \frac{22t + 15}{8t^2 + 10t + 3} = \frac{a}{2t + 1} + \frac{b}{4t + 3},\ t > 0$$

WORKING AREA

FORMULA BANK

Proof route

LHS ⟶ RHS

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q029 | WRITTEN C01-T07-S-WU1

Prove that $(x+y)^2-(x-y)^2=4xy$.

WORKING AREA

FORMULA BANK

Proof route

LHS ⟶ RHS

Useful identities

$(a\pm b)^2=a^2\pm 2ab+b^2$

Rational identity

$$\frac{A}{B}=\frac{AC}{BC}\quad (C\neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q030 | WRITTEN

C01-T07-S-EX6

Prove that $(2a+b)^2-(a+2b)^2=3\left(a^2-b^2\right)$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q031 | MCQ

C01-T07-P-F01-V01-01

For the identity $-(x-2y+1)^2+(x+2y+1)^2 = 2y\,(4x+4)$, the value of the simplified left-hand side is:

A $8xy+8y$

B $8xy+8y+1$

C $8xy+8y-1$

D $-8xy-8y$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q032 | MCQ

C01-T07-P-F01-V01-02

For the identity $-(x-3y+2)^2+(x+3y+2)^2 = 3y\,(4x+8)$, the value of the simplified left-hand side is:

A $12xy+24y+1$

B $12xy+24y-1$

C $-12xy-24y$

D $12xy+24y$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q033 | MCQ

C01-T07-P-F01-V01-03

For the identity $-(x-y+3)^2+(x+y+3)^2=y(4x+12)$, the value of the simplified left-hand side is:

A $4xy+12y+1$

B $4xy+12y-1$

C $-4xy-12y$

D $4xy+12y$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a\pm b)^2=a^2\pm 2ab+b^2$$

Rational identity

$$\frac{A}{B}=\frac{AC}{BC}\quad (C\neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q034 | MCQ

C01-T07-P-F01-V01-04

For the identity $-(x-2y+4)^2+(x+2y+4)^2=2y(4x+16)$, the value of the simplified left-hand side is:

A $8xy+32y$

B $8xy+32y+1$

C $8xy+32y-1$

D $-8xy-32y$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a\pm b)^2=a^2\pm 2ab+b^2$$

Rational identity

$$\frac{A}{B}=\frac{AC}{BC}\quad (C\neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q035 | WRITTEN

C01-T07-S-TR1

Prove that $(x+y)^2+(x-y)^2=2x^2+2y^2$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q036 | MCQ

C01-T07-P-F01-V02-01

For the identity $(x-2y+1)^2+(x+2y+1)^2=8y^2+2(x+1)^2$, the value of the simplified left-hand side is:

A $2x^2+4x+8y^2+3$

B $2x^2+4x+8y^2+1$

C $2x^2+4x+8y^2+2$

D $-2x^2-4x-8y^2-2$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a\pm b)^2=a^2\pm 2ab+b^2$$

Rational identity

$$\frac{A}{B}=\frac{AC}{BC}\quad (C\neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q037 | MCQ

C01-T07-P-F01-V02-02

For the identity $(x-3y+2)^2+(x+3y+2)^2=18y^2+2(x+2)^2$, the value of the simplified left-hand side is:

A $2x^2+8x+18y^2+9$

B $2x^2+8x+18y^2+7$

C $2x^2+8x+18y^2+8$

D $-2x^2-8x-18y^2-8$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a\pm b)^2=a^2\pm 2ab+b^2$$

Rational identity

$$\frac{A}{B}=\frac{AC}{BC}\quad (C\neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q038 | MCQ

C01-T07-P-F01-V02-03

For the identity $(x-y+3)^2+(x+y+3)^2=2y^2+2(x+3)^2$, the value of the simplified left-hand side is:

A $2x^2+12x+2y^2+19$

B $2x^2+12x+2y^2+17$

C $2x^2+12x+2y^2+18$

D $-2x^2-12x-2y^2-18$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q039 | MCQ

C01-T07-P-F01-V02-04

For the identity $(x-2y+4)^2+(x+2y+4)^2=8y^2+2(x+4)^2$, the value of the simplified left-hand side is:

A $2x^2+16x+8y^2+33$

B $2x^2+16x+8y^2+31$

C $-2x^2-16x-8y^2-32$

D $2x^2+16x+8y^2+32$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a\pm b)^2=a^2\pm 2ab+b^2$$

Rational identity

$$\frac{A}{B}=\frac{AC}{BC}\quad (C\neq 0)$$

Concept 4 | Identities and Proofs

F01 | V03

Q040 | WRITTEN

C01-T07-S-EX4

Prove that $(a+2b)^2 - 4ab = (a-2b)^2 + 4ab$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V03

Q041 | MCQ

C01-T07-P-F01-V03-01

For the identity $-(x-2y+3)^2+(x+2y-1)^2=(8x+8)(y-1)$, the value of the simplified left-hand side is:

A $8xy-8x+8y-7$

B $8xy-8x+8y-9$

C $-8xy+8x-8y+8$

D $8xy-8x+8y-8$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a\pm b)^2=a^2\pm 2ab+b^2$$

Rational identity

$$\frac{A}{B}=\frac{AC}{BC}\quad (C\neq 0)$$

Concept 4 | Identities and Proofs

F01 | V03

Q042 | MCQ

C01-T07-P-F01-V03-02

For the identity $-(2x-3y+5)^2+(2x+3y-1)^2=(24x+24)(y-1)$, the value of the simplified left-hand side is:

A $24xy-24x+24y-23$

B $24xy-24x+24y-25$

C $24xy-24x+24y-24$

D $-24xy+24x-24y+24$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a\pm b)^2=a^2\pm 2ab+b^2$$

Rational identity

$$\frac{A}{B}=\frac{AC}{BC}\quad (C\neq 0)$$

Concept 4 | Identities and Proofs

F02 | V01

Q043 | WRITTEN

C01-T07-S-EX1

Prove that $(x^2 + x + 1)(x^2 - x + 1) = x^4 + x^2 + 1$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F02 | V02

Q044 | WRITTEN

C01-T07-S-CH1

Prove that $(a^2 - ab + b^2)(a^2 + ab + b^2) = (a^2 + b^2)^2 - (ab)^2$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F03 | V01

Q045 | WRITTEN

C01-T07-S-WU2

Prove that $(a^2+b^2)(c^2+d^2)=(ac-bd)^2+(ad+bc)^2$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F03 | V01

Q046 | WRITTEN

C01-T07-S-EX5

Prove that $(x^2+1)(y^2+1) = (xy+1)^2 + (x-y)^2$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F03 | V02

Q047 | WRITTEN

C01-T07-S-TR2

Prove that $(a^2 - b^2)(c^2 - d^2) = (ac - bd)^2 - (ad - bc)^2$.

WORKING AREA

FORMULA BANK

Proof route

LHS $\longrightarrow$ RHS

Useful identities

$(a \pm b)^2 = a^2 \pm 2ab + b^2$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F04 | V01

Q048 | WRITTEN

C01-T07-S-EX2

Prove that $(a+b)^3 - 3ab(a+b) = a^3 + b^3$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F04 | V02

Q049 | WRITTEN

C01-T07-S-EX3

Prove that $(a+b+c)\left(a^2+b^2+c^2-ab-bc-ca\right)=a^3+b^3+c^3-3abc$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F99 | V01

Q050 | CHALLENGE MCQ C01-T07-C-01

For the integrated identity $(x^2+1)\left(-(x-2y+1)^2+(x+2y+1)^2\right)=2y\,(4x+4)\,(x^2+1)$, the value of the simplified left-hand side is:

A $8x^3y+8x^2y+8xy+8y+1$

B $8x^3y+8x^2y+8xy+8y$

C $8x^3y+8x^2y+8xy+8y-1$

D $-8x^3y-8x^2y-8xy-8y$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a\pm b)^2=a^2\pm 2ab+b^2$$

Rational identity

$$\frac{A}{B}=\frac{AC}{BC}\quad (C\neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q051 | WRITTEN

C01-T08-S-TR1

Under the condition $x + y = 1$, prove that $x^2 + y^2 + 1 = 2(x + y - xy)$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q052 | WRITTEN

C01-T08-S-EX1

Under the condition $x + y = 1$, prove that $x^2 + y^2 = 1 - 2xy$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q053 | MCQ

C01-T08-P-F01-V01-01

Under the condition $x + y = 2$, the expression $x^2 + y^2$ is equal to:

A $-2xy + 5$

B $-2xy + 3$

C $-2(xy - 2)$

D $2(xy - 2)$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q054 | MCQ

C01-T08-P-F01-V01-02

Under the condition $x + y = 3$, the expression $x^2 + y^2$ is equal to:

A $-2(xy - 5)$

B $-2(xy - 4)$

C $2xy - 9$

D $-2xy + 9$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q055 | MCQ

C01-T08-P-F01-V01-03

Under the condition $x + y = -1$, the expression $x^2 + y^2$ is equal to:

A $-2(xy - 1)$

B $-2xy$

C $-2xy + 1$

D $2xy - 1$

WORKING AREA

FORMULA BANK

Proof route

LHS $\longrightarrow$ RHS

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q056 | MCQ

C01-T08-P-F01-V01-04

Under the condition $x + y = 4$, the expression $x^2 + y^2$ is equal to:

A $-2(xy - 8)$

B $-2xy + 17$

C $-2xy + 15$

D $2(xy - 8)$

WORKING AREA

FORMULA BANK

Proof route

LHS ⟶ RHS

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q057 | WRITTEN

C01-T08-S-EX2

Under the condition $x - y = 1$, prove that $x^2 + y^2 = 2xy + 1$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q058 | MCQ

C01-T08-P-F01-V02-01

Under the condition $x - y = 1$, the expression $x^2 + y^2$ is equal to:

A $2(xy + 1)$

B $2xy + 1$

C $2xy$

D $-2xy - 1$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q059 | MCQ

C01-T08-P-F01-V02-02

Under the condition $x - y = 2$, the expression $x^2 + y^2$ is equal to:

A $2xy + 5$

B $2(xy + 2)$

C $2xy + 3$

D $-2(xy + 2)$

WORKING AREA

FORMULA BANK

Proof route

LHS ⟶ RHS

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q060 | MCQ

C01-T08-P-F01-V02-03

Under the condition $x - y = -2$, the expression $x^2 + y^2$ is equal to:

A $2xy + 5$

B $2xy + 3$

C $2(xy + 2)$

D $-2(xy + 2)$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q061 | MCQ

C01-T08-P-F01-V02-04

Under the condition $x - y = 3$, the expression $x^2 + y^2$ is equal to:

A $2(xy + 5)$

B $2(xy + 4)$

C $-2xy - 9$

D $2xy + 9$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V03

Q062 | WRITTEN

C01-T08-S-EX3

Under the condition $x + y = 1$, prove that $x^2 - x = y^2 - y$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F02 | V01

Q063 | WRITTEN C01-T08-S-WU1

Under the condition $a + b + c = 0$, prove that $a^2 + b^2 + c^2 = -2(ab + bc + ca)$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F02 | V02

Q064 | WRITTEN

C01-T08-S-TR2

Under the condition $a + b + c = 0$, prove that $a^3 + b^3 + c^3 = 3abc$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F03 | V01

Q065 | WRITTEN

C01-T08-S-EX4

Under the condition $a + b + c = 0$, prove that $a^2 + ca = b^2 + bc$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F03 | V02

Q066 | WRITTEN

C01-T08-S-EX5

Under the condition $a+b+c=0$, prove that $(a+b)(b+c)(c+a)+abc=0$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F04 | V01

Q067 | WRITTEN

C01-T08-S-CH1

Under the condition $a+b+c=0$, $\quad abc \neq 0$, prove that $\dfrac{a}{b+c}+\dfrac{b}{c+a}+\dfrac{c}{a+b}=-3$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F99 | V01

Q068 | CHALLENGE MCQ C01-T08-C-01

Under the condition $x + y = 3$, the expression $x^2 + y^2 + 1$ is equal to:

A $-2xy + 11$

B $-2xy + 9$

C $-2(xy - 5)$

D $2(xy - 5)$

WORKING AREA

FORMULA BANK

Proof route

LHS $\longrightarrow$ RHS

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q069 | WRITTEN

C01-T09-S-WU1

Under the condition $a/b = c/d$, prove or find the required expression: $\frac{a}{b} = \frac{c}{d}$, $\frac{ab}{a^2+b^2} = \frac{cd}{c^2+d^2}$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q070 | MCQ

C01-T09-P-001

Under the condition $a/b = c/d$, the required expression is equal to:

A $\dfrac{c^2 + cd + d^2}{c^2 + d^2}$

B $-\dfrac{c^2 - cd + d^2}{c^2 + d^2}$

C $\dfrac{cd}{c^2 + d^2}$

D $-\dfrac{cd}{c^2 + d^2}$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q071 | MCQ

C01-T09-P-002

Under the condition $a/b = c/d$, the required expression is equal to:

A $\dfrac{c^2 + cd + d^2}{c^2 + d^2}$

B $-\dfrac{c^2 - cd + d^2}{c^2 + d^2}$

C $-\dfrac{cd}{c^2 + d^2}$

D $\dfrac{cd}{c^2 + d^2}$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q072 | MCQ

C01-T09-P-003

Under the condition $a/b = c/d$, the required expression is equal to:

A $\dfrac{c^2 + cd + d^2}{c^2 + d^2}$

B $-\dfrac{c^2 - cd + d^2}{c^2 + d^2}$

C $\dfrac{cd}{c^2 + d^2}$

D $-\dfrac{cd}{c^2 + d^2}$

WORKING AREA

FORMULA BANK

Proof route

LHS ⟶ RHS

Useful identities

$(a \pm b)^2 = a^2 \pm 2ab + b^2$

Rational identity

$\dfrac{A}{B} = \dfrac{AC}{BC} \quad (C \neq 0)$

Concept 4 | Identities and Proofs

F01 | V01

Q073 | MCQ

C01-T09-P-004

Under the condition $a/b = c/d$, the required expression is equal to:

A $\dfrac{c^2 + cd + d^2}{c^2 + d^2}$

B $-\dfrac{c^2 - cd + d^2}{c^2 + d^2}$

C $-\dfrac{cd}{c^2 + d^2}$

D $\dfrac{cd}{c^2 + d^2}$

WORKING AREA

FORMULA BANK

Proof route

LHS ⟶ RHS

Useful identities

$(a \pm b)^2 = a^2 \pm 2ab + b^2$

Rational identity

$\dfrac{A}{B} = \dfrac{AC}{BC} \quad (C \neq 0)$

Concept 4 | Identities and Proofs

F01 | V01

Q074 | CHALLENGE MCQ C01-T09-C-01

Under the condition $a/b = c/d$, the required expression is equal to:

A $\dfrac{c^2 + cd + d^2}{c^2 + d^2}$

B $-\dfrac{c^2 - cd + d^2}{c^2 + d^2}$

C $-\dfrac{cd}{c^2 + d^2}$

D $\dfrac{cd}{c^2 + d^2}$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V01

Q075 | CHALLENGE MCQ C01-T09-C-02

Under the condition $a/b = c/d$, the required expression is equal to:

A $\dfrac{c^2 + cd + d^2}{c^2 + d^2}$

B $-\dfrac{c^2 - cd + d^2}{c^2 + d^2}$

C $\dfrac{cd}{c^2 + d^2}$

D $-\dfrac{cd}{c^2 + d^2}$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q076 | WRITTEN

C01-T09-S-TR1

Under the condition $a/b = c/d$, prove or find the required expression: $\frac{a}{b} = \frac{c}{d}$, $\frac{ab+cd}{ab-cd} = \frac{a^2+c^2}{a^2-c^2}$.

WORKING AREA

FORMULA BANK

Proof route

LHS ⟶ RHS

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q077 | MCQ

C01-T09-P-008

Under the condition $a/b = c/d$, the required expression is equal to:

A $\dfrac{a^2 + c^2}{(a - c)(a + c)}$

B $\dfrac{2a^2}{(a - c)(a + c)}$

C $\dfrac{2c^2}{(a - c)(a + c)}$

D $-\dfrac{a^2 + c^2}{(a - c)(a + c)}$

WORKING AREA

FORMULA BANK

Proof route

LHS ⟶ RHS

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q078 | MCQ

C01-T09-P-009

Under the condition $a/b = c/d$, the required expression is equal to:

A $\dfrac{2a^2}{(a-c)(a+c)}$

B $\dfrac{2c^2}{(a-c)(a+c)}$

C $-\dfrac{a^2+c^2}{(a-c)(a+c)}$

D $\dfrac{a^2+c^2}{(a-c)(a+c)}$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q079 | MCQ

C01-T09-P-010

Under the condition $a/b = c/d$, the required expression is equal to:

A $\dfrac{2a^2}{(a-c)(a+c)}$

B $\dfrac{2c^2}{(a-c)(a+c)}$

C $-\dfrac{a^2+c^2}{(a-c)(a+c)}$

D $\dfrac{a^2+c^2}{(a-c)(a+c)}$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V02

Q080 | MCQ

C01-T09-P-011

Under the condition $a/b = c/d$, the required expression is equal to:

A $\dfrac{a^2 + c^2}{(a - c)(a + c)}$

B $\dfrac{2a^2}{(a - c)(a + c)}$

C $\dfrac{2c^2}{(a - c)(a + c)}$

D $-\dfrac{a^2 + c^2}{(a - c)(a + c)}$

WORKING AREA

FORMULA BANK

Proof route

LHS ⟶ RHS

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V03

Q081 | WRITTEN

C01-T09-S-EX1

Under the condition $a/b = c/d$, prove or find the required expression: $\frac{a}{b} = \frac{c}{d}$, $\frac{a+b}{a-b} = \frac{c+d}{c-d}$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V03

Q082 | MCQ

C01-T09-P-015

Under the condition $a/b = c/d$, the required expression is equal to:

A $\dfrac{2c}{c-d}$

B $\dfrac{c+d}{c-d}$

C $\dfrac{2d}{c-d}$

D $-\dfrac{c+d}{c-d}$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V03

Q083 | MCQ

C01-T09-P-016

Under the condition $a/b = c/d$, the required expression is equal to:

A $\dfrac{2c}{c-d}$

B $\dfrac{c+d}{c-d}$

C $\dfrac{2d}{c-d}$

D $-\dfrac{c+d}{c-d}$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V03

Q084 | MCQ

C01-T09-P-017

Under the condition $a/b = c/d$, the required expression is equal to:

A $\dfrac{c+d}{c-d}$

B $\dfrac{2c}{c-d}$

C $\dfrac{2d}{c-d}$

D $-\dfrac{c+d}{c-d}$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V03

Q085 | MCQ

C01-T09-P-018

Under the condition $a/b = c/d$, the required expression is equal to:

A $\dfrac{c+d}{c-d}$

B $\dfrac{2c}{c-d}$

C $\dfrac{2d}{c-d}$

D $-\dfrac{c+d}{c-d}$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V04

Q086 | WRITTEN

C01-T09-S-EX2

Under the condition $a/b = c/d$, prove or find the required expression: $\frac{a}{b} = \frac{c}{d}$, $\frac{3a+c}{3b+d} = \frac{2a-c}{2b-d}$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V04

Q087 | MCQ

C01-T09-P-022

Under the condition $a/b = c/d$, the required expression is equal to:

A $\dfrac{2a-c}{2b-d}$

B $\dfrac{2a+2b-c-d}{2b-d}$

C $\dfrac{2a-2b-c+d}{2b-d}$

D $-\dfrac{2a-c}{2b-d}$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V05

Q088 | WRITTEN

C01-T09-S-EX3

Under the condition $x/a = y/b$, prove or find the required expression: $\frac{x}{a} = \frac{y}{b}$, $\frac{a^2+x^2}{a^2-x^2} = \frac{b^2+y^2}{b^2-y^2}$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F01 | V06

Q089 | WRITTEN

C01-T09-S-CH1

Under the condition $a/b = c/d$, prove or find the required expression: $\frac{a}{b} = \frac{c}{d}$, $\frac{a+b}{a-b} = \frac{c+d}{c-d}$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F02 | V01

Q090 | WRITTEN

C01-T09-S-TR2

Under the condition $x/a = y/b = z/c$, prove or find the required expression: $\frac{x}{a} = \frac{y}{b} = \frac{z}{c}$, $\frac{x^2+y^2+z^2}{a^2+b^2+c^2} = \frac{xy+yz+zx}{ab+bc+ca}$.

WORKING AREA

FORMULA BANK

Proof route

LHS ⟶ RHS

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F02 | V02

Q091 | WRITTEN

C01-T09-S-EX4

Under the condition $x/a = y/b = z/c$, prove or find the required expression: $\frac{x}{a} = \frac{y}{b} = \frac{z}{c}$, $\frac{x+y+z}{a+b+c} = \frac{x}{a}$.

WORKING AREA

FORMULA BANK

Proof route

LHS ⟶ RHS

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F02 | V03

Q092 | WRITTEN

C01-T09-S-EX5

Under the condition $x/a = y/b = z/c$, prove or find the required expression: $\frac{x}{a} = \frac{y}{b} = \frac{z}{c}$, $\frac{x+2y+3z}{a+2b+3c} = \frac{x+y+z}{a+b+c}$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F03 | V01

Q093 | WRITTEN

C01-T09-S-WU2

Under the condition $x : y : z = 2 : 3 : 5$, prove or find the required expression: $x : y : z = 2 : 3 : 5$, $\frac{2xy+yz+3zx}{x^2+y^2+z^2}$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F03 | V02

Q094 | WRITTEN

C01-T09-S-TR3

Under the condition $a : b : c = 2 : 3 : 4$, prove or find the required expression: $a : b : c = 2 : 3 : 4$, $\dfrac{ab+bc+ca}{a^2+b^2+c^2}$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F03 | V03

Q095 | WRITTEN

C01-T09-S-EX7

Under the condition $a : b : c = 3 : 5 : 2$, prove or find the required expression: $a : b : c = 3 : 5 : 2$, $\frac{a^2+b^2-c^2}{a^2-b^2+c^2}$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F03 | V04

Q096 | WRITTEN

C01-T09-S-EX8

Under the condition $x : y : z = 2 : -3 : 4$, prove or find the required expression: $x : y : z = 2 : -3 : 4$, $\dfrac{x^2+y^2+z^2}{xy+yz+zx}$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F03 | V05

Q097 | WRITTEN

C01-T09-S-EX9

Under the condition $x/7 = y/3 \neq 0$, prove or find the required expression: $\frac{x}{7} = \frac{y}{3} \neq 0$, $\frac{x^2+5y^2}{x^2+xy+y^2}$.

WORKING AREA

FORMULA BANK

Proof route

LHS ⟶ RHS

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F04 | V01

Q098 | WRITTEN

C01-T09-S-EX6

Under the condition $x/a = y/b = z/c$, prove or find the required expression: $\frac{x}{a} = \frac{y}{b} = \frac{z}{c}$, $(a^2 + b^2 + c^2)(x^2 + y^2 + z^2) = (ax + by + cz)^2$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

C01-T06-QUIZ | C01-T06-QUIZ-MCQ

Quiz M1 | QUIZ MCQ C01-T06-Q01

If $x^2+4x+1=(x+1)(ax+b)+c$, then (a,b,c) is... Which of the following is correct?:

A $(1,3,-2)$

B $(1,2,-1)$

C $(2,3,-2)$

D $(1,-3,2)$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F02 | V01

Quiz M2 | QUIZ MCQ

C01-T07-Q-M04

For the identity $(x^2 - 2x + 2)(x^2 + 2x + 2) = -4x^2 + (x^2 + 2)^2$, the value of the simplified left-hand side is:

A $x^4 + 4$

B $x^4 + 5$

C $x^4 + 3$

D $-x^4 - 4$

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F03 | V01

Quiz M3 | QUIZ MCQ

C01-T08-Q-M07

Under the condition $a + b + c = 0$, the expression $3a^2 + 3ac$ is equal to:

A $3b(b + c)$

B $3b^2 + 3bc + 1$

C $3b^2 + 3bc - 1$

D $-3b(b + c)$

WORKING AREA

FORMULA BANK

Proof route

LHS $\longrightarrow$ RHS

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F03 | V01

Quiz M4 | QUIZ MCQ

C01-T09-Q-M10

Under the condition $x : y : z = 2 : 3 : 5$, the required expression is equal to:

A $\frac{5}{2}$

B $\frac{3}{2}$

C $\frac{1}{2}$

D $-\frac{3}{2}$

WORKING AREA

FORMULA BANK

Proof route

LHS ⟶ RHS

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

C01-T06-QUIZ | C01-T06-QUIZ-WRITTEN

Quiz W1 | QUIZ WRITTEN C01-T06-Q11

Find a, b, c if $x^2 - 3x + 5 = (x - 2)(ax + b) + c$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F02 | V01

Quiz W2 | QUIZ WRITTEN

C01-T07-Q-W02

Prove that $(x^2 - 3x + 4)(x^2 + 3x + 4) = -9x^2 + (x^2 + 4)^2$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F03 | V01

Quiz W3 | QUIZ WRITTEN C01-T08-Q-W04

Under the condition $a + b + c = 0$, prove that $4a^2 + 4ac = 4b^2 + 4bc$.

WORKING AREA

FORMULA BANK

Proof route

$$\text{LHS} \longrightarrow \text{RHS}$$

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 4 | Identities and Proofs

F04 | V01

Quiz W4 | QUIZ WRITTEN

C01-T09-Q-W05

Under the condition $x/a = y/b = z/c$, prove that $(a^2+b^2+c^2)(x^2+y^2+z^2) = (ax+by+cz)^2$.

WORKING AREA

FORMULA BANK

Proof route

LHS ⟶ RHS

Useful identities

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Rational identity

$$\frac{A}{B} = \frac{AC}{BC} \quad (C \neq 0)$$

Concept 5 | Inequalities OFFICIAL LESSONS 1-13, 1-14, 1-15, 1-16

Inequalities

Equation-first recall | use the same rail beside every question in this Concept

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Start with the family cue, write the first move, then use the working grid.

Concept 5 | Inequalities

F01 | V01

Q001 | WRITTEN C01-T10-S-WU1

Under the condition $a > b, \quad x > y$, prove that $2(ax + by) > (a + b)(x + y)$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a + b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V01

Q002 | MCQ C01-T10-G-001

If x>y, prove that $3x + y > 2(x + y)$.
If x>y, the positive difference between the two sides is:

A $x - y$

B $x - y + 1$

C $x - y - 1$

D $-x + y$

WORKING AREA

FORMULA BANK

Order rule
$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule
$$(x - y)^2 \geq 0$$

AM–GM
$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V01

Q003 | MCQ

C01-T10-G-002

If x>y, prove that $3x + 2y > 2x + 3y$.
If x>y, the positive difference between the two sides is:

A $x - y + 1$

B $x - y - 1$

C $x - y$

D $-x + y$

WORKING AREA

FORMULA BANK

Order rule
$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule
$$(x - y)^2 \geq 0$$

AM–GM
$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V01

Q004 | MCQ C01-T10-G-003

If x>y, prove that $3(x+y) > 2(x+2y)$.
If x>y, the positive difference between the two sides is:

A $x - y + 1$

B $x - y - 1$

C $-x + y$

D $x - y$

WORKING AREA

FORMULA BANK

Order rule
$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule
$$(x-y)^2 \geq 0$$

AM–GM
$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Q005 | MCQ C01-T10-G-004

If x>y, prove that $3x + 4y > 2x + 5y$.
If x>y, the positive difference between the two sides is:

A $x - y + 1$

B $x - y - 1$

C $-x + y$

D $x - y$

WORKING AREA

FORMULA BANK

Order rule
$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule
$$(x - y)^2 \geq 0$$

AM–GM
$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V01

Q006 | MCQ C01-T10-G-005

If x>y, prove that $3x + 5y > 2(x + 3y)$.
If x>y, the positive difference between the two sides is:

A $x - y + 1$

B $x - y$

C $x - y - 1$

D $-x + y$

WORKING AREA

FORMULA BANK

Order rule
$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule
$$(x - y)^2 \geq 0$$

AM–GM
$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V02

Q007 | WRITTEN

C01-T10-S-TR1

Under the condition $a > b, \quad c > d$, prove that $ac + bd > ad + bc$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V02

Q008 | WRITTEN

C01-T10-S-EX2

Under the condition $a > c, \quad b > d$, prove that $ab + cd > ad + bc$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V02

Q009 | MCQ C01-T10-G-006

If a>b and c>d, prove that $ac + bd > ad + bc$.
If a>b and c>d, the positive difference between the two sides is:

A $ac - ad - bc + bd + 1$

B $ac - ad - bc + bd - 1$

C $-(a - b)(c - d)$

D $(a - b)(c - d)$

WORKING AREA

FORMULA BANK

Order rule
$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule
$$(x - y)^2 \geq 0$$

AM–GM
$$\frac{a + b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V02

Q010 | MCQ C01-T10-G-007

If a>2b and c>d, prove that $ac + 2bd > ad + 2bc$.
If a>2b and c>d, the positive difference between the two sides is:

A $ac - ad - 2bc + 2bd + 1$

B $ac - ad - 2bc + 2bd - 1$

C $(a - 2b)(c - d)$

D $-(a - 2b)(c - d)$

WORKING AREA

FORMULA BANK

Order rule
$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule
$$(x - y)^2 \geq 0$$

AM–GM
$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V02

Q011 | MCQ

C01-T10-G-008

If a>3b and c>d, prove that $ac + 3bd > ad + 3bc$.
If a>3b and c>d, the positive difference between the two sides is:

A $(a - 3b)(c - d)$

B $ac - ad - 3bc + 3bd + 1$

C $ac - ad - 3bc + 3bd - 1$

D $-(a - 3b)(c - d)$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V03

Q012 | WRITTEN

C01-T10-S-EX1

Under the condition $x > y$, prove that $3x - 4y > 2x - 3y$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F02 | V01

Q013 | WRITTEN C01-T10-S-WU2

Under the condition $x > 3, \quad y > -5$, prove that $xy + 5x > 3y + 15$.

WORKING AREA

FORMULA BANK

Order rule
$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule
$$(x - y)^2 \geq 0$$

AM–GM
$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F02 | V02

Q014 | WRITTEN

C01-T10-S-TR2

Under the condition $x > 2, \quad y > 1$, prove that $xy + 2 > x + 2y$.

WORKING AREA

FORMULA BANK

Order rule
$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule
$$(x - y)^2 \geq 0$$

AM–GM
$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F02 | V03

Q015 | WRITTEN

C01-T10-S-EX3

Under the condition $a > 1, \quad b > 1$, prove that $ab + 1 > a + b$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F03 | V01

Q016 | WRITTEN

C01-T10-S-EX4

Under the condition $a > b > x > y$, prove that $ax + by > ay + bx$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F03 | V02

Q017 | WRITTEN

C01-T10-S-CH1

Under the condition $a > b > c > 0$, $x > y > z > 0$, prove that $ax + by + cz > ay + bz + cx$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F99 | V01

Q018 | CHALLENGE MCQ

C01-T10-C-001

If a>b and x>y, prove that $2(ax+by) > 2(ay+bx)$.
If a>b and x>y, the positive difference between the two sides is:

A $2ax-2ay-2bx+2by+1$

B $2ax-2ay-2bx+2by-1$

C $-2(a-b)(x-y)$

D $2(a-b)(x-y)$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Q019 | WRITTEN C01-T11-S-WU1

Prove that $a^2 + 4b^2 \geq 4ab$.

WORKING AREA

FORMULA BANK

Order rule
$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule
$$(x - y)^2 \geq 0$$

AM–GM
$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V01

Q020 | MCQ

C01-T11-G-001

Under a,b real, prove that $a^2 + 4b^2 \geq 4ab$ select the correct factorisation of LHS − RHS:

A $a^2 - 4ab + 4b^2 + 1$

B $(a - 2b - 1)(a - 2b + 1)$

C $-(a - 2b)^2$

D $(a - 2b)^2$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V01

Q021 | MCQ

C01-T11-G-002

Under a,b real, prove that $a^2 + 9b^2 \geq 6ab$ select the correct factorisation of LHS − RHS:

A $a^2 - 6ab + 9b^2 + 1$

B $(a - 3b - 1)(a - 3b + 1)$

C $(a - 3b)^2$

D $-(a - 3b)^2$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V01

Q022 | MCQ

C01-T11-G-003

Under a,b real, prove that $a^2 + 16b^2 \geq 8ab$ select the correct factorisation of LHS – RHS:

A $a^2 - 8ab + 16b^2 + 1$

B $(a - 4b)^2$

C $(a - 4b - 1)(a - 4b + 1)$

D $-(a - 4b)^2$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V01

Q023 | MCQ

C01-T11-G-004

Under a,b real, prove that $a^2+25b^2 \geq 10ab$ select the correct factorisation of LHS – RHS:

A $(a-5b)^2$

B $a^2-10ab+25b^2+1$

C $(a-5b-1)(a-5b+1)$

D $-(a-5b)^2$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Q024 | MCQ

C01-T11-G-005

Under a,b real, prove that $a^2+36b^2 \geq 12ab$ select the correct factorisation of LHS – RHS:

A $a^2-12ab+36b^2+1$

B $(a-6b-1)(a-6b+1)$

C $(a-6b)^2$

D $-(a-6b)^2$

WORKING AREA

FORMULA BANK

Order rule

$$0<a<b \Rightarrow a^2<b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Q025 | MCQ

C01-T11-G-006

Under a,b real, prove that $a^2+49b^2 \geq 14ab$ select the correct factorisation of LHS – RHS:

A $a^2-14ab+49b^2+1$

B $(a-7b)^2$

C $(a-7b-1)(a-7b+1)$

D $-(a-7b)^2$

WORKING AREA

FORMULA BANK

Order rule

$$0<a<b \Rightarrow a^2<b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V02

Q026 | WRITTEN

C01-T11-S-TR2

Prove that $a^2 + 5b^2 \geq 4ab$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V02

Q027 | WRITTEN

C01-T11-S-EX1

Prove that $9x^2 \geq y(6x - y)$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V02

Q028 | WRITTEN

C01-T11-S-EX2

Prove that $2(x^2 + y^2) \geq (x + y)^2$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a + b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V02

Q029 | WRITTEN

C01-T11-S-EX3

Prove that $(2x - y)^2 \geq 3(x^2 - y^2)$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V02

Q030 | WRITTEN

C01-T11-S-EX4

Prove that $(2a + 3b)^2 \geq 12ab$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V02

Q031 | MCQ

C01-T11-G-007

Under x,y real, prove that $4x^2 \geq y\,(4x - y)$ select the correct factorisation of LHS – RHS:

A $(2x - y)^2$

B $4x^2 - 4xy + y^2 + 1$

C $(2x - y - 1)(2x - y + 1)$

D $-(2x - y)^2$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a + b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V02

Q032 | MCQ

C01-T11-G-008

Under x,y real, prove that $9x^2 \geq y\,(6x - y)$ select the correct factorisation of LHS – RHS:

A $9x^2 - 6xy + y^2 + 1$

B $(3x - y - 1)(3x - y + 1)$

C $(3x - y)^2$

D $-(3x - y)^2$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a + b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V02

Q033 | MCQ

C01-T11-G-009

Under x,y real, prove that $16x^2 \geq y(8x - y)$ select the correct factorisation of LHS – RHS:

A $16x^2 - 8xy + y^2 + 1$

B $(4x - y - 1)(4x - y + 1)$

C $-(4x - y)^2$

D $(4x - y)^2$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a + b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V02

Q034 | MCQ

C01-T11-G-010

Under x,y real, prove that $25x^2 \geq y(10x - y)$ select the correct factorisation of LHS – RHS:

A $25x^2 - 10xy + y^2 + 1$

B $(5x - y - 1)(5x - y + 1)$

C $-(5x - y)^2$

D $(5x - y)^2$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a + b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V02

Q035 | MCQ

C01-T11-G-011

Under x,y real, prove that $36x^2 \geq y(12x - y)$ select the correct factorisation of LHS – RHS:

A $(6x - y)^2$

B $36x^2 - 12xy + y^2 + 1$

C $(6x - y - 1)(6x - y + 1)$

D $-(6x - y)^2$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a + b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V03

Q036 | MCQ

C01-T11-G-012

Under x,y real, prove that $x^2 + y^2 \geq 2xy$ select the correct factorisation of LHS – RHS:

A $x^2 - 2xy + y^2 + 1$

B $(x - y - 1)(x - y + 1)$

C $(x - y)^2$

D $-(x - y)^2$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a + b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F02 | V01

Q037 | WRITTEN C01-T11-S-WU2

Prove that $x^2 + y^2 \geq 2(x - y - 1)$.

WORKING AREA

FORMULA BANK

Order rule
$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule
$$(x - y)^2 \geq 0$$

AM–GM
$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F02 | V02

Q038 | WRITTEN

C01-T11-S-EX5

Prove that $x^2 + 2 > 2x$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F02 | V02

Q039 | WRITTEN

C01-T11-S-EX6

Prove that $x^2 + y^2 - 6x + 8y + 25 \geq 0$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F02 | V03

Q040 | WRITTEN

C01-T11-S-CH1

Prove that $x^2 + 2y^2 - 10x + 12y + 43 \geq 0$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F03 | V01

Q041 | WRITTEN

C01-T11-S-TR1

Prove that $(a^2 + b^2)(x^2 + y^2) \geq (ax + by)^2$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F99 | V01

Q042 | CHALLENGE WRITTEN C01-T11-C-01

For real x, y, prove that $x^2 + 2y^2 - 10x + 12y + 43 \geq 0$.

WORKING AREA

FORMULA BANK

Order rule
$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule
$$(x - y)^2 \geq 0$$

AM–GM
$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V01

Q043 | WRITTEN

C01-T12-S-WU1

Prove that $\sqrt{\frac{a^2+b^2}{2}} \geq \frac{a+b}{2}$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Q044 | MCQ

C01-T12-G-001

Under a>0 and b>0, prove that $\sqrt{\frac{a^2}{2}+\frac{b^2}{2}} \geq \frac{a}{2}+\frac{b}{2}$.

After squaring the positive sides, the value of $\text{LHS}^2 - \text{RHS}^2$ is:

A $\frac{(a-b)^2}{4}$

B $\frac{a^2-2ab+b^2+4}{4}$

C $\frac{(a-b-2)(a-b+2)}{4}$

D $-\frac{(a-b)^2}{4}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Q045 | MCQ

C01-T12-G-002

Under a>0 and b>0, prove that $\sqrt{\frac{a^2}{2}+2b^2} \geq \frac{a}{2}+b$.

After squaring the positive sides, the value of $\text{LHS}^2 - \text{RHS}^2$ is:

A $\frac{(a-2b)^2}{4}$

B $\frac{a^2-4ab+4b^2+4}{4}$

C $\frac{(a-2b-2)(a-2b+2)}{4}$

D $-\frac{(a-2b)^2}{4}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Q046 | MCQ

C01-T12-G-003

Under a>0 and b>0, prove that $\sqrt{\frac{a^2}{2}+\frac{9b^2}{2}} \geq \frac{a}{2}+\frac{3b}{2}$.

After squaring the positive sides, the value of $\text{LHS}^2 - \text{RHS}^2$ is:

A $\frac{a^2-6ab+9b^2+4}{4}$

B $\frac{(a-3b-2)(a-3b+2)}{4}$

C $\frac{(a-3b)^2}{4}$

D $-\frac{(a-3b)^2}{4}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Q047 | MCQ

C01-T12-G-004

Under a>0 and b>0, prove that $\sqrt{\frac{a^2}{2}+8b^2} \geq \frac{a}{2}+2b$.

After squaring the positive sides, the value of $\text{LHS}^2 - \text{RHS}^2$ is:

A $\frac{(a-4b)^2}{4}$

B $\frac{a^2-8ab+16b^2+4}{4}$

C $\frac{(a-4b-2)(a-4b+2)}{4}$

D $-\frac{(a-4b)^2}{4}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Q048 | MCQ

C01-T12-G-005

Under a>0 and b>0, prove that $\sqrt{\frac{a^2}{2}+\frac{25b^2}{2}} \geq \frac{a}{2}+\frac{5b}{2}$.

After squaring the positive sides, the value of $\text{LHS}^2 - \text{RHS}^2$ is:

A $\frac{(a-5b)^2}{4}$

B $\frac{a^2-10ab+25b^2+4}{4}$

C $\frac{(a-5b-2)(a-5b+2)}{4}$

D $-\frac{(a-5b)^2}{4}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Q049 | MCQ

C01-T12-G-006

Under a>0 and b>0, prove that $\sqrt{\frac{a^2}{2}+18b^2} \geq \frac{a}{2}+3b$.

After squaring the positive sides, the value of $\text{LHS}^2 - \text{RHS}^2$ is:

A $\frac{a^2-12ab+36b^2+4}{4}$

B $\frac{(a-6b)^2}{4}$

C $\frac{(a-6b-2)(a-6b+2)}{4}$

D $-\frac{(a-6b)^2}{4}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Q050 | MCQ

C01-T12-G-007

Under a>0 and b>0, prove that $\sqrt{\frac{a^2}{2}+\frac{49b^2}{2}} \geq \frac{a}{2}+\frac{7b}{2}$.

After squaring the positive sides, the value of $\text{LHS}^2 - \text{RHS}^2$ is:

A $\frac{(a-7b)^2}{4}$

B $\frac{a^2-14ab+49b^2+4}{4}$

C $\frac{(a-7b-2)(a-7b+2)}{4}$

D $-\frac{(a-7b)^2}{4}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Q051 | MCQ

C01-T12-G-008

Under a>0 and b>0, prove that $\sqrt{\frac{a^2}{2}+32b^2} \geq \frac{a}{2}+4b$.

After squaring the positive sides, the value of $\text{LHS}^2 - \text{RHS}^2$ is:

A $\frac{(a-8b)^2}{4}$

B $\frac{a^2-16ab+64b^2+4}{4}$

C $\frac{(a-8b-2)(a-8b+2)}{4}$

D $-\frac{(a-8b)^2}{4}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V02

Q052 | WRITTEN

C01-T12-S-TR1

Prove that $\sqrt{2(a+b)} \geq \sqrt{a} + \sqrt{b}$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V02

Q053 | WRITTEN

C01-T12-S-EX1

Prove that $a + 2 \geq \sqrt{3 + 6a}$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V02

Q054 | WRITTEN

C01-T12-S-EX2

Prove that $\sqrt{2(a^2+b^2)} \geq a+b$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V02

Q055 | WRITTEN

C01-T12-S-EX3

Prove that $\sqrt{\frac{a+b}{2}} \geq \frac{\sqrt{a}+\sqrt{b}}{2}$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V02

Q056 | MCQ

C01-T12-G-009

Under a>0 and b>0, prove that $\sqrt{a}+\sqrt{b}>\sqrt{a+b}$.
After squaring the positive sides, the value of $\text{LHS}^2-\text{RHS}^2$ is:

A $2\sqrt{a}\sqrt{b}+1$

B $2\sqrt{a}\sqrt{b}$

C $2\sqrt{a}\sqrt{b}-1$

D $-2\sqrt{a}\sqrt{b}$

WORKING AREA

FORMULA BANK

Order rule
$0<a<b\Rightarrow a^2<b^2$

Square rule
$$(x-y)^2\geq 0$$

AM–GM
$$\frac{a+b}{2}\geq\sqrt{ab}\quad(a,b>0)$$

Concept 5 | Inequalities

F01 | V02

Q057 | MCQ

C01-T12-G-010

Under a>0 and b>0, prove that $\sqrt{a}+2\sqrt{b}>\sqrt{a+4b}$.
After squaring the positive sides, the value of $\text{LHS}^2-\text{RHS}^2$ is:

A $4\sqrt{a}\sqrt{b}$

B $4\sqrt{a}\sqrt{b}+1$

C $4\sqrt{a}\sqrt{b}-1$

D $-4\sqrt{a}\sqrt{b}$

WORKING AREA

FORMULA BANK

Order rule
$$0<a<b\Rightarrow a^2<b^2$$

Square rule
$$(x-y)^2\geq 0$$

AM–GM
$$\frac{a+b}{2}\geq\sqrt{ab}\quad(a,b>0)$$

Concept 5 | Inequalities

F01 | V02

Q058 | MCQ

C01-T12-G-011

Under a>0 and b>0, prove that $\sqrt{a}+3\sqrt{b}>\sqrt{a+9b}$.
After squaring the positive sides, the value of $\text{LHS}^2-\text{RHS}^2$ is:

A $6\sqrt{a}\sqrt{b}+1$

B $6\sqrt{a}\sqrt{b}-1$

C $6\sqrt{a}\sqrt{b}$

D $-6\sqrt{a}\sqrt{b}$

WORKING AREA

FORMULA BANK

Order rule
$$0<a<b\Rightarrow a^2<b^2$$

Square rule
$$(x-y)^2\geq 0$$

AM–GM
$$\frac{a+b}{2}\geq\sqrt{ab}\quad(a,b>0)$$

Concept 5 | Inequalities

F01 | V02

Q059 | MCQ

C01-T12-G-012

Under a>0 and b>0, prove that $\sqrt{a}+4\sqrt{b}>\sqrt{a+16b}$.
After squaring the positive sides, the value of $\text{LHS}^2-\text{RHS}^2$ is:

A $8\sqrt{a}\sqrt{b}+1$

B $8\sqrt{a}\sqrt{b}$

C $8\sqrt{a}\sqrt{b}-1$

D $-8\sqrt{a}\sqrt{b}$

WORKING AREA

FORMULA BANK

Order rule
$$0<a<b\Rightarrow a^2<b^2$$

Square rule
$$(x-y)^2\geq 0$$

AM–GM
$$\frac{a+b}{2}\geq\sqrt{ab}\quad(a,b>0)$$

Concept 5 | Inequalities

F02 | V01

Q060 | WRITTEN

C01-T12-S-WU2

Prove that $\sqrt{a}+4\sqrt{b}>\sqrt{a+16b}$.

WORKING AREA

FORMULA BANK

Order rule

$$0<a<b\Rightarrow a^2<b^2$$

Square rule

$$(x-y)^2\geq 0$$

AM–GM

$$\frac{a+b}{2}\geq\sqrt{ab}\quad(a,b>0)$$

Concept 5 | Inequalities

F02 | V02

Q061 | WRITTEN

C01-T12-S-TR2

Prove that $2\sqrt{a}+\sqrt{b}>\sqrt{4a+b}$.

WORKING AREA

FORMULA BANK

Order rule

$$0<a<b \Rightarrow a^2<b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F02 | V02

Q062 | WRITTEN

C01-T12-S-EX4

Prove that $\sqrt{a}+\sqrt{b}>\sqrt{a+b}$.

WORKING AREA

FORMULA BANK

Order rule

$$0<a<b \Rightarrow a^2<b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F02 | V02

Q063 | WRITTEN

C01-T12-S-EX5

Prove that $2\sqrt{a}+3\sqrt{b}>\sqrt{4a+9b}$.

WORKING AREA

FORMULA BANK

Order rule

$$0<a<b\Rightarrow a^2<b^2$$

Square rule

$$(x-y)^2\geq 0$$

AM–GM

$$\frac{a+b}{2}\geq\sqrt{ab}\quad(a,b>0)$$

Concept 5 | Inequalities

F02 | V02

Q064 | WRITTEN

C01-T12-S-EX6

Prove that $\sqrt{a-b} > \sqrt{a} - \sqrt{b}$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F03 | V01

Q065 | WRITTEN

C01-T12-S-CH1

If $a > b > 0$, prove that $\sqrt{a-b} < \sqrt{a} - \frac{b}{2\sqrt{a}}$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F99 | V01

Q066 | CHALLENGE WRITTEN C01-T12-C-01

For $a, b > 0$, prove that $\sqrt{a} + 4\sqrt{b} > \sqrt{a + 16b}$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V01

Q067 | WRITTEN C01-T13-S-WU1

Prove that $\frac{b}{a} + \frac{a}{b} \geq 2$.

WORKING AREA

FORMULA BANK

Order rule
$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule
$$(x - y)^2 \geq 0$$

AM–GM
$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V01

Q068 | WRITTEN

C01-T13-S-TR1

Prove that $\frac{b}{3a} + \frac{12a}{b} \geq 4$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V01

Q069 | MCQ

C01-T13-G-001

Under a>0 and b>0, prove that $\frac{a^2+b^2}{ab} \geq 2$ select the correct factorisation of LHS − RHS:

A $\frac{(a-b)^2}{ab}$

B $\frac{a^2-ab+b^2}{ab}$

C $\frac{a^2-3ab+b^2}{ab}$

D $-\frac{(a-b)^2}{ab}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Q070 | MCQ

C01-T13-G-002

Under a>0 and b>0, prove that $\frac{4a^2+b^2}{2ab} \geq 2$ select the correct factorisation of LHS − RHS:

A $\frac{4a^2-2ab+b^2}{2ab}$

B $\frac{4a^2-6ab+b^2}{2ab}$

C $\frac{(2a-b)^2}{2ab}$

D $-\frac{(2a-b)^2}{2ab}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Q071 | MCQ

C01-T13-G-003

Under a>0 and b>0, prove that $\frac{9a^2+b^2}{3ab} \geq 2$ select the correct factorisation of LHS − RHS:

A $\frac{9a^2-3ab+b^2}{3ab}$

B $\frac{(3a-b)^2}{3ab}$

C $\frac{9a^2-9ab+b^2}{3ab}$

D $-\frac{(3a-b)^2}{3ab}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Q072 | MCQ

C01-T13-G-004

Under a>0 and b>0, prove that $\frac{16a^2+b^2}{4ab} \geq 2$ select the correct factorisation of LHS − RHS:

A $\frac{(4a-b)^2}{4ab}$

B $\frac{16a^2-4ab+b^2}{4ab}$

C $\frac{16a^2-12ab+b^2}{4ab}$

D $-\frac{(4a-b)^2}{4ab}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Q073 | MCQ

C01-T13-G-005

Under a>0 and b>0, prove that $\frac{25a^2+b^2}{5ab} \geq 2$ select the correct factorisation of LHS − RHS:

A $\frac{25a^2 - 5ab + b^2}{5ab}$

B $\frac{25a^2 - 15ab + b^2}{5ab}$

C $-\frac{(5a-b)^2}{5ab}$

D $\frac{(5a-b)^2}{5ab}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Q074 | MCQ

C01-T13-G-006

Under a>0 and b>0, prove that $\frac{36a^2+b^2}{6ab} \geq 2$ select the correct factorisation of LHS − RHS:

A $\frac{36a^2-6ab+b^2}{6ab}$

B $\frac{36a^2-18ab+b^2}{6ab}$

C $-\frac{(6a-b)^2}{6ab}$

D $\frac{(6a-b)^2}{6ab}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Q075 | MCQ

C01-T13-G-007

Under a>0 and b>0, prove that $\frac{49a^2+b^2}{7ab} \geq 2$ select the correct factorisation of LHS − RHS:

A $\frac{49a^2 - 7ab + b^2}{7ab}$

B $\frac{49a^2 - 21ab + b^2}{7ab}$

C $\frac{(7a-b)^2}{7ab}$

D $-\frac{(7a-b)^2}{7ab}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Q076 | MCQ

C01-T13-G-008

Under a>0 and b>0, prove that $\frac{64a^2+b^2}{8ab} \geq 2$ select the correct factorisation of LHS − RHS:

A $\frac{64a^2 - 8ab + b^2}{8ab}$

B $\frac{64a^2 - 24ab + b^2}{8ab}$

C $-\frac{(8a-b)^2}{8ab}$

D $\frac{(8a-b)^2}{8ab}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V02

Q077 | WRITTEN

C01-T13-S-WU2

Prove that $(a+b)\left(\frac{1}{a}+\frac{1}{b}\right) \geq 4$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V02

Q078 | WRITTEN

C01-T13-S-EX4

Prove that $\left(x+\frac{1}{x}\right)\left(x+\frac{4}{x}\right) \geq 9$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V02

Q079 | WRITTEN

C01-T13-S-EX5

Prove that $(a+8b)\left(\frac{2}{a}+\frac{1}{b}\right) \geq 18$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V02

Q080 | WRITTEN

C01-T13-S-EX6

Prove that $\left(a+\frac{3}{b}\right)\left(b+\frac{3}{a}\right) \geq 12$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V02

Q081 | MCQ

C01-T13-G-009

Under a>0 and b>0, prove that $\frac{(a+b)^2}{ab} \geq 4$ select the correct factorisation of LHS − RHS:

A $\frac{a^2-ab+b^2}{ab}$

B $\frac{a^2-3ab+b^2}{ab}$

C $-\frac{(a-b)^2}{ab}$

D $\frac{(a-b)^2}{ab}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V02

Q082 | MCQ

C01-T13-G-010

Under a>0 and b>0, prove that $\frac{(a+4b)(4a+b)}{ab} \geq 25$ select the correct factorisation of LHS − RHS:

A $\frac{4a^2-7ab+4b^2}{ab}$

B $\frac{4(a-b)^2}{ab}$

C $\frac{4a^2-9ab+4b^2}{ab}$

D $-\frac{4(a-b)^2}{ab}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V02

Q083 | MCQ

C01-T13-G-011

Under a>0 and b>0, prove that $\frac{(a+9b)(9a+b)}{ab} \geq 100$ select the correct factorisation of LHS − RHS:

A $\frac{9a^2-17ab+9b^2}{ab}$

B $\frac{9a^2-19ab+9b^2}{ab}$

C $\frac{9(a-b)^2}{ab}$

D $-\frac{9(a-b)^2}{ab}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V02

Q084 | MCQ

C01-T13-G-012

Under a>0 and b>0, prove that $\frac{(a+16b)(16a+b)}{ab} \geq 289$ select the correct factorisation of LHS − RHS:

A $\frac{16a^2-31ab+16b^2}{ab}$

B $\frac{16a^2-33ab+16b^2}{ab}$

C $-\frac{16(a-b)^2}{ab}$

D $\frac{16(a-b)^2}{ab}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F02 | V01

Q085 | WRITTEN

C01-T13-S-TR2

Prove that $\left(a+\frac{1}{b}\right)\left(b+\frac{9}{a}\right) \geq 16$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F02 | V02

Q086 | WRITTEN

C01-T13-S-EX1

Prove that $a + \frac{4}{a} \geq 4$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F02 | V02

Q087 | WRITTEN

C01-T13-S-EX2

Prove that $3ab + \frac{4}{ab} \geq 4\sqrt{3}$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F02 | V02

Q088 | WRITTEN

C01-T13-S-EX3

Prove that $a + b + \frac{9}{a+b} \geq 6$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F03 | V01

Q089 | WRITTEN

C01-T13-S-CH1

A rectangle has perimeter 200 cm. Prove that its area $LW \leq 2500\,\text{cm}^2$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F99 | V01

Q090 | CHALLENGE WRITTEN C01-T13-C-01

For $a, b > 0$, prove that $\frac{b}{a} + \frac{a}{b} \geq 2$.

WORKING AREA

FORMULA BANK

Order rule
$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule
$$(x - y)^2 \geq 0$$

AM–GM
$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V01

Quiz M1 | QUIZ MCQ C01-T10-Q-M01

If x>y, prove that $3x + y > 2(x + y)$.
If x>y, the positive difference between the two sides is:

A $x - y$

B $x - y + 1$

C $x - y - 1$

D $-x + y$

WORKING AREA

FORMULA BANK

Order rule
$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule
$$(x - y)^2 \geq 0$$

AM–GM
$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V01

Quiz M2 | QUIZ MCQ

C01-T11-Q-M04

Under a,b real, prove that $a^2+25b^2 \geq 10ab$ select the correct factorisation of LHS – RHS:

A $(a-5b)^2$

B $a^2-10ab+25b^2+1$

C $(a-5b-1)(a-5b+1)$

D $-(a-5b)^2$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Quiz M3 | QUIZ MCQ

C01-T12-Q-M07

Under a>0 and b>0, prove that $\sqrt{\frac{a^2}{2}+\frac{49b^2}{2}} \geq \frac{a}{2}+\frac{7b}{2}$.

After squaring the positive sides, the value of $\text{LHS}^2 - \text{RHS}^2$ is:

A $\frac{(a-7b)^2}{4}$

B $\frac{a^2-14ab+49b^2+4}{4}$

C $\frac{(a-7b-2)(a-7b+2)}{4}$

D $-\frac{(a-7b)^2}{4}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V02

Quiz M4 | QUIZ MCQ

C01-T13-Q-M10

Under a>0 and b>0, prove that $\frac{(a+4b)(4a+b)}{ab} \geq 25$ select the correct factorisation of LHS – RHS:

A $\frac{4a^2-7ab+4b^2}{ab}$

B $\frac{4(a-b)^2}{ab}$

C $\frac{4a^2-9ab+4b^2}{ab}$

D $-\frac{4(a-b)^2}{ab}$

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

Concept 5 | Inequalities

F01 | V01

Quiz W1 | QUIZ WRITTEN C01-T10-Q-W01

If x>y, prove that $3x + 4y > 2x + 5y$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x - y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V03

Quiz W2 | QUIZ WRITTEN C01-T11-Q-W02

Under x,y real, prove that $x^2 + y^2 \geq 2xy$.

WORKING AREA

FORMULA BANK

Order rule
$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule
$$(x - y)^2 \geq 0$$

AM–GM
$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a, b > 0)$$

Concept 5 | Inequalities

F01 | V02

Quiz W3 | QUIZ WRITTEN

C01-T12-Q-W04

Under a>0 and b>0, prove that $\sqrt{a}+6\sqrt{b}>\sqrt{a+36b}$.

WORKING AREA

FORMULA BANK

Order rule

$$0<a<b\Rightarrow a^2<b^2$$

Square rule

$$(x-y)^2\geq 0$$

AM–GM

$$\frac{a+b}{2}\geq\sqrt{ab}\quad(a,b>0)$$

Concept 5 | Inequalities

F02 | V01

Quiz W4 | QUIZ WRITTEN C01-T13-Q-W05

Under t>0, prove that $\frac{t^2+1}{t} \geq 2$.

WORKING AREA

FORMULA BANK

Order rule

$$0 < a < b \Rightarrow a^2 < b^2$$

Square rule

$$(x-y)^2 \geq 0$$

AM–GM

$$\frac{a+b}{2} \geq \sqrt{ab} \quad (a,b>0)$$

EGYPTIAN BACCALAUREATE • 2026

MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 02

Sequences

5 Concepts | 988 questions

B5 Landscape | one question per teaching page

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Chapter 02 | Sequences — CLASSROOM ROUTE

Concept 1 | Arithmetic Sequences — 288 questions
Official lessons: 2-1, 2-2, 2-3, 2-4, 2-5, 2-6

Concept 2 | Geometric Sequences — 194 questions
Official lessons: 2-7, 2-8, 2-9, 2-10

Concept 3 | Summation — 282 questions
Official lessons: 2-11, 2-12, 2-13, 2-14, 2-15, 2-16, 2-17

Concept 4 | Advanced Sequences — 54 questions
Official lessons: 2-18, 2-19

Concept 5 | Recurrence and Induction — 170 questions
Official lessons: 2-20, 2-21, 2-22, 2-23, 2-24, 2-25, 2-26

Formula Bank changes at each Concept boundary.

Concept 1 | Arithmetic Sequences OFFICIAL LESSONS 2-1, 2-2, 2-3, 2-4, 2-5, 2-6

Arithmetic Sequences

Equation-first recall | use the same rail beside every question in this Concept

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Start with the family cue, write the first move, then use the working grid.

Concept 1 | Arithmetic Sequences

F01 | V01

Q001 | WRITTEN C02-T01-S-TRY1A

When the general term of the sequence $\{a_n\}$ is $a_n = 2n - 3$, find the first term through the 3rd term.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q002 | WRITTEN C02-T01-S-TRY1C

When the general term of the sequence $\{a_n\}$ is $a_n = n^2 - 7n$, find the first term through the 3rd term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q003 | WRITTEN C02-T01-S-EX1A

When the general term of the sequence $\{a_n\}$ is $a_n = 5n - 8$, find the first term through the 3rd term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q004 | WRITTEN C02-T01-S-EX1B

When the general term of the sequence $\{a_n\}$ is $a_n = -3n + 1$, find the first term through the 3rd term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q005 | WRITTEN C02-T01-S-EX1C

When the general term of the sequence $\{a_n\}$ is $a_n = -2n - 4$, find the first term through the 3rd term.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q006 | WRITTEN C02-T01-S-EX1G

When the general term of the sequence $\{a_n\}$ is $a_n = n^2 - 1$, find the first term through the 3rd term.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q007 | WRITTEN C02-T01-S-EX1H

When the general term of the sequence $\{a_n\}$ is $a_n = n^2+n+1$, find the first term through the 3rd term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q008 | WRITTEN C02-T01-S-EX1I

When the general term of the sequence $\{a_n\}$ is $a_n = n^2 + 2n + 4$, find the first term through the 3rd term.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q009 | MCQ C02-T01-G-M01

For $a_n = 3n - 5$, the first three terms (a_1, a_2, a_3) are:

A $(-2, 1, 5)$

B $(-2, 1, 4)$

C $(-2, 0, 4)$

D $(2, -1, -4)$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q010 | MCQ C02-T01-G-M02

For $a_n = 4n + 7$, the first three terms (a_1, a_2, a_3) are:

A $(11, 15, 20)$

B $(11, 14, 19)$

C $(11, 15, 19)$

D $(-11, -15, -19)$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q011 | MCQ C02-T01-G-M03

For $a_n = n^2 - 4n + 6$, the first three terms (a_1, a_2, a_3) are:

A $(3, 2, 4)$

B $(3, 1, 3)$

C $(-3, -2, -3)$

D $(3, 2, 3)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q012 | MCQ C02-T01-G-M04

For $a_n = 2n^2 + 3$, the first three terms (a_1, a_2, a_3) are:

A $(5, 11, 21)$

B $(5, 11, 22)$

C $(5, 10, 21)$

D $(-5, -11, -21)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q013 | MCQ C02-T01-G-M05

For $a_n = n^2 + 5n - 2$, the first three terms (a_1, a_2, a_3) are:

A $(4, 10, 17)$

B $(4, 10, 16)$

C $(4, 9, 16)$

D $(-4, -10, -16)$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q014 | MCQ C02-T01-G-M06

For $a_n = 5 - 2n$, the first three terms (a_1, a_2, a_3) are:

A $(3, 1, 0)$

B $(3, 0, -1)$

C $(3, 1, -1)$

D $(-3, -1, 1)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q015 | MCQ C02-T01-G-M07

For $a_n = 2n^2 - 7n + 9$, the first three terms (a_1, a_2, a_3) are:

A $(4, 3, 7)$

B $(4, 2, 6)$

C $(-4, -3, -6)$

D $(4, 3, 6)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q016 | MCQ C02-T01-G-M08

For $a_n = n^2 - 3n - 1$, the first three terms (a_1, a_2, a_3) are:

A $(-3, -3, -1)$

B $(-3, -3, 0)$

C $(-3, -4, -1)$

D $(3, 3, 1)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q017 | MCQ C02-T01-G-M09

For $a_n = 3n^2 - 2$, the first three terms (a_1, a_2, a_3) are:

A $(1, 10, 26)$

B $(1, 10, 25)$

C $(1, 9, 25)$

D $(-1, -10, -25)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q018 | MCQ C02-T01-G-M10

For $a_n = n^2 + 2$, the first three terms (a_1, a_2, a_3) are:

A $(3, 6, 12)$

B $(3, 5, 11)$

C $(3, 6, 11)$

D $(-3, -6, -11)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q019 | MCQ C02-T01-G-M11

For $a_n = 7n - 10$, the first three terms (a_1, a_2, a_3) are:

A $(-3, 4, 12)$

B $(-3, 3, 11)$

C $(3, -4, -11)$

D $(-3, 4, 11)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q020 | MCQ

C02-T01-G-M12

For $a_n = 2n^2 + n - 1$, the first three terms (a_1, a_2, a_3) are:

A $(2, 9, 20)$

B $(2, 9, 21)$

C $(2, 8, 20)$

D $(-2, -9, -20)$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q021 | WRITTEN

C02-T01-S-TRY1B

When the general term of the sequence $\{a_n\}$ is $a_n = 2 \times 3^n$, find the first term through the 3rd term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q022 | WRITTEN C02-T01-S-EX1D

When the general term of the sequence $\{a_n\}$ is $a_n = 3^n - 1$, find the first term through the 3rd term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q023 | WRITTEN C02-T01-S-EX1E

When the general term of the sequence $\{a_n\}$ is $a_n = (-3)^n$, find the first term through the 3rd term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q024 | WRITTEN C02-T01-S-EX1F

When the general term of the sequence $\{a_n\}$ is $a_n = 3\times(-2)^n$, find the first term through the 3rd term.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q025 | MCQ C02-T01-G-M16

For $a_n = 2^n$, the first three terms (a_1, a_2, a_3) are:

A $(2, 4, 8)$

B $(2, 4, 9)$

C $(2, 3, 8)$

D $(-2, -4, -8)$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q026 | MCQ C02-T01-G-M17

For $a_n = (-2)^n$, the first three terms (a_1, a_2, a_3) are:

A $(-2, 4, -7)$

B $(-2, 4, -8)$

C $(-2, 3, -8)$

D $(2, -4, 8)$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q027 | MCQ C02-T01-G-M18

For $a_n = 2 \times 3^n$, the first three terms (a_1, a_2, a_3) are:

A $(6, 18, 55)$

B $(6, 17, 54)$

C $(6, 18, 54)$

D $(-6, -18, -54)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q028 | MCQ C02-T01-G-M19

For $a_n = 5 \times (-3)^n$, the first three terms (a_1, a_2, a_3) are:

A $(-15, 45, -134)$

B $(-15, 44, -135)$

C $(15, -45, 135)$

D $(-15, 45, -135)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q029 | MCQ C02-T01-G-M20

For $a_n = 4^n - 1$, the first three terms (a_1, a_2, a_3) are:

A $(3, 15, 63)$

B $(3, 15, 64)$

C $(3, 14, 63)$

D $(-3, -15, -63)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q030 | MCQ C02-T01-G-M21

For $a_n = 2 \times 3^{n-1}$, the first three terms (a_1, a_2, a_3) are:

A $(2, 6, 19)$

B $(2, 6, 18)$

C $(2, 5, 18)$

D $(-2, -6, -18)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q031 | MCQ C02-T01-G-M22

For $a_n = (-1)^{n-1}5^n$, the first three terms (a_1, a_2, a_3) are:

A $(5, -25, 126)$

B $(5, -26, 125)$

C $(5, -25, 125)$

D $(-5, 25, -125)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q032 | MCQ C02-T01-G-M23

For $a_n = (-3)^n + 2$, the first three terms (a_1, a_2, a_3) are:

A $(-1, 11, -24)$

B $(-1, 10, -25)$

C $(1, -11, 25)$

D $(-1, 11, -25)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q033 | WRITTEN

C02-T01-S-WU1

When the general term of the sequence $\{a_n\}$ is $a_n = \frac{n}{n+1}$, find the first term through the 3rd term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q034 | WRITTEN

C02-T01-S-TRY1D

When the general term of the sequence $\{a_n\}$ is $a_n = \frac{n}{2n+1}$, find the first term through the 3rd term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q035 | WRITTEN

C02-T01-S-EX1J

When the general term of the sequence $\{a_n\}$ is $a_n = \frac{1}{3n-2}$, find the first term through the 3rd term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q036 | WRITTEN

C02-T01-S-EX1K

When the general term of the sequence $\{a_n\}$ is $a_n = \frac{2n}{n+3}$, find the first term through the 3rd term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q037 | WRITTEN

C02-T01-S-EX1L

When the general term of the sequence $\{a_n\}$ is $a_n = \frac{n+1}{2n-1}$, find the first term through the 3rd term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q038 | MCQ C02-T01-G-M26

For $a_n = \frac{n+1}{n+2}$, the first three terms (a_1, a_2, a_3) are:

A $(\frac{2}{3}, \frac{3}{4}, \frac{4}{6})$

B $(\frac{2}{3}, \frac{3}{3}, \frac{4}{5})$

C $(\frac{2}{3}, \frac{3}{4}, \frac{4}{5})$

D $(-\frac{2}{3}, -\frac{3}{4}, -\frac{4}{5})$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q039 | MCQ C02-T01-G-M27

For $a_n = \frac{2n-1}{3n+1}$, the first three terms (a_1, a_2, a_3) are:

A $(\frac{1}{4}, \frac{3}{7}, \frac{1}{3})$

B $(\frac{1}{4}, \frac{3}{6}, \frac{1}{2})$

C $(-\frac{1}{4}, -\frac{3}{7}, -\frac{1}{2})$

D $(\frac{1}{4}, \frac{3}{7}, \frac{1}{2})$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q040 | MCQ C02-T01-G-M28

For $a_n = \frac{n^2+1}{n+1}$, the first three terms (a_1, a_2, a_3) are:

A $(1, \frac{5}{3}, \frac{5}{2})$

B $(1, \frac{5}{3}, \frac{5}{3})$

C $(1, \frac{5}{2}, \frac{5}{2})$

D $(-1, -\frac{5}{3}, -\frac{5}{2})$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q041 | MCQ C02-T01-G-M29

For $a_n = \frac{3n}{2n-1}$, the first three terms (a_1, a_2, a_3) are:

A $(3, 2, \frac{9}{6})$

B $(3, 2, \frac{9}{5})$

C $(3, 1, \frac{9}{5})$

D $(-3, -2, -\frac{9}{5})$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q042 | MCQ C02-T01-G-M30

For $a_n = \frac{2n+3}{n+4}$, the first three terms (a_1, a_2, a_3) are:

A $(1, \frac{7}{6}, \frac{9}{8})$

B $(1, \frac{7}{5}, \frac{9}{7})$

C $(1, \frac{7}{6}, \frac{9}{7})$

D $(-1, -\frac{7}{6}, -\frac{9}{7})$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q043 | MCQ C02-T01-G-M31

For $a_n = \frac{n}{3n-2}$, the first three terms (a_1, a_2, a_3) are:

A $(1, \frac{1}{4}, \frac{3}{8})$

B $(1, \frac{1}{3}, \frac{3}{7})$

C $(-1, -\frac{1}{4}, -\frac{3}{7})$

D $(1, \frac{1}{4}, \frac{3}{7})$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q044 | WRITTEN

C02-T01-S-WU2A

For the sequence $\{a_n\}$: 0, 1, 4, 9, 16, ..., deduce the general term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q045 | WRITTEN

C02-T01-S-TRY2A

For the sequence $\{a_n\}$: 0, 1, 8, 27, 64, ..., deduce the general term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q046 | WRITTEN C02-T01-S-EX2B

For the sequence $\{a_n\}$: 1, 4, 9, 16, 25, ..., deduce the general term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q047 | WRITTEN C02-T01-S-EX2G

For the sequence $\{a_n\}$: $7^2,\ 8^2,\ 9^2,\ 10^2,\ 11^2,\ \ldots$, deduce the general term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q048 | MCQ C02-T01-G-M33

Which formula gives the general term of $\{a_n\}$: 1, 8, 27, 64, ...?:

A n^2

B n^3

C n^5

D n^6

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q049 | MCQ C02-T01-G-M34

Which formula gives the general term of $\{a_n\}$: 9, 16, 25, 36, ...?:

A $(n+2)^3$

B $(n+2)^4$

C $(n+2)^2$

D $(n+2)^5$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q050 | MCQ C02-T01-G-M35

Which formula gives the general term of $\{a_n\}$: $-1,\ 0,\ 1,\ 8,\ \ldots$?:

A $(n-2)^2$

B $(n-2)^5$

C $(n-2)^6$

D $(n-2)^3$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q051 | MCQ C02-T01-G-M36

Which formula gives the general term of $\{a_n\}$: 36, 49, 64, 81, ...?:

A $(n+5)^2$

B $(n+5)^3$

C $(n+5)^4$

D $(n+5)^5$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q052 | MCQ C02-T01-G-M37

Which formula gives the general term of $\{a_n\}$: 1, 9, 25, 49, ...?:

A $(2n+1)^2$

B $(2n-1)^2$

C $(2n-1)^4$

D $(2n-1)^5$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q053 | MCQ C02-T01-G-M38

Which formula gives the general term of $\{a_n\}$: 0, 1, 16, 81, ...?:

A $(n+1)^4$

B $(n-1)^6$

C $(n-1)^4$

D $(n-1)^7$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q054 | WRITTEN

C02-T01-S-TRY2C

For the sequence $\{a_n\}$: 2, 5, 8, 11, 14, ..., deduce the general term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q055 | WRITTEN C02-T01-S-EX2A

For the sequence $\{a_n\}$: 0, 2, 4, 6, 8, ..., deduce the general term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q056 | WRITTEN C02-T01-S-EX2C

For the sequence $\{a_n\}$: 0, 3, 6, 9, 12, ..., deduce the general term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q057 | WRITTEN C02-T01-S-EX2H

For the sequence $\{a_n\}$: 4, 9, 14, 19, 24, ..., deduce the general term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q058 | WRITTEN C02-T01-S-EX2I

For the sequence $\{a_n\}$: 6, 13, 20, 27, 34, ..., deduce the general term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q059 | MCQ C02-T01-G-M40

Which formula gives the general term of $\{a_n\}$: 7, 12, 17, 22, ...?:

A $5n + 2$

B $(5n + 2) + 1$

C $(5n + 2) - 1$

D $-(5n + 2)$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q060 | MCQ

C02-T01-G-M41

Which formula gives the general term of $\{a_n\}$: $-4,\ -1,\ 2,\ 5,\ \ldots$?:

A $(3n-7)+1$

B $3n-7$

C $(3n-7)-1$

D $-(3n-7)$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q061 | MCQ C02-T01-G-M42

Which formula gives the general term of $\{a_n\}$: $10,\ 6,\ 2,\ -2,\ \ldots$?:

A $(14-4n)+1$

B $(14-4n)-1$

C $14-4n$

D $-(14-4n)$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q062 | MCQ

C02-T01-G-M43

Which formula gives the general term of $\{a_n\}$: $\frac{1}{2}$, 1, $\frac{3}{2}$, 2, ...?:

A $\left(\frac{n}{2}\right)+1$

B $\left(\frac{n}{2}\right)-1$

C $-\left(\frac{n}{2}\right)$

D $\frac{n}{2}$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V03

Q063 | WRITTEN C02-T01-S-WU2B

For the sequence $\{a_n\}$: $2,\ -4,\ 6,\ -8,\ 10,\ \ldots$, deduce the general term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V03

Q064 | WRITTEN C02-T01-S-TRY2B

For the sequence $\{a_n\}$: $-3,\ 6,\ -9,\ 12,\ -15,\ \ldots$, deduce the general term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V03

Q065 | WRITTEN C02-T01-S-EX2D

For the sequence $\{a_n\}$: $-5,\ 10,\ -15,\ 20,\ -25,\ \ldots$, deduce the general term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V03

Q066 | WRITTEN

C02-T01-S-EX2F

For the sequence $\{a_n\}$: $-1,\ 4,\ -7,\ 10,\ -13,\ \ldots$, deduce the general term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V04

Q067 | WRITTEN

C02-T01-S-WU2C

For the sequence $\{a_n\}$: 1, $\frac{2}{3}$, $\frac{3}{5}$, $\frac{4}{7}$, $\frac{5}{9}$, ..., deduce the general term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V04

Q068 | WRITTEN

C02-T01-S-TRY2D

For the sequence $\{a_n\}$: $1, \frac{3}{4}, \frac{5}{9}, \frac{7}{16}, \frac{9}{25}, \ldots$, deduce the general term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V04

Q069 | WRITTEN

C02-T01-S-EX2E

For the sequence $\{a_n\}$: $1,\ -\frac{1}{3},\ \frac{1}{5},\ -\frac{1}{7},\ \frac{1}{9},\ \ldots$, deduce the general term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V04

Q070 | WRITTEN

C02-T01-S-EX2J

For the sequence $\{a_n\}$: $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \ldots$, deduce the general term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V05

Q071 | WRITTEN C02-T01-S-EX2K

For the sequence $\{a_n\}$: $1\times 3,\ 2\times 9,\ 3\times 27,\ 4\times 81,\ 5\times 243,\ \ldots$, deduce the general term.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F99 | V01

Q072 | WRITTEN C02-T01-S-CH1

For the sequence $\{a_n\}$: $1 \times \frac{1}{2},\ 2 \times \frac{1}{3},\ 3 \times \frac{1}{4},\ 4 \times \frac{1}{5},\ 5 \times \frac{1}{6},\ \ldots$, deduce the general term then find the 20th term.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q073 | WRITTEN C02-T02-S-WU1

Find the first term and the common difference of the arithmetic sequences: (a) $2, 5, 8, 11, \ldots$; (b) $3, -2, -7, -12, -17, \ldots$.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q074 | WRITTEN C02-T02-S-TR1

Find the first term and common difference of: (a) 1, 5, 9, 13, 17, ...; (b) 23, 19, 15, 11, 7, ...

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q075 | MCQ C02-T02-G-001

The listed terms $\{a_n\} = (4, 9, 14, 19, \ldots)$ form an arithmetic sequence. Find the ordered pair (a, d) of first term and common difference select the correct ordered pair a, d:

A $(4, 4)$

B $(4, 5)$

C $(5, 4)$

D $(4, -5)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q076 | MCQ C02-T02-G-002

The listed terms $\{a_n\} = (-7, -3, 1, 5, \ldots)$ form an arithmetic sequence. Find the ordered pair (a, d) of first term and common difference select the correct ordered pair a, d:

A $(-7, 4)$

B $(-7, -4)$

C $(7, 4)$

D $(-3, 4)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q077 | MCQ C02-T02-G-003

The listed terms $\{a_n\} = (18, 13, 8, 3, \ldots)$ form an arithmetic sequence. Find the ordered pair (a, d) of first term and common difference select the correct ordered pair a, d:

A $(18, 5)$

B $(13, -5)$

C $(18, -5)$

D $(-18, -5)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q078 | MCQ C02-T02-G-006

The listed terms $\{a_n\} = (12, 8, 4, 0, \ldots)$ form an arithmetic sequence. Find the ordered pair (a, d) of first term and common difference select the correct ordered pair a, d:

A $(12, 4)$

B $(8, -4)$

C $(-12, -4)$

D $(12, -4)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q079 | WRITTEN

C02-T02-S-EX1

Find the first term and common difference of: (a) $3, 5, 7, 9, 11, \ldots$; (b) $-13, -9, -5, -1, 3, \ldots$; (c) $-2, 1, 4, 7, 10, \ldots$; (d) $10, 7, 4, 1, -2, \ldots$; (e) $6, \frac{16}{3}, \frac{14}{3}, 4, \frac{10}{3}, \ldots$; (f) $-4, -\frac{9}{2}, -5, -\frac{11}{2}, -6, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q080 | MCQ C02-T02-G-004

The listed terms $\{a_n\} = (\frac{1}{2}, \frac{5}{6}, \frac{7}{6}, \frac{3}{2}, \ldots)$ form an arithmetic sequence. Find the ordered pair (a, d) of first term and common difference select the correct ordered pair a, d:

A $(\frac{1}{2}, \frac{2}{3})$

B $(\frac{1}{2}, \frac{1}{3})$

C $(\frac{1}{3}, \frac{1}{2})$

D $(-\frac{1}{2}, \frac{1}{3})$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q081 | MCQ

C02-T02-G-005

The listed terms $\{a_n\} = (-\frac{3}{4}, -\frac{1}{4}, \frac{1}{4}, \frac{3}{4}, \ldots)$ form an arithmetic sequence. Find the ordered pair (a, d) of first term and common difference select the correct ordered pair a, d:

A $(-\frac{3}{4}, \frac{1}{2})$

B $(-\frac{3}{4}, -\frac{1}{2})$

C $(\frac{3}{4}, \frac{1}{2})$

D $(-\frac{1}{4}, \frac{1}{2})$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q082 | MCQ

C02-T02-G-007

The listed terms $\{a_n\} = (\frac{5}{3}, 2, \frac{7}{3}, \frac{8}{3}, \ldots)$ form an arithmetic sequence. Find the ordered pair (a, d) of first term and common difference select the correct ordered pair a, d:

A $(\frac{5}{3}, \frac{2}{3})$

B $(2, \frac{1}{3})$

C $(\frac{5}{3}, \frac{1}{3})$

D $(-\frac{5}{3}, \frac{1}{3})$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q083 | MCQ C02-T02-G-008

The listed terms $\{a_n\} = (-\frac{5}{2}, -1, \frac{1}{2}, 2, \ldots)$ form an arithmetic sequence. Find the ordered pair (a, d) of first term and common difference select the correct ordered pair a, d:

A $(-\frac{5}{2}, -\frac{3}{2})$

B $(-\frac{5}{2}, \frac{3}{2})$

C $(\frac{5}{2}, \frac{3}{2})$

D $(-1, \frac{3}{2})$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q084 | WRITTEN C02-T02-S-WU2

The sequences are arithmetic. Find the common difference and the numbers that fit in (A) and (B): (a) $A, 2, -1, B, \ldots$; (b) $13, A, B, -2, \ldots$.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q085 | WRITTEN C02-T02-S-TR2

The sequences are arithmetic. Find the common difference and the missing numbers: (a) $2, 9, A, B, \ldots$; (b) $A, 17, B, 5, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q086 | MCQ

C02-T02-G-014

The sequence $\{a_n\} = (6, A, 14, B, \ldots)$ is arithmetic. Determine the common difference and every missing letter select the correct values of d and the missing terms:

A $d = 4, A = 10, B = 18$

B $d = 8, A = 14, B = 22$

C $d = 4, A = 12, B = 18$

D $d = -4, A = 2, B = 10$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q087 | MCQ C02-T02-G-015

The sequence $\{a_n\} = (A, 5, 9, B, \ldots)$ is arithmetic. Determine the common difference and every missing letter select the correct values of d and the missing terms:

A $d = 4, A = 9, B = 13$

B $d = -4, A = 9, B = 1$

C $d = 4, A = 1, B = 13$

D $d = 2, A = 3, B = 11$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q088 | MCQ C02-T02-G-016

The sequence $\{a_n\} = (11, A, B, 23, \ldots)$ is arithmetic. Determine the common difference and every missing letter select the correct values of d and the missing terms:

A $d = 3, A = 14, B = 17$

B $d = 4, A = 15, B = 19$

C $d = 4, A = 14, B = 17$

D $d = -4, A = 7, B = 3$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q089 | WRITTEN

C02-T02-S-EX2

Find the common difference and missing terms: (a) $8, 15, A, B, \ldots$; (b) $7, 13, A, B, \ldots$; (c) $A, 9, 4, B, \ldots$; (d) $A, 15, B, 9, \ldots$; (e) $11, A, B, 20, \ldots$; (f) $17, A, B, 5, C, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V01

Q090 | WRITTEN C02-T02-S-TR3

For each arithmetic sequence, find the general term and the 7th term: (a) first term (4), common difference (3); (b) first term (2), common difference -3.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V02

Q091 | WRITTEN C02-T02-S-EX3

For each arithmetic sequence, find the general term and the 7th term: (a) $a = 5, d = 4$; (b) $a = -2, d = 3$; (c) $a = 10, d = -3$; (d) $a = -\frac{1}{2}, d = -\frac{1}{2}$.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V04

Q092 | WRITTEN C02-T02-S-WU3

For the arithmetic sequence a_n with first term (8) and common difference -6, find the general term and the 20th term.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V04

Q093 | WRITTEN C02-T02-S-EX4

For each arithmetic sequence, find the general term and the 10th term: (a) $a = -7, d = 3$; (b) $a = -2, d = -3$; (c) $a = 7, d = \frac{1}{2}$; (d) $a = \frac{2}{3}, d = -\frac{1}{3}$.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F99 | V01

Q094 | WRITTEN

C02-T02-S-CH1

In an arithmetic sequence, $a_3 + a_7 = 38$ and $\frac{a_4}{a_{12}} = \frac{2}{5}$. Find the first term and common difference.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q095 | WRITTEN C02-T03-S-TR1A

Find the general term of the arithmetic sequence whose first term is -5 and whose 17th term is 75.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q096 | WRITTEN C02-T03-S-EX1A

The first term is 6, and the 4th term is 18. Find a_n.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q097 | WRITTEN C02-T03-S-EX1B

The first term is 20, and the 8th term is -1. Find a_n.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q098 | WRITTEN C02-T03-S-EX1C

The first term is -8, and the 8th term is 55. Find a_n.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q099 | WRITTEN C02-T03-S-EX1D

The first term is -18, and the 10th term is -63. Find a_n.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q100 | MCQ C02-T03-G-M01

An arithmetic sequence has $a = 4$ and $a_7 = 22$. Select the correct pair (a_n, d):

A $(3n - 1, 3)$

B $(4n, 4)$

C $(3n + 1, 4)$

D $(a_n, d) = (3n + 1, 3)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n - 1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n - 1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q101 | MCQ C02-T03-G-M02

An arithmetic sequence has $a = -3$ and $a_9 = 29$. Select the correct pair (a_n, d):

A $(4n - 3, 4)$

B $(a_n, d) = (4n - 7, 4)$

C $(5n - 8, 5)$

D $(4n - 7, -4)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q102 | MCQ C02-T03-G-M03

An arithmetic sequence has $a = 12$ and $a_5 = -4$. Select the correct pair (a_n, d):

A $(a_n, d) = (16 - 4n, -4)$

B $(12 - 4n, -4)$

C $(16 + 4n, 4)$

D $(16 - 3n, -3)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q103 | MCQ C02-T03-G-M04

An arithmetic sequence has $a = 5$ and $a_{11} = 45$. Select the correct pair (a_n, d):

A $(5n, 5)$

B $(a_n, d) = (4n + 1, 4)$

C $(4n - 1, 4)$

D $(4n + 1, -4)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n - 1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n - 1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q104 | WRITTEN

C02-T03-S-TR1B

Find the general term of the arithmetic sequence whose common difference is 3 and whose 16th term is 81.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q105 | WRITTEN

C02-T03-S-EX1E

The common difference is 2, and the 8th term is 4. Find a_n.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q106 | WRITTEN

C02-T03-S-EX1F

The common difference is -4, and the 5th term is -7. Find a_n.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q107 | WRITTEN C02-T03-S-EX1G

The common difference is -7, and the 6th term is -24. Find a_n.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q108 | MCQ C02-T03-G-M05

An arithmetic sequence has common difference -2 and $a_4 = 1$. Select the correct pair (a_n, a):

A $(a_n, a) = (9 - 2n, 7)$

B $(7 - 2n, 9)$

C $(1 - 2n, 3)$

D $(9 + 2n, 7)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q109 | MCQ C02-T03-G-M06

An arithmetic sequence has common difference 5 and $a_6 = 17$. Select the correct pair (a_n, a):

A $(5n - 3, -2)$

B $(17 + 5n, 2)$

C $(13 - 5n, 8)$

D $(a_n, a) = (5n - 13, -8)$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q110 | MCQ C02-T03-G-M07

An arithmetic sequence has common difference 4 and $a_{10} = 38$. Select the correct pair (a_n, a):

A $(4n + 2, -2)$

B $(2n + 4, 6)$

C $(a_n, a) = (4n - 2, 2)$

D $(4n - 2, 4)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n - 1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n - 1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q111 | MCQ C02-T03-G-M08

An arithmetic sequence has common difference -3 and $a_8 = -18$. Select the correct pair (a_n, a):

A $(3 - 3n, 6)$

B $(6 + 3n, 3)$

C $(6 - 2n, 2)$

D $(a_n, a) = (6 - 3n, 3)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q112 | WRITTEN C02-T03-S-WU1

Find the general term of the arithmetic sequence $\{a_n\}$ whose 3rd term is 10 and the 8th term is 50.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q113 | WRITTEN C02-T03-S-TR1C

Find the general term of the arithmetic sequence whose 6th term is 2 and whose 15th term is -25.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q114 | WRITTEN

C02-T03-S-EX1I

The 4th term is 14, and the 10th term is 62. Find a_n.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q115 | WRITTEN

C02-T03-S-EX1J

The 3rd term is 30, and the 10th term is 2. Find a_n.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q116 | WRITTEN

C02-T03-S-EX1K

The 10th term is 49, and the 23rd term is 10. Find a_n.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q117 | WRITTEN

C02-T03-S-EX1L

The 3rd term is 6, and the 10th term is 62. Find a_n.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q118 | MCQ C02-T03-G-M09

An arithmetic sequence has $a_3 = 5$ and $a_9 = 17$. Select the correct pair (a_n, a):

A $(2n+1, -1)$

B $(n+3, 2)$

C $(a_n, a) = (2n-1, 1)$

D $(2n-1, 5)$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q119 | MCQ C02-T03-G-M10

An arithmetic sequence has $a_4 = 7$ and $a_{10} = -5$. Select the correct pair (a_n, a):

A $(13 - 2n, 15)$

B $(15 + 2n, 5)$

C $(a_n, a) = (15 - 2n, 13)$

D $(2n - 15, -13)$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q120 | MCQ C02-T03-G-M11

An arithmetic sequence has $a_7 = 31$ and $a_{12} = 56$. Select the correct pair (a_n, a):

A $(5n + 4, -1)$

B $(a_n, a) = (5n - 4, 1)$

C $(4n - 5, 2)$

D $(5n - 4, 31)$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q121 | MCQ C02-T03-G-M12

An arithmetic sequence has $a_2 = -4$ and $a_8 = 14$. Select the correct pair (a_n, a):

A $(a_n, a) = (3n - 10, -7)$

B $(3n - 4, -1)$

C $(2n - 7, -5)$

D $(10 - 3n, 7)$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q122 | MCQ

C02-T03-G-M13

An arithmetic sequence has $a_5 = 3$ and $a_{11} = 9$. Select the correct pair (a_n, a):

A $\left(a_n = \frac{n-2}{2}, -\frac{1}{2}\right)$

B $\left(a_n = \frac{n+2}{2}, -\frac{5}{2}\right)$

C $\left(a_n = \frac{n-2}{2}, \frac{1}{2}\right)$

D $\left(a_n = \frac{2n-1}{3}, -\frac{1}{3}\right)$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Q123 | MCQ C02-T03-G-M14

An arithmetic sequence has $a_2 = 6$ and $a_9 = 20$. Select the correct pair (a_n, a):

A $(a_n = 2n + 4, 2)$

B $(a_n = 2n + 2, 4)$

C $(a_n = n + 4, 5)$

D $(a_n = 2n - 2, 8)$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V04

Q124 | WRITTEN

C02-T03-S-EX1H

The common difference is $\frac{2}{5}$, and the 30th term is $\frac{23}{5}$. Find a_n.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V04

Q125 | MCQ

C02-T03-G-M15

An arithmetic sequence has $d = -\frac{3}{2}$ and $a_5 = -9$. Select the correct pair (a_n, a):

A $\left(a_n = -\frac{3(n+1)}{2}, -3\right)$

B $\left(a_n = -\frac{3(n-1)}{2}, -6\right)$

C $\left(a_n = \frac{3(n+1)}{2}, 3\right)$

D $\left(a_n = -\frac{n+1}{2}, -3\right)$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V04

Q126 | MCQ

C02-T03-G-M16

An arithmetic sequence has $d = \frac{2}{3}$ and $a_{12} = 10$. Select the correct pair (a_n, a):

A $\left(a_n = \frac{2n+4}{3}, 2\right)$

B $\left(a_n = \frac{2n-6}{3}, -\frac{8}{3}\right)$

C $\left(a_n = \frac{n+6}{3}, \frac{8}{3}\right)$

D $\left(a_n = \frac{2n+6}{3}, \frac{8}{3}\right)$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q127 | WRITTEN

C02-T03-S-WU2A

For the arithmetic sequence $\{a_n\}$ with common difference 4 and $a_8 = 33$, which term is 113?

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q128 | WRITTEN C02-T03-S-TR2A

For the arithmetic sequence with first term 1 and common difference 3, determine which term is 40.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q129 | WRITTEN C02-T03-S-EX2A

For the arithmetic sequence with common difference -5 and 13th term -7, determine which term is -52.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q130 | WRITTEN C02-T03-S-EX3A

For the arithmetic sequence whose 10th term is -20 and 20th term is -50, determine which term is -110.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q131 | MCQ C02-T03-G-M17

For $a = 3, d = 4$, which term of the arithmetic sequence is 59?:

A $n = 14$

B $n = 16$

C $n = 15$

D $n = 13$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q132 | MCQ C02-T03-G-M18

For $a = -5, d = 6$, which term of the arithmetic sequence is 55?:

A $n = 10$

B $n = 12$

C $n = 9$

D $n = 11$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q133 | MCQ C02-T03-G-M19

For $a = 20, d = -3$, which term of the arithmetic sequence is -16?:

A $n = 13$

B $n = 12$

C $n = 14$

D $n = 11$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q134 | MCQ C02-T03-G-M20

For $a = 1, d = 5$, which term of the arithmetic sequence is 86?:

A $n = 17$

B $n = 18$

C $n = 19$

D $n = 16$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q135 | WRITTEN

C02-T03-S-WU2B

For the arithmetic sequence $\{a_n\}$ with common difference 4 and $a_8 = 33$, find the first term greater than 500.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q136 | WRITTEN

C02-T03-S-TR2B

For the arithmetic sequence with first term 1 and common difference 3, find the first term greater than 100.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q137 | MCQ C02-T03-G-M21

For $a = 2, d = 7$, find the first term greater than 100:

A $n = 16$

B $n = 15$

C $n = 17$

D $n = 14$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q138 | MCQ C02-T03-G-M22

For $a = -9, d = 4$, find the first term greater than 50:

A $n = 15$

B $n = 17$

C $n = 14$

D $n = 16$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q139 | MCQ C02-T03-G-M23

For $a = 6, d = 3$, find the first term greater than 200:

A $n = 65$

B $n = 67$

C $n = 64$

D $n = 66$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q140 | MCQ C02-T03-G-M24

For $a = -1, d = 9$, find the first term greater than 300:

A $n = 34$

B $n = 35$

C $n = 36$

D $n = 33$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V03

Q141 | WRITTEN C02-T03-S-EX2B

For the arithmetic sequence with common difference -5 and 13th term -7, find the first term smaller than -300.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V03

Q142 | WRITTEN C02-T03-S-EX3B

For the arithmetic sequence whose 10th term is -20 and 20th term is -50, find the first term smaller than -500.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V03

Q143 | MCQ C02-T03-G-M25

For $a = 10, d = -4$, find the first term smaller than -100:

A $n = 28$

B $n = 29$

C $n = 30$

D $n = 27$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V03

Q144 | MCQ C02-T03-G-M26

For $a = 25, d = -6$, find the first term smaller than -250:

A $n = 46$

B $n = 47$

C $n = 48$

D $n = 45$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V03

Q145 | MCQ C02-T03-G-M27

For $a = -3, d = -5$, find the first term smaller than -200:

A $n = 40$

B $n = 42$

C $n = 41$

D $n = 39$

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V04

Q146 | MCQ C02-T03-G-M28

For $a = 4, d = 6$, find the first term that is at least 100:

A $n = 17$

B $n = 16$

C $n = 18$

D $n = 15$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V04

Q147 | MCQ C02-T03-G-M29

For the expression For $a = 5, d = 4$, does the sequence contain the term 42?, the required value is:

A $n = 9$

B No term

C $n = 10$

D $n = 11$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V01

Q148 | WRITTEN

C02-T03-S-EX4

When $a, 6, 2a$ form an arithmetic sequence in this order, find a.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V02

Q149 | WRITTEN C02-T03-S-WU3

When the three numbers $x, 6, x^2$ form an arithmetic sequence in this order, find x.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V02

Q150 | WRITTEN

C02-T03-S-TR3

When $x^2, x, -8$ form an arithmetic sequence in this order, find x.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V02

Q151 | WRITTEN

C02-T03-S-EX5

When $-3, x, x^2$ form an arithmetic sequence in this order, find x.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F99 | V01

Q152 | CHALLENGE WRITTEN C02-T03-S-CH1

When $2, x, y, z$ form an arithmetic sequence in this order, and $2x, y+1, z-y$ also form an arithmetic sequence in this order, find x, y, z.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q153 | WRITTEN C02-T04-S-WU1A

Find the sum (S_7) of a sequence with first term (8), last term (22), and (7) terms.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q154 | WRITTEN C02-T04-S-TR1A

Find (S_{10}) for a sequence with first term (7), last term (13), and (10) terms.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q155 | WRITTEN C02-T04-S-EX1A

Find (S_{10}) for a sequence with first term (3), last term (21), and (10) terms.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q156 | WRITTEN C02-T04-S-EX1B

Find (S_8) for a sequence with first term (5), last term (33), and (8) terms.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q157 | WRITTEN C02-T04-S-EX1C

Find (S_{10}) for a sequence with first term (2), last term (29), and (10) terms.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q158 | MCQ C02-T04-G-M01

A sequence has first term 6, last term 30, and 7 terms. Find its sum:

A 105

B 126

C 132

D 168

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q159 | MCQ C02-T04-G-M02

A sequence has first term -4, last term 20, and 9 terms. Find its sum:

A 64

B 72

C 81

D 144

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q160 | MCQ C02-T04-G-M03

Find the sum of 10 terms whose first term is 15 and last term is 3:

A 45

B 90

C 150

D 180

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q161 | MCQ C02-T04-G-M04

The first term is 7, the last term is 42, and there are 8 terms. Find S_8:

A 168

B 196

C 224

D 392

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q162 | MCQ C02-T04-G-M05

Find the sum of 6 terms with first term -12 and last term 8:

A -120

B -12

C 12

D -2

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q163 | MCQ C02-T04-G-M06

A sequence has $S_9 = 72$ and first term -4. Find its last term:

A 12

B 16

C 20

D 24

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q164 | WRITTEN

C02-T04-S-WU1C

Find (S_{13}) when the first term is (20), the common difference is (-5), and the number of terms is (13).

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q165 | WRITTEN C02-T04-S-TR1C

Find (S_{12}) when the first term is (-6), the common difference is (3), and there are (12) terms.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q166 | WRITTEN

C02-T04-S-EX1G

Find (S_{15}) when the first term is (10), the common difference is (-3), and there are (15) terms.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q167 | WRITTEN C02-T04-S-EX1H

Find (S_{11}) when the first term is (-4), the common difference is (4), and there are (11) terms.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q168 | WRITTEN C02-T04-S-EX1I

Find (S_{18}) when the first term is (3), the common difference is (2), and there are (18) terms.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q169 | MCQ C02-T04-G-M07

For $a = 4, d = 3, n = 12$, find S_{12}:

A 198

B 228

C 246

D 264

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q170 | MCQ C02-T04-G-M08

For $a = 9, d = -2, n = 10$, find S_{10}:

A -90

B 0

C 9

D 90

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q171 | MCQ

C02-T04-G-M09

For $a = -5, d = 4, n = 9$, find S_9:

A -88

B 44

C 88

D 99

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q172 | MCQ C02-T04-G-M10

For $a = 2, d = -3, n = 15$, find S_{15}:

A -315

B -285

C -270

D 285

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q173 | MCQ C02-T04-G-M11

For $a = 11, d = 0, n = 8$, find S_8:

A 11

B 44

C 88

D 96

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q174 | MCQ C02-T04-G-M12

For $a = -3, d = -2, n = 7$, find S_7:

A -42

B -54

C 54

D -63

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V01

Q175 | WRITTEN C02-T04-S-WU1B

Find the sum (S) of a sequence with first term (2), common difference (3), and last term (47).

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V01

Q176 | WRITTEN C02-T04-S-TR1B

Find (S) for a sequence with first term (5), common difference (3), and last term (44).

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V01

Q177 | WRITTEN C02-T04-S-EX1D

Find (S) for a sequence with first term (3), common difference (4), and last term (75).

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V01

Q178 | WRITTEN C02-T04-S-EX1E

Find (S) for a sequence with first term (2), common difference (5), and last term (57).

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V01

Q179 | WRITTEN C02-T04-S-EX1F

Find (S) for a sequence with first term (4), common difference (3), and last term (100).

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V01

Q180 | MCQ C02-T04-G-M13

A sequence has $a = 5, d = 4, l = 41$. Find its sum:

A 205

B 225

C 230

D 246

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V01

Q181 | MCQ C02-T04-G-M15

A sequence has $a = -7, d = 5, l = 48$. Find its sum:

A 228

B 240

C 246

D 264

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V01

Q182 | MCQ C02-T04-G-M16

A sequence has $a = 12, d = 2, l = 50$. Find its sum:

A 580

B 600

C 620

D 640

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V01

Q183 | MCQ C02-T04-G-M18

A sequence has $a = -10, d = 6, l = 50$. Find its sum:

A 198

B 210

C 220

D 240

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V02

Q184 | MCQ C02-T04-G-M14

A sequence has $a = 18, d = -3, l = -9$. Find its sum:

A -45

B 36

C 45

D 90

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V02

Q185 | MCQ C02-T04-G-M17

A sequence has $a = 40, d = -4, l = -12$. Find its sum:

A 168

B 196

C 224

D 280

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V01

Q186 | WRITTEN

C02-T04-S-TR2

For the arithmetic sequence with first term (48) and common difference (-2), find the sum from the 20th term to the 30th term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V01

Q187 | WRITTEN C02-T04-S-EX3

For the arithmetic sequence with first term (-53) and common difference (4), find the sum from the 10th term to the 25th term.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V01

Q188 | MCQ C02-T04-G-M19

For $a = 3, d = 4$, find the sum from a_5 to a_{12}:

A 252

B 264

C 276

D 288

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V01

Q189 | MCQ C02-T04-G-M20

For $a = 20, d = -3$, find the sum from a_4 to a_{10}:

A -14

B 7

C 14

D 28

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V01

Q190 | MCQ C02-T04-G-M22

For $a = 60, d = -3$, find the sum from a_8 to a_{16}:

A 216

B 234

C 243

D 270

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V01

Q191 | MCQ C02-T04-G-M23

For $a = 1, d = 7$, find the sum from a_3 to a_9:

A 224

B 245

C 252

D 266

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V01

Q192 | MCQ C02-T04-G-M25

For $a = 60, d = -3$, find the sum from a_9 to a_{17}:

A 198

B 216

C 225

D 234

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V01

Q193 | MCQ C02-T04-G-M26

For $a = 12, d = 5$, find the sum from a_2 to a_8:

A 196

B 210

C 224

D 238

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V02

Q194 | WRITTEN C02-T04-S-WU2

For the arithmetic sequence $(90, 84, 78, \ldots)$, find the sum from the 10th term to the 20th term.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V02

Q195 | WRITTEN C02-T04-S-EX2

For the arithmetic sequence $(-9, -3, 3, \ldots)$, find the sum from the 11th term to the 20th term.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V02

Q196 | WRITTEN C02-T04-S-EX4

For the arithmetic sequence $(74, 69, 64, \ldots)$, find the sum from the 8th term to the 18th term.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V02

Q197 | MCQ C02-T04-G-M21

For $a = 4, d = 5$, find the sum from a_6 to a_{13}:

A 248

B 336

C 372

D 384

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V02

Q198 | MCQ C02-T04-G-M24

For $a = -25, d = 6$, find the sum from a_5 to a_{11}:

A 105

B 112

C 119

D 126

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F05 | V01

Q199 | WRITTEN

C02-T04-S-WU1D

Find (S_n) for a sequence with first term (1) and common difference (4).

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F05 | V01

Q200 | WRITTEN

C02-T04-S-TR1D

Find (S_n) for a sequence with first term (2) and common difference (-3).

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F05 | V01

Q201 | WRITTEN C02-T04-S-EX1J

Find (S_n) for a sequence with first term (0) and common difference (5).

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F05 | V01

Q202 | WRITTEN C02-T04-S-EX1K

Find (S_n) for a sequence with first term (3) and common difference (-4).

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F05 | V01

Q203 | WRITTEN C02-T04-S-EX1L

Find (S_n) for a sequence with first term (-4) and common difference (-2).

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F06 | V01

Q204 | CHALLENGE WRITTEN C02-T04-S-CH1

For the arithmetic sequence (94, 89, 84, …), find the sum of the odd-numbered terms from the first term to the 11th term.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q205 | WRITTEN C02-T05-S-WU1

Find the sum of the natural numbers from 1 to 100.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q206 | WRITTEN C02-T05-S-T1

Find the sum of the natural numbers from 1 to 200.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q207 | WRITTEN

C02-T05-S-E1

Find the sum of the natural numbers from 1 to 150.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q208 | WRITTEN

C02-T05-S-E2

Find the sum of the natural numbers from 1 to 70.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q209 | WRITTEN C02-T05-S-E3

Find the sum of the natural numbers from 1 to 100.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q210 | WRITTEN C02-T05-S-E4

Find the sum of the natural numbers from 1 to 400.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q211 | WRITTEN C02-T05-S-E5

Find the sum of the natural numbers from 1 to 250.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q212 | WRITTEN C02-T05-S-E6

Find the sum of the natural numbers from 1 to 81.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q213 | WRITTEN C02-T05-S-E7

Find the sum of the natural numbers from 1 to 301.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q214 | WRITTEN C02-T05-S-E8

Find the sum of the natural numbers from 1 to 99.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q215 | MCQ C02-T05-G-M01

Find the sum of the natural numbers from 1 to 30:

A 435

B 465

C 495

D 525

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q216 | MCQ C02-T05-G-M02

Find the sum of the natural numbers from 1 to 45:

A 990

B 1035

C 1080

D 1125

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q217 | MCQ C02-T05-G-M03

Find the sum of the natural numbers from 1 to 60:

A 1770

B 1830

C 1890

D 1950

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q218 | MCQ C02-T05-G-M04

Find the sum of the natural numbers from 1 to 75:

A 2775

B 2850

C 2925

D 3000

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q219 | MCQ C02-T05-G-M05

Find the sum of the natural numbers from 1 to 90:

A 4005

B 4095

C 4185

D 4275

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q220 | MCQ

C02-T05-G-M06

Find the sum of the natural numbers from 1 to 125:

A 7750

B 7875

C 8000

D 8125

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q221 | MCQ C02-T05-G-M07

Find the sum of the natural numbers from 1 to 180:

A 16110

B 16290

C 16470

D 16650

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q222 | MCQ

C02-T05-G-M08

Find the sum of the natural numbers from 1 to 220:

A 24090

B 24310

C 24530

D 24750

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q223 | MCQ C02-T05-G-M09

Find the sum of the natural numbers from 1 to 275:

A 37675

B 37950

C 38225

D 38500

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q224 | MCQ

C02-T05-G-M10

Find the sum of the natural numbers from 1 to 350:

A 61075

B 61425

C 61775

D 62125

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q225 | WRITTEN C02-T05-S-WU2

Find the sum of the natural numbers from 101 to 200.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q226 | WRITTEN

C02-T05-S-T2

Find the sum of the natural numbers from 201 to 300.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q227 | WRITTEN

C02-T05-S-EX4

Find the sum of all two-digit natural numbers.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q228 | MCQ C02-T05-G-M11

A sequence has first term 5, last term 35, and 7 terms. Select its sum:

A 133

B 140

C 147

D 154

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q229 | MCQ C02-T05-G-M12

A sequence has first term 12, last term 68, and 9 terms. Select its sum:

A 351

B 360

C 369

D 378

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q230 | MCQ C02-T05-G-M13

A sequence has first term -4, last term 20, and 9 terms. Select its sum:

A 63

B 72

C 81

D 90

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q231 | MCQ C02-T05-G-M14

A sequence has first term 7, last term 42, and 8 terms. Select its sum:

A 188

B 196

C 204

D 212

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q232 | MCQ C02-T05-G-M15

A sequence has first term 15, last term 3, and 10 terms. Select its sum:

A 80

B 90

C 100

D 110

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q233 | MCQ C02-T05-G-M16

A sequence has first term 10, last term 70, and 13 terms. Select its sum:

A 507

B 520

C 533

D 546

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q234 | MCQ C02-T05-G-M17

A sequence has first term 2, last term 57, and 12 terms. Select its sum:

A 342

B 354

C 366

D 378

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q235 | MCQ C02-T05-G-M18

A sequence has first term 25, last term 100, and 16 terms. Select its sum:

A 984

B 1000

C 1016

D 1032

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q236 | MCQ C02-T05-G-M19

A sequence has first term 101, last term 200, and 100 terms. Select its sum:

A 14950

B 15050

C 15150

D 15250

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q237 | MCQ C02-T05-G-M20

A sequence has first term 31, last term 91, and 16 terms. Select its sum:

A 960

B 976

C 992

D 1008

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q238 | WRITTEN C02-T05-S-WU3

Find the sum of the multiples of 3 among the two-digit natural numbers.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q239 | WRITTEN

C02-T05-S-T3

Find the sum of all two-digit natural numbers that are multiples of 5.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q240 | WRITTEN

C02-T05-S-EX6

Find the sum of the multiples of 4 from 1 to 100.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q241 | WRITTEN

C02-T05-S-EX8

Find the sum of all multiples of 6 from 10 to 100.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q242 | MCQ C02-T05-G-M21

Select the sum of the multiples of 3 from 3 to 99:

A 1680

B 1683

C 1686

D 1689

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V02

Q243 | MCQ C02-T05-G-M22

Select the sum of the multiples of 4 from 4 to 100:

A 1296

B 1300

C 1304

D 1308

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V01

Q244 | WRITTEN C02-T05-S-EX7

Find the sum of the natural numbers from 1 to 100 that leave a remainder of 1 when divided by 4.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V02

Q245 | WRITTEN C02-T05-S-T4

Find the sum of all two-digit natural numbers that leave a remainder of 3 when divided by 5.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V01

Q246 | WRITTEN C02-T05-S-EX5

Find the sum of all two-digit odd natural numbers.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V02

Q247 | WRITTEN C02-T05-S-EX9

Find the sum of all natural numbers from 10 to 100 that are not divisible by 6.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F99 | V01

Q248 | CHALLENGE WRITTEN C02-T05-S-CH1

Find the sum of the numbers from 1 to 100 which are not divisible by 4.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q249 | WRITTEN C02-T06-S-WU1

In an arithmetic sequence with first term 4 and common difference 3, find how many terms from the first term have sum 50.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q250 | WRITTEN C02-T06-S-E1

Find n when $a = 3, d = 2$ and $S_n = 63$.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q251 | MCQ C02-T06-G-M01

Select the correct option: Find n if $S_n = 48$ for $a = 3, d = 2$:

A 5

B 6

C 7

D 8

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q252 | MCQ C02-T06-G-M02

Select the correct option: Find n if $S_n = 80$ for $a = 3, d = 2$:

A 7

B 8

C 9

D 10

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q253 | MCQ C02-T06-G-M03

Select the correct option: Find n if $S_n = 120$ for $a = 3, d = 2$:

A 9

B 10

C 11

D 12

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q254 | MCQ C02-T06-G-M04

Select the correct option: Find n if $S_n = 168$ for $a = 3, d = 2$:

A 11

B 12

C 13

D 14

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q255 | MCQ C02-T06-G-M05

Select the correct option: Find n if $S_n = 255$ for $a = 3, d = 2$:

A 14

B 15

C 16

D 17

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q256 | MCQ C02-T06-G-M06

Select the correct option: Find n if $S_n = 360$ for $a = 3, d = 2$:

A 17

B 18

C 19

D 20

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q257 | MCQ C02-T06-G-M07

Select the correct option: Find n if $S_n = 440$ for $a = 3, d = 2$:

A 19

B 20

C 21

D 22

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q258 | MCQ C02-T06-G-M08

Select the correct option: Find n if $S_n = 624$ for $a = 3, d = 2$:

A 23

B 24

C 25

D 26

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q259 | MCQ C02-T06-G-M09

Select the correct option: Find n if $S_n = 840$ for $a = 3, d = 2$:

A 27

B 28

C 29

D 30

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q260 | MCQ C02-T06-G-M10

Select the correct option: Find n if $S_n = 1088$ for $a = 3, d = 2$:

A 31

B 32

C 33

D 34

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q261 | MCQ C02-T06-G-M11

Select the correct option: Find n if $S_n = 1368$ for $a = 3, d = 2$:

A 35

B 36

C 37

D 38

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Q262 | MCQ C02-T06-G-M12

Select the correct option: Find n if $S_n = 1680$ for $a = 3, d = 2$:

A 39

B 40

C 41

D 42

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q263 | WRITTEN C02-T06-S-T1

For first term 17 and common difference -2, find how many terms have sum -63.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q264 | WRITTEN C02-T06-S-E2

Find n when $a = 24, d = -4$ and $S_n = -28$.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q265 | MCQ C02-T06-G-M13

Select the correct option: For $a = 10, d = 3$, find n when $S_n = 80$:

A 3

B 4

C 5

D 6

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q266 | MCQ C02-T06-G-M14

Select the correct option: For $a = 10, d = 3$, find n when $S_n = 133$:

A 5

B 6

C 7

D 8

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q267 | MCQ C02-T06-G-M15

Select the correct option: For $a = 10, d = 3$, find n when $S_n = 198$:

A 7

B 8

C 9

D 10

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V02

Q268 | MCQ C02-T06-G-M16

Select the correct option: For $a = 10, d = 3$, find n when $S_n = 275$:

A 9

B 10

C 11

D 12

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q269 | WRITTEN C02-T06-S-WU2

Find the general term of $\{a_n\}$ with first term -60 and sum of the first 15 terms -60.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q270 | WRITTEN C02-T06-S-T2

Find the general term with first term 8 and sum of the first 13 terms -130.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q271 | WRITTEN C02-T06-S-E3

Find the general term with first term 4 and $S_6 = 114$.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F02 | V01

Q272 | WRITTEN

C02-T06-S-E6

Find the general term when $a_3 = 10$ and $S_{10} = 175$.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V02

Q273 | WRITTEN C02-T06-S-WU3

For first term 65 and common difference -4, find the number of terms giving the maximum sum and the sum.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V02

Q274 | WRITTEN C02-T06-S-T3

For first term 70 and common difference -4, find the number of terms giving the maximum sum and the sum.

WORKING AREA

FORMULA BANK

General term
$$a_n = a + (n-1)d$$

Sum
$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test
$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V02

Q275 | WRITTEN C02-T06-S-E4

For $a = 20, d = -6$, find n giving the maximum sum and the sum.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F03 | V02

Q276 | WRITTEN C02-T06-S-E5

For $a = 126, d = -13$, find n giving the maximum sum and the sum.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V01

Q277 | WRITTEN

C02-T06-S-T4

Find the general term where $S_{10} = 10$ and $S_{20} = 40$.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V01

Q278 | WRITTEN

C02-T06-S-E7

Find the general term where $S_6 = 3$ and $S_{10} = 65$.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V01

Q279 | WRITTEN C02-T06-S-E8

Find the general term where $S_{20} = 400$ and $S_{30} = 900$.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F99 | V01

Q280 | CHALLENGE WRITTEN C02-T06-S-CH1

The 15th term is 33 and the 50th term is 103. Find the sum of the first 79 terms.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Quiz M1 | QUIZ MCQ

C02-T01-Q-M01

For $a_n = \frac{2n+1}{n+2}$, what is a_5?:

A $\frac{11}{7}$

B $\frac{10}{7}$

C $\frac{7}{11}$

D $\frac{9}{7}$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Quiz M2 | QUIZ MCQ C02-T03-Q-M01

An arithmetic sequence has $a_3 = 10$ and $a_8 = 30$. Select its general term:

A $a_n = 4n + 2$

B $a_n = 4n - 2$

C $a_n = 5n - 5$

D $a_n = 2n + 4$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F06 | V01

Quiz M3 | QUIZ MCQ C02-T04-Q-M04

For $a = 12, d = -2$, select the sum of odd-numbered terms through a_9:

A 16

B 18

C 20

D 24

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V01

Quiz M4 | QUIZ MCQ

C02-T06-Q-M4

Select the correct option: If $S_{10} = 10$ and $S_{20} = 40$, find d:

A $\frac{1}{10}$

B $\frac{1}{5}$

C $\frac{2}{5}$

D $\frac{1}{2}$

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V01

Quiz W1 | QUIZ WRITTEN C02-T01-Q-W02

If $a_n = 3n^2 - 2n + 1$, find a_1, a_2, a_3.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F01 | V03

Quiz W2 | QUIZ WRITTEN C02-T03-Q-W01

Find a_n for an arithmetic sequence with $a_4 = 14$ and $a_{10} = 62$.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F06 | V01

Quiz W3 | QUIZ WRITTEN C02-T04-Q-W04

For $a = 9, d = 4$, find the sum of odd-numbered terms from a_1 to a_{15}.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 1 | Arithmetic Sequences

F04 | V01

Quiz W4 | QUIZ WRITTEN C02-T06-Q-W4

Find the general term when $S_{20} = 400$ and $S_{30} = 900$.

WORKING AREA

FORMULA BANK

General term

$$a_n = a + (n-1)d$$

Sum

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Arithmetic test

$$a_{n+1} - a_n = d$$

Concept 2 | Geometric Sequences OFFICIAL LESSONS 2-7, 2-8, 2-9, 2-10

Geometric Sequences

Equation-first recall | use the same rail beside every question in this Concept

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Start with the family cue, write the first move, then use the working grid.

Concept 2 | Geometric Sequences

F01 | V01

Q001 | WRITTEN C02-T07-S-WU1a

Find the general term of a geometric sequence whose first term is 2 and common ratio is 3.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q002 | WRITTEN C02-T07-S-T1a

Find the general term when the first term is 3 and the common ratio is 4.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q003 | WRITTEN C02-T07-S-E1a

Find the general term of the geometric sequence in part a. The first term is 5, common ratio 2.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q004 | WRITTEN C02-T07-S-E1b

Find the general term of the geometric sequence in part b. The first term is 2, common ratio 5.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q005 | WRITTEN C02-T07-S-E1c

Find the general term of the geometric sequence in part c. The first term is 7, common ratio 4.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q006 | MCQ C02-T07-G-M01

Select the correct option: For first term $a = 2$, common ratio $r = 3$, and $n = 5$, which expression gives a_n?:

A $a_n = 2(3)^4$

B $a_n = 2(3)^5$

C $a_n = 2(3)^3$

D $a_n = 2 + (3)^4$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q007 | MCQ C02-T07-G-M02

Select the correct option: For first term $a = 3$, common ratio $r = 2$, and $n = 6$, which expression gives a_n?:

A $a_n = 3\,(2)^5$

B $a_n = 3\,(2)^6$

C $a_n = 3(2)^4$

D $a_n = 3 + (2)^5$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q008 | MCQ C02-T07-G-M03

Select the correct option: For first term $a = 5$, common ratio $r = 4$, and $n = 4$, which expression gives a_n?:

A $a_n = 5(4)^3$

B $a_n = 5(4)^4$

C $a_n = 5(4)^2$

D $a_n = 5 + (4)^3$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q009 | MCQ C02-T07-G-M04

Select the correct option: For first term $a = 4$, common ratio $r = 5$, and $n = 3$, which expression gives a_n?:

A $a_n = 4\,(5)^2$

B $a_n = 4\,(5)^3$

C $a_n = 4(5)^1$

D $a_n = 4 + (5)^2$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q010 | MCQ

C02-T07-G-M14

Select the correct option: For first term $a = 5$, common ratio $r = 2$, and $n = 7$, which expression gives a_n?:

A $a_n = 5\,(2)^6$

B $a_n = 5\,(2)^7$

C $a_n = 5(2)^5$

D $a_n = 5 + (2)^6$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q011 | MCQ

C02-T07-G-M15

Select the correct option: For first term $a = 7$, common ratio $r = 4$, and $n = 3$, which expression gives a_n?:

A $a_n = 7(4)^2$

B $a_n = 7(4)^3$

C $a_n = 7(4)^1$

D $a_n = 7 + (4)^2$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q012 | WRITTEN

C02-T07-S-T1b

Find the general term when the first term is 5 and the common ratio is -2.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q013 | WRITTEN C02-T07-S-E1d

Find the general term of the geometric sequence in part d. The first term is 2, common ratio -3.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q014 | WRITTEN C02-T07-S-E1e

Find the general term of the geometric sequence in part e. The first term is 3, common ratio -5.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q015 | WRITTEN C02-T07-S-E1f

Find the general term of the geometric sequence in part f. The first term is 4, common ratio -2.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q016 | MCQ C02-T07-G-M05

Select the correct option: For first term $a = 2$, common ratio $r = -3$, and $n = 5$, which expression gives a_n?:

A $a_n = 2(-3)^4$

B $a_n = 2(-3)^5$

C $a_n = 2(-3)^3$

D $a_n = 2 + (-3)^4$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q017 | MCQ C02-T07-G-M06

Select the correct option: For first term $a = 3$, common ratio $r = -2$, and $n = 6$, which expression gives a_n?:

A $a_n = 3(-2)^5$

B $a_n = 3(-2)^6$

C $a_n = 3(-2)^4$

D $a_n = 3 + (-2)^5$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q018 | MCQ C02-T07-G-M07

Select the correct option: For first term $a = 6$, common ratio $r = -1$, and $n = 4$, which expression gives a_n?:

A $a_n = 6(-1)^3$

B $a_n = 6(-1)^4$

C $a_n = 6(-1)^2$

D $a_n = 6 + (-1)^3$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q019 | MCQ C02-T07-G-M08

Select the correct option: For first term $a = 8$, common ratio $r = -2$, and $n = 3$, which expression gives a_n?:

A $a_n = 8(-2)^2$

B $a_n = 8(-2)^3$

C $a_n = 8(-2)^1$

D $a_n = 8 + (-2)^2$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q020 | MCQ

C02-T07-G-M16

Select the correct option: For first term $a = 9$, common ratio $r = -2$, and $n = 5$, which expression gives a_n?:

A $a_n = 9(-2)^4$

B $a_n = 9(-2)^5$

C $a_n = 9(-2)^3$

D $a_n = 9 + (-2)^4$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q021 | WRITTEN

C02-T07-S-T1c

Find the general term when the first term is 8 and the common ratio is $-\frac{1}{3}$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q022 | WRITTEN

C02-T07-S-E1g

Find the general term of the geometric sequence in part g. The first term is 4, common ratio $\frac{1}{3}$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q023 | WRITTEN

C02-T07-S-E1h

Find the general term of the geometric sequence in part h. The first term is 3, common ratio $-\frac{1}{2}$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q024 | WRITTEN C02-T07-S-E1i

Find the general term of the geometric sequence in part i. The first term is 6, common ratio $\frac{1}{2}$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q025 | MCQ

C02-T07-G-M09

Select the correct option: For first term $a = 4$, common ratio $r = \frac{1}{3}$, and $n = 5$, which expression gives a_n?:

A $a_n = 4\left(\frac{1}{3}\right)^4$

B $a_n = 4\left(\frac{1}{3}\right)^5$

C $a_n = 4(\frac{1}{3})^3$

D $a_n = 4 + (\frac{1}{3})^4$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q026 | MCQ

C02-T07-G-M10

Select the correct option: For first term $a = 3$, common ratio $r = -\frac{1}{2}$, and $n = 6$, which expression gives a_n?:

A $a_n = 3\left(-\frac{1}{2}\right)^5$

B $a_n = 3\left(-\frac{1}{2}\right)^6$

C $a_n = 3(-\frac{1}{2})^4$

D $a_n = 3 + (-\frac{1}{2})^5$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q027 | MCQ

C02-T07-G-M11

Select the correct option: For first term $a = 6$, common ratio $r = \frac{1}{2}$, and $n = 4$, which expression gives a_n?:

A $a_n = 6\left(\frac{1}{2}\right)^3$

B $a_n = 6\left(\frac{1}{2}\right)^4$

C $a_n = 6(\frac{1}{2})^2$

D $a_n = 6 + (\frac{1}{2})^3$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q028 | MCQ

C02-T07-G-M12

Select the correct option: For first term $a = 2$, common ratio $r = \frac{3}{2}$, and $n = 5$, which expression gives a_n?:

A $a_n = 2\left(\frac{3}{2}\right)^4$

B $a_n = 2\left(\frac{3}{2}\right)^5$

C $a_n = 2(\frac{3}{2})^3$

D $a_n = 2 + (\frac{3}{2})^4$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q029 | MCQ

C02-T07-G-M13

Select the correct option: For first term $a = 8$, common ratio $r = -\frac{3}{2}$, and $n = 4$, which expression gives a_n?:

A $a_n = 8\left(-\frac{3}{2}\right)^3$

B $a_n = 8\left(-\frac{3}{2}\right)^4$

C $a_n = 8(-\frac{3}{2})^2$

D $a_n = 8 + (-\frac{3}{2})^3$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q030 | WRITTEN

C02-T07-S-WU1b

Find the general term of $5, 10, 20, 40, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q031 | WRITTEN

C02-T07-S-T1d

Find the general term of $2, 6, 18, 54, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q032 | WRITTEN

C02-T07-S-E1j

Find the general term of the geometric sequence in part j. The sequence is $3, 6, 12, 24, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q033 | MCQ C02-T07-G-M17

Select the correct option: Find the general term of the geometric sequence $3, 6, 12, 24, \ldots$:

A $3 \times 2^{n-1}$

B 3×2^{n}

C $3 \times 2^{n-2}$

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q034 | MCQ C02-T07-G-M18

Select the correct option: Find the general term of the geometric sequence $2, 10, 50, 250, \ldots$:

A $2 \times 5^{n-1}$

B 2×5^{n}

C $2 \times 5^{n-2}$

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q035 | MCQ C02-T07-G-M26

Select the correct option: Find the general term of the geometric sequence $4, 8, 16, 32, \ldots$:

A $4 \times 2^{n-1}$

B 4×2^{n}

C $4 \times 2^{n-2}$

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q036 | MCQ C02-T07-G-M27

Select the correct option: Find the general term of the geometric sequence $7, 21, 63, 189, \ldots$:

A $7 \times 3^{n-1}$

B 7×3^{n}

C $7 \times 3^{n-2}$

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q037 | MCQ C02-T07-G-M31

Select the correct option: Find the general term of the geometric sequence $1, 4, 16, 64, \ldots$:

A 4^{n-1}

B 4^{n}

C 4^{n-2}

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V02

Q038 | WRITTEN

C02-T07-S-E1k

Find the general term of the geometric sequence in part k. The sequence is $2, -6, 18, -54, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V02

Q039 | WRITTEN

C02-T07-S-E1l

Find the general term of the geometric sequence in part l. The sequence is $5, -10, 20, -40, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V02

Q040 | MCQ C02-T07-G-M19

Select the correct option: Find the general term of the geometric sequence $5, -10, 20, -40, \ldots$:

A $5(-2)^{n-1}$

B $5(-2)^{n}$

C $5(-2)^{n-2}$

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V02

Q041 | MCQ C02-T07-G-M25

Select the correct option: Find the general term of the geometric sequence $2, -6, 18, -54, \ldots$:

A $2(-3)^{n-1}$

B $2(-3)^{n}$

C $2(-3)^{n-2}$

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V02

Q042 | MCQ C02-T07-G-M30

Select the correct option: Find the general term of the geometric sequence $-4, 8, -16, 32, \ldots$:

A $-4(-2)^{n-1}$

B $-4(-2)^{n}$

C $-4(-2)^{n-2}$

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V02

Q043 | MCQ C02-T07-G-M32

Select the correct option: Find the general term of the geometric sequence $6, -18, 54, -162, \ldots$:

A $6(-3)^{n-1}$

B $6(-3)^{n}$

C $6(-3)^{n-2}$

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q044 | WRITTEN

C02-T07-S-WU1c

Find the general term of $-4, 6, -9, \frac{27}{2}, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q045 | WRITTEN

C02-T07-S-T1e

Find the general term of $-8, 12, -18, 27, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q046 | WRITTEN

C02-T07-S-T1f

Find the general term of $2, \frac{2}{3}, \frac{2}{9}, \frac{2}{27}, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q047 | WRITTEN

C02-T07-S-E1m

Find the general term of the geometric sequence in part m. The sequence is $48, 24, 12, 6, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q048 | WRITTEN

C02-T07-S-E1n

Find the general term of the geometric sequence in part n. The sequence is $\frac{1}{6}, \frac{1}{4}, \frac{3}{8}, \frac{9}{16}, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q049 | WRITTEN

C02-T07-S-E1o

Find the general term of the geometric sequence in part o. The sequence is $8, 16\sqrt{2}, 64, 128\sqrt{2}, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q050 | WRITTEN

C02-T07-S-E1p

Find the general term of the geometric sequence in part p. The sequence is $3, -\frac{15}{2}, \frac{75}{4}, -\frac{375}{8}, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q051 | WRITTEN

C02-T07-S-E1q

Find the general term of the geometric sequence in part q. The sequence is $9, -3\sqrt{3}, 3, -\sqrt{3}, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q052 | WRITTEN

C02-T07-S-E1r

Find the general term of the geometric sequence in part r. The sequence is $5, -\frac{10}{3}, \frac{20}{9}, -\frac{40}{27}, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q053 | MCQ C02-T07-G-M20

Select the correct option: Find the general term of the geometric sequence $-8, 12, -18, 27, \ldots$:

A $-8\left(-\frac{3}{2}\right)^{n-1}$

B $-8\left(-\frac{3}{2}\right)^{n}$

C $-8\left(-\frac{3}{2}\right)^{n-2}$

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q054 | MCQ

C02-T07-G-M21

Select the correct option: Find the general term of the geometric sequence 48, 24, 12, 6, ...:

A $48\left(\frac{1}{2}\right)^{n-1}$

B $48\left(\frac{1}{2}\right)^{n}$

C $48\left(\frac{1}{2}\right)^{n-2}$

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q055 | MCQ C02-T07-G-M22

Select the correct option: Find the general term of the geometric sequence $\frac{1}{6}, \frac{1}{4}, \frac{3}{8}, \ldots$:

A $\frac{1}{6}\left(\frac{3}{2}\right)^{n-1}$

B $\frac{1}{6}\left(\frac{3}{2}\right)^{n}$

C $\frac{1}{6}\left(\frac{3}{2}\right)^{n-2}$

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q056 | MCQ

C02-T07-G-M23

Select the correct option: Find the general term of the geometric sequence $8, 16\sqrt{2}, 64, \ldots$:

A $8\left(2\sqrt{2}\right)^{n-1}$

B $8\left(2\sqrt{2}\right)^{n}$

C $8\left(2\sqrt{2}\right)^{n-2}$

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q057 | MCQ C02-T07-G-M24

Select the correct option: Find the general term of the geometric sequence $9, -3\sqrt{3}, 3, \ldots$:

A $9\left(-\frac{\sqrt{3}}{3}\right)^{n-1}$

B $9\left(-\frac{\sqrt{3}}{3}\right)^{n}$

C $9\left(-\frac{\sqrt{3}}{3}\right)^{n-2}$

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q058 | MCQ

C02-T07-G-M28

Select the correct option: Find the general term of the geometric sequence $3, -\frac{3}{2}, \frac{3}{4}, \ldots$:

A $3\left(-\frac{1}{2}\right)^{n-1}$

B $3\left(-\frac{1}{2}\right)^{n}$

C $3\left(-\frac{1}{2}\right)^{n-2}$

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q059 | MCQ C02-T07-G-M29

Select the correct option: Find the general term of the geometric sequence $10, 5, \frac{5}{2}, \ldots$:

A $10\left(\frac{1}{2}\right)^{n-1}$

B $10\left(\frac{1}{2}\right)^{n}$

C $10\left(\frac{1}{2}\right)^{n-2}$

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F03 | V01

Q060 | WRITTEN

C02-T07-S-T2

Find the common ratio and missing values in $A, -18, 6, B, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F03 | V01

Q061 | MCQ C02-T07-G-M33

Select the correct option: The sequence $A, 12, 6, B, \ldots$ is geometric. Find r, A, B:

A $r = \frac{1}{2},\ A = 24,\ B = 3$

B $r = 2,\ A = 1,\ B = 2$

C $r = -1,\ A = 0,\ B = 0$

D $r = 3,\ A = 3,\ B = 9$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F03 | V02

Q062 | WRITTEN C02-T07-S-WU2

Find the common ratio and the missing values in $A, 24, 12, B, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F03 | V02

Q063 | WRITTEN

C02-T07-S-E2a

Find the common ratio and missing values in $A, -3, 9, B$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F03 | V02

Q064 | WRITTEN

C02-T07-S-E2b

Find the common ratio and missing values in $A, \frac{1}{3}, \frac{1}{9}, B$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F03 | V03

Q065 | WRITTEN

C02-T07-S-E2c

Find the common ratio and missing values in $A, -\frac{1}{4}, \frac{1}{8}, B$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F99 | V01

Q066 | CHALLENGE WRITTEN C02-T07-S-CH1

In an increasing geometric sequence, if $a_3 + a_5 = 80$ and $a_4 = 24$, find a_7.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q067 | WRITTEN C02-T08-S-WU1a

Find the general term of a geometric sequence whose 4th term is 24 and 6th term is 96.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q068 | WRITTEN C02-T08-S-T1a

Find the general term when the 3rd term is 18 and the 5th term is 162.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q069 | WRITTEN

C02-T08-S-E1a

Find the requested values. The 2nd term is 6 and the 4th term is 54.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q070 | WRITTEN C02-T08-S-E1b

Find the requested values. The 3rd term is 27 and the 5th term is 243.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q071 | WRITTEN C02-T08-S-E1d

Find the requested values. The 2nd term is 14 and the 5th term is 112.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q072 | WRITTEN C02-T08-S-WU1b

Find the general term when the 3rd term is 12 and the 6th term is -96.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q073 | WRITTEN C02-T08-S-T1b

Find the general term when the 2nd term is -6 and the 5th term is 48.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q074 | WRITTEN

C02-T08-S-T1c

Find the general term when the 3rd term is 12 and the 7th term is 192.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q075 | WRITTEN C02-T08-S-E1c

Find the requested values. The 3rd term is -28 and the 5th term is -112.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q076 | WRITTEN C02-T08-S-E1e

Find the requested values. The 4th term is 16 and the 7th term is -128.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q077 | WRITTEN

C02-T08-S-E1f

Find the requested values. The 3rd term is -20 and the 6th term is 160.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q078 | WRITTEN C02-T08-S-E1g

Find the requested values. The 2nd term is 3 and the 6th term is 768.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q079 | WRITTEN

C02-T08-S-E1h

Find the requested values. The 3rd term is 9 and the 7th term is 729/16.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q080 | WRITTEN

C02-T08-S-E1i

Find the requested values. The 4th term is 2/9 and the 8th term is 18.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q081 | MCQ C02-T08-G-M01

Select the correct option: For $a = 2$, $r = 3$, which expression gives the general term a_n:

A $a_n = 2(3)^{n-1}$

B $a_n = 2(3)^{n}$

C $a_n = 2(3)^{n+1}$

D $a_n = 2 + 3^{n-1}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q082 | MCQ

C02-T08-G-M02

Select the correct option: For $a = 3$, $r = 2$, which expression gives the general term a_n:

A $a_n = 3\,(2)^{n-1}$

B $a_n = 3\,(2)^{n}$

C $a_n = 3\,(2)^{n+1}$

D $a_n = 3 + 2^{n-1}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q083 | MCQ C02-T08-G-M03

Select the correct option: For $a = 5$, $r = 4$, which expression gives the general term a_n:

A $a_n = 5(4)^{n-1}$

B $a_n = 5(4)^{n}$

C $a_n = 5(4)^{n+1}$

D $a_n = 5 + 4^{n-1}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q084 | MCQ

C02-T08-G-M04

Select the correct option: For $a = 4$, $r = 5$, which expression gives the general term a_n:

A $a_n = 4(5)^{n-1}$

B $a_n = 4(5)^{n}$

C $a_n = 4(5)^{n+1}$

D $a_n = 4 + 5^{n-1}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q085 | MCQ C02-T08-G-M05

Select the correct option: For $a = 2, r = -3$, which expression gives the general term a_n:

A $a_n = 2(-3)^{n-1}$

B $a_n = 2(-3)^{n}$

C $a_n = 2(-3)^{n+1}$

D $a_n = 2 - 3^{n-1}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q086 | MCQ

C02-T08-G-M06

Select the correct option: For $a = 3, r = -2$, which expression gives the general term a_n:

A $a_n = 3(-2)^{n-1}$

B $a_n = 3(-2)^{n}$

C $a_n = 3(-2)^{n+1}$

D $a_n = 3 - 2^{n-1}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q087 | MCQ C02-T08-G-M07

Select the correct option: For $a = 6, r = -1$, which expression gives the general term a_n:

A $a_n = 6(-1)^{n-1}$

B $a_n = 6(-1)^{n}$

C $a_n = 6(-1)^{n+1}$

D $a_n = 6 - 1^{n-1}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q088 | MCQ

C02-T08-G-M08

Select the correct option: For $a = 8, r = -2$, which expression gives the general term a_n:

A $a_n = 8(-2)^{n-1}$

B $a_n = 8(-2)^{n}$

C $a_n = 8(-2)^{n+1}$

D $a_n = 8 - 2^{n-1}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q089 | MCQ C02-T08-G-M09

Select the correct option: For $a = 4$, $r = \frac{1}{3}$, which expression gives the general term a_n:

A $a_n = 4\left(\frac{1}{3}\right)^{n-1}$

B $a_n = 4\left(\frac{1}{3}\right)^{n}$

C $a_n = 4\left(\frac{1}{3}\right)^{n+1}$

D $a_n = 4 + \frac{1}{3}^{n-1}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q090 | MCQ C02-T08-G-M10

Select the correct option: For $a = 3$, $r = -\frac{1}{2}$, which expression gives the general term a_n:

A $a_n = 3\left(-\frac{1}{2}\right)^{n-1}$

B $a_n = 3\left(-\frac{1}{2}\right)^{n}$

C $a_n = 3\left(-\frac{1}{2}\right)^{n+1}$

D $a_n = 3 - \frac{1}{2}^{n-1}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q091 | MCQ C02-T08-G-M11

Select the correct option: For $a = 6$, $r = \frac{1}{2}$, which expression gives the general term a_n:

A $a_n = 6\left(\frac{1}{2}\right)^{n-1}$

B $a_n = 6\left(\frac{1}{2}\right)^{n}$

C $a_n = 6\left(\frac{1}{2}\right)^{n+1}$

D $a_n = 6 + \frac{1}{2}^{n-1}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q092 | MCQ C02-T08-G-M12

Select the correct option: For $a = 2$, $r = \frac{3}{2}$, which expression gives the general term a_n:

A $a_n = 2\left(\frac{3}{2}\right)^{n-1}$

B $a_n = 2\left(\frac{3}{2}\right)^{n}$

C $a_n = 2\left(\frac{3}{2}\right)^{n+1}$

D $a_n = 2 + \frac{3}{2}^{n-1}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q093 | MCQ C02-T08-G-M13

Select the correct option: For $a = 8$, $r = -\frac{3}{2}$, which expression gives the general term a_n:

A $a_n = 8\left(-\frac{3}{2}\right)^{n-1}$

B $a_n = 8\left(-\frac{3}{2}\right)^{n}$

C $a_n = 8\left(-\frac{3}{2}\right)^{n+1}$

D $a_n = 8 - \frac{3}{2}^{n-1}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q094 | MCQ C02-T08-G-M14

Select the correct option: For $a = 5$, $r = 2$, which expression gives the general term a_n:

A $a_n = 5(2)^{n-1}$

B $a_n = 5(2)^{n}$

C $a_n = 5(2)^{n+1}$

D $a_n = 5 + 2^{n-1}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q095 | MCQ C02-T08-G-M15

Select the correct option: For $a = 7$, $r = 4$, which expression gives the general term a_n:

A $a_n = 7(4)^{n-1}$

B $a_n = 7(4)^{n}$

C $a_n = 7(4)^{n+1}$

D $a_n = 7 + 4^{n-1}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q096 | MCQ

C02-T08-G-M16

Select the correct option: For $a = 9, r = -2$, which expression gives the general term a_n:

A $a_n = 9(-2)^{n-1}$

B $a_n = 9(-2)^{n}$

C $a_n = 9(-2)^{n+1}$

D $a_n = 9 - 2^{n-1}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q097 | WRITTEN C02-T08-S-WU2

When $2, x, 8$ form a geometric sequence in this order, find x.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q098 | WRITTEN C02-T08-S-E2

Find the requested values. When $1, x, 25$ form a geometric sequence, find x.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V02

Q099 | WRITTEN C02-T08-S-E3

Find the requested values. When $1/2, x, 8$ form a geometric sequence, find x.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q100 | WRITTEN C02-T08-S-T2

When $1, x, 12$ form a geometric sequence in this order, find x.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q101 | MCQ C02-T08-G-M17

Select the correct option: If x is the middle term of the geometric triple $2, x, 8$, find x:

A ± 4

B $+4$

C -4

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q102 | MCQ C02-T08-G-M18

Select the correct option: If x is the middle term of the geometric triple $1, x, 25$, find x:

A ± 5

B $+5$

C -5

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q103 | MCQ

C02-T08-G-M19

Select the correct option: If x is the middle term of the geometric triple $\frac{1}{2}, x, 8$, find x:

A ± 2

B $+2$

C -2

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q104 | MCQ C02-T08-G-M20

Select the correct option: If x is the middle term of the geometric triple $3, x, 12$, find x:

A ± 6

B $+6$

C -6

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q105 | MCQ C02-T08-G-M21

Select the correct option: If x is the middle term of the geometric triple $4, x, 9$, find x:

A ± 6

B $+6$

C -6

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q106 | MCQ C02-T08-G-M22

Select the correct option: If x is the middle term of the geometric triple $2, x, 18$, find x:

A ± 6

B $+6$

C -6

D 0

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F03 | V01

Q107 | WRITTEN C02-T08-S-WU3

The numbers 6, a, b form an arithmetic sequence and a, b, 16 form a geometric sequence. Find a, b.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F03 | V01

Q108 | WRITTEN C02-T08-S-E4

Find the requested values. The numbers $a, b, 2$ form an arithmetic sequence and $a, 2, b$ form a geometric sequence. Find a, b.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F03 | V02

Q109 | WRITTEN

C02-T08-S-T3

The numbers $-2, a, b$ form an arithmetic sequence and $a, b, 18$ form a geometric sequence. Find a, b.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F99 | V01

Q110 | CHALLENGE WRITTEN C02-T08-S-CH1

A planning model gives $-5, a, b$ as an arithmetic sequence, while $a, b, 45$ form a geometric sequence. Find a, b.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q111 | WRITTEN C02-T09-S-WU1a

Find the sum S of a geometric sequence with first term 4, common ratio 3, and 5 terms.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q112 | WRITTEN C02-T09-S-TRY1a

Find the sum S of a geometric sequence with first term 3, common ratio 2, and 5 terms.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q113 | WRITTEN C02-T09-S-EX1a

Find the sum S of a geometric sequence with first term 5, common ratio 3, and 4 terms.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q114 | WRITTEN C02-T09-S-EX1d

Find the sum S of a geometric sequence with first term 3, common ratio 2, and 10 terms.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q115 | MCQ C02-T09-G-M01

For a geometric sequence with $a = 4$, $r = 3$, and $n = 4$, calculate S_n:

A 161

B 159

C 162

D 160

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q116 | MCQ

C02-T09-G-M02

For a geometric sequence with $a = 5$, $r = 2$, and $n = 6$, calculate S_n:

A 316

B 314

C 315

D 317

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q117 | MCQ

C02-T09-G-M03

For a geometric sequence with $a = 2$, $r = 4$, and $n = 5$, calculate S_n:

A 683

B 682

C 681

D 684

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q118 | MCQ

C02-T09-G-M04

For a geometric sequence with $a = 3$, $r = 5$, and $n = 4$, calculate S_n:

A 468

B 469

C 467

D 470

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q119 | MCQ C02-T09-G-M05

For a geometric sequence with $a = 7$, $r = 2$, and $n = 5$, calculate S_n:

A 218

B 216

C 219

D 217

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q120 | MCQ

C02-T09-G-M06

For a geometric sequence with $a = 6$, $r = 3$, and $n = 3$, calculate S_n:

A 79

B 77

C 78

D 80

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q121 | WRITTEN

C02-T09-S-WU1b

Find the sum S of a geometric sequence with first term 8, common ratio $\frac{1}{2}$, and 6 terms.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q122 | WRITTEN C02-T09-S-TRY1c

Find the sum S of a geometric sequence with first term 6, common ratio $\frac{1}{2}$, and 6 terms.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q123 | WRITTEN C02-T09-S-EX1c

Find the sum S of a geometric sequence with first term 1, common ratio $\frac{1}{3}$, and 3 terms.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q124 | WRITTEN

C02-T09-S-EX1f

Find the sum S of a geometric sequence with first term 1, common ratio $\frac{1}{2}$, and 8 terms.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q125 | MCQ C02-T09-G-M07

For a geometric sequence with $a = 8$, $r = \frac{1}{2}$, and $n = 4$, calculate S_n:

A 16

B 15

C 14

D 17

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q126 | MCQ

C02-T09-G-M08

For a geometric sequence with $a = 9$, $r = \frac{1}{3}$, and $n = 3$, calculate S_n:

A 13

B 14

C 12

D 15

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q127 | MCQ

C02-T09-G-M09

For a geometric sequence with $a = 12$, $r = \frac{1}{2}$, and $n = 5$, calculate S_n:

A $\frac{47}{2}$

B 23

C $\frac{95}{4}$

D $\frac{93}{4}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q128 | MCQ C02-T09-G-M10

For a geometric sequence with $a = 5$, $r = \frac{1}{4}$, and $n = 3$, calculate S_n:

A $\frac{53}{8}$

B $\frac{13}{2}$

C $\frac{105}{16}$

D $\frac{107}{16}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q129 | MCQ

C02-T09-G-M11

For a geometric sequence with $a = 10$, $r = \frac{1}{2}$, and $n = 6$, calculate S_n:

A $\frac{79}{4}$

B $\frac{315}{16}$

C $\frac{157}{8}$

D $\frac{317}{16}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q130 | MCQ

C02-T09-G-M12

For a geometric sequence with $a = 4$, $r = \frac{1}{3}$, and $n = 4$, calculate S_n:

A $\frac{160}{27}$

B $\frac{161}{27}$

C $\frac{53}{9}$

D 6

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q131 | WRITTEN C02-T09-S-TRY1b

Find the sum S of a geometric sequence with first term 6, common ratio -2, and 4 terms.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q132 | WRITTEN C02-T09-S-EX1b

Find the sum S of a geometric sequence with first term 1, common ratio -3, and 4 terms.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q133 | WRITTEN C02-T09-S-EX1e

Find the sum S of a geometric sequence with first term 2, common ratio -3, and 6 terms.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q134 | MCQ C02-T09-G-M13

For a geometric sequence with $a = 4$, $r = -2$, and $n = 5$, calculate S_n:

A 45

B 43

C 46

D 44

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q135 | MCQ C02-T09-G-M14

For a geometric sequence with $a = 3$, $r = -3$, and $n = 4$, calculate S_n:

A -59

B -61

C -60

D -58

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q136 | MCQ C02-T09-G-M15

For a geometric sequence with $a = 2$, $r = -1$, and $n = 6$, calculate S_n:

A 1

B 0

C -1

D 2

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q137 | MCQ C02-T09-G-M16

For a geometric sequence with $a = 5$, $r = -2$, and $n = 6$, calculate S_n:

A -105

B -104

C -106

D -103

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q138 | MCQ C02-T09-G-M17

For a geometric sequence with $a = 7$, $r = -1$, and $n = 5$, calculate S_n:

A 8

B 6

C 9

D 7

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q139 | MCQ C02-T09-G-M18

For a geometric sequence with $a = 6$, $r = -3$, and $n = 3$, calculate S_n:

A 43

B 41

C 42

D 44

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q140 | WRITTEN

C02-T09-S-TRY2a

Find S_n from the first term to the n-th term when the first term is 3 and the common ratio is -2.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q141 | WRITTEN C02-T09-S-EX2a

Find S_n from the first term to the n-th term when the first term is 7 and the common ratio is 2.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q142 | WRITTEN

C02-T09-S-EX2b

Find S_n from the first term to the n-th term when the first term is 2 and the common ratio is $\frac{1}{3}$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q143 | WRITTEN

C02-T09-S-EX2e

Find S_n from the first term to the n-th term when the first term is 4 and the common ratio is 2.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q144 | MCQ C02-T09-G-M19

For the geometric sequence with $a = 3, r = 2$, find the sum S_n from the first term to the n-th term:

A $3(2^{n-1} - 1)$

B $6(2^n - 1)$

C $3(2^n - 1)$

D $3(1 - 2^n)$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q145 | MCQ C02-T09-G-M20

For the geometric sequence with $a = 5, r = \frac{1}{2}$, find the sum S_n from the first term to the n-th term:

A $5\{1 - (\frac{1}{2})^n\}$

B $10\{1 - (\frac{1}{2})^{n-1}\}$

C $10\{1 - (2)^n\}$

D $10\{1 - (\frac{1}{2})^n\}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q146 | MCQ C02-T09-G-M21

For the geometric sequence with $a = 4, r = -2$, find the sum S_n from the first term to the n-th term:

A $\frac{4\{1-(-2)^n\}}{3}$

B $\frac{4\{1-(-2)^{n-1}\}}{3}$

C $\frac{4\{1+(-2)^n\}}{3}$

D $\frac{4\{1-2^n\}}{3}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V02

Q147 | WRITTEN

C02-T09-S-EX2c

Find S_n from the first term to the n-th term of $2, 6, 18, 54, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q148 | WRITTEN C02-T09-S-WU2

Find S_n from the first term to the n-th term of $2, -6, 18, -54, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q149 | WRITTEN

C02-T09-S-TRY2b

Find S_n from the first term to the n-th term of $8, -4, 2, -1, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q150 | WRITTEN C02-T09-S-EX2d

Find S_n from the first term to the n-th term of $1, -3, 9, -27, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q151 | WRITTEN

C02-T09-S-EX2f

Find S_n from the first term to the n-th term when the first term is 16 and the common ratio is $-\frac{1}{2}$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Q152 | WRITTEN

C02-T09-S-EX2g

Find S_n from the first term to the n-th term of $1, -2, 4, -8, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F03 | V01

Q153 | MCQ C02-T09-G-M38

A culture grows by $3, 9, 27, 81$ units. Find the four-stage total:

A 120

B 121

C 119

D 122

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F99 | V01

Q154 | CHALLENGE WRITTEN C02-T09-S-CH1

A filtration scale is geometric: $3, 1, \frac{1}{3}, \frac{1}{9}, \ldots$ mg/L removed per stage. Calculate the total removed in 4 stages.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q155 | MCQ C02-T10-G-M01

Given $S_3 = 7$ and the sum from the 3rd to the 5th terms is 28, find all real pairs (a, r):

A $(a, r) = (2, 2)$

B $(a, r) = (1, 3)$

C $(a, r) = \left(\frac{10}{3}, -2\right)$

D $(a, r) = (1, 2)$ or $(a, r) = \left(\frac{7}{3}, -2\right)$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q156 | MCQ C02-T10-G-M02

Given $S_3 = 26$ and the sum from the 3rd to the 5th terms is 234, find all real pairs (a, r):

A $(a, r) = (3, 3)$

B $(a, r) = (2, 4)$

C $(a, r) = (2, 3)$ or $(a, r) = \left(\frac{26}{7}, -3\right)$

D $(a, r) = \left(\frac{33}{7}, -3\right)$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q157 | MCQ C02-T10-G-M03

Given $S_3 = 21$ and the sum from the 3rd to the 5th terms is 84, find all real pairs (a, r):

A $(a, r) = (4, 2)$

B $(a, r) = (3, 2)$ or $(a, r) = (7, -2)$

C $(a, r) = (3, 3)$

D $(a, r) = (8, -2)$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q158 | MCQ C02-T10-G-M04

Given $S_3 = 28$ and the sum from the 3rd to the 5th terms is 112, find all real pairs (a, r):

A $(a, r) = (4, 2)$ or $(a, r) = \left(\frac{28}{3}, -2\right)$

B $(a, r) = (5, 2)$

C $(a, r) = (4, 3)$

D $(a, r) = \left(\frac{31}{3}, -2\right)$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q159 | MCQ C02-T10-G-M05

Given $S_3 = 13$ and the sum from the 3rd to the 5th terms is 117, find all real pairs (a, r):

A $(a, r) = (2, 3)$

B $(a, r) = (1, 4)$

C $(a, r) = \left(\frac{20}{7}, -3\right)$

D $(a, r) = (1, 3)$ or $(a, r) = \left(\frac{13}{7}, -3\right)$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q160 | MCQ

C02-T10-G-M06

Given $S_3 = 35$ and the sum from the 3rd to the 5th terms is 140, find all real pairs (a, r):

A $(a, r) = (6, 2)$

B $(a, r) = (5, 3)$

C $(a, r) = (5, 2)$ or $(a, r) = \left(\frac{35}{3}, -2\right)$

D $(a, r) = \left(\frac{38}{3}, -2\right)$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Q161 | MCQ

C02-T10-G-M09

Given $S_3 = \frac{19}{2}$ and the sum from the 3rd to the 5th terms is $\frac{171}{8}$, find all real pairs (a, r):

A $(a, r) = \left(3, \frac{3}{2}\right)$

B $(a, r) = \left(2, \frac{5}{2}\right)$

C $(a, r) = \left(\frac{45}{7}, -\frac{3}{2}\right)$

D $(a, r) = \left(2, \frac{3}{2}\right)$ or $(a, r) = \left(\frac{38}{7}, -\frac{3}{2}\right)$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q162 | WRITTEN C02-T10-S-E1

Find the first term and common ratio of a geometric sequence if $S_3 = 9$ and the sum from the 4th to the 6th term is -72.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Q163 | MCQ C02-T10-G-M10

Given $S_3 = 7$ and the sum from the 3rd to the 5th terms is $\frac{7}{4}$, find all real pairs (a, r):

A $(a, r) = \left(5, \frac{1}{2}\right)$

B $(a, r) = \left(4, \frac{3}{2}\right)$

C $(a, r) = \left(4, \frac{1}{2}\right)$ or $(a, r) = \left(\frac{28}{3}, -\frac{1}{2}\right)$

D $(a, r) = \left(\frac{31}{3}, -\frac{1}{2}\right)$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q164 | WRITTEN C02-T10-S-WU1

Find the first term and common ratio of a geometric sequence if $S_3 = 35$ and the sum from the 3rd to the 5th term is 140.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q165 | WRITTEN C02-T10-S-T1

Find the first term and common ratio of a geometric sequence if $S_3 = 21$ and the sum from the 3rd to the 5th term is 84.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q166 | WRITTEN C02-T10-S-E2

Find the first term and common ratio of a geometric sequence if $S_3 = 9$ and the sum from the 3rd to the 5th term is 36.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q167 | WRITTEN C02-T10-S-E3

Find the first term and common ratio of a geometric sequence if $S_3 = 78$ and the sum from the 3rd to the 5th term is 702.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q168 | MCQ

C02-T10-G-M07

Given $S_3 = 6$ and the sum from the 3rd to the 5th terms is 24, find all real pairs (a, r):

A $(a, r) = (3, -2)$

B $(a, r) = (2, -2)$ or $(a, r) = \left(\frac{6}{7}, 2\right)$

C $(a, r) = (2, -1)$

D $(a, r) = \left(\frac{13}{7}, 2\right)$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V03

Q169 | MCQ

C02-T10-G-M08

Given $S_3 = 9$ and the sum from the 3rd to the 5th terms is 36, find all real pairs (a, r):

A $(a, r) = (3, -2)$ or $(a, r) = \left(\frac{9}{7}, 2\right)$

B $(a, r) = (4, -2)$

C $(a, r) = (3, -1)$

D $(a, r) = \left(\frac{16}{7}, 2\right)$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q170 | WRITTEN C02-T10-S-T3

Find the first term and common ratio of a geometric sequence if the 2nd term is 3 and $S_3 = 13$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q171 | WRITTEN

C02-T10-S-E7

Find the first term and common ratio of a geometric sequence if the 2nd term is 6, and $S_3 = 21$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q172 | MCQ C02-T10-G-M11

The second term is 6 and $S_3 = 21$. Find all real pairs (a, r):

A $(a, r) = (4, 2)$

B $(a, r) = (3, 3)$

C $(a, r) = (3, 2)$ or $(a, r) = \left(12, \frac{1}{2}\right)$

D $(a, r) = \left(13, \frac{1}{2}\right)$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q173 | MCQ C02-T10-G-M12

The second term is 6 and $S_3 = 26$. Find all real pairs (a, r):

A $(a, r) = (3, 3)$

B $(a, r) = (2, 4)$

C $(a, r) = \left(19, \frac{1}{3}\right)$

D $(a, r) = (2, 3)$ or $(a, r) = \left(18, \frac{1}{3}\right)$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q174 | MCQ

C02-T10-G-M14

The second term is 8 and $S_3 = 28$. Find all real pairs (a, r):

A $(a, r) = (5, 2)$

B $(a, r) = (4, 2)$ or $(a, r) = \left(16, \frac{1}{2}\right)$

C $(a, r) = (4, 3)$

D $(a, r) = \left(17, \frac{1}{2}\right)$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q175 | MCQ C02-T10-G-M15

The second term is 3 and $S_3 = 13$. Find all real pairs (a, r):

A $(a, r) = (2, 3)$

B $(a, r) = (1, 4)$

C $(a, r) = (1, 3)$ or $(a, r) = \left(9, \frac{1}{3}\right)$

D $(a, r) = \left(10, \frac{1}{3}\right)$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V01

Q176 | MCQ

C02-T10-G-M16

The second term is $\frac{5}{2}$ and $S_3 = \frac{35}{4}$. Find all real pairs (a, r):

A $(a, r) = \left(6, \frac{1}{2}\right)$

B $(a, r) = \left(5, \frac{3}{2}\right)$

C $(a, r) = \left(\frac{9}{4}, 2\right)$

D $(a, r) = \left(5, \frac{1}{2}\right)$ or $(a, r) = \left(\frac{5}{4}, 2\right)$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V02

Q177 | WRITTEN C02-T10-S-WU3

Find the first term and common ratio of a geometric sequence if the 3rd term is 4 and $S_3 = 7$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V02

Q178 | WRITTEN

C02-T10-S-E8

Find the first term and common ratio of a geometric sequence if the 3rd term is 12, and $S_3 = 9$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V02

Q179 | WRITTEN

C02-T10-S-E9

Find the first term and common ratio of a geometric sequence if the 3rd term is 20, and $S_3 = 35$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F03 | V01

Q180 | WRITTEN C02-T10-S-WU2

Find the first term and common ratio of a geometric sequence if $S_3 = 21$ and $S_6 = 189$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F03 | V01

Q181 | WRITTEN C02-T10-S-T2

Find the first term and common ratio of a geometric sequence if $S_3 = 26$ and $S_6 = 728$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F03 | V01

Q182 | WRITTEN C02-T10-S-E5

Find the first term and common ratio of a geometric sequence if $S_3 = 65$ and $S_6 = 1820$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F04 | V03

Q183 | WRITTEN C02-T10-S-E4

Find the first term and common ratio of a geometric sequence if the sum of the first and second terms is 3, and $S_4 = 51$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F04 | V03

Q184 | WRITTEN C02-T10-S-E6

Find the first term and common ratio of a geometric sequence if the sum of the first and second terms is -8, and $S_4 = -80$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F05 | V01

Q185 | MCQ

C02-T10-G-M40

A geometric sequence has $S_6 = 63$, $S_7 = 127$, and $S_8 = 255$. Find a_{10}:

A 537

B 487

C 562

D 512

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F99 | V01

Q186 | CHALLENGE WRITTEN C02-T10-S-CH1

If S_n is the sum of the first n terms of a geometric sequence, $S_8 = 255$, $S_6 = 63$, and $a_8 - a_7 = 64$, find a_{10}.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V01

Quiz M1 | QUIZ MCQ C02-T07-Q-M1

Select the correct option: For $a = 3, r = 2$, find a_6:

A 48

B 96

C 192

D 64

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Quiz M2 | QUIZ MCQ C02-T08-Q-M2

Select the correct option: If $2, x, 8$ are consecutive geometric terms, find x:

A 4

B -4

C ± 4

D 16

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V02

Quiz M3 | QUIZ MCQ

C02-T09-Q-M3

For $1, 3, 9, \ldots$, find S_n:

A $\frac{3^{n-1}-1}{2}$

B $\frac{3^{n}-1}{2}$

C $\frac{3^{n}+1}{2}$

D $\frac{3^{n}-1}{3}$

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F05 | V01

Quiz M4 | QUIZ MCQ

C02-T10-Q-M4

A geometric sequence has $S_6 = 63$, $S_7 = 127$, and $S_8 = 255$. Find a_{10}:

A 528

B 496

C 544

D 512

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F01 | V02

Quiz W1 | QUIZ WRITTEN C02-T07-Q-W1

Find the general term of $-4, 8, -16, 32, \ldots$.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F02 | V03

Quiz W2 | QUIZ WRITTEN C02-T08-Q-W2

If $1, x, 25$ are consecutive geometric terms, find x.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F03 | V01

Quiz W3 | QUIZ WRITTEN C02-T09-Q-W3

A four-stage process has outputs $5, 15, 45, 135$. Find the total output.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 2 | Geometric Sequences

F05 | V01

Quiz W4 | QUIZ WRITTEN C02-T10-Q-W4

A geometric sequence has $S_6 = 63$, $S_7 = 127$, and $S_8 = 255$. Find a_{10}.

WORKING AREA

FORMULA BANK

General term

$$a_n = ar^{n-1}$$

Finite sum

$$S_n = a\frac{r^n - 1}{r - 1} \quad (r \neq 1)$$

Infinite sum

$$S_\infty = \frac{a}{1 - r} \quad (|r| < 1)$$

Concept 3 | Summation OFFICIAL LESSONS 2-11, 2-12, 2-13, 2-14, 2-15, 2-16, 2-17

Summation

Equation-first recall | use the same rail beside every question in this Concept

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Start with the family cue, write the first move, then use the working grid.

Concept 3 | Summation

F01 | V01

Q001 | WRITTEN

C02-T11-S-WU1a

Write $\sum_{k=1}^{5} 2k$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q002 | WRITTEN

C02-T11-S-T1a

Write $\sum_{k=1}^{5}(2k+1)$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q003 | WRITTEN

C02-T11-S-E1a

Write $\sum_{k=1}^{5} 3k$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q004 | WRITTEN

C02-T11-S-E1b

Write $\sum_{k=1}^{4}(4k-2)$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q005 | WRITTEN

C02-T11-S-E1c

Write $\sum_{k=1}^{5}(2k-3)$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q006 | MCQ C02-T11-G-M01

Select the correct option: Expand $\sum_{k=1}^{3} 4k$ into a sum of terms:

A $4 + 8 + 12$

B $4 + 8 + 16$

C $8 + 12 + 16$

D $4 + 12 + 20$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q007 | MCQ

C02-T11-G-M04

Select the correct option: Expand $\sum_{k=1}^{4} 2^k$ into a sum of terms:

A $2+4+8+16$

B $1+2+4+8$

C $2+6+18+54$

D $4+8+16+32$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q008 | MCQ C02-T11-G-M07

Select the correct option: Expand $\sum_{k=1}^{3}(5^k - 1)$ into a sum of terms:

A $4 + 24 + 124$

B $5 + 25 + 125$

C $4 + 25 + 124$

D $1 + 4 + 24$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q009 | MCQ

C02-T11-G-M10

Select the correct option: Expand $\sum_{k=1}^{5}(k+4)$ into a sum of terms:

A $5+6+7+8+9$

B $4+5+6+7+8$

C $1+2+3+4+5$

D $6+7+8+9+10$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q010 | MCQ

C02-T11-G-M13

Select the correct option: Expand $\sum_{k=2}^{5}(2k+3)$ into a sum of terms:

A $7+9+11+13$

B $5+7+9+11$

C $4+7+10+13$

D $8+10+12+14$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q011 | MCQ C02-T11-G-M16

Select the correct option: Expand $\sum_{k=1}^{3}(2^k+1)$ into a sum of terms:

A $3+5+9$

B $2+4+8$

C $1+3+5$

D $4+6+10$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q012 | MCQ C02-T11-G-M19

Select the correct option: Expand $\sum_{k=1}^{3}(k^2+3k)$ into a sum of terms:

A $4+10+18$

B $3+8+15$

C $1+4+9$

D $6+12+18$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q013 | MCQ C02-T11-G-M22

Select the correct option: Expand $\sum_{k=2}^{5}(k^2+1)$ into a sum of terms:

A $5+10+17+26$

B $2+5+10+17$

C $4+9+16+25$

D $6+11+18+27$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q014 | WRITTEN

C02-T11-S-WU1b

Write $\sum_{k=1}^{3}(k^2-3)$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q015 | WRITTEN

C02-T11-S-T1b

Write $\sum_{k=1}^{3}(3k^2+2)$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q016 | WRITTEN

C02-T11-S-E1d

Write $\sum_{k=1}^{4} k^2$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q017 | WRITTEN

C02-T11-S-E1e

Write $\sum_{k=1}^{3}(2k^2+3)$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q018 | WRITTEN

C02-T11-S-E1f

Write $\sum_{k=1}^{4}(k^2-2k)$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q019 | MCQ

C02-T11-G-M02

Select the correct option: Expand $\sum_{k=1}^{4}(2k+1)$ into a sum of terms:

A $3+5+7+9$

B $2+4+6+8$

C $3+6+9+12$

D $1+3+5+7$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q020 | MCQ

C02-T11-G-M05

Select the correct option: Expand $\sum_{k=2}^{5}(3k-1)$ into a sum of terms:

A $5+8+11+14$

B $2+5+8+11$

C $5+9+13+17$

D $4+7+10+13$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q021 | MCQ C02-T11-G-M08

Select the correct option: Expand $\sum_{k=1}^{4}(2k^2-3)$ into a sum of terms:

A $-1+5+15+29$

B $-1+1+5+13$

C $2+5+10+17$

D $-3+5+13+29$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q022 | MCQ C02-T11-G-M11

Select the correct option: Expand $\sum_{k=1}^{4}(3k^2+1)$ into a sum of terms:

A $4+13+28+49$

B $3+12+27+48$

C $4+10+19+28$

D $1+4+9+16$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q023 | MCQ C02-T11-G-M14

Select the correct option: Expand $\sum_{k=1}^{4}(k^2-k)$ into a sum of terms:

A $0+2+6+12$

B $1+4+9+16$

C $0+1+4+9$

D $2+6+12+20$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q024 | MCQ C02-T11-G-M17

Select the correct option: Expand $\sum_{k=2}^{4} 5k$ into a sum of terms:

A $10 + 15 + 20$

B $5 + 10 + 15$

C $2 + 4 + 6$

D $15 + 20 + 25$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q025 | MCQ

C02-T11-G-M20

Select the correct option: Expand $\sum_{k=1}^{4} 3$ into a sum of terms:

A $3+3+3+3$

B $3+6+9+12$

C $1+1+1+1$

D $4+4+4+4$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q026 | MCQ

C02-T11-G-M23

Select the correct option: Expand $\sum_{k=1}^{4}(5k+1)$ into a sum of terms:

A $6+11+16+21$

B $5+10+15+20$

C $1+6+11+16$

D $7+12+17+22$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q027 | WRITTEN

C02-T11-S-WU1c

Write $\sum_{k=1}^{4} 3^k$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q028 | WRITTEN

C02-T11-S-WU1d

Write $\sum_{k=1}^{3} 2$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q029 | WRITTEN

C02-T11-S-T1c

Write $\sum_{k=1}^{4} 2^k$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q030 | WRITTEN

C02-T11-S-T1d

Write $\sum_{k=1}^{6} 3$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q031 | WRITTEN

C02-T11-S-E1g

Write $\sum_{k=1}^{3} 3^k$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q032 | WRITTEN

C02-T11-S-E1h

Write $\sum_{k=1}^{3}(5^k + 3)$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q033 | WRITTEN

C02-T11-S-E1i

Write $\sum_{k=1}^{4}(2^k - 3)$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q034 | WRITTEN

C02-T11-S-E1j

Write $\sum_{k=1}^{4} 5$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q035 | WRITTEN

C02-T11-S-E1k

Write $\sum_{k=1}^{3} 3$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q036 | WRITTEN

C02-T11-S-E1I

Write $\sum_{k=1}^{5} 4$ as a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q037 | MCQ C02-T11-G-M03

Select the correct option: Expand $\sum_{k=1}^{3}(k^2+2)$ into a sum of terms:

A $3+6+11$

B $2+5+10$

C $3+5+9$

D $1+4+9$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q038 | MCQ

C02-T11-G-M06

Select the correct option: Expand $\sum_{k=1}^{5} 7$ into a sum of terms:

A $7+7+7+7+7$

B $7+14+21+28+35$

C $7+7+7+7$

D $5+5+5+5+5$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q039 | MCQ

C02-T11-G-M09

Select the correct option: Expand $\sum_{k=3}^{6} k^2$ into a sum of terms:

A $9 + 16 + 25 + 36$

B $1 + 4 + 9 + 16$

C $9 + 25 + 49 + 81$

D $3 + 4 + 5 + 6$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q040 | MCQ

C02-T11-G-M12

Select the correct option: Expand $\sum_{k=1}^{3} 6^k$ into a sum of terms:

A $6 + 36 + 216$

B $1 + 6 + 36$

C $6 + 12 + 18$

D $36 + 72 + 108$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q041 | MCQ

C02-T11-G-M15

Select the correct option: Expand $\sum_{k=1}^{5}(4k-3)$ into a sum of terms:

A $1+5+9+13+17$

B $4+8+12+16+20$

C $1+4+7+10+13$

D $-1+3+7+11+15$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q042 | MCQ C02-T11-G-M18

Select the correct option: Expand $\sum_{k=1}^{4}(3k-5)$ into a sum of terms:

A $-2+1+4+7$

B $-2+0+2+4$

C $3+6+9+12$

D $-5-2+1+4$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q043 | MCQ C02-T11-G-M21

Select the correct option: Expand $\sum_{k=1}^{3}(4^k - 2)$ into a sum of terms:

A $2 + 14 + 62$

B $4 + 16 + 64$

C $2 + 12 + 60$

D $-2 + 2 + 14$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q044 | MCQ

C02-T11-G-M24

Select the correct option: Expand $\sum_{k=1}^{3}(2k^2 - k)$ into a sum of terms:

A $1 + 6 + 15$

B $2 + 7 + 18$

C $1 + 3 + 5$

D $0 + 6 + 12$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q045 | WRITTEN

C02-T11-S-WU2a

Express $3 + 7 + 11 + \cdots + (4n - 1)$ using the summation symbol Σ.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q046 | WRITTEN

C02-T11-S-T2a

Express $5 + 8 + 11 + \cdots + (3n + 2)$ using Σ.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q047 | WRITTEN

C02-T11-S-T2b

Write the sum of the first n terms of the sequence $a_n = 2n + 1$ using Σ.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q048 | WRITTEN

C02-T11-S-E2a

Express $1 + 3 + 5 + \cdots + (2n - 1)$ using Σ.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q049 | WRITTEN

C02-T11-S-E2d

Write the sum of the first n terms of $a_n = 7n - 1$ using Σ.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q050 | WRITTEN

C02-T11-S-E2e

Write the sum of the first n terms of $a_n = 4n + 5$ using Σ.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q051 | WRITTEN

C02-T11-S-E2f

Write the sum of the first n terms of $a_n = 3n - 2$ using Σ.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q052 | MCQ

C02-T11-G-M25

Select the correct option: Express $2+5+8+\cdots+(3n-1)$ using the summation symbol Σ:

A $\sum_{k=1}^{n}(3k-1)$

B $\sum_{k=0}^{n}(3k-1)$

C $\sum_{k=1}^{n}(3k+1)$

D $\sum_{k=1}^{n}(2k-1)$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q053 | MCQ C02-T11-G-M28

Select the correct option: Express $7 + 11 + 15 + \cdots + 43$ using the summation symbol Σ:

A $\sum_{k=1}^{10}(4k+3)$

B $\sum_{k=1}^{9}(4k+3)$

C $\sum_{k=0}^{10}(4k+3)$

D $\sum_{k=1}^{10}(4k-3)$

WORKING AREA

FORMULA BANK

Sigma linearity
$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums
$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping
$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q054 | MCQ C02-T11-G-M31

Select the correct option: Express $6+10+14+\cdots+(4n+2)$ using the summation symbol Σ:

A $\sum_{k=1}^{n}(4k+2)$

B $\sum_{k=0}^{n}(4k+2)$

C $\sum_{k=1}^{n}(4k-2)$

D $\sum_{k=1}^{n}(3k+2)$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q055 | MCQ C02-T11-G-M34

Select the correct option: Express $8+13+18+\cdots+103$ using the summation symbol Σ:

A $\sum_{k=1}^{20}(5k+3)$

B $\sum_{k=1}^{19}(5k+3)$

C $\sum_{k=0}^{20}(5k+3)$

D $\sum_{k=1}^{20}(5k-3)$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q056 | MCQ

C02-T11-G-M37

Select the correct option: Express $11^2 + 12^2 + \cdots + 19^2$ using the summation symbol Σ:

A $\sum_{k=11}^{19} k^2$

B $\sum_{k=1}^{9} k^2$

C $\sum_{k=11}^{19} k$

D $\sum_{k=12}^{19} k^2$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q057 | MCQ C02-T11-G-M40

Select the correct option: Express $2^2 + 3^2 + \cdots + 10^2$ using the summation symbol Σ:

A $\sum_{k=2}^{10} k^2$

B $\sum_{k=1}^{9} k^2$

C $\sum_{k=2}^{10} k$

D $\sum_{k=3}^{10} k^2$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q058 | MCQ

C02-T11-G-M43

Select the correct option: Express $1 + 3 + 9 + \cdots + 3^{n-1}$ using the summation symbol Σ:

A $\sum_{k=0}^{n-1} 3^k$

B $\sum_{k=1}^{n} 3^k$

C $\sum_{k=1}^{n-1} 3^k$

D $\sum_{k=0}^{n} 3^k$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q059 | MCQ C02-T11-G-M46

Select the correct option: Express $2+7+12+\cdots+(5n-3)$ using the summation symbol Σ:

A $\sum_{k=1}^{n}(5k-3)$

B $\sum_{k=0}^{n}(5k-3)$

C $\sum_{k=1}^{n}(5k+3)$

D $\sum_{k=1}^{n}(4k-3)$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q060 | WRITTEN

C02-T11-S-WU2b

Express $6^2 + 7^2 + 8^2 + \cdots + 15^2$ using Σ.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q061 | WRITTEN

C02-T11-S-T2c

Express $4^2 + 5^2 + 6^2 + \cdots + 13^2$ using Σ.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q062 | WRITTEN

C02-T11-S-E2b

Express $1 + 7 + 25 + 79 + \cdots + (3^n - 2)$ using Σ.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q063 | WRITTEN

C02-T11-S-E2c

Express $1 + 2 + 4 + 8 + \cdots + 2^{n-1}$ using Σ.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q064 | WRITTEN

C02-T11-S-E2g

Express $7^2 + 8^2 + \cdots + 21^2$ using Σ.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q065 | WRITTEN

C02-T11-S-E2h

Express $12^2 + 13^2 + \cdots + 18^2$ using Σ.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q066 | WRITTEN

C02-T11-S-E2i

Express $10^2 + 11^2 + \cdots + 20^2$ using Σ.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q067 | MCQ

C02-T11-G-M26

Select the correct option: Express $4^2 + 5^2 + \cdots + 12^2$ using the summation symbol Σ:

A $\sum_{k=4}^{12} k^2$

B $\sum_{k=1}^{9} k^2$

C $\sum_{k=4}^{12} k$

D $\sum_{k=5}^{12} k^2$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q068 | MCQ

C02-T11-G-M29

Select the correct option: Express $3^1 + 3^2 + \cdots + 3^n$ using the summation symbol Σ:

A $\sum_{k=1}^{n} 3^k$

B $\sum_{k=0}^{n} 3^k$

C $\sum_{k=1}^{n} 3^{k-1}$

D $\sum_{k=1}^{n} k^3$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q069 | MCQ

C02-T11-G-M32

Select the correct option: Express $2 + 4 + 8 + \cdots + 2^n$ using the summation symbol Σ:

A $\sum_{k=1}^{n} 2^k$

B $\sum_{k=0}^{n} 2^k$

C $\sum_{k=1}^{n} 2^{k-1}$

D $\sum_{k=1}^{n} k^2$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q070 | MCQ

C02-T11-G-M35

Select the correct option: Express $1 + 2^1 + 2^2 + \cdots + 2^{n-1}$ using the summation symbol Σ:

A $\sum_{k=0}^{n-1} 2^k$

B $\sum_{k=1}^{n} 2^k$

C $\sum_{k=1}^{n-1} 2^k$

D $\sum_{k=0}^{n} 2^k$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q071 | MCQ

C02-T11-G-M38

Select the correct option: Express $7 + 14 + 21 + \cdots + 7n$ using the summation symbol Σ:

A $\sum_{k=1}^{n} 7k$

B $\sum_{k=0}^{n} 7k$

C $\sum_{k=1}^{n} (7k + 1)$

D $\sum_{k=1}^{n} k^7$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n} (u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q072 | MCQ

C02-T11-G-M41

Select the correct option: Express $10+15+20+\cdots+5n$ using the summation symbol Σ:

A $\sum_{k=2}^{n} 5k$

B $\sum_{k=1}^{n} 5k$

C $\sum_{k=2}^{n}(5k+1)$

D $\sum_{k=0}^{n} 5k$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q073 | MCQ

C02-T11-G-M44

Select the correct option: Express $6^2 + 7^2 + \cdots + 16^2$ using the summation symbol Σ:

A $\sum_{k=6}^{16} k^2$

B $\sum_{k=1}^{11} k^2$

C $\sum_{k=6}^{16} k$

D $\sum_{k=7}^{16} k^2$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q074 | WRITTEN

C02-T11-S-T2d

Express $2 + 5 + 8 + \cdots + 29$ using Σ.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q075 | WRITTEN

C02-T11-S-E2j

Express $8 + 16 + 24 + \cdots + 56$ using Σ.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q076 | WRITTEN

C02-T11-S-E2k

Express $7 + 13 + 19 + \cdots + 73$ using Σ.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q077 | WRITTEN

C02-T11-S-E2I

Express $4 + 9 + 14 + \cdots + 119$ using Σ.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F99 | V01

Q078 | CHALLENGE WRITTEN C02-T11-S-CH1

A green-tech startup installs 1 solar panel in Week 1, 4 in Week 2, 7 in Week 3, and $3n-2$ in Week n. Write one expression using Σ for the total panels installed from Week 1 through Week n.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q079 | WRITTEN

C02-T12-S-WU-A

Find $\sum_{k=1}^{n}(-3)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q080 | WRITTEN

C02-T12-S-T-A

Find $\sum_{k=1}^{n} 3$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q081 | WRITTEN

C02-T12-S-E-A

Find $\sum_{k=1}^{n} 6$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q082 | WRITTEN

C02-T12-S-E-B

Find $\sum_{k=1}^{n}(-4)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q083 | WRITTEN

C02-T12-S-E-C

Find $\sum_{k=1}^{n} 1$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q084 | MCQ

C02-T12-G-M01

Select the correct option: Find $\sum_{k=1}^{n} 9$:

A $9n$

B $n+9$

C $9n^2$

D $\frac{9n(n+1)}{2}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q085 | MCQ

C02-T12-G-M02

Select the correct option: Find $\sum_{k=1}^{n}(-2)$:

A $-2n$

B $2n$

C $-n-2$

D $-n^2$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q086 | MCQ

C02-T12-G-M09

Select the correct option: Find $\sum_{k=1}^{7} 4$:

A 28

B 11

C 16

D 49

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q087 | MCQ

C02-T12-G-M12

Select the correct option: Find $\sum_{k=1}^{12}(-5)$:

A -60

B 60

C -17

D -144

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q088 | MCQ

C02-T12-G-M03

Select the correct option: Find $\sum_{k=1}^{n} k$:

A $\frac{n(n+1)}{2}$

B $n(n+1)$

C $\frac{n(n-1)}{2}$

D n^2

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q089 | MCQ

C02-T12-G-M05

Select the correct option: Find $\sum_{k=1}^{n} 4k$:

A $2n(n+1)$

B $4n(n+1)$

C $2n(n-1)$

D $4n$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q090 | MCQ

C02-T12-G-M07

Select the correct option: Find $\sum_{k=1}^{10} k$:

A 55

B 45

C 100

D 110

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q091 | MCQ

C02-T12-G-M10

Select the correct option: Find $\sum_{k=1}^{8} 3k$:

A 108

B 72

C 96

D 120

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q092 | MCQ

C02-T12-G-M13

Select the correct option: Find $\sum_{k=1}^{6} 5k$:

A 105

B 75

C 90

D 120

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q093 | MCQ

C02-T12-G-M15

Select the correct option: Find $\sum_{k=1}^{20} k$:

A 210

B 190

C 200

D 420

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q094 | MCQ

C02-T12-G-M04

Select the correct option: Find $\sum_{k=1}^{n} k^2$:

A $\frac{n(n+1)(2n+1)}{6}$

B $\frac{n(n+1)}{2}$

C $\frac{n(n+1)(2n-1)}{6}$

D $\frac{n^2(n+1)^2}{4}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q095 | MCQ

C02-T12-G-M06

Select the correct option: Find $\sum_{k=1}^{n} 6k^2$:

A $n(n+1)(2n+1)$

B $3n(n+1)$

C $n(n+1)(2n-1)$

D $6n^2$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q096 | MCQ

C02-T12-G-M08

Select the correct option: Find $\sum_{k=1}^{5} k^2$:

A 55

B 25

C 30

D 50

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q097 | MCQ

C02-T12-G-M11

Select the correct option: Find $\sum_{k=1}^{4} 2k^2$:

A 60

B 30

C 40

D 80

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q098 | MCQ

C02-T12-G-M14

Select the correct option: Find $\sum_{k=1}^{3} 4k^2$:

A 56

B 36

C 48

D 72

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q099 | MCQ

C02-T12-G-M16

Select the correct option: Find $\sum_{k=1}^{7} k^2$:

A 140

B 49

C 91

D 196

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q100 | WRITTEN

C02-T12-S-WU-B

Find $\sum_{k=1}^{n}(5k+4)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q101 | WRITTEN

C02-T12-S-T-B

Find $\sum_{k=1}^{n}(2k-3)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q102 | WRITTEN

C02-T12-S-E-D

Find $\sum_{k=1}^{n}(4k-1)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q103 | WRITTEN

C02-T12-S-E-E

Find $\sum_{k=1}^{n}(3k+2)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q104 | WRITTEN

C02-T12-S-E-F

Find $\sum_{k=1}^{n}(6k-3)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q105 | MCQ

C02-T12-G-M17

Select the correct option: Find $\sum_{k=1}^{n}(3k-1)$:

A $\frac{n(3n+1)}{2}$

B $\frac{n(3n-1)}{2}$

C $n(3n+1)$

D $\frac{3n(n+1)}{2}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q106 | MCQ

C02-T12-G-M18

Select the correct option: Find $\sum_{k=1}^{n}(2k+5)$:

A $n(n+6)$

B $n(n+5)$

C $n(n+1)+5$

D $2n(n+6)$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q107 | MCQ

C02-T12-G-M19

Select the correct option: Find $\sum_{k=1}^{n}(8k-4)$:

A $4n^2$

B $4n(n+1)$

C $8n^2$

D $4n(n-1)$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q108 | MCQ

C02-T12-G-M26

Select the correct option: Find $\sum_{k=1}^{n}(5k+3)$:

A $\frac{n(5n+11)}{2}$

B $\frac{n(5n+3)}{2}$

C $\frac{n(5n+5)}{2}$

D $n(5n+11)$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q109 | WRITTEN

C02-T12-S-E-I

Find $\sum_{k=1}^{n}(k-1)^2$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q110 | MCQ

C02-T12-G-M20

Select the correct option: Find $\sum_{k=1}^{n}(k^2+k)$:

A $\frac{n(n+1)(n+2)}{3}$

B $\frac{n(n+1)(2n+1)}{6}$

C $\frac{n(n+1)(n+2)}{6}$

D $n(n+1)(n+2)$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q111 | MCQ

C02-T12-G-M21

Select the correct option: Find $\sum_{k=1}^{n}(2k^2-k)$:

A $\frac{n(n+1)(4n-1)}{6}$

B $\frac{n(n+1)(4n+1)}{6}$

C $\frac{n(n+1)(2n-1)}{6}$

D $\frac{n(n-1)(4n-1)}{6}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q112 | MCQ

C02-T12-G-M22

Select the correct option: Find $\sum_{k=1}^{n}(k^2-1)$:

A $\frac{n(2n^2+3n-5)}{6}$

B $\frac{n(2n^2+3n-1)}{6}$

C $\frac{n(2n^2-3n+1)}{6}$

D $\frac{n(n+1)(2n+1)}{6}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q113 | MCQ

C02-T12-G-M27

Select the correct option: Find $\sum_{k=1}^{n}(3k^2+2k)$:

A $\frac{n(n+1)(2n+3)}{2}$

B $\frac{n(n+1)(2n+1)}{2}$

C $n(n+1)(2n+3)$

D $\frac{n(n-1)(2n+3)}{2}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q114 | MCQ

C02-T12-G-M28

Select the correct option: Find $\sum_{k=1}^{n}(4k^2-3k+2)$:

A $\frac{n(8n^2+3n+7)}{6}$

B $\frac{n(8n^2+9n+7)}{6}$

C $\frac{n(4n^2+3n+2)}{6}$

D $\frac{n(8n^2-3n+7)}{6}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q115 | WRITTEN

C02-T12-S-WU-C

Find $1 \cdot 3 + 2 \cdot 8 + 3 \cdot 13 + \cdots + n(5n-2)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q116 | WRITTEN

C02-T12-S-T-C

Find $\sum_{k=1}^{n}(k-1)(3k-1)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q117 | WRITTEN

C02-T12-S-T-D

Find $1 \cdot 3 + 2 \cdot 5 + 3 \cdot 7 + \cdots + n(2n+1)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q118 | WRITTEN

C02-T12-S-E-G

Find $\sum_{k=1}^{n} k(k-2)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q119 | WRITTEN

C02-T12-S-E-H

Find $\sum_{k=1}^{n} k(2k-2)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q120 | WRITTEN

C02-T12-S-E-J

Find $1 \cdot 4 + 2 \cdot 5 + 3 \cdot 6 + \cdots + n(n+3)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q121 | WRITTEN

C02-T12-S-E-K

Find $1 \cdot 5 + 2 \cdot 8 + 3 \cdot 11 + \cdots + n(3n + 2)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q122 | WRITTEN

C02-T12-S-E-L

Find $2 \cdot 5 + 3 \cdot 6 + 4 \cdot 7 + \cdots + (n+1)(n+4)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F03 | V01

Q123 | WRITTEN

C02-T12-S-WU-D

Find $\sum_{k=1}^{4}(2k-1)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F03 | V01

Q124 | WRITTEN

C02-T12-S-T-E

Find $\sum_{k=1}^{5}(3k-2)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F03 | V01

Q125 | WRITTEN

C02-T12-S-E-M

Find $\sum_{k=1}^{20}(2k-7)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F03 | V01

Q126 | WRITTEN

C02-T12-S-E-N

Find $\sum_{k=1}^{8}(4k+5)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F03 | V01

Q127 | WRITTEN

C02-T12-S-E-O

Find $\sum_{k=1}^{10}(2k-1)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F99 | V01

Q128 | CHALLENGE WRITTEN

C02-T12-S-CH

Find $\sum_{r=4}^{8}(r^2+r+5)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q129 | WRITTEN

C02-T13-S-WU-a

Find the sum $\sum_{k=1}^{n} k^2(k+1)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q130 | WRITTEN

C02-T13-S-Try-a

Find the sum $\sum_{k=1}^{n} k^2(k-2)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q131 | WRITTEN

C02-T13-S-Ex-b

Find the sum $\sum_{k=1}^{n} k^2(k+2)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q132 | WRITTEN

C02-T13-S-Ex-d

Find the sum $\sum_{k=1}^{n} k^2(k-3)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q133 | MCQ C02-T13-G-M01

Select the correct option: Find the sum $\sum_{k=1}^{n} k^2(k+1)$:

A $\frac{n(n+1)(n+2)(3n+1)}{12}$

B $\frac{n(n+1)(n+2)(3n-1)}{12}$

C $\frac{n(n+1)(3n+1)}{12}$

D $\frac{n(n+1)(n+2)(3n+2)}{6}$

WORKING AREA

FORMULA BANK

Sigma linearity
$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$

Standard sums
$\sum k = \frac{n(n+1)}{2}$ $\sum k^2 = \frac{n(n+1)(2n+1)}{6}$

Telescoping
$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$

Concept 3 | Summation

F01 | V01

Q134 | MCQ

C02-T13-G-M02

Select the correct option: Find the sum $\sum_{k=1}^{n} k^2(k-2)$:

A $\frac{n(n+1)(3n^2-5n-4)}{12}$

B $\frac{n(n+1)(3n^2+5n-4)}{12}$

C $\frac{n(n+1)(3n^2-5n+4)}{12}$

D $\frac{n(n+1)(3n^2-4n-5)}{12}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q135 | MCQ C02-T13-G-M04

Select the correct option: Find the sum $\sum_{k=1}^{n} k^2(k+2)$:

A $\frac{n(n+1)(3n^2+11n+4)}{12}$

B $\frac{n(n+1)(3n^2+11n-4)}{12}$

C $\frac{n(n+1)(3n^2+9n+4)}{12}$

D $\frac{n(n+1)(3n^2+4n+11)}{12}$

WORKING AREA

FORMULA BANK

Sigma linearity
$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$

Standard sums
$\sum k = \frac{n(n+1)}{2}$ $\sum k^2 = \frac{n(n+1)(2n+1)}{6}$

Telescoping
$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$

Concept 3 | Summation

F01 | V01

Q136 | MCQ C02-T13-G-M06

Select the correct option: Find the sum $\sum_{k=1}^{n} k^2(k-3)$:

A $\frac{n(n+1)(n^2-3n-2)}{4}$

B $\frac{n(n+1)(n^2+3n-2)}{4}$

C $\frac{n(n+1)(n^2-3n+2)}{4}$

D $\frac{n(n+1)(n^2-2n-3)}{4}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q137 | MCQ C02-T13-G-M07

Select the correct option: Find the sum $\sum_{k=1}^{n} k^2(k+3)$:

A $\frac{n(n+1)(n^2+5n+2)}{4}$

B $\frac{n(n+1)(n^2+5n-2)}{4}$

C $\frac{n(n+1)(n^2+3n+2)}{4}$

D $\frac{n(n+1)(n^2+2n+5)}{4}$

WORKING AREA

FORMULA BANK

Sigma linearity
$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$

Standard sums
$\sum k = \frac{n(n+1)}{2}$ $\sum k^2 = \frac{n(n+1)(2n+1)}{6}$

Telescoping
$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q138 | MCQ C02-T13-G-M08

Select the correct option: Find the sum $\sum_{k=1}^{n} k^2(k-4)$:

A $\frac{n(n+1)(3n^2-13n-8)}{12}$

B $\frac{n(n+1)(3n^2-13n+8)}{12}$

C $\frac{n(n+1)(3n^2-11n-8)}{12}$

D $\frac{n(n+1)(3n^2-8n-13)}{12}$

WORKING AREA

FORMULA BANK

Sigma linearity
$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$

Standard sums
$\sum k = \frac{n(n+1)}{2}$ $\sum k^2 = \frac{n(n+1)(2n+1)}{6}$

Telescoping
$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$

Concept 3 | Summation

F01 | V01

Q139 | MCQ C02-T13-G-M11

Select the correct option: Find the sum $\sum_{k=1}^{n} k^2(k+4)$:

A $\frac{n(n+1)(3n^2+19n+8)}{12}$

B $\frac{n(n+1)(3n^2+19n-8)}{12}$

C $\frac{n(n+1)(3n^2+17n+8)}{12}$

D $\frac{n(n+1)(3n^2+8n+19)}{12}$

WORKING AREA

FORMULA BANK

Sigma linearity
$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$

Standard sums
$\sum k = \frac{n(n+1)}{2}$ $\sum k^2 = \frac{n(n+1)(2n+1)}{6}$

Telescoping
$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$

Concept 3 | Summation

F01 | V01

Q140 | MCQ

C02-T13-G-M18

Select the correct option: Find the sum $\sum_{k=1}^{n} k^2(k-1)$:

A $\frac{n(n+1)(3n^2-5n-4)}{12}$

B $\frac{n(n+1)(3n^2-5n+4)}{12}$

C $\frac{n(n+1)(3n^2-4n-5)}{12}$

D $\frac{n(n+1)(3n^2-n-4)}{12}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q141 | WRITTEN

C02-T13-S-Ex-a

Find the sum $\sum_{k=1}^{n} k(k^2-1)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q142 | WRITTEN

C02-T13-S-Ex-c

Find the sum $\sum_{k=1}^{n} k(k^2+2)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q143 | MCQ

C02-T13-G-M03

Select the correct option: Find the sum $\sum_{k=1}^{n} k(k^2-1)$:

A $\frac{n(n+1)(n-1)(n+2)}{4}$

B $\frac{n(n+1)(n+1)(n+2)}{4}$

C $\frac{n(n-1)(n+2)}{4}$

D $\frac{n(n+1)(n-2)(n+3)}{4}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q144 | MCQ

C02-T13-G-M05

Select the correct option: Find the sum $\sum_{k=1}^{n} k(k^2+2)$:

A $\frac{n(n+1)(n^2+n+4)}{4}$

B $\frac{n(n+1)(n^2+n-4)}{4}$

C $\frac{n(n+1)(n^2+2n+4)}{4}$

D $\frac{n(n+1)(n^2+n+2)}{4}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q145 | MCQ C02-T13-G-M09

Select the correct option: Find the sum $\sum_{k=1}^{n} k(k^2+3)$:

A $\frac{n(n+1)(n^2+n+6)}{4}$

B $\frac{n(n+1)(n^2+n-6)}{4}$

C $\frac{n(n+1)(n^2+3n+6)}{4}$

D $\frac{n(n+1)(n^2+n+3)}{4}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q146 | MCQ

C02-T13-G-M10

Select the correct option: Find the sum $\sum_{k=1}^{n} k(k^2-2)$:

A $\frac{n(n+1)(n^2+n-4)}{4}$

B $\frac{n(n+1)(n^2+n+4)}{4}$

C $\frac{n(n+1)(n^2-2n-4)}{4}$

D $\frac{n(n+1)(n^2+n-2)}{4}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q147 | MCQ C02-T13-G-M12

Select the correct option: Find the sum $\sum_{k=1}^{n} k(k^2+4)$:

A $\frac{n(n+1)(n^2+n+8)}{4}$

B $\frac{n(n+1)(n^2+n-8)}{4}$

C $\frac{n(n+1)(n^2+4n+8)}{4}$

D $\frac{n(n+1)(n^2+n+4)}{4}$

WORKING AREA

FORMULA BANK

Sigma linearity
$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$

Standard sums
$\sum k = \frac{n(n+1)}{2}$ $\sum k^2 = \frac{n(n+1)(2n+1)}{6}$

Telescoping
$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$

Concept 3 | Summation

F01 | V02

Q148 | MCQ C02-T13-G-M13

Select the correct option: Find the sum $\sum_{k=1}^{n} k(k^2-3)$:

A $\frac{n(n+1)(n^2+n-6)}{4}$

B $\frac{n(n+1)(n^2+n+6)}{4}$

C $\frac{n(n+1)(n^2-3n-6)}{4}$

D $\frac{n(n+1)(n^2+n-3)}{4}$

WORKING AREA

FORMULA BANK

Sigma linearity
$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$

Standard sums
$\sum k = \frac{n(n+1)}{2}$ $\sum k^2 = \frac{n(n+1)(2n+1)}{6}$

Telescoping
$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$

Concept 3 | Summation

F01 | V03

Q149 | MCQ

C02-T13-G-M14

Select the correct option: Find the sum $\sum_{k=1}^{n} k^2(k+5)$:

A $\frac{n(n+1)(3n^2+23n+10)}{12}$

B $\frac{n(n+1)(3n^2+23n-10)}{12}$

C $\frac{n(n+1)(3n^2+21n+10)}{12}$

D $\frac{n(n+1)(3n^2+10n+23)}{12}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q150 | MCQ

C02-T13-G-M15

Select the correct option: Find the sum $\sum_{k=1}^{n} k^2(k-5)$:

A $\frac{n(n+1)(3n^2-17n-10)}{12}$

B $\frac{n(n+1)(3n^2-17n+10)}{12}$

C $\frac{n(n+1)(3n^2-15n-10)}{12}$

D $\frac{n(n+1)(3n^2-10n-17)}{12}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q151 | MCQ C02-T13-G-M16

Select the correct option: Find the sum $\sum_{k=1}^{n} k(k^2+5)$:

A $\frac{n(n+1)(n^2+n+10)}{4}$

B $\frac{n(n+1)(n^2+n-10)}{4}$

C $\frac{n(n+1)(n^2+5n+10)}{4}$

D $\frac{n(n+1)(n^2+n+5)}{4}$

WORKING AREA

FORMULA BANK

Sigma linearity
$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$

Standard sums
$\sum k = \frac{n(n+1)}{2}$ $\sum k^2 = \frac{n(n+1)(2n+1)}{6}$

Telescoping
$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$

Concept 3 | Summation

F01 | V03

Q152 | MCQ C02-T13-G-M17

Select the correct option: Find the sum $\sum_{k=1}^{n} k(k^2-5)$:

A $\frac{n(n+1)(n^2+n-10)}{4}$

B $\frac{n(n+1)(n^2+n+10)}{4}$

C $\frac{n(n+1)(n^2-5n-10)}{4}$

D $\frac{n(n+1)(n^2+n-5)}{4}$

WORKING AREA

FORMULA BANK

Sigma linearity
$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$

Standard sums
$\sum k = \frac{n(n+1)}{2}$ $\sum k^2 = \frac{n(n+1)(2n+1)}{6}$

Telescoping
$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$

Concept 3 | Summation

F01 | V03

Q153 | MCQ C02-T13-G-M19

Select the correct option: Find the sum $\sum_{k=1}^{n} k^2(k+6)$:

A $\frac{n(n+1)(3n^2+27n+12)}{12}$

B $\frac{n(n+1)(3n^2+27n-12)}{12}$

C $\frac{n(n+1)(3n^2+25n+12)}{12}$

D $\frac{n(n+1)(3n^2+12n+27)}{12}$

WORKING AREA

FORMULA BANK

Sigma linearity
$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$

Standard sums
$\sum k = \frac{n(n+1)}{2}$ $\sum k^2 = \frac{n(n+1)(2n+1)}{6}$

Telescoping
$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$

Concept 3 | Summation

F01 | V03

Q154 | MCQ

C02-T13-G-M20

Select the correct option: Find the sum $\sum_{k=1}^{n} k(k^2+6)$:

A $\frac{n(n+1)(n^2+n+12)}{4}$

B $\frac{n(n+1)(n^2+n-12)}{4}$

C $\frac{n(n+1)(n^2+6n+12)}{4}$

D $\frac{n(n+1)(n^2+n+6)}{4}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q155 | MCQ C02-T13-G-M21

Select the correct option: Find the sum $\sum_{k=1}^{n} k^2(k-6)$:

A $\frac{n(n+1)(3n^2-25n-12)}{12}$

B $\frac{n(n+1)(3n^2-25n+12)}{12}$

C $\frac{n(n+1)(3n^2-23n-12)}{12}$

D $\frac{n(n+1)(3n^2-12n-25)}{12}$

WORKING AREA

FORMULA BANK

Sigma linearity
$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$

Standard sums
$\sum k = \frac{n(n+1)}{2}$ $\sum k^2 = \frac{n(n+1)(2n+1)}{6}$

Telescoping
$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$

Concept 3 | Summation

F01 | V03

Q156 | MCQ

C02-T13-G-M22

Select the correct option: Find the sum $\sum_{k=1}^{n} k(k^2-6)$:

A $\frac{n(n+1)(n^2+n-12)}{4}$

B $\frac{n(n+1)(n^2+n+12)}{4}$

C $\frac{n(n+1)(n^2-6n-12)}{4}$

D $\frac{n(n+1)(n^2+n-6)}{4}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q157 | MCQ

C02-T13-G-M23

Select the correct option: Find the sum $\sum_{k=1}^{n} k^2(k+7)$:

A $\frac{n(n+1)(3n^2+31n+14)}{12}$

B $\frac{n(n+1)(3n^2+31n-14)}{12}$

C $\frac{n(n+1)(3n^2+29n+14)}{12}$

D $\frac{n(n+1)(3n^2+14n+31)}{12}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q158 | MCQ C02-T13-G-M24

Select the correct option: Find the sum $\sum_{k=1}^{n} k^2(k+8)$:

A $\frac{n(n+1)(3n^2+35n+16)}{12}$

B $\frac{n(n+1)(3n^2+35n-16)}{12}$

C $\frac{n(n+1)(3n^2+33n+16)}{12}$

D $\frac{n(n+1)(3n^2+16n+35)}{12}$

WORKING AREA

FORMULA BANK

Sigma linearity
$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$

Standard sums
$\sum k = \frac{n(n+1)}{2}$ $\sum k^2 = \frac{n(n+1)(2n+1)}{6}$

Telescoping
$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$

Concept 3 | Summation

F02 | V01

Q159 | WRITTEN

C02-T13-S-Ex-e

Find the sum $\sum_{k=1}^{n} 6 \times 3^{k-1}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q160 | WRITTEN

C02-T13-S-Ex-g

Find the sum $\sum_{k=1}^{n} 4 \times 2^{k-1}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q161 | WRITTEN

C02-T13-S-Ex-o

Find the sum $\sum_{k=1}^{n} 2^k$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q162 | WRITTEN

C02-T13-S-WU-b

Find the sum $\sum_{k=1}^{n} 2 \times (-3)^{k-1}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q163 | WRITTEN

C02-T13-S-Try-b

Find the sum $\sum_{k=1}^{n} 3 \times (-2)^{k-1}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q164 | WRITTEN

C02-T13-S-Try-d

Find the sum $\sum_{k=1}^{n}(-5)^k$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q165 | WRITTEN

C02-T13-S-Ex-f

Find the sum $\sum_{k=1}^{n} 2 \times (-1)^{k-1}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q166 | WRITTEN

C02-T13-S-Ex-h

Find the sum $\sum_{k=1}^{n} 8 \times (-3)^{k-1}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q167 | WRITTEN

C02-T13-S-Ex-k

Find the sum $\sum_{k=1}^{n}(-2)^{k-1}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q168 | WRITTEN

C02-T13-S-Ex-m

Find the sum $\sum_{k=1}^{n}(-3)^k$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q169 | WRITTEN

C02-T13-S-WU-c

Find the sum $\sum_{k=1}^{n} 4^k$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q170 | WRITTEN

C02-T13-S-Try-c

Find the sum $\sum_{k=1}^{n} 4^{k-1}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q171 | WRITTEN

C02-T13-S-Ex-i

Find the sum $\sum_{k=1}^{n} 3^{k-1}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q172 | WRITTEN

C02-T13-S-Ex-j

Find the sum $\sum_{k=1}^{4}(-2)^{k-1}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q173 | WRITTEN

C02-T13-S-Ex-I

Find the sum $\sum_{k=1}^{3} 3^k$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q174 | WRITTEN

C02-T13-S-Ex-n

Find the sum $\sum_{k=1}^{5} 2^k$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q175 | WRITTEN

C02-T13-S-Ex-p

Find the sum $\sum_{k=1}^{4}(-3)^k$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F99 | V01

Q176 | CHALLENGE WRITTEN

C02-T13-S-CH1

Find the finite sum $\sum_{r=5}^{9}(2r+7)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q177 | WRITTEN

C02-T14-S-T1a

Find $\frac{1}{2\times 3}+\frac{1}{3\times 4}+\frac{1}{4\times 5}+\cdots+\frac{1}{(n+1)(n+2)}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q178 | WRITTEN

C02-T14-S-E1a

Find $\frac{1}{1\times 2}+\frac{1}{2\times 3}+\frac{1}{3\times 4}+\cdots+\frac{1}{n(n+1)}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q179 | WRITTEN

C02-T14-S-E2a

Find $\frac{1}{3\times 4}+\frac{1}{4\times 5}+\frac{1}{5\times 6}+\cdots+\frac{1}{(n+2)(n+3)}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q180 | MCQ

C02-T14-G-M01

Select the correct option: Find the sum $\frac{1}{1\times2} + \cdots + \frac{1}{n(n+1)}$:

A $\frac{n}{n+1}$

B $\frac{1}{n+1}$

C $\frac{n}{2(n+1)}$

D $\frac{n+1}{n}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q181 | MCQ C02-T14-G-M02

Select the correct option: Find the sum $\frac{1}{2\times3} + \cdots + \frac{1}{(n+1)(n+2)}$:

A $\frac{n}{2(n+2)}$

B $\frac{1}{2(n+2)}$

C $\frac{n}{n+2}$

D $\frac{n+1}{2(n+2)}$

WORKING AREA

FORMULA BANK

Sigma linearity
$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums
$$\sum k = \frac{n(n+1)}{2} \quad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping
$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q182 | MCQ

C02-T14-G-M03

Select the correct option: Find the sum $\frac{1}{3\times4} + \cdots + \frac{1}{(n+2)(n+3)}$:

A $\frac{n}{3(n+3)}$

B $\frac{n}{n+3}$

C $\frac{1}{3(n+3)}$

D $\frac{n+1}{3(n+3)}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q183 | MCQ

C02-T14-G-M09

Select the correct option: Find the sum $\frac{1}{4\times5} + \cdots + \frac{1}{(n+3)(n+4)}$:

A $\frac{n}{4(n+4)}$

B $\frac{n}{3(n+4)}$

C $\frac{n+1}{4(n+4)}$

D $\frac{1}{4(n+4)}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q184 | MCQ

C02-T14-G-M12

Select the correct option: Find the sum $\frac{1}{6\times7} + \cdots + \frac{1}{(n+5)(n+6)}$:

A $\frac{n}{6(n+6)}$

B $\frac{n}{5(n+6)}$

C $\frac{n+1}{6(n+6)}$

D $\frac{1}{6(n+6)}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q185 | MCQ

C02-T14-G-M15

Select the correct option: Find the sum $\frac{1}{7\times8} + \cdots + \frac{1}{(n+6)(n+7)}$:

A $\frac{n}{7(n+7)}$

B $\frac{n}{6(n+7)}$

C $\frac{n+1}{7(n+7)}$

D $\frac{1}{7(n+7)}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q186 | MCQ

C02-T14-G-M18

Select the correct option: Find the sum $\frac{1}{9\times10} + \cdots + \frac{1}{(n+8)(n+9)}$:

A $\frac{n}{9(n+9)}$

B $\frac{n}{8(n+9)}$

C $\frac{n+1}{9(n+9)}$

D $\frac{1}{9(n+9)}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q187 | MCQ

C02-T14-G-M21

Select the correct option: Find the sum $\frac{1}{10\times11}+\cdots+\frac{1}{(n+9)(n+10)}$:

A $\frac{n}{10(n+10)}$

B $\frac{n}{9(n+10)}$

C $\frac{n+1}{10(n+10)}$

D $\frac{1}{10(n+10)}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2}\qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q188 | MCQ

C02-T14-G-M24

Select the correct option: Find the sum $\frac{1}{11\times12}+\cdots+\frac{1}{(n+10)(n+11)}$:

A $\frac{n}{11(n+11)}$

B $\frac{n}{10(n+11)}$

C $\frac{n+1}{11(n+11)}$

D $\frac{1}{11(n+11)}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q189 | WRITTEN

C02-T14-S-WU1a

Find the following sum: $\frac{1}{2\times 5}+\frac{1}{5\times 8}+\frac{1}{8\times 11}+\cdots+\frac{1}{(3n-1)(3n+2)}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q190 | WRITTEN

C02-T14-S-T1b

Find $\frac{1}{1\times 3}+\frac{1}{3\times 5}+\frac{1}{5\times 7}+\cdots+\frac{1}{(2n-1)(2n+1)}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q191 | WRITTEN

C02-T14-S-E1c

Find $\frac{1}{1\times 3}+\frac{1}{2\times 4}+\frac{1}{3\times 5}+\cdots+\frac{1}{n(n+2)}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q192 | WRITTEN

C02-T14-S-E2b

Find $\frac{1}{1\times 4}+\frac{1}{4\times 7}+\frac{1}{7\times 10}+\cdots+\frac{1}{(3n-2)(3n+1)}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q193 | WRITTEN

C02-T14-S-E2c

Find $\frac{1}{1\times 7}+\frac{1}{4\times 10}+\frac{1}{7\times 13}+\cdots+\frac{1}{(3n-2)(3n+4)}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q194 | MCQ

C02-T14-G-M04

Select the correct option: Find the sum $\frac{1}{1\times3}+\cdots+\frac{1}{(2n-1)(2n+1)}$:

A $\frac{n}{2n+1}$

B $\frac{n}{2(2n+1)}$

C $\frac{1}{2n+1}$

D $\frac{n+1}{2n+1}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q195 | MCQ

C02-T14-G-M05

Select the correct option: Find the sum $\frac{1}{1\times4}+\cdots+\frac{1}{(3n-2)(3n+1)}$:

A $\frac{n}{3n+1}$

B $\frac{n}{3(3n+1)}$

C $\frac{1}{3n+1}$

D $\frac{n+1}{3n+1}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q196 | MCQ

C02-T14-G-M06

Select the correct option: Find the sum $\frac{1}{1\times7}+\cdots+\frac{1}{(3n-2)(3n+4)}$:

A $\frac{1}{6}(1+\frac{1}{4}-\frac{1}{3n+1}-\frac{1}{3n+4})$

B $\frac{1}{6}(1-\frac{1}{3n+4})$

C $\frac{1}{2(3n+4)}$

D $\frac{n}{2(3n+4)}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q197 | MCQ

C02-T14-G-M10

Select the correct option: Find the sum $\frac{1}{2\times6}+\cdots+\frac{1}{(4n-2)(4n+2)}$:

A $\frac{n}{2(4n+2)}$

B $\frac{n}{4(4n+2)}$

C $\frac{1}{4n+2}$

D $\frac{n+1}{2(4n+2)}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q198 | MCQ

C02-T14-G-M13

Select the correct option: Find the sum $\frac{1}{3\times8}+\cdots+\frac{1}{(5n-2)(5n+3)}$:

A $\frac{n}{3(5n+3)}$

B $\frac{n}{5(5n+3)}$

C $\frac{n+1}{3(5n+3)}$

D $\frac{1}{5n+3}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q199 | MCQ

C02-T14-G-M16

Select the correct option: Find the sum $\frac{1}{1\times5}+\cdots+\frac{1}{(4n-3)(4n+1)}$:

A $\frac{n}{4n+1}$

B $\frac{n}{4(4n+1)}$

C $\frac{1}{4n+1}$

D $\frac{n+1}{4n+1}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q200 | MCQ

C02-T14-G-M19

Select the correct option: Find the sum $\frac{1}{2\times7}+\cdots+\frac{1}{(5n-3)(5n+2)}$:

A $\frac{n}{2(5n+2)}$

B $\frac{n}{5(5n+2)}$

C $\frac{n+1}{2(5n+2)}$

D $\frac{1}{5n+2}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q201 | MCQ

C02-T14-G-M22

Select the correct option: Find the sum $\frac{1}{4\times10} + \cdots + \frac{1}{(6n-2)(6n+4)}$:

A $\frac{n}{4(6n+4)}$

B $\frac{n}{6(6n+4)}$

C $\frac{n+1}{4(6n+4)}$

D $\frac{1}{6n+4}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q202 | WRITTEN

C02-T14-S-T1c

Find $\frac{1}{4\times 6}+\frac{1}{5\times 7}+\frac{1}{6\times 8}+\cdots+\frac{1}{(n+3)(n+5)}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q203 | WRITTEN

C02-T14-S-E1b

Find $\frac{1}{2\times 4}+\frac{1}{4\times 6}+\frac{1}{6\times 8}+\cdots+\frac{1}{2n(2n+2)}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q204 | WRITTEN

C02-T14-S-WU1b

Find the following sum: $\sum_{k=1}^{n} \frac{1}{\sqrt{k+2}+\sqrt{k+1}}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q205 | WRITTEN

C02-T14-S-T1d

Find $\sum_{k=1}^{n} \frac{1}{\sqrt{k+1}+\sqrt{k}}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q206 | WRITTEN

C02-T14-S-E1d

Find $\sum_{k=1}^{n} \frac{1}{\sqrt{k}+\sqrt{k-1}}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q207 | WRITTEN

C02-T14-S-E2e

Find $\dfrac{1}{\sqrt{1}+\sqrt{2}}+\dfrac{1}{\sqrt{2}+\sqrt{3}}+\cdots+\dfrac{1}{\sqrt{n}+\sqrt{n+1}}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F02 | V02

Q208 | WRITTEN

C02-T14-S-E2d

Find $\sum_{k=1}^{n} \frac{1}{\sqrt{2k-1}+\sqrt{2k+1}}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q209 | WRITTEN

C02-T14-S-E1e

Find $\dfrac{1}{\sqrt{2}+\sqrt{3}}+\dfrac{1}{\sqrt{3}+\sqrt{4}}+\cdots+\dfrac{1}{\sqrt{n+1}+\sqrt{n+2}}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F99 | V01

Q210 | CHALLENGE WRITTEN

C02-T14-S-CH1

Find the sum, showing your steps: $\sum_{r=1}^{30} \frac{1}{r(r+2)}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q211 | WRITTEN C02-T15-S-WU

Find the following sum $S = 3 \times 1 + 5 \times 3 + 7 \times 3^2 + 9 \times 3^3 + \cdots + (2n+1) \times 3^{n-1}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q212 | WRITTEN

C02-T15-G-W01

Find the sum $\sum_{k=1}^{n}(2k+1)\times(3)^{k-1}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q213 | WRITTEN

C02-T15-G-W21

Find the sum $\sum_{k=1}^{4}(2k+1)\times(3)^{k-1}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q214 | WRITTEN

C02-T15-G-W09

Find the sum $\sum_{k=1}^{n}(2k-1)\times(4)^{k-1}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q215 | WRITTEN

C02-T15-G-W29

Find the sum $\sum_{k=1}^{6}(2k-1)\times(4)^{k-1}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q216 | MCQ

C02-T15-G-M01

Select the correct option: Find the sum $\sum_{k=1}^{n}(2k+1)\times(3)^{k-1}$:

A $3^n n$

B $-(3^n n)$

C $(3^n n)+1$

D $(3^n n)-1$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q217 | MCQ

C02-T15-G-M25

Select the correct option: Find the sum $\sum_{k=1}^{n}(2k-1)\times(4)^{k-1}$:

A $\frac{6\,2^{2n}n-5\,2^{2n}+5}{9}$

B $-\left(\frac{6\,2^{2n}n-5\,2^{2n}+5}{9}\right)$

C $\left(\frac{6\,2^{2n}n-5\,2^{2n}+5}{9}\right)+1$

D $\left(\frac{6\,2^{2n}n-5\,2^{2n}+5}{9}\right)-1$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q218 | MCQ

C02-T15-G-M37

Select the correct option: Find the sum $\sum_{k=1}^{n}(k+4)\times(2)^{k-1}$:

A $2^n n + 3\,2^n - 3$

B $-(2^n n + 3\,2^n - 3)$

C $(2^n n + 3\,2^n - 3) + 1$

D $(2^n n + 3\,2^n - 3) - 1$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q219 | WRITTEN

C02-T15-S-TRY

Find the following sum $S = 2 \times 1 + 3 \times 3 + 4 \times 3^2 + 5 \times 3^3 + \cdots + (n+1) \times 3^{n-1}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q220 | MCQ

C02-T15-G-M04

Select the correct option: Find the sum $\sum_{k=1}^{n}(k+1)\times(3)^{k-1}$:

A $\frac{2\,3^n n+3^n-1}{4}$

B $-\left(\frac{2\,3^n n+3^n-1}{4}\right)$

C $\left(\frac{2\,3^n n+3^n-1}{4}\right)+1$

D $\left(\frac{2\,3^n n+3^n-1}{4}\right)-1$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q221 | MCQ

C02-T15-G-M29

Select the correct option: Find the sum $\sum_{k=1}^{n}(k-2)\times(3)^{k-1}$:

A $\frac{2\,3^n n-5\,3^n+5}{4}$

B $-\left(\frac{2\,3^n n-5\,3^n+5}{4}\right)$

C $\left(\frac{2\,3^n n-5\,3^n+5}{4}\right)+1$

D $\left(\frac{2\,3^n n-5\,3^n+5}{4}\right)-1$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q222 | MCQ

C02-T15-G-M41

Select the correct option: Find the sum $\sum_{k=1}^{n}(2k-3)\times(3)^{k-1}$:

A $3^n n - 2\,3^n + 2$

B $-(3^n n - 2\,3^n + 2)$

C $(3^n n - 2\,3^n + 2) + 1$

D $(3^n n - 2\,3^n + 2) - 1$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q223 | MCQ

C02-T15-G-M13

Select the correct option: Find the sum $\sum_{k=1}^{n}(2k+1)\times(-2)^{k-1}$:

A $-\dfrac{6(-2)^n n+5(-2)^n-5}{9}$

B $-\left(-\dfrac{6(-2)^n n+5(-2)^n-5}{9}\right)$

C $\left(-\dfrac{6(-2)^n n+5(-2)^n-5}{9}\right)+1$

D $\left(-\dfrac{6(-2)^n n+5(-2)^n-5}{9}\right)-1$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q224 | MCQ

C02-T15-G-M19

Select the correct option: Find the sum $\sum_{k=1}^{n}(k+2)\times(-3)^{k-1}$:

A $-\dfrac{4(-3)^n n+9(-3)^n-9}{16}$

B $-\left(-\dfrac{4(-3)^n n+9(-3)^n-9}{16}\right)$

C $\left(-\dfrac{4(-3)^n n+9(-3)^n-9}{16}\right)+1$

D $\left(-\dfrac{4(-3)^n n+9(-3)^n-9}{16}\right)-1$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q225 | WRITTEN

C02-T15-S-EX1

Find the following sum $S = 1 \times 1 + 2 \times 2 + 3 \times 2^2 + 4 \times 2^3 + \cdots + n \times 2^{n-1}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q226 | WRITTEN

C02-T15-S-EX2

Find the following sum $S = 1 \times 3 + 3 \times 3^2 + 5 \times 3^3 + 7 \times 3^4 + \cdots + (2n-1) \times 3^n$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F03 | V03

Q227 | MCQ

C02-T15-G-M02

Select the correct option: Find the sum $\sum_{k=1}^{n}(3k)\times(3)^{k-1}$:

A $\frac{3(2\,3^n n-3^n+1)}{4}$

B $-\left(\frac{3(2\,3^n n-3^n+1)}{4}\right)$

C $\left(\frac{3(2\,3^n n-3^n+1)}{4}\right)+1$

D $\left(\frac{3(2\,3^n n-3^n+1)}{4}\right)-1$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F99 | V01

Q228 | CHALLENGE WRITTEN C02-T15-S-CH

Find the sum of the partial sums $5+(5+9)+(5+9+13)+\cdots+[5+9+\cdots+(4k+1)]$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n+bv_n)=a\sum u_n+b\sum v_n$$

Standard sums

$$\sum k=\frac{n(n+1)}{2} \qquad \sum k^2=\frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k-u_{k+1})=u_1-u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q229 | WRITTEN

C02-T16-S-WU-A

For the sequence $3,\ 3+5,\ 3+5+7,\ 3+5+7+9,\ldots$, find the k-th term.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q230 | WRITTEN

C02-T16-S-TRY-1

For the sequence $1,\ 1+3,\ 1+3+5,\ 1+3+5+7,\ldots$, find the k-th term.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q231 | WRITTEN

C02-T16-S-EX2-A

For the sequence $2,\ 2+4,\ 2+4+6,\ 2+4+6+8,\ldots$, find the k-th term.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q232 | WRITTEN

C02-T16-S-EX1-A

For the sequence $1,\ 1+5,\ 1+5+9,\ 1+5+9+13,\ldots$, find the k-th term.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q233 | MCQ C02-T16-G-M01

Select the correct option: For the cumulative sequence $2,\ 2+4,\ 2+4+6,\ 2+4+6+8,\ \ldots$, what is a_k:

A $k(k+1)$

B $k(k+3)$

C $2k^2$

D $k(k+2)$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q234 | MCQ C02-T16-G-M02

Select the correct option: For the cumulative sequence $3,\ 3+6,\ 3+6+9,\ 3+6+9+12,\ \ldots$, what is a_k:

A $\frac{3k(k+1)}{2}$

B $\frac{3k(k+3)}{2}$

C $3k^2$

D $\frac{3k(k+2)}{2}$

WORKING AREA

FORMULA BANK

Sigma linearity
$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums
$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping
$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q235 | MCQ C02-T16-G-M03

Select the correct option: For the cumulative sequence $4,\ 4+6,\ 4+6+8,\ 4+6+8+10,\ \ldots$, what is a_k:

A $k\,(k+3)$

B $k\,(k+5)$

C $2k\,(k+1)$

D $k\,(k+4)$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q236 | MCQ C02-T16-G-M04

Select the correct option: For the cumulative sequence $2,\ 2+6,\ 2+6+10,\ 2+6+10+14,\ \ldots$, what is a_k:

A $2k^2$

B $2k\,(k+2)$

C $2k\,(2k-1)$

D $2k\,(k+1)$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q237 | MCQ C02-T16-G-M05

Select the correct option: For the cumulative sequence $5,\ 5+8,\ 5+8+11,\ 5+8+11+14,\ \ldots$, what is a_k:

A $\frac{k(3k+7)}{2}$

B $\frac{k(3k+13)}{2}$

C $k(3k+2)$

D $\frac{k(3k+10)}{2}$

WORKING AREA

FORMULA BANK

Sigma linearity
$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums
$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping
$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q238 | MCQ C02-T16-G-M06

Select the correct option: For the cumulative sequence $3,\ 3+8,\ 3+8+13,\ 3+8+13+18,\ \ldots$, what is a_k:

A $\frac{k\,(5k+1)}{2}$

B $\frac{k\,(5k+11)}{2}$

C $k\,(5k-2)$

D $\frac{k\,(5k+6)}{2}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q239 | MCQ C02-T16-G-M07

Select the correct option: For the cumulative sequence $6,\ 6+8,\ 6+8+10,\ 6+8+10+12,\ \ldots$, what is a_k:

A $k\,(k+5)$

B $k\,(k+7)$

C $2k\,(k+2)$

D $k\,(k+6)$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q240 | MCQ C02-T16-G-M08

Select the correct option: For the cumulative sequence $4,\ 4+8,\ 4+8+12,\ 4+8+12+16,\ \ldots$, what is a_k:

A $2k(k+1)$

B $2k(k+3)$

C $4k^2$

D $2k(k+2)$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q241 | WRITTEN

C02-T16-S-WU-B

For the sequence $3,\ 3+5,\ 3+5+7,\ 3+5+7+9,\ldots$, find the sum from the first term to the n-th term.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q242 | WRITTEN C02-T16-S-TRY-2

For the sequence $1,\ 1+3,\ 1+3+5,\ 1+3+5+7,\ldots$, find the sum from the first term to the n-th term.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q243 | WRITTEN

C02-T16-S-EX1-B

For the sequence $1,\ 1+5,\ 1+5+9,\ 1+5+9+13,\ldots$, find the sum from the first term to the n-th term.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q244 | WRITTEN

C02-T16-S-EX2-B

For the sequence $2,\ 2+4,\ 2+4+6,\ 2+4+6+8,\ldots$, find the sum from the first term to the n-th term.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F03 | V01

Q245 | MCQ C02-T16-G-M25

Select the correct option: For the cumulative sequence $2,\ 2+5,\ 2+5+8,\ 2+5+8+11,\ \ldots$, find a_5:

A 40

B 46

C 34

D 52

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F99 | V01

Q246 | CHALLENGE WRITTEN C02-T16-S-CH

The sum of the first n terms of $\{a_n\}$ is $S_n = 2n^2 + 5n$. Find the general term.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q247 | WRITTEN

C02-T17-S-WU-A

Find the general term of the sequence $\{a_n\}$ where the sum S_n from the first term to the n-th term is given by $S_n = n\,(n-3)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q248 | WRITTEN

C02-T17-S-TRY-1

Find the general term of the sequence $\{a_n\}$ where the sum S_n from the first term to the n-th term is given by $S_n = n(2n + 5)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q249 | WRITTEN

C02-T17-S-EX-1

Find the general term of the sequence $\{a_n\}$ where the sum S_n from the first term to the n-th term is given by $S_n = n^2$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q250 | WRITTEN

C02-T17-S-EX-2

Find the general term of the sequence $\{a_n\}$ where the sum S_n from the first term to the n-th term is given by $S_n = n\,(n-4)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q251 | MCQ C02-T17-G-M01

Select the correct option: If $S_n = n(n+2)$, the general term a_n is:

A $2n+3$

B $2n-1$

C $2(n+2)$

D $a_n = 2n+1$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q252 | MCQ

C02-T17-G-M02

Select the correct option: If $S_n = 2n(n+2)$, the general term a_n is:

A $4n+1$

B $2(2n+3)$

C $a_n = 2(2n+1)$

D $4n+5$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q253 | MCQ C02-T17-G-M03

Select the correct option: If $S_n = 3n(n-1)$, the general term a_n is:

A $6n$

B $a_n = 6(n-1)$

C $6n-5$

D $2(3n-4)$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q254 | MCQ C02-T17-G-M04

Select the correct option: If $S_n = 2n(2n-1)$, the general term a_n is:

A $a_n = 2(4n-3)$

B $4(2n-1)$

C $8n-7$

D $2(4n+1)$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q255 | MCQ C02-T17-G-M05

Select the correct option: If $S_n = 5n(n+1)$, the general term a_n is:

A $10n + 3$

B $2(5n - 1)$

C $10(n + 1)$

D $a_n = 10n$

WORKING AREA

FORMULA BANK

Sigma linearity
$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums
$$\sum k = \frac{n(n+1)}{2} \quad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping
$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q256 | MCQ

C02-T17-G-M19

Select the correct option: If $S_n = n(2n+3)$, the general term a_n is:

A $4n-1$

B $4n+5$

C $a_n = 4n+1$

D $4n+3$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Q257 | MCQ C02-T17-G-M20

Select the correct option: If $S_n = n(3n+1)$, the general term a_n is:

A $3(2n-1)$

B $2(3n+2)$

C $a_n = 2(3n-1)$

D $6n+1$

WORKING AREA

FORMULA BANK

Sigma linearity
$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums
$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping
$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q258 | MCQ

C02-T17-G-M06

Select the correct option: If $S_n = n\left(n^2 + 2n + 3\right)$, the general term a_n is:

A $3n^2 + n + 1$

B $3n^2 + 7n + 6$

C $a_n = 3n^2 + n + 2$

D $3n^2 + n + 3$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q259 | MCQ C02-T17-G-M07

Select the correct option: If $S_n = n(n+1)(2n-1)$, the general term a_n is:

A $2(n+1)(3n+1)$

B $a_n = 2n(3n-2)$

C $2(3n^2-2n+1)$

D $2(n-1)(3n+1)$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q260 | MCQ

C02-T17-G-M08

Select the correct option: If $S_n = n\left(3n^2 - 2n + 4\right)$, the general term a_n is:

A $a_n = 9n^2 - 13n + 9$

B $9n^2 - 13n + 12$

C $9n^2 - 13n + 8$

D $9n^2 + 5n + 5$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q261 | MCQ

C02-T17-G-M09

Select the correct option: If $S_n = n\left(n^2 - n + 2\right)$, the general term a_n is:

A $3n^2 - 5n + 5$

B $(n-1)(3n-2)$

C $3n^2 + n + 2$

D $a_n = 3n^2 - 5n + 4$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q262 | MCQ C02-T17-G-M10

Select the correct option: If $S_n = n(n+1)(2n+1)$, the general term a_n is:

A $2(3n^2+1)$

B $6n^2-1$

C $6(n+1)^2$

D $a_n = 6n^2$

WORKING AREA

FORMULA BANK

Sigma linearity
$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums
$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping
$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Q263 | MCQ

C02-T17-G-M21

Select the correct option: If $S_n = n(n+1)(n+2)$, the general term a_n is:

A $3(n+1)(n+2)$

B $a_n = 3n(n+1)$

C $3n^2 + 3n + 1$

D $3n^2 + 3n - 2$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q264 | WRITTEN

C02-T17-S-TRY-3

Find the general term of the sequence $\{a_n\}$ where the sum S_n from the first term to the n-th term is given by $S_n = n^3 + 2n + 6$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q265 | WRITTEN

C02-T17-S-EX-3

Find the general term of the sequence $\{a_n\}$ where the sum S_n from the first term to the n-th term is given by $S_n = n^2 + 2n - 1$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Q266 | WRITTEN

C02-T17-S-EX-7

Find the general term of the sequence $\{a_n\}$ where the sum S_n from the first term to the n-th term is given by $S_n = (n-1)\left(n^2+n+1\right)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q267 | WRITTEN

C02-T17-S-WU-B

Find the general term of the sequence $\{a_n\}$ where the sum S_n from the first term to the n-th term is given by $S_n = 5^n - 1$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q268 | WRITTEN

C02-T17-S-TRY-2

Find the general term of the sequence $\{a_n\}$ where the sum S_n from the first term to the n-th term is given by $S_n = 3^n - 1$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q269 | WRITTEN C02-T17-S-EX-4

Find the general term of the sequence $\{a_n\}$ where the sum S_n from the first term to the n-th term is given by $S_n = 2^n - 1$.

WORKING AREA

FORMULA BANK

Sigma linearity
$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums
$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping
$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Q270 | WRITTEN C02-T17-S-EX-6

Find the general term of the sequence $\{a_n\}$ where the sum S_n from the first term to the n-th term is given by $S_n = 7^n - 1$.

WORKING AREA

FORMULA BANK

Sigma linearity
$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums
$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping
$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q271 | WRITTEN

C02-T17-S-EX-5

Find the general term of the sequence $\{a_n\}$ where the sum S_n from the first term to the n-th term is given by $S_n = 5^n - 2$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Q272 | WRITTEN

C02-T17-S-EX-8

Find the general term of the sequence $\{a_n\}$ where the sum S_n from the first term to the n-th term is given by $S_n = 4\,2^n - 3$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F03 | V01

Q273 | MCQ

C02-T17-G-M25

Select the correct option: If $S_n = n(n+4)$, find a_5:

A -13

B 13

C 14

D 12

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F99 | V01

Q274 | CHALLENGE WRITTEN C02-T17-S-CH

Find the general term of the sequence $\{a_n\}$ where S_n is given by $S_n = 3\,3^n - 2n + 1$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V01

Quiz M1 | QUIZ MCQ

C02-T11-Q-M1

Select the correct option: Expand $\sum_{k=1}^{4}(3k-1)$ into a sum of terms:

A $2+5+8+11$

B $3+6+9+12$

C $1+4+7+10$

D $2+6+10+14$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Quiz M2 | QUIZ MCQ

C02-T13-Q-M4

Select the correct option: Find the sum $\sum_{k=1}^{n} k(k^2-1)$:

A $\frac{n(n+1)(n-1)(n+2)}{4}$

B $\frac{n(n+1)(n+1)(n+2)}{4}$

C $\frac{n(n-1)(n+2)}{4}$

D $\frac{n(n+1)(n-2)(n+3)}{4}$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V01

Quiz M3 | QUIZ MCQ

C02-T15-Q-M2

Select the correct option: Find the sum $\sum_{k=1}^{n} k \times 2^{k-1}$:

A $(n-1)\times 2^n + 1$

B $-\left((n-1)\times 2^n + 1\right)$

C $\left((n-1)\times 2^n + 1\right) + 1$

D $\left((n-1)\times 2^n + 1\right) - 1$

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F03 | V03

Quiz M4 | QUIZ MCQ

C02-T17-Q-M4

Select the correct option: If $S_n = 2^n - 3$, find a_6:

A 30

B -32

C 32

D 34

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V02

Quiz W1 | QUIZ WRITTEN

C02-T11-Q-W1

Expand $\sum_{k=1}^{5}(k^2-2)$ into a sum of terms.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F01 | V03

Quiz W2 | QUIZ WRITTEN

C02-T13-Q-W1

Find the sum $\sum_{k=1}^{n} k^2(k+5)$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F02 | V03

Quiz W3 | QUIZ WRITTEN

C02-T15-Q-W3

Find the sum $\sum_{k=1}^{n}(4k-1)\times 3^{k}$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 3 | Summation

F99 | V01

Quiz W4 | QUIZ WRITTEN

C02-T17-Q-W4

Find the general term of the sequence $\{a_n\}$ when S_n is $2\,2^n - 2n + 1$.

WORKING AREA

FORMULA BANK

Sigma linearity

$$\sum(au_n + bv_n) = a\sum u_n + b\sum v_n$$

Standard sums

$$\sum k = \frac{n(n+1)}{2} \qquad \sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

Telescoping

$$\sum_{k=1}^{n}(u_k - u_{k+1}) = u_1 - u_{n+1}$$

Concept 4 | Advanced Sequences OFFICIAL LESSONS 2-18, 2-19

Advanced Sequences

Equation-first recall | use the same rail beside every question in this Concept

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Start with the family cue, write the first move, then use the working grid.

Concept 4 | Advanced Sequences

F01 | V01

Q001 | WRITTEN C02-T18-S-W1

Find the general term of the sequence $\{2, 5, 12, 23, 38, 57, \ldots\}$.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V01

Q002 | MCQ C02-T18-G-M01

Select the correct option: If $a_1 = 1$ and $b_k = 2k + 1$, then a_n is:

A $n^2 - 3$

B $(n+1)^2$

C $a_n = n^2$

D $n^2 + 3$

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V01

Q003 | MCQ

C02-T18-G-M02

Select the correct option: If $a_1 = 2$ and $b_k = 3k - 2$, then a_n is:

A $\frac{3n^2 - n + 4}{2}$

B $a_n = \frac{3n^2 - 7n + 8}{2}$

C $\frac{3n^2 - 7n + 16}{2}$

D $\frac{3n^2 - 7n + 6}{2}$

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V01

Q004 | MCQ

C02-T18-G-M07

Select the correct option: If $a_1 = 7$ and $b_k = 6k - 5$, then a_n is:

A $a_n = 3n^2 - 8n + 12$

B $3n^2 - 8n + 13$

C $3n^2 - 8n + 9$

D $3n^2 - 2n + 7$

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V01

Q005 | MCQ C02-T18-G-M33

Select the correct option: If $a_1 = 1$ and $b_k = 2k + 1$, find a_5:

A -25

B 25

C 30

D 23

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V01

Q006 | MCQ C02-T18-G-M34

Select the correct option: If $a_1 = 2$ and $b_k = 3k - 2$, find a_6:

A 37

B 38

C 34

D -37

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V01

Q007 | MCQ C02-T18-G-M39

Select the correct option: If $a_1 = 7$ and $b_k = 6k - 5$, find a_6:

A 73

B 70

C -72

D 72

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V02

Q008 | WRITTEN

C02-T18-S-T1A

Find the general term of the sequence $\{2, 10, 24, 44, 70, 102, \ldots\}$.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V02

Q009 | WRITTEN

C02-T18-S-E1D

Find the general term of the sequence $\{1, 6, 15, 28, 45, 66, \ldots\}$.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V02

Q010 | MCQ

C02-T18-G-M03

Select the correct option: If $a_1 = 3$ and $b_k = 5k + 4$, then a_n is:

A $a_n = \dfrac{(n+1)(5n-2)}{2}$

B $\dfrac{n(5n+3)}{2}$

C $\dfrac{5n^2+3n-6}{2}$

D $\dfrac{(n+2)(5n+3)}{2}$

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V02

Q011 | MCQ

C02-T18-G-M04

Select the correct option: If $a_1 = 4$ and $b_k = 7k - 3$, then a_n is:

A $\frac{7n^2 - 13n + 18}{2}$

B $\frac{7n^2 - 13n + 8}{2}$

C $\frac{7n^2 + n + 8}{2}$

D $a_n = \frac{7n^2 - 13n + 14}{2}$

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V02

Q012 | MCQ

C02-T18-G-M06

Select the correct option: If $a_1 = 6$ and $b_k = 2(2k+3)$, then a_n is:

A $2(n+1)(n+3)$

B $a_n = 2n(n+2)$

C $2(n^2+2n+2)$

D $2(n^2+2n-1)$

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V03

Q013 | WRITTEN

C02-T18-S-E1B

Find the general term of the sequence $\{5, 8, 9, 8, 5, 0, \ldots\}$.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F02 | V01

Q014 | WRITTEN

C02-T18-S-W2

Find the general term of the sequence $\{2, 3, 6, 15, 42, 123, \ldots\}$.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F02 | V01

Q015 | WRITTEN

C02-T18-S-E1A

Find the general term of the sequence $\{1, 2, 5, 14, 41, 122, \ldots\}$.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F02 | V03

Q016 | WRITTEN

C02-T18-S-T1B

Find the general term of the sequence $\{5, 7, 11, 19, 35, \ldots\}$.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F03 | V01

Q017 | WRITTEN

C02-T18-S-E1C

Find the general term of the sequence $\{2, 3, 1, 5, -3, 13, \ldots\}$.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index $\longrightarrow$ term formula

Concept 4 | Advanced Sequences

F03 | V02

Q018 | WRITTEN

C02-T18-S-E1E

Find the general term of the sequence $\{5, 4, 7, -2, 25, -56, \ldots\}$.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F04 | V01

Q019 | MCQ

C02-T18-G-M25

Select the correct option: If $a_1 = 1$ and $b_k = k^2$, then a_n is:

A $a_n = \dfrac{(n+1)(2n^2-5n+6)}{6}$

B $\dfrac{2n^3-3n^2+n+12}{6}$

C $\dfrac{2n^3-3n^2+n-12}{6}$

D $\dfrac{(n+2)(2n^2-n+3)}{6}$

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F99 | V01

Q020 | CHALLENGE WRITTEN C02-T18-S-CH1

An oncology team records tissue volumes $1, 3, 7, 13, 21, 31, \ldots$ in mm^3. Find the general formula a_n and calculate a_{12} to decide whether the $130\ \text{mm}^3$ threshold is exceeded.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index $\longrightarrow$ term formula

Concept 4 | Advanced Sequences

F01 | V01

Q021 | WRITTEN C02-T19-S-W1

For groups with $a_j = 2 + (j-1)2$ and $c_j = 2n - 1$ terms in group j, find the first term of group 10.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V01

Q022 | WRITTEN C02-T19-S-T1

For groups with $a_j = 1 + (j-1)2$ and $c_j = 2n - 1$ terms in group j, find the first term of group 10.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V01

Q023 | WRITTEN C02-T19-S-E1A

For groups with $a_j = 1+(j-1)1$ and $c_j = n$ terms in group j, find the first term of group 10.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V01

Q024 | MCQ C02-T19-G-M01

Select the correct option: find the first term of group 3:

A 6

B 4

C 5

D 3

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V01

Q025 | MCQ C02-T19-G-M04

Select the correct option: find the first term of group 6:

A 77

B 108

C 78

D 79

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V01

Q026 | MCQ C02-T19-G-M07

Select the correct option: find the first term of group 9:

A 38

B 36

C 45

D 37

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V01

Q027 | MCQ C02-T19-G-M10

Select the correct option: find the first term of group 4:

A 48

B 30

C 31

D 29

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V01

Q028 | MCQ C02-T19-G-M13

Select the correct option: find the first term of group 7:

A 21

B 28

C 22

D 23

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V01

Q029 | MCQ C02-T19-G-M16

Select the correct option: find the first term of group 10:

A 247

B 245

C 300

D 246

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V02

Q030 | MCQ C02-T19-G-M02

Select the correct option: find the first term of group 4:

A 20

B 21

C 19

D 32

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V02

Q031 | MCQ C02-T19-G-M05

Select the correct option: find the first term of group 7:

A 138

B 110

C 111

D 109

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V02

Q032 | MCQ C02-T19-G-M08

Select the correct option: find the first term of group 10:

A 163

B 200

C 164

D 165

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V02

Q033 | MCQ C02-T19-G-M11

Select the correct option: find the first term of group 5:

A 58

B 59

C 57

D 78

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V02

Q034 | MCQ C02-T19-G-M14

Select the correct option: find the first term of group 8:

A 128

B 100

C 101

D 99

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V03

Q035 | WRITTEN C02-T19-S-E2A

For groups with $a_j = 1 + (j-1)3$ and $c_j = 3n - 1$ terms in group j, find the first term of group 10.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V03

Q036 | MCQ C02-T19-G-M03

Select the correct option: find the first term of group 5:

A 30

B 28

C 39

D 29

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V03

Q037 | MCQ C02-T19-G-M06

Select the correct option: find the first term of group 8:

A 89

B 90

C 88

D 110

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F02 | V01

Q038 | WRITTEN

C02-T19-S-W2

For groups with $a_j = 2 + (j-1)2$ and $c_j = 2n - 1$ terms in group j, derive the sum of the terms in group n.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F02 | V02

Q039 | WRITTEN C02-T19-S-T2

For the same grouped sequence, find the sum of the terms in group 10.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F02 | V02

Q040 | WRITTEN C02-T19-S-E1B

For the same grouped sequence, find the sum of the terms in group 10.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F02 | V03

Q041 | WRITTEN C02-T19-S-E2B

For the same grouped sequence, find the sum of the terms in group 10.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F03 | V01

Q042 | WRITTEN

C02-T19-S-W3

In the grouped arithmetic sequence, locate the value 88: state its group and its position within that group.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F03 | V01

Q043 | WRITTEN

C02-T19-S-T3

In the grouped arithmetic sequence, locate the value 101: state its group and its position within that group.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F03 | V02

Q044 | WRITTEN C02-T19-S-E1C

In the grouped arithmetic sequence, locate the value 124: state its group and its position within that group.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F03 | V03

Q045 | WRITTEN C02-T19-S-E2C

In the grouped arithmetic sequence, locate the value 100: state its group and its position within that group.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F99 | V01

Q046 | CHALLENGE WRITTEN C02-T19-S-CH1

For the grouped sequence $2, 6 \mid 10, 14, 18 \mid 22, 26, 30, 34 \mid \ldots$, solve: (a) the first term of Group 12; (b) the sum in Group n; (c) the group and position of 202; (d) the total through Group 12.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index $\longrightarrow$ term formula

Concept 4 | Advanced Sequences

F01 | V01

Quiz M1 | QUIZ MCQ

C02-T18-Q-M1

Select the correct option: If $a_1 = 2$ and $b_k = 3k + 1$, then a_n is:

A $a_n = \dfrac{3n^2 - n + 2}{2}$

B $\dfrac{3n^2 - n + 4}{2}$

C $\dfrac{n(3n - 1)}{2}$

D $\dfrac{3n^2 + 5n + 4}{2}$

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F03 | V01

Quiz M2 | QUIZ MCQ

C02-T18-Q-M3

Select the correct option: If $a_1 = 3$ and $b_k = (-2)^{k-1}$, then a_n is:

A $\frac{(-2)^n + 2}{6}$

B $-\frac{(-2)^n - 10}{3}$

C $a_n = \frac{(-2)^n + 20}{6}$

D $\frac{(-2)^n + 38}{6}$

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V01

Quiz M3 | QUIZ MCQ

C02-T19-Q-M4

Select the correct option: find the first term of group 9:

A 195

B 196

C 194

D 243

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F03 | V01

Quiz M4 | QUIZ MCQ

C02-T19-Q-M3

Select the correct option: the value 29 is in:

A Group 5, position 2

B Group 5, position 1

C Group 6, position 1

D Group 4, position 2

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V01

Quiz W1 | QUIZ WRITTEN C02-T18-Q-W1

A sequence has $a_1 = 1$ and difference sequence $b_k = 4k - 1$. Find the required general term a_n.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F03 | V01

Quiz W2 | QUIZ WRITTEN

C02-T18-Q-W3

A sequence has $a_1 = 2$ and difference sequence $b_k = (-2)^{k-1}$. Find the required general term a_n.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F01 | V02

Quiz W3 | QUIZ WRITTEN C02-T19-Q-W4

For groups with $a_j = 5+(j-1)3$ and $c_j = n$ terms in group j, find the first term of group 12.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 4 | Advanced Sequences

F03 | V02

Quiz W4 | QUIZ WRITTEN C02-T19-Q-W3

In the grouped arithmetic sequence, locate the value 66: state its group and its position within that group.

WORKING AREA

FORMULA BANK

Difference sequence

$$d_n = a_{n+1} - a_n$$

Rebuild

$$a_n = a_1 + \sum_{k=1}^{n-1} d_k$$

Grouping

group index ⟶ term formula

Concept 5 | Recurrence and Induction — **OFFICIAL LESSONS 2-20, 2-21, 2-22, 2-23, 2-24, 2-25, 2-26**

Recurrence and Induction

Equation-first recall | use the same rail beside every question in this Concept

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Start with the family cue, write the first move, then use the working grid.

Concept 5 | Recurrence and Induction

F01 | V01

Q001 | WRITTEN

C02-T20-S-W1

For the sequence $\{a_n\}$ with $a_1 = 2$ and recurrence $a_{n+1} = 3a_n + (2)$. Find the 2nd through the 4th terms.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q002 | WRITTEN C02-T20-S-T1A

For the sequence $\{a_n\}$ with $a_1 = -6$ and recurrence $a_{n+1} = 2a_n + (3)$. Find the 2nd through the 4th terms.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q003 | WRITTEN C02-T20-S-E1B

For the sequence $\{a_n\}$ with $a_1 = -6$ and recurrence $a_{n+1} = 1a_n + (n(n-2))$. Find the 2nd through the 4th terms.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q004 | WRITTEN

C02-T20-S-E1D

For the sequence $\{a_n\}$ with $a_1 = -2$ and recurrence $a_{n+1} = 1a_n + (-n)$. Find the 2nd through the 4th terms.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q005 | WRITTEN

C02-T20-S-E1E

For the sequence $\{a_n\}$ with $a_1 = 2$ and recurrence $a_{n+1} = 1a_n + (2n)$. Find the 2nd through the 4th terms.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q006 | WRITTEN C02-T20-S-E1F

For the sequence $\{a_n\}$ with $a_1 = -2$ and recurrence $a_{n+1} = 1a_n + (3^n)$. Find the 2nd through the 4th terms.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q007 | MCQ C02-T20-G-M27

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 3$ and recurrence $a_{n+1} = 3a_n + (0)$. The fourth term is:

A -81

B 81

C 82

D 80

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q008 | MCQ C02-T20-G-M30

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 2$ and recurrence $a_{n+1} = 4a_n + (0)$. The fourth term is:

A 133

B 127

C -128

D 128

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q009 | MCQ C02-T20-G-M33

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 2$ and recurrence $a_{n+1} = 2a_n + (n+1)$. The fourth term is:

A 34

B 37

C 33

D -34

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q010 | MCQ C02-T20-G-M36

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 5$ and recurrence $a_{n+1} = 3a_n + (2n)$. The fourth term is:

A -171

B 171

C 172

D 170

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V02

Q011 | MCQ C02-T20-G-M25

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 1$ and recurrence $a_{n+1} = 1a_n + (4)$. The fourth term is:

A 17

B 11

C -13

D 13

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V02

Q012 | MCQ C02-T20-G-M28

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 4$ and recurrence $a_{n+1} = -2a_n + (5)$. The fourth term is:

A -17

B -15

C -19

D 17

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V02

Q013 | MCQ C02-T20-G-M31

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 1$ and recurrence $a_{n+1} = -3a_n + (2)$. The fourth term is:

A -15

B 13

C -13

D -12

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V02

Q014 | MCQ C02-T20-G-M34

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 4$ and recurrence $a_{n+1} = 1a_n + (n^2)$. The fourth term is:

A 22

B 16

C -18

D 18

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V03

Q015 | MCQ C02-T20-G-M26

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 2$ and recurrence $a_{n+1} = 2a_n + (1)$. The fourth term is:

A 20

B -23

C 23

D 28

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V03

Q016 | MCQ

C02-T20-G-M29

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 5$ and recurrence $a_{n+1} = 1a_n + (-3)$. The fourth term is:

A -1

B -7

C 4

D -4

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V03

Q017 | MCQ C02-T20-G-M32

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 3$ and recurrence $a_{n+1} = 1a_n + (n)$. The fourth term is:

A -9

B 9

C 11

D 6

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V03

Q018 | MCQ C02-T20-G-M35

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 1$ and recurrence $a_{n+1} = 2a_n + (-n)$. The fourth term is:

A -6

B 3

C -3

D 2

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ and $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q019 | WRITTEN C02-T20-S-W2A

For the sequence $\{a_n\}$ with $a_1 = -1$ and recurrence $a_{n+1} = 1a_n + (5)$. Find the general term.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q020 | WRITTEN

C02-T20-S-T2A

For the sequence $\{a_n\}$ with $a_1 = 1$ and recurrence $a_{n+1} = 1a_n + (3)$. Find the general term.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q021 | WRITTEN C02-T20-S-T2B

For the sequence $\{a_n\}$ with $a_1 = 4$ and recurrence $a_{n+1} = 1a_n + (-2)$. Find the general term.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q022 | WRITTEN C02-T20-S-E2A

For the sequence $\{a_n\}$ with $a_1 = 1$ and recurrence $a_{n+1} = 1a_n + (6)$. Find the general term.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q023 | WRITTEN C02-T20-S-E2B

For the sequence $\{a_n\}$ with $a_1 = 3$ and recurrence $a_{n+1} = 1a_n + (-5)$. Find the general term.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q024 | WRITTEN

C02-T20-S-E2E

For the sequence $\{a_n\}$ with $a_1 = -2$ and recurrence $a_{n+1} = 1a_n + (3)$. Find the general term.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q025 | WRITTEN C02-T20-S-E2F

For the sequence $\{a_n\}$ with $a_1 = 4$ and recurrence $a_{n+1} = 1a_n + (-4)$. Find the general term.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q026 | MCQ C02-T20-G-M03

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 3$ and recurrence $a_{n+1} = 3a_n + (0)$. The general term is:

A $3^n + 2$

B $3^n - 1$

C $3^n + 3$

D $a_n = 3^n$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q027 | MCQ C02-T20-G-M06

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 2$ and recurrence $a_{n+1} = 4a_n + (0)$. The general term is:

A $a_n = 2^{2n-1}$

B $\frac{2^{2n}+2}{2}$

C $\frac{2^{2n}-2}{2}$

D $\frac{2^{2n}+4}{2}$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q028 | MCQ C02-T20-G-M15

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 4$ and recurrence $a_{n+1} = 5a_n + (0)$. The general term is:

A $a_n = 4\,5^{n-1}$

B $\frac{4\,5^n + 5}{5}$

C $\frac{4\,5^n - 5}{5}$

D $\frac{2(2\,5^n + 5)}{5}$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q029 | MCQ C02-T20-G-M24

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 6$ and recurrence $a_{n+1} = 2a_n + (0)$. The general term is:

A $a_n = 32^n$

B $32^n + 1$

C $32^n - 1$

D $32^n + 2$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V02

Q030 | WRITTEN

C02-T20-S-W2B

For the sequence $\{a_n\}$ with $a_1 = 2$ and recurrence $a_{n+1} = 3a_n + (0)$. Find the general term.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V02

Q031 | WRITTEN

C02-T20-S-T2C

For the sequence $\{a_n\}$ with $a_1 = 3$ and recurrence $a_{n+1} = 5a_n + (0)$. Find the general term.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V02

Q032 | WRITTEN

C02-T20-S-E2C

For the sequence $\{a_n\}$ with $a_1 = 4$ and recurrence $a_{n+1} = 3a_n + (0)$. Find the general term.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V02

Q033 | WRITTEN

C02-T20-S-E2G

For the sequence $\{a_n\}$ with $a_1 = 1$ and recurrence $a_{n+1} = 4a_n + (0)$. Find the general term.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V02

Q034 | MCQ C02-T20-G-M01

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 1$ and recurrence $a_{n+1} = 1a_n + (4)$. The general term is:

A $4n - 1$

B $a_n = 4n - 3$

C $4n + 1$

D $4n - 5$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V02

Q035 | MCQ C02-T20-G-M10

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 4$ and recurrence $a_{n+1} = 1a_n + (n^2)$. The general term is:

A $\frac{2n^3 - 3n^2 + n + 36}{6}$

B $a_n = \frac{2n^3 - 3n^2 + n + 24}{6}$

C $\frac{2n^3 - 3n^2 + n + 48}{6}$

D $\frac{2n^3 - 3n^2 + n + 12}{6}$

WORKING AREA

FORMULA BANK

Recurrence
$$a_{n+1} = f(a_n)$$

Induction
$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility
$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V02

Q036 | MCQ

C02-T20-G-M16

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 1$ and recurrence $a_{n+1} = -4a_n + (0)$. The general term is:

A $-\frac{(-4)^n - 8}{4}$

B $-\frac{(-4)^n + 8}{4}$

C $-\frac{(-4)^n - 12}{4}$

D $a_n = (-4)^{n-1}$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ and $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V02

Q037 | MCQ C02-T20-G-M19

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 5$ and recurrence $a_{n+1} = 1a_n + (3^n)$. The general term is:

A $a_n = \frac{3^n + 7}{2}$

B $\frac{3^n + 9}{2}$

C $\frac{3^n + 3}{2}$

D $\frac{3^n + 11}{2}$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V03

Q038 | WRITTEN

C02-T20-S-T2D

For the sequence $\{a_n\}$ with $a_1 = -3$ and recurrence $a_{n+1} = -2a_n + (0)$. Find the general term.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V03

Q039 | WRITTEN

C02-T20-S-E2D

For the sequence $\{a_n\}$ with $a_1 = 2$ and recurrence $a_{n+1} = -5a_n + (0)$. Find the general term.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V03

Q040 | WRITTEN

C02-T20-S-E2H

For the sequence $\{a_n\}$ with $a_1 = -2$ and recurrence $a_{n+1} = -4a_n + (0)$. Find the general term.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ and $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V03

Q041 | MCQ C02-T20-G-M05

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 5$ and recurrence $a_{n+1} = 1a_n + (-3)$. The general term is:

A $10 - 3n$

B $a_n = 8 - 3n$

C $-3(n-4)$

D $5 - 3n$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V03

Q042 | MCQ

C02-T20-G-M08

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 3$ and recurrence $a_{n+1} = 1a_n + (n)$. The general term is:

A $\frac{n(n-1)}{2}$

B $\frac{n^2-n+10}{2}$

C $a_n = \frac{n^2-n+6}{2}$

D $\frac{n^2-n+12}{2}$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V03

Q043 | MCQ C02-T20-G-M14

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 3$ and recurrence $a_{n+1} = 1a_n + (-5)$. The general term is:

A $-5(n-2)$

B $a_n = 8 - 5n$

C $12 - 5n$

D $-5(n-1)$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V03

Q044 | MCQ C02-T20-G-M17

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 2$ and recurrence $a_{n+1} = 1a_n + (6)$. The general term is:

A $6n - 7$

B $2(3n - 1)$

C $a_n = 2(3n - 2)$

D $6n - 1$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F03 | V01

Q045 | WRITTEN

C02-T20-S-T1B

For the sequence $\{a_n\}$ with $a_1 = 2$ and recurrence $a_{n+1} = 3a_n + (-n)$. Find the 2nd through the 4th terms.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F03 | V01

Q046 | WRITTEN

C02-T20-S-E1A

For the sequence $\{a_n\}$ with $a_1 = 1$ and recurrence $a_{n+1} = -2a_n + (5)$. Find the 2nd through the 4th terms.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F03 | V01

Q047 | WRITTEN C02-T20-S-E1C

For the sequence $\{a_n\}$ with $a_1 = 3$ and recurrence $a_{n+1} = 3a_n + (-n)$. Find the 2nd through the 4th terms.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F99 | V01

Q048 | CHALLENGE WRITTEN C02-T20-S-CH1

Solve the third-order recurrence $a_n = 6a_{n-1} - 11a_{n-2} + 6a_{n-3}$ for $n \geq 3$ with $a_0 = 0, a_1 = 1, a_2 = 6$.

WORKING AREA

FORMULA BANK

Recurrence
$$a_{n+1} = f(a_n)$$

Induction
$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility
$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q049 | WRITTEN C02-T21-S-W1

Find the general term of the sequence $\{a_n\}$ determined by $a_1 = 1$ and $a_{n+1} = a_n + (2n-3)$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q050 | WRITTEN

C02-T21-S-T1B

Find the general term of the sequence $\{a_n\}$ determined by $a_1 = 1$ and $a_{n+1} = a_n + (3n)$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q051 | WRITTEN C02-T21-S-E1A

Find the general term of the sequence $\{a_n\}$ determined by $a_1 = 2$ and $a_{n+1} = a_n + (2n)$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q052 | WRITTEN

C02-T21-S-E1B

Find the general term of the sequence $\{a_n\}$ determined by $a_1 = 2$ and $a_{n+1} = a_n + (3n^2)$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q053 | WRITTEN

C02-T21-S-E1D

Find the general term of the sequence $\{a_n\}$ determined by $a_1 = 2$ and $a_{n+1} = a_n + (3n+1)$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q054 | WRITTEN C02-T21-S-E1E

Find the general term of the sequence $\{a_n\}$ determined by $a_1 = 2$ and $a_{n+1} = a_n + (n(2n+1))$.

WORKING AREA

FORMULA BANK

Recurrence
$$a_{n+1} = f(a_n)$$

Induction
$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility
$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q055 | MCQ C02-T21-G-M03

Select the correct option: If $a_1 = 3$ and $a_{n+1} = a_n + (n^2)$, then a_n is:

A $\frac{(n+1)(2n^2-5n+6)}{6}$

B $\frac{(n+2)(2n^2-7n+15)}{6}$

C $a_n = \frac{2n^3-3n^2+n+18}{6}$

D $\frac{2n^3-3n^2+n+36}{6}$

WORKING AREA

FORMULA BANK

Recurrence
$$a_{n+1} = f(a_n)$$

Induction
$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility
$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q056 | MCQ

C02-T21-G-M09

Select the correct option: If $a_1 = 2$ and $a_{n+1} = a_n + (3n^2)$, then a_n is:

A $a_n = \dfrac{2n^3 - 3n^2 + n + 4}{2}$

B $\dfrac{(n+1)(2n^2 - 5n + 6)}{2}$

C $\dfrac{n(n-1)(2n-1)}{2}$

D $\dfrac{2n^3 - 3n^2 + n + 8}{2}$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q057 | MCQ C02-T21-G-M12

Select the correct option: If $a_1 = 2$ and $a_{n+1} = a_n + (n^2 + 1)$, then a_n is:

A $\frac{(n-1)(2n^2 - n + 6)}{6}$

B $\frac{2n^3 - 3n^2 + 7n + 18}{6}$

C $a_n = \frac{2n^3 - 3n^2 + 7n + 6}{6}$

D $\frac{(2n+3)(n^2 - 3n + 8)}{6}$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q058 | MCQ

C02-T21-G-M15

Select the correct option: If $a_1 = 5$ and $a_{n+1} = a_n + (n(4n-1))$, then a_n is:

A $\dfrac{8n^3 - 15n^2 + 7n + 42}{6}$

B $\dfrac{8n^3 - 15n^2 + 7n + 18}{6}$

C $\dfrac{8n^3 - 15n^2 + 7n + 48}{6}$

D $a_n = \dfrac{(n+1)(8n^2 - 23n + 30)}{6}$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q059 | MCQ C02-T21-G-M21

Select the correct option: If $a_1 = 2$ and $a_{n+1} = a_n + (8n)$, then a_n is:

A $4n(n-1)$

B $4(n^2 - n + 1)$

C $a_n = 2(2n^2 - 2n + 1)$

D $4n^2 - 4n + 5$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q060 | MCQ C02-T21-G-M27

Select the correct option: find a_4 when $a_1 = 3$ and $a_{n+1} = a_n + (n^2)$:

A 17

B 19

C 15

D -17

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q061 | MCQ C02-T21-G-M33

Select the correct option: find a_5 when $a_1 = 2$ and $a_{n+1} = a_n + (3n^2)$:

A 96

B 90

C -92

D 92

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q062 | MCQ C02-T21-G-M36

Select the correct option: find a_3 when $a_1 = 2$ and $a_{n+1} = a_n + (n^2 + 1)$:

A 9

B 11

C 7

D -9

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q063 | MCQ C02-T21-G-M39

Select the correct option: find a_6 when $a_1 = 5$ and $a_{n+1} = a_n + (n(4n-1))$:

A -210

B 210

C 215

D 208

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q064 | MCQ C02-T21-G-M45

Select the correct option: find a_2 when $a_1 = 2$ and $a_{n+1} = a_n + (8n)$:

A 10

B 12

C 8

D -10

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V02

Q065 | WRITTEN C02-T21-S-T1A

Find the general term of the sequence $\{a_n\}$ determined by $a_1 = 2$ and $a_{n+1} = a_n + (n^2)$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V02

Q066 | MCQ C02-T21-G-M01

Select the correct option: If $a_1 = 1$ and $a_{n+1} = a_n + (2n + 1)$, then a_n is:

A $a_n = n^2$

B $n^2 + 1$

C $n^2 - 3$

D $n^2 + 2$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q067 | WRITTEN

C02-T21-S-E1C

Find the general term of the sequence $\{a_n\}$ determined by $a_1 = 1$ and $a_{n+1} = a_n + (2^n)$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q068 | WRITTEN

C02-T21-S-E1F

Find the general term of the sequence $\{a_n\}$ determined by $a_1 = 2$ and $a_{n+1} = a_n + (-3^n)$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q069 | WRITTEN C02-T21-S-E1G

Find the general term of the sequence $\{a_n\}$ determined by $a_1 = 4$ and $a_{n+1} = a_n + (-4^n)$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F99 | V01

Q070 | CHALLENGE WRITTEN C02-T21-S-CH1

A technology startup has a reserve of 400,000 LE, represented by $a_1 = 4$, and burns $0.04n$ hundred-thousand LE each quarter: $a_{n+1} = a_n - 0.04n$. Find an explicit formula for a_n.

WORKING AREA

FORMULA BANK

Recurrence
$$a_{n+1} = f(a_n)$$

Induction
$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility
$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q071 | WRITTEN

C02-T22-S-W1

Find the general term of $\{a_n\}$ given $a_1 = 1$ and $a_{n+1} = 3a_n + (4)$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q072 | WRITTEN

C02-T22-S-T1A

Find the general term of $\{a_n\}$ given $a_1 = 1$ and $a_{n+1} = 5a_n + (8)$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q073 | WRITTEN

C02-T22-S-E1A

Find the general term of $\{a_n\}$ given $a_1 = 2$ and $a_{n+1} = 2a_n + (-1)$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q074 | WRITTEN

C02-T22-S-E1B

Find the general term of $\{a_n\}$ given $a_1 = -3$ and $a_{n+1} = 4a_n + (3)$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q075 | WRITTEN C02-T22-S-E1C

Find the general term of $\{a_n\}$ given $a_1 = 3$ and $a_{n+1} = 3a_n + (-2)$.

WORKING AREA

FORMULA BANK

Recurrence
$$a_{n+1} = f(a_n)$$

Induction
$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility
$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q076 | WRITTEN

C02-T22-S-E1D

Find the general term of $\{a_n\}$ given $a_1 = -2$ and $a_{n+1} = -3a_n + (4)$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q077 | WRITTEN

C02-T22-S-E1E

Find the general term of $\{a_n\}$ given $a_1 = 1$ and $a_{n+1} = \frac{1}{3}a_n + (2)$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q078 | WRITTEN

C02-T22-S-E1F

Find the general term of $\{a_n\}$ given $a_1 = 2$ and $a_{n+1} = \frac{2}{3}a_n + (-\frac{1}{2})$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V02

Q079 | WRITTEN

C02-T22-S-T1B

Find the general term of $\{a_n\}$ given $a_1 = 4$ and $a_{n+1} = -2a_n + (3)$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q080 | MCQ C02-T22-G-M03

Select the correct option: If $a_1 = 3$ and $a_{n+1} = -2a_n + (5)$, the general term is:

A $-\frac{2(-2)^n - 11}{3}$

B $a_n = -\frac{2(-2)^n - 5}{3}$

C $-\frac{2(-2)^n - 17}{3}$

D $-\frac{2\left((-2)^n + 2\right)}{3}$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q081 | MCQ

C02-T22-G-M06

Select the correct option: If $a_1 = 1$ and $a_{n+1} = \frac{2}{3}a_n + (-2)$, the general term is:

A $\frac{3\,3^{-n}\,(7\,2^n - 6\,3^n)}{2}$

B $\frac{3^{-n}\,(21\,2^n - 8\,3^n)}{2}$

C $a_n = \frac{3\,3^{-n}\,(7\,2^n - 4\,3^n)}{2}$

D $\frac{3\,3^{-n}\,(7\,2^n - 2\,3^n)}{2}$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q082 | MCQ C02-T22-G-M09

Select the correct option: If $a_1 = 2$ and $a_{n+1} = 7a_n + (-4)$, the general term is:

A $\frac{4(7^n + 14)}{21}$

B $\frac{4\,7^n - 49}{21}$

C $\frac{4\,7^n + 77}{21}$

D $a_n = \frac{2(2\,7^n + 7)}{21}$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q083 | MCQ C02-T22-G-M12

Select the correct option: If $a_1 = 6$ and $a_{n+1} = 2a_n + (-5)$, the general term is:

A $\frac{2^n + 14}{2}$

B $a_n = \frac{2^n + 10}{2}$

C $\frac{2^n + 18}{2}$

D $\frac{2^n + 4}{2}$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q084 | MCQ

C02-T22-G-M15

Select the correct option: If $a_1 = 5$ and $a_{n+1} = -2a_n + (7)$, the general term is:

A $-\frac{2\left(2(-2)^n + 1\right)}{3}$

B $-\frac{4(-2)^n - 13}{3}$

C $a_n = -\frac{4(-2)^n - 7}{3}$

D $-\frac{4\left((-2)^n - 4\right)}{3}$

WORKING AREA

FORMULA BANK

Recurrence
$$a_{n+1} = f(a_n)$$

Induction
$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility
$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q085 | MCQ C02-T22-G-M18

Select the correct option: If $a_1 = 4$ and $a_{n+1} = -5a_n + (-2)$, the general term is:

A $-\frac{13(-5)^n - 25}{15}$

B $-\frac{13(-5)^n + 50}{15}$

C $-\frac{13(-5)^n - 40}{15}$

D $a_n = -\frac{13(-5)^n + 5}{15}$

WORKING AREA

FORMULA BANK

Recurrence
$$a_{n+1} = f(a_n)$$

Induction
$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility
$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q086 | MCQ

C02-T22-G-M21

Select the correct option: If $a_1 = 2$ and $a_{n+1} = -3a_n + (5)$, the general term is:

A $-\frac{(-3)^n - 13}{4}$

B $a_n = -\frac{(-3)^n - 5}{4}$

C $-\frac{(-3)^n - 21}{4}$

D $-\frac{(-3)^n + 7}{4}$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q087 | MCQ C02-T22-G-M24

Select the correct option: If $a_1 = 1$ and $a_{n+1} = \frac{1}{2}a_n + (7)$, the general term is:

A $2^{-n}\,(11\,2^n - 26)$

B $2\,2^{-n}\,(8\,2^n - 13)$

C $a_n = 2\,2^{-n}\,(7\,2^n - 13)$

D $2^{-n}\,(17\,2^n - 26)$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V02

Q088 | MCQ C02-T22-G-M01

Select the correct option: If $a_1 = 1$ and $a_{n+1} = 2a_n + (-1)$, the general term is:

A 3

B 0

C 4

D $a_n = 1$

WORKING AREA

FORMULA BANK

Recurrence
$$a_{n+1} = f(a_n)$$

Induction
$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility
$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F03 | V01

Q089 | MCQ

C02-T22-G-M27

Select the correct option: If $a_1 = 3$ and $a_{n+1} = -2a_n + (5)$, the general term is:

A $-\frac{2(-2)^n - 11}{3}$

B $-\frac{2\left((-2)^n + 2\right)}{3}$

C $-\frac{2\left((-2)^n - 7\right)}{3}$

D $a_n = -\frac{2(-2)^n - 5}{3}$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F99 | V01

Q090 | CHALLENGE WRITTEN C02-T22-G-CH1

A sequence satisfies $a_{n+1} = 4a_n - 9$ with $a_1 = 2$. Find the equilibrium value, the explicit formula, and a_5.

WORKING AREA

FORMULA BANK

Recurrence
$$a_{n+1} = f(a_n)$$

Induction
$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility
$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q091 | WRITTEN

C02-T23-S-W1

Use mathematical induction to prove $\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q092 | WRITTEN

C02-T23-S-E1

Use mathematical induction to prove $\sum_{i=1}^{n}(2i-1)^2 = \frac{n(2n-1)(2n+1)}{3}$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q093 | WRITTEN

C02-T23-G-W03

Use mathematical induction to prove $\sum_{i=1}^{n} i\,(i+1) = \frac{n(n+1)(n+2)}{3}$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q094 | MCQ

C02-T23-G-M03

Select the correct option: the right-hand side equivalent to $\sum_{i=1}^{n} i\,(i+1)$ is:

A $\dfrac{n\,(n+1)\,(n+2)}{3}$

B $\dfrac{n^3+3n^2+2n+3}{3}$

C $\dfrac{n^3+3n^2+2n-3}{3}$

D $\dfrac{(n+3)\,(n^2+2)}{3}$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q095 | MCQ C02-T23-G-M06

Select the correct option: the right-hand side equivalent to $\sum_{i=1}^{n} 3 \cdot 4^{i-1}$ is:

A $4^n + 1$

B $4^n - 1$

C $4^n + 3$

D $4^n - 2$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q096 | MCQ

C02-T23-G-M09

Select the correct option: the right-hand side equivalent to $\sum_{i=1}^{n} 2i + 3$ is:

A $n^2 + 4n - 1$

B $n^2 + 4n + 2$

C $n(n + 4)$

D $(n + 1)(n + 3)$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k + 1)$

Divisibility

$P(k) = mq \Rightarrow P(k + 1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q097 | MCQ

C02-T23-G-M15

Select the correct option: the right-hand side equivalent to $\sum_{i=1}^{n} 2i^2 + 3i$ is:

A $\frac{4n^3 + 15n^2 + 11n + 12}{6}$

B $\frac{n(n+1)(4n+11)}{6}$

C $\frac{4n^3 + 15n^2 + 11n + 24}{6}$

D $\frac{(n+2)(4n^2 + 7n - 3)}{6}$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q098 | MCQ C02-T23-G-M18

Select the correct option: the right-hand side equivalent to $\sum_{i=1}^{n} 3i^2 + 2i$ is:

A $\frac{2n^3 + 5n^2 + 3n - 2}{2}$

B $\frac{2n^3 + 5n^2 + 3n + 4}{2}$

C $\frac{n(n+1)(2n+3)}{2}$

D $\frac{2n^3 + 5n^2 + 3n + 6}{2}$

WORKING AREA

FORMULA BANK

Recurrence
$$a_{n+1} = f(a_n)$$

Induction
$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility
$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q099 | MCQ

C02-T23-G-M21

Select the correct option: the right-hand side equivalent to $\sum_{i=1}^{n} 7 \cdot 2^{i-1}$ is:

A $7(2^n - 1)$

B $72^n - 6$

C $72^n - 8$

D $72^n - 5$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q100 | MCQ

C02-T23-G-M27

Select the correct option: the right-hand side equivalent to $\sum_{i=1}^{n} i\,(i+1)$ is:

A $\dfrac{n^3+3n^2+2n-3}{3}$

B $\dfrac{(n+3)(n^2+2)}{3}$

C $\dfrac{n(n+1)(n+2)}{3}$

D $\dfrac{n^3+3n^2+2n+9}{3}$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q101 | MCQ C02-T23-G-M30

Select the correct option: the right-hand side equivalent to $\sum_{i=1}^{n} 3 \cdot 4^{i-1}$ is:

A $4^n - 1$

B 4^n

C $4^n - 2$

D $4^n + 1$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q102 | MCQ C02-T23-G-M33

Select the correct option: the right-hand side equivalent to $\sum_{i=1}^{n} 2i + 3$ is:

A $n^2 + 4n + 2$

B $n(n+4)$

C $(n+2)^2$

D $n^2 + 4n - 1$

WORKING AREA

FORMULA BANK

Recurrence
$$a_{n+1} = f(a_n)$$

Induction
$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility
$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V02

Q103 | WRITTEN

C02-T23-S-T1

Use mathematical induction to prove $\sum_{i=1}^{n}(2i-1)=n^2$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1}=f(a_n)$$

Induction

$P(1)$ **and** $P(k)\Rightarrow P(k+1)$

Divisibility

$P(k)=mq\Rightarrow P(k+1)=m(q')$

Concept 5 | Recurrence and Induction

F02 | V03

Q104 | WRITTEN

C02-T23-S-T2

Use mathematical induction to prove $\sum_{i=1}^{n} i(i+1) = \frac{n(n+1)(n+2)}{3}$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V03

Q105 | WRITTEN

C02-T23-S-E3

Use mathematical induction to prove $\sum_{i=1}^{n} i(i+2) = \frac{n(n+1)(2n+7)}{6}$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F03 | V01

Q106 | WRITTEN

C02-T23-S-E2

Use mathematical induction to prove $\sum_{i=1}^{n} 3\,4^{i-1} = 4^n - 1$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F03 | V02

Q107 | WRITTEN

C02-T23-S-E4

Use mathematical induction to prove $\sum_{i=0}^{n} 10^i = \frac{10\,10^n - 1}{9}$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F99 | V01

Q108 | CHALLENGE WRITTEN C02-T23-G-CH1

Use mathematical induction to prove $\sum_{i=1}^{n}(i^2+i+1)=\frac{n(n^2+3n+5)}{3}$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1}=f(a_n)$$

Induction

$P(1)$ **and** $P(k)\Rightarrow P(k+1)$

Divisibility

$P(k)=mq\Rightarrow P(k+1)=m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q109 | WRITTEN

C02-T24-S-W1

Prove by mathematical induction that $2^n > 3n$ for $n \geq 4$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V02

Q110 | WRITTEN

C02-T24-S-T1

Prove by mathematical induction that $3^n > 5n + 1$ for $n \geq 3$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q111 | WRITTEN

C02-T24-S-E1

Prove by mathematical induction that $3^n > 2n$ for $n \geq 1$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q112 | WRITTEN

C02-T24-G-W03

Prove by mathematical induction that $2^n > 1n + 2$ for $n \geq 3$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q113 | WRITTEN

C02-T24-G-W09

Prove by mathematical induction that $3^n > 5n + 1$ for $n \geq 4$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q114 | WRITTEN

C02-T24-G-W15

Prove by mathematical induction that $3^n > 5n + 2$ for $n \geq 4$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q115 | WRITTEN

C02-T24-G-W21

Prove by mathematical induction that $4^n > 2n + 3$ for $n \geq 4$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q116 | MCQ C02-T24-G-M03

Select the correct option: which inequality is proved for $n \geq 3$?:

A $2^n \geq 1n + 2$

B $2^n > 2n + 2$

C $2^n + 1 > 1n + 2$

D $2^n > 1n + 2$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q117 | MCQ C02-T24-G-M06

Select the correct option: which inequality is proved for $n \geq 2$?:

A $3^n > 2n$

B $3^n \geq 2n + 0$

C $3^n > 3n + 0$

D $3^n + 1 > 2n + 0$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q118 | MCQ C02-T24-G-M09

Select the correct option: which inequality is proved for $n \geq 4$?:

A $3^n + 1 > 5n + 1$

B $3^n > 5n + 1$

C $3^n \geq 5n + 1$

D $3^n > 6n + 1$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q119 | MCQ C02-T24-G-M12

Select the correct option: which inequality is proved for $n \geq 3$?:

A $3^n \geq 3n + 0$

B $3^n > 4n + 0$

C $3^n + 1 > 3n + 0$

D $3^n > 3n$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q120 | MCQ C02-T24-G-M15

Select the correct option: which inequality is proved for $n \geq 4$?:

A $3^n > 5n + 2$

B $3^n \geq 5n + 2$

C $3^n > 6n + 2$

D $3^n + 1 > 5n + 2$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q121 | MCQ C02-T24-G-M18

Select the correct option: which inequality is proved for $n \geq 3$?:

A $4^n + 1 > 3n + 1$

B $4^n > 3n + 1$

C $4^n \geq 3n + 1$

D $4^n > 4n + 1$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q122 | MCQ C02-T24-G-M21

Select the correct option: which inequality is proved for $n \geq 4$?:

A $4^n \geq 2n + 3$

B $4^n > 3n + 3$

C $4^n + 1 > 2n + 3$

D $4^n > 2n + 3$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q123 | MCQ C02-T24-G-M24

Select the correct option: which inequality is proved for $n \geq 4$?:

A $4^n > 4n + 1$

B $4^n \geq 4n + 1$

C $4^n > 5n + 1$

D $4^n + 1 > 4n + 1$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V02

Q124 | WRITTEN

C02-T24-S-E2

Prove by mathematical induction that $2^n > 3n + 1$ for $n \geq 4$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F03 | V01

Q125 | MCQ C02-T24-G-M27

Select the correct option: which inequality is proved for $n \geq 3$?:

A $4^n + 1 > 3n + 0$

B $4^n > 3n$

C $4^n \geq 3n + 0$

D $4^n > 4n + 0$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F99 | V01

Q126 | CHALLENGE WRITTEN C02-T24-S-CH1

When $h > 0$ and $n \geq 3$, prove $(1+h)^n > 1 + nh^2$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q127 | WRITTEN C02-T25-S-W1

Prove that $n^3 + (n+1)^3 + (n+2)^3$ is a multiple of 9 for every natural number n, using mathematical induction.

WORKING AREA

FORMULA BANK

Recurrence
$$a_{n+1} = f(a_n)$$

Induction
$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility
$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q128 | WRITTEN C02-T25-S-T1

Prove that $n^3 + 2n$ is a multiple of 3 for every natural number n, using mathematical induction.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q129 | WRITTEN C02-T25-G-W01

Prove by mathematical induction that $n^2 + n$ is a multiple of 2.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q130 | WRITTEN

C02-T25-G-W06

Prove by mathematical induction that $n^2 + 5n + 8$ is a multiple of 2.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q131 | WRITTEN C02-T25-G-W07

Prove by mathematical induction that $n^2 + 7n + 12$ is a multiple of 2.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q132 | WRITTEN

C02-T25-G-W12

Prove by mathematical induction that $n^2 + 11n + 32$ is a multiple of 2.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q133 | MCQ C02-T25-G-M01

Select the correct option: which positive integer is guaranteed to divide $n^2 + n$ for every natural number n?:

A 2

B 3

C 4

D 5

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q134 | MCQ C02-T25-G-M06

Select the correct option: which positive integer is guaranteed to divide $n^2 + 5n + 8$ for every natural number n?:

A 3

B 4

C 5

D 2

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q135 | MCQ C02-T25-G-M07

Select the correct option: which positive integer is guaranteed to divide $n^2 + 7n + 12$ for every natural number n?:

A 4

B 5

C 2

D 3

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q136 | MCQ C02-T25-G-M12

Select the correct option: which positive integer is guaranteed to divide $n^2 + 11n + 32$ for every natural number n?:

A 4

B 5

C 2

D 3

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ and $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q137 | MCQ C02-T25-G-M13

Select the correct option: which positive integer is guaranteed to divide $n^3 + 3n^2 + 2n$ for every natural number n?:

A 9

B 6

C 7

D 8

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q138 | MCQ C02-T25-G-M18

Select the correct option: which positive integer is guaranteed to divide $n^3+9n^2+26n+30$ for every natural number n?:

A 6

B 7

C 8

D 9

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q139 | MCQ C02-T25-G-M19

Select the correct option: which positive integer is guaranteed to divide $n^3+12n^2+47n+60$ for every natural number n?:

A 7

B 8

C 9

D 6

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q140 | MCQ C02-T25-G-M24

Select the correct option: which positive integer is guaranteed to divide $n^3 + 18n^2 + 107n + 216$ for every natural number n?:

A 7

B 8

C 9

D 6

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V02

Q141 | MCQ C02-T25-G-M02

Select the correct option: which positive integer is guaranteed to divide $n^2 + n + 2$ for every natural number n?:

A 3

B 4

C 5

D 2

WORKING AREA

FORMULA BANK

Recurrence
$$a_{n+1} = f(a_n)$$

Induction
$P(1)$ and $P(k) \Rightarrow P(k+1)$

Divisibility
$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F03 | V01

Q142 | WRITTEN

C02-T25-S-E1

Prove by mathematical induction that $2n^3 - 3n^2 + n$ is a multiple of 6.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F03 | V02

Q143 | WRITTEN

C02-T25-S-E2

Prove by mathematical induction that $4n^3 - n$ is a multiple of 3.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F99 | V01

Q144 | CHALLENGE WRITTEN C02-T25-S-CH1

For any integer $n \geq 1$, prove that $(n+1)^n - 1$ is a multiple of n^2.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V01

Q145 | WRITTEN C02-T26-S-W1

For the sequence determined by $a_1 = 3$ and $a_{n+1} = \frac{a_n^2 - 1}{n+1}$, find a_2, a_3, a_4 and estimate the general term.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V02

Q146 | WRITTEN

C02-T26-S-T1

For the sequence determined by $a_1 = -1$ and $a_{n+1} = a_n^2 + 2na_n - 2$, find a_2, a_3, a_4 and estimate the general term.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V03

Q147 | WRITTEN

C02-T26-S-E1A

For the sequence determined by $a_1 = 1$ and $a_{n+1} = a_n^2 - n^2 a_n + (n+1)^2$, find a_2, a_3, a_4 and estimate the general term.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F01 | V03

Q148 | WRITTEN

C02-T26-S-E2A

For the sequence determined by $a_1 = 1$ and $a_{n+1} = \frac{a_n - 4}{a_n - 3}$, find a_2, a_3, a_4 and estimate the general term.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q149 | WRITTEN

C02-T26-S-W2

For a sequence with $a_1 = 3$ and $a_{n+1} = \frac{a_n^2 - 1}{n+1}$, prove by mathematical induction that $a_n = n + 2$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q150 | MCQ C02-T26-G-M01

Select the correct option: for $a_1 = 1$ and $a_{n+1} = a_n + 2$, the general term is:

A $a_n = 2n$

B $a_n = 2(n-1)$

C $a_n = 1 - 2n$

D $a_n = 2n - 1$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q151 | MCQ C02-T26-G-M02

Select the correct option: for $a_1 = 2$ and $a_{n+1} = a_n + 2$, the general term is:

A $a_n = 2n - 1$

B $a_n = -2n$

C $a_n = 2n$

D $a_n = 2n + 1$

WORKING AREA

FORMULA BANK

Recurrence
$$a_{n+1} = f(a_n)$$

Induction
$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility
$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q152 | MCQ

C02-T26-G-M03

Select the correct option: for $a_1 = 3$ and $a_{n+1} = a_n + 2$, the general term is:

A $a_n = -2n - 1$

B $a_n = 2n + 1$

C $a_n = 2(n + 1)$

D $a_n = 2n$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q153 | MCQ C02-T26-G-M04

Select the correct option: for $a_1 = 4$ and $a_{n+1} = a_n + 2$, the general term is:

A $a_n = 2(n+1)$

B $a_n = 2n + 3$

C $a_n = 2n + 1$

D $a_n = -2(n+1)$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q154 | MCQ

C02-T26-G-M05

Select the correct option: for $a_1 = 1$ and $a_{n+1} = a_n + 3$, the general term is:

A $a_n = 3n - 1$

B $a_n = 3(n - 1)$

C $a_n = 2 - 3n$

D $a_n = 3n - 2$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q155 | MCQ C02-T26-G-M06

Select the correct option: for $a_1 = 2$ and $a_{n+1} = a_n + 3$, the general term is:

A $a_n = 3n - 2$

B $a_n = 1 - 3n$

C $a_n = 3n - 1$

D $a_n = 3n$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q156 | MCQ C02-T26-G-M07

Select the correct option: for $a_1 = 3$ and $a_{n+1} = a_n + 3$, the general term is:

A $a_n = -3n$

B $a_n = 3n$

C $a_n = 3n + 1$

D $a_n = 3n - 1$

WORKING AREA

FORMULA BANK

Recurrence
$$a_{n+1} = f(a_n)$$

Induction
$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility
$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Q157 | MCQ C02-T26-G-M08

Select the correct option: for $a_1 = 4$ and $a_{n+1} = a_n + 3$, the general term is:

A $a_n = 3n + 1$

B $a_n = 3n + 2$

C $a_n = 3n$

D $a_n = -3n - 1$

WORKING AREA

FORMULA BANK

Recurrence
$$a_{n+1} = f(a_n)$$

Induction
$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility
$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V02

Q158 | WRITTEN

C02-T26-S-E1B

For a sequence with $a_1 = 1$ and $a_{n+1} = a_n^2 - n^2 a_n + (n+1)^2$, prove by mathematical induction that $a_n = n^2$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V03

Q159 | WRITTEN C02-T26-S-T2

For a sequence with $a_1 = -1$ and $a_{n+1} = a_n^2 + 2na_n - 2$, prove by mathematical induction that $a_n = 1 - 2n$.

WORKING AREA

FORMULA BANK

Recurrence
$$a_{n+1} = f(a_n)$$

Induction
$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility
$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F03 | V01

Q160 | MCQ

C02-T26-G-M33

Select the correct option: for $a_1 = 1$ and $a_{n+1} = 2a_n + 0$, the general term is:

A $a_n = \dfrac{2^n - 2}{2}$

B $a_n = -2^{n-1}$

C $a_n = 2^{n-1}$

D $a_n = \dfrac{2^n + 2}{2}$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F04 | V01

Q161 | WRITTEN

C02-T26-S-E2B

For a sequence with $a_1 = 1$ and $a_{n+1} = \frac{a_n - 4}{a_n - 3}$, prove by mathematical induction that $a_n = \frac{2n-1}{n}$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F99 | V01

Q162 | CHALLENGE WRITTEN C02-T26-S-CH1

Three numbers A, B, C in that order form a geometric sequence with common ratio r. If $A, 2B, C$ in that order form an arithmetic sequence, determine the possible values of r.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Quiz M1 | QUIZ MCQ

C02-T20-Q-M1

Select the correct option: For the sequence $\{a_n\}$ with $a_1 = 2$ and recurrence $a_{n+1} = 1a_n + (4)$. The general term is:

A $4n$

B $4n - 5$

C $4n + 1$

D $a_n = 2(2n - 1)$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Quiz M2 | QUIZ MCQ

C02-T22-Q-M2

Select the correct option: If $a_1 = 2$ and $a_{n+1} = -2a_n + (3)$, the general term is:

A $a_n = -\dfrac{(-2)^n - 2}{2}$

B $-\dfrac{(-2)^n - 4}{2}$

C $-\dfrac{(-2)^n + 4}{2}$

D $-\dfrac{(-2)^n - 6}{2}$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Quiz M3 | QUIZ MCQ

C02-T24-Q-M3

Select the correct option: which inequality is proved for $n \geq 4$?:

A $2^n + 1 > 3n + 1$

B $2^n > 3n + 1$

C $2^n \geq 3n + 1$

D $2^n > 4n + 1$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V01

Quiz M4 | QUIZ MCQ

C02-T26-Q-M4

Select the correct option: for $a_1 = 4$ and $a_{n+1} = a_n + 2$, the general term is:

A $a_n = 2n + 1$

B $a_n = -2(n + 1)$

C $a_n = 2(n + 1)$

D $a_n = 2n + 3$

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k + 1)$

Divisibility

$P(k) = mq \Rightarrow P(k + 1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V02

Quiz W1 | QUIZ WRITTEN C02-T20-Q-W2

For the sequence $\{a_n\}$ with $a_1 = 2$ and recurrence $a_{n+1} = 1a_n + (5)$. Find the general term.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F03 | V02

Quiz W2 | QUIZ WRITTEN C02-T22-Q-W2

Find the general term of $\{a_n\}$ given $a_1 = 1$ and $a_{n+1} = 5a_n + (8)$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F03 | V02

Quiz W3 | QUIZ WRITTEN C02-T24-G-Q-W3

Prove by mathematical induction that $2^n > 4n + 1$ for $n \geq 4$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

Concept 5 | Recurrence and Induction

F02 | V03

Quiz W4 | QUIZ WRITTEN C02-T26-Q-W2

For a sequence with $a_1 = 5$ and $a_{n+1} = a_n + 1(2n + 1) + 2$, prove by mathematical induction that $a_n = n^2 + 2n + 2$.

WORKING AREA

FORMULA BANK

Recurrence

$$a_{n+1} = f(a_n)$$

Induction

$P(1)$ **and** $P(k) \Rightarrow P(k+1)$

Divisibility

$P(k) = mq \Rightarrow P(k+1) = m(q')$

EGYPTIAN BACCALAUREATE • 2026

MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 03

Complex Numbers and Equations

4 Concepts | 702 questions

B5 Landscape | one question per teaching page

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Chapter 03 | Complex Numbers and Equations

CLASSROOM ROUTE

Concept 1 | Complex Numbers — 210 questions
Official lessons: 3-1, 3-2, 3-3, 3-4

Concept 2 | Quadratic Equations — 248 questions
Official lessons: 3-5, 3-6, 3-7, 3-8, 3-9, 3-10, 3-11

Concept 3 | Polynomial Theorems — 126 questions
Official lessons: 3-12, 3-13, 3-14, 3-15, 3-16

Concept 4 | Higher-Degree Equations — 118 questions
Official lessons: 3-17, 3-18, 3-19, 3-20

Formula Bank changes at each Concept boundary.

Concept 1 | Complex Numbers — **OFFICIAL LESSONS 3-1, 3-2, 3-3, 3-4**

Complex Numbers

Equation-first recall | use the same rail beside every question in this Concept

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Start with the family cue, write the first move, then use the working grid.

Concept 1 | Complex Numbers

F01 | V01

Q001 | WRITTEN

C03-T01-31-WU1a

State the real and imaginary parts of $3 - 2i$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V02

Q002 | WRITTEN

C03-T01-31-WU1b

State the real and imaginary parts of $(4 - \sqrt{5}i)/3$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V03

Q003 | WRITTEN

C03-T01-31-WU1c

State the real and imaginary parts of -8.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V04

Q004 | WRITTEN

C03-T01-31-WU1d

State the real and imaginary parts of $2i$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F02 | V02

Q005 | WRITTEN C03-T01-31-WU2

Find the real values of x and y satisfying $(2+i)x+(1+i)y=2+3i, x, yreal.$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F01 | V01

Q006 | WRITTEN

C03-T01-31-TR1a

State the real and imaginary parts of $-3 + 5i$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V02

Q007 | WRITTEN

C03-T01-31-TR1b

State the real and imaginary parts of $(-1-\sqrt{3}i)/2$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V03

Q008 | WRITTEN

C03-T01-31-TR1c

State the real and imaginary parts of 1.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V04

Q009 | WRITTEN

C03-T01-31-TR1d

State the real and imaginary parts of $3i$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F02 | V03

Q010 | WRITTEN

C03-T01-31-TR2a

Find the real values of x and y satisfying $(x-6)+(x+3y)i=0, x, yreal.$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F02 | V02

Q011 | WRITTEN

C03-T01-31-TR2b

Find the real values of x and y satisfying $(3+2i)x+(4-i)y=6-7i, x, yreal.$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V01

Q012 | WRITTEN

C03-T01-31-EX1a

State the real and imaginary parts of $2 + 5i$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V01

Q013 | WRITTEN

C03-T01-31-EX1b

State the real and imaginary parts of $-25 + 13i$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V02

Q014 | WRITTEN

C03-T01-31-EX1c

State the real and imaginary parts of $(2-\sqrt{5}i)/3$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V02

Q015 | WRITTEN

C03-T01-31-EX1d

State the real and imaginary parts of $(7 - \sqrt{2}i)/2$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V03

Q016 | WRITTEN C03-T01-31-EX1e

State the real and imaginary parts of -4.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V03

Q017 | WRITTEN

C03-T01-31-EX1f

State the real and imaginary parts of 1/4.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V04

Q018 | WRITTEN

C03-T01-31-EX1g

State the real and imaginary parts of $\sqrt{3}i$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V04

Q019 | WRITTEN

C03-T01-31-EX1h

State the real and imaginary parts of $-i$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F02 | V01

Q020 | WRITTEN

C03-T01-31-EX2a

Find the real values of x and y satisfying $(2x + y) + (3x - y)i = 8 + 7i$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F02 | V01

Q021 | WRITTEN

C03-T01-31-EX2b

Find the real values of x and y satisfying $(x+1)-5i=4+(2y+1)i$.

WORKING AREA

FORMULA BANK

Standard form

$$z=a+bi$$

Equality

$$a+bi=c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4=1 \qquad i^{4q+r}=i^r$$

Conjugate and division

$$\overline{a+bi}=a-bi \qquad \frac{z}{w}=\frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a}=i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F02 | V01

Q022 | WRITTEN

C03-T01-31-EX2c

Find the real values of x and y satisfying $(x-2)+(x+y)i=0$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F02 | V01

Q023 | WRITTEN

C03-T01-31-EX2d

Find the real values of x and y satisfying $(3+2i)x+(1-i)y=7+3i$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F02 | V01

Q024 | WRITTEN

C03-T01-31-EX2e

Find the real values of x and y satisfying $(1-i)(x+yi)=2+i$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F99 | V01

Q025 | WRITTEN C03-T01-31-CH

Solve the complex-number equation and find the exact real values of x and y: $(1+2i)(x+i) = x(y+i)$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V01

Q026 | WRITTEN

C03-T01-32-WUa

Calculate $(3 - 2i) - (2 + 5i)$ and give the answer in standard form.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V01

Q027 | WRITTEN

C03-T01-32-WUb

Calculate $(i-2)^2$ and give the answer in standard form.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V04

Q028 | WRITTEN C03-T01-32-WUc

Calculate $i^6 + i^{27} + i^{17}$ and give the answer in standard form.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V01

Q029 | WRITTEN C03-T01-32-TRa

Calculate $(4 + 6i) + (-3 + 2i)$ and give the answer in standard form.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V02

Q030 | WRITTEN

C03-T01-32-TRb

Calculate $(2 + 3i)(1 - 2i)$ and give the answer in standard form.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V03

Q031 | WRITTEN

C03-T01-32-TRc

Calculate $i + i^2 + i^3 + i^4$ and give the answer in standard form.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V01

Q032 | WRITTEN

C03-T01-32-EXa

Calculate $(7 + 4i) - (3 + 5i)$ and give the answer in standard form.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V01

Q033 | WRITTEN

C03-T01-32-EXb

Calculate $(-4+3i)+(5-6i)$ and give the answer in standard form.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V01

Q034 | WRITTEN

C03-T01-32-EXc

Calculate $(3 - 3i) - (5 - 3i)$ and give the answer in standard form.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V02

Q035 | WRITTEN

C03-T01-32-EXd

Calculate $(\sqrt{2}+3i)(\sqrt{2}+i)$ and give the answer in standard form.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V01

Q036 | WRITTEN

C03-T01-32-EXe

Calculate $(2 + 3i) + (5 + 8i)$ and give the answer in standard form.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V01

Q037 | WRITTEN

C03-T01-32-EXf

Calculate $(2/5 - 1/2i) - (1/3 + 3/7i)$ and give the answer in standard form.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V02

Q038 | WRITTEN

C03-T01-32-EXg

Calculate $(2i-1)^2$ and give the answer in standard form.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V02

Q039 | WRITTEN C03-T01-32-EXh

Calculate $(2/i + i)(2/i - i)$ and give the answer in standard form.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V02

Q040 | WRITTEN

C03-T01-32-EXi

Calculate $(2+i)^3+(2-i)^3$ and give the answer in standard form.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V03

Q041 | WRITTEN

C03-T01-32-EXj

Calculate $i^5 + i^3 + i$ and give the answer in standard form.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V03

Q042 | WRITTEN

C03-T01-32-EXk

Calculate $i^9 + i^{14} + i^{11}$ and give the answer in standard form.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V03

Q043 | WRITTEN

C03-T01-32-EXI

Calculate $i^{12} + i^{18} + i^{15}$ and give the answer in standard form.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F99 | V02

Q044 | WRITTEN

C03-T01-32-CH

Given x is real, solve $(7x - 7i)(x^2 + xi) = 14x^2i^{40}$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q045 | WRITTEN

C03-T01-33-WU1a

State the complex conjugate of $2 + 3i$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q046 | WRITTEN

C03-T01-33-WU1b

State the complex conjugate of $7 - i\sqrt{11}$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q047 | WRITTEN

C03-T01-33-WU1c

State the complex conjugate of 6.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q048 | WRITTEN

C03-T01-33-WU1d

State the complex conjugate of $-5i$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q049 | WRITTEN

C03-T01-33-WU2a

Calculate $(2+i)/(2-i)$ and give the answer in the form a+bi.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V03

Q050 | WRITTEN

C03-T01-33-WU2b

Calculate $(3-i)/(2i)$ and give the answer in the form a+bi.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q051 | WRITTEN

C03-T01-33-TR1a

State the complex conjugate of $1 - 4i$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q052 | WRITTEN

C03-T01-33-TR1b

State the complex conjugate of $\sqrt{2} + i\sqrt{10}$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q053 | WRITTEN

C03-T01-33-TR1c

State the complex conjugate of 2.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q054 | WRITTEN

C03-T01-33-TR1d

State the complex conjugate of $-8i$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q055 | WRITTEN

C03-T01-33-TR2a

Calculate $(3 + i)/(1 + 2i)$ and give the answer in the form a+bi.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V03

Q056 | WRITTEN

C03-T01-33-TR2b

Calculate $(1-i)/i$ and give the answer in the form a+bi.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q057 | WRITTEN

C03-T01-33-EX1a

State the complex conjugate of $3 + 4i$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q058 | WRITTEN

C03-T01-33-EX1b

State the complex conjugate of $9 + 8i$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q059 | WRITTEN

C03-T01-33-EX1c

State the complex conjugate of $8 + i\sqrt{3}$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q060 | WRITTEN

C03-T01-33-EX1d

State the complex conjugate of 5.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q061 | WRITTEN

C03-T01-33-EX1e

State the complex conjugate of -15.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q062 | WRITTEN

C03-T01-33-EX1f

State the complex conjugate of $\sqrt{7}$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q063 | WRITTEN

C03-T01-33-EX1g

State the complex conjugate of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q064 | WRITTEN

C03-T01-33-EX1h

State the complex conjugate of $-50i$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q065 | WRITTEN

C03-T01-33-EX1i

State the complex conjugate of $i\sqrt{6}$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q066 | WRITTEN

C03-T01-33-EX2a

Calculate $(1 + i)/(1 - i)$ and give the answer in the form a+bi.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q067 | WRITTEN

C03-T01-33-EX2b

Calculate $(3 + i)/(2 + i)$ and give the answer in the form a+bi.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q068 | WRITTEN

C03-T01-33-EX2c

Calculate $(\sqrt{5}+i)/(\sqrt{5}-i)$ and give the answer in the form a+bi.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q069 | WRITTEN

C03-T01-33-EX2d

Calculate $5i/(1+2i)$ and give the answer in the form a+bi.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q070 | WRITTEN

C03-T01-33-EX2e

Calculate $5i/(4+3i)$ and give the answer in the form a+bi.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q071 | WRITTEN

C03-T01-33-EX2f

Calculate $(1-3i)/(3-2i)$ and give the answer in the form a+bi.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V03

Q072 | WRITTEN

C03-T01-33-EX2g

Calculate $1/i$ and give the answer in the form a+bi.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V03

Q073 | WRITTEN

C03-T01-33-EX2h

Calculate $(2 + i)/(3i)$ and give the answer in the form a+bi.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F99 | V03

Q074 | WRITTEN

C03-T01-33-CH

Simplify exactly: $\left(\frac{i(10-12i)}{(2+i)(-1+4i)}\right)^{2027}$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q075 | WRITTEN

C03-T01-34-WU1

Express the square roots of $-6 in terms of i$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V02

Q076 | WRITTEN

C03-T01-34-WU2a

Express $\sqrt{-12}\sqrt{-6}$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V02

Q077 | WRITTEN

C03-T01-34-WU2b

Express $\sqrt{8}/\sqrt{-18}$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q078 | WRITTEN

C03-T01-34-TR1a

Express $\sqrt{-7}$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q079 | WRITTEN

C03-T01-34-TR1b

Express $\sqrt{-27}$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q080 | WRITTEN

C03-T01-34-TR1c

Express $-\sqrt{-12}$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q081 | WRITTEN

C03-T01-34-TR1d

Express the square roots of -12 in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V02

Q082 | WRITTEN

C03-T01-34-TR2a

Express $\sqrt{-3}\sqrt{-6}$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V02

Q083 | WRITTEN

C03-T01-34-TR2b

Express $\sqrt{27}/\sqrt{-3}$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V03

Q084 | WRITTEN

C03-T01-34-TR2c

Express $(3+\sqrt{-2})^2$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q085 | WRITTEN

C03-T01-34-EX1a

Express $\sqrt{-2}$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q086 | WRITTEN

C03-T01-34-EX1b

Express $\sqrt{-9}$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q087 | WRITTEN

C03-T01-34-EX1c

Express $\sqrt{-45}$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q088 | WRITTEN

C03-T01-34-EX1d

Express $-\sqrt{-24}$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q089 | WRITTEN

C03-T01-34-EX1e

Express $-\sqrt{-36}$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q090 | WRITTEN C03-T01-34-EX1f

Express the square roots of -2 in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q091 | WRITTEN

C03-T01-34-EX1g

Express the square roots of -18 in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q092 | WRITTEN

C03-T01-34-EX1h

Express the square roots of -16 in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V02

Q093 | WRITTEN

C03-T01-34-EX2a

Express $\sqrt{-2}\sqrt{-6}$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V02

Q094 | WRITTEN

C03-T01-34-EX2b

Express $\sqrt{-28}\sqrt{-35}$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V02

Q095 | WRITTEN

C03-T01-34-EX2c

Express $\sqrt{8}/\sqrt{-2}$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V02

Q096 | WRITTEN

C03-T01-34-EX2d

Express $\sqrt{27}/\sqrt{-12}$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V02

Q097 | WRITTEN

C03-T01-34-EX2e

Express $\sqrt{-32}+\sqrt{-98}+\sqrt{-8}$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V02

Q098 | WRITTEN

C03-T01-34-EX2f

Express $\sqrt{-98} - \sqrt{-72} + \sqrt{-50}$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V03

Q099 | WRITTEN

C03-T01-34-EX2g

Express $(\sqrt{3}+\sqrt{-5})^2$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V03

Q100 | WRITTEN

C03-T01-34-EX2h

Express $(2+\sqrt{-3})(2-\sqrt{-3})$ in terms of i.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F99 | V04

Q101 | WRITTEN C03-T01-34-CH

Solve over the complex numbers: $(2x-8)^2=-10$.

WORKING AREA

FORMULA BANK

Standard form

$$z=a+bi$$

Equality

$$a+bi=c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4=1 \qquad i^{4q+r}=i^r$$

Conjugate and division

$$\overline{a+bi}=a-bi \qquad \frac{z}{w}=\frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a}=i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F01 | V01

Q102 | MCQ

C03-K01-G-MCQ-001

For $2 + 3i$, select the ordered pair (real part, imaginary part):

A $(2,\ 4)$

B $(3,\ 2)$

C $(2,\ 3)$

D $(3,\ 3)$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V01

Q103 | MCQ C03-K01-G-MCQ-002

For $-4 + 5i$, select the ordered pair (real part, imaginary part):

A $(-3,\ 5)$

B $(-4,\ 6)$

C $(5,\ -4)$

D $(-4,\ 5)$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V01

Q104 | MCQ

C03-K01-G-MCQ-003

For $7 - 2i$, select the ordered pair (real part, imaginary part):

A $(8, -2)$

B $(7, -1)$

C $(-2, 7)$

D $(7, -2)$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V01

Q105 | MCQ

C03-K01-G-MCQ-004

For $(1-\sqrt{2}i)/3$, select the ordered pair (real part, imaginary part):

A $\left(-\frac{\sqrt{2}}{3}, \frac{1}{3}\right)$

B $\left(\frac{1}{3}, -\frac{\sqrt{2}}{3}\right)$

C $\left(\frac{4}{3}, -\frac{\sqrt{2}}{3}\right)$

D $\left(\frac{1}{3}, 1-\frac{\sqrt{2}}{3}\right)$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V01

Q106 | MCQ

C03-K01-G-MCQ-005

For -6, select the ordered pair (real part, imaginary part):

A $(-5,\ 0)$

B $(-6,\ 1)$

C $(0,\ -6)$

D $(-6,\ 0)$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V01

Q107 | MCQ

C03-K01-G-MCQ-006

For $4i$, select the ordered pair (real part, imaginary part):

A $(0,\ 4)$

B $(1,\ 4)$

C $(0,\ 5)$

D $(4,\ 0)$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V01

Q108 | MCQ

C03-K01-G-MCQ-007

For $-i$, select the ordered pair (real part, imaginary part):

A $(-1,\ 0)$

B $(0,\ -1)$

C $(1,\ -1)$

D $(0,\ 0)$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V01

Q109 | MCQ

C03-K01-G-MCQ-008

For $\sqrt{5}i$, select the ordered pair (real part, imaginary part):

A $(0,\ 1+\sqrt{5})$

B $(\sqrt{5},\ 0)$

C $(0,\ \sqrt{5})$

D $(1,\ \sqrt{5})$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V01

Q110 | MCQ

C03-K01-G-MCQ-009

For $3/2 + \sqrt{3}i$, select the ordered pair (real part, imaginary part):

A $\left(\sqrt{3}, \frac{3}{2}\right)$

B $\left(\frac{3}{2}, \sqrt{3}\right)$

C $\left(\frac{5}{2}, \sqrt{3}\right)$

D $\left(\frac{3}{2}, 1+\sqrt{3}\right)$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V01

Q111 | MCQ

C03-K01-G-MCQ-010

For $-1/4 - 2i$, select the ordered pair (real part, imaginary part):

A $\left(\frac{3}{4}, -2\right)$

B $\left(-\frac{1}{4}, -1\right)$

C $\left(-2, -\frac{1}{4}\right)$

D $\left(-\frac{1}{4}, -2\right)$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V01

Q112 | MCQ

C03-K01-G-MCQ-011

For 5/3, select the ordered pair (real part, imaginary part):

A $\left(\frac{8}{3}, 0\right)$

B $\left(\frac{5}{3}, 1\right)$

C $\left(0, \frac{5}{3}\right)$

D $\left(\frac{5}{3}, 0\right)$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V01

Q113 | MCQ

C03-K01-G-MCQ-012

For $-\sqrt{7}i$, select the ordered pair (real part, imaginary part):

A $(0,\ 1-\sqrt{7})$

B $(-\sqrt{7},\ 0)$

C $(0,\ -\sqrt{7})$

D $(1,\ -\sqrt{7})$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V01

Q114 | MCQ

C03-K01-G-MCQ-013

For $-9+\sqrt{2}i$, select the ordered pair (real part, imaginary part):

A $(-8,\ \sqrt{2})$

B $(-9,\ 1+\sqrt{2})$

C $(\sqrt{2},\ -9)$

D $(-9,\ \sqrt{2})$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F01 | V01

Q115 | MCQ

C03-K01-G-MCQ-014

For $2/5 - 3/4i$, select the ordered pair (real part, imaginary part):

A $\left(-\frac{3}{4}, \frac{2}{5}\right)$

B $\left(\frac{2}{5}, -\frac{3}{4}\right)$

C $\left(\frac{7}{5}, -\frac{3}{4}\right)$

D $\left(\frac{2}{5}, \frac{1}{4}\right)$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V01

Q116 | MCQ

C03-K01-G-MCQ-015

For $-\sqrt{11}$, select the ordered pair (real part, imaginary part):

A $\left(0,\ -\sqrt{11}\right)$

B $\left(-\sqrt{11},\ 0\right)$

C $\left(1-\sqrt{11},\ 0\right)$

D $\left(-\sqrt{11},\ 1\right)$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | V01

Q117 | MCQ

C03-K01-G-MCQ-016

For $\sqrt{13}i$, select the ordered pair (real part, imaginary part):

A $\left(0,\ 1+\sqrt{13}\right)$

B $\left(\sqrt{13},\ 0\right)$

C $\left(0,\ \sqrt{13}\right)$

D $\left(1,\ \sqrt{13}\right)$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F02 | V02

Q118 | MCQ

C03-K01-G-MCQ-017

For $(2+i)x+(1-i)y=3+3i$, select the ordered pair (x,y):

A $(3,\ -1)$

B $(2,\ -2)$

C $(-1,\ 2)$

D $(2,\ -1)$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F02 | V02

Q119 | MCQ

C03-K01-G-MCQ-018

For $(1+2i)x+(3-i)y=5-4i$, select the ordered pair (x,y):

A $(-1,\ 2)$

B $(0,\ 2)$

C $(-1,\ 1)$

D $(2,\ -1)$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F02 | V02

Q120 | MCQ

C03-K01-G-MCQ-019

For $(3-2i)x+(1+i)y=6+i$, select the ordered pair (x,y):

A (3, 1)

B (1, 3)

C (2, 3)

D (1, 2)

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F02 | V02

Q121 | MCQ

C03-K01-G-MCQ-020

For $(2-i)x+(4+2i)y=4i$, select the ordered pair (x,y):

A $(1,\ -2)$

B $(-2,\ 1)$

C $(-1,\ 1)$

D $(-2,\ 0)$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F02 | V02

Q122 | MCQ

C03-K01-G-MCQ-021

For $(1+i)x+(2+3i)y=1$, select the ordered pair (x,y):

A $(3,\ -2)$

B $(-1,\ 3)$

C $(3,\ -1)$

D $(4,\ -1)$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F02 | V02

Q123 | MCQ

C03-K01-G-MCQ-022

For $(4+i)x+(1-2i)y=2+5i$, select the ordered pair (x,y):

A $(2,\ -2)$

B $(1,\ -3)$

C $(-2,\ 1)$

D $(1,\ -2)$

WORKING AREA

FORMULA BANK

Standard form

$$z=a+bi$$

Equality

$$a+bi=c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4=1 \qquad i^{4q+r}=i^r$$

Conjugate and division

$$\overline{a+bi}=a-bi \qquad \frac{z}{w}=\frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a}=i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F02 | V02

Q124 | MCQ

C03-K01-G-MCQ-023

For $(2+3i)x+(3+i)y=-8-5i$, select the ordered pair (x,y):

A $(0,\ -2)$

B $(-1,\ -3)$

C $(-2,\ -1)$

D $(-1,\ -2)$

WORKING AREA

FORMULA BANK

Standard form

$$z=a+bi$$

Equality

$$a+bi=c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4=1 \qquad i^{4q+r}=i^r$$

Conjugate and division

$$\overline{a+bi}=a-bi \qquad \frac{z}{w}=\frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a}=i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F02 | V02

Q125 | MCQ

C03-K01-G-MCQ-024

For $(1-i)x+(2-i)y=6-4i$, select the ordered pair (x,y):

A (2, 1)

B 3

C (2, 2)

D (3, 2)

WORKING AREA

FORMULA BANK

Standard form

$$z=a+bi$$

Equality

$$a+bi=c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4=1 \qquad i^{4q+r}=i^r$$

Conjugate and division

$$\overline{a+bi}=a-bi \qquad \frac{z}{w}=\frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a}=i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F03 | V02

Q126 | MCQ

C03-K01-G-MCQ-025

For $(3+4i)-(1-2i)$, select the simplified standard form:

A $1+6i$

B $-2-6i$

C $2+6i$

D $3+6i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F03 | V02

Q127 | MCQ

C03-K01-G-MCQ-026

For $(-2+i)+(5-3i)$, select the simplified standard form:

A $2-2i$

B $-3+2i$

C $3-2i$

D $4-2i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F03 | V02

Q128 | MCQ

C03-K01-G-MCQ-027

For $(1+2i)(3-i)$, select the simplified standard form:

A $6+5i$

B $4+5i$

C $-5-5i$

D $5+5i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F03 | V02

Q129 | MCQ

C03-K01-G-MCQ-028

For $(\sqrt{3}+i)(\sqrt{3}-i)$, select the simplified standard form:

A 4

B 5

C 3

D -4

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V02

Q130 | MCQ

C03-K01-G-MCQ-029

For $(2-i)^2$, select the simplified standard form:

A $2-4i$

B $-3+4i$

C $(2-i)^2$

D $4-4i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F03 | V02

Q131 | MCQ

C03-K01-G-MCQ-030

For $(1 + 3i)^2$, select the simplified standard form:

A $-8 + 6i$

B $-7 + 6i$

C $-9 + 6i$

D $8 - 6i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V02

Q132 | MCQ

C03-K01-G-MCQ-031

For i^{37}, select the simplified standard form:

A $-i$

B i

C $1+i$

D $-1+i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V02

Q133 | MCQ

C03-K01-G-MCQ-032

For $i^{22} + i^9$, select the simplified standard form:

A $1 - i$

B $-1 + i$

C i

D $-2 + i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V02

Q134 | MCQ

C03-K01-G-MCQ-033

For $i^{15} - i^{6}$, select the simplified standard form:

A $-1 + i$

B $1 - i$

C $2 - i$

D $-i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^{4} = 1 \qquad i^{4q+r} = i^{r}$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V02

Q135 | MCQ

C03-K01-G-MCQ-034

For $(4-2i)+(1+5i)$, select the simplified standard form:

A $4+3i$

B $-5-3i$

C $5+3i$

D $6+3i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F03 | V02

Q136 | MCQ

C03-K01-G-MCQ-035

For $(2+i)(2-i)$, select the simplified standard form:

A 5

B 6

C 4

D -5

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V02

Q137 | MCQ

C03-K01-G-MCQ-036

For $(\sqrt{2}+2i)^2$, select the simplified standard form:

A $-3+4\sqrt{2}i$

B $2-4\sqrt{2}i$

C $\left(\sqrt{2}+2i\right)^2$

D $-1+4\sqrt{2}i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F03 | V02

Q138 | MCQ

C03-K01-G-MCQ-037

For $i^8 + i^{11} + i^{14}$, select the simplified standard form:

A $-1 - i$

B i

C $-i$

D $1 - i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V02

Q139 | MCQ

C03-K01-G-MCQ-038

For $(3-i)^3$, select the simplified standard form:

A $19-26i$

B $17-26i$

C $-18+26i$

D $(3-i)^3$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F03 | V02

Q140 | MCQ

C03-K01-G-MCQ-039

For $(1-2i)(-2+i)$, select the simplified standard form:

A $1+5i$

B $-1+5i$

C $-5i$

D $5i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F03 | V02

Q141 | MCQ

C03-K01-G-MCQ-040

For $i^5 + i^{10}$, select the simplified standard form:

A i

B $-2 + i$

C $1 - i$

D $-1 + i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V02

Q142 | MCQ

C03-K01-G-MCQ-041

For $(5 + 2i) - (3 - 4i)$, select the simplified standard form:

A $3 + 6i$

B $1 + 6i$

C $-2 - 6i$

D $2 + 6i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | V02

Q143 | MCQ

C03-K01-G-MCQ-042

For $(2-3i)^2$, select the simplified standard form:

A $-6-12i$

B $5+12i$

C $(2-3i)^2$

D $-4-12i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q144 | MCQ

C03-K01-G-MCQ-043

For the expression State the complex conjugate of $3 - 2i$:, the required value is:

A $4 + 2i$

B $3 - 2i$

C $3 + 2i$

D $-3 - 2i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q145 | MCQ

C03-K01-G-MCQ-044

For the expression State the complex conjugate of $-4+\sqrt{3}i$:, the required value is:

A $-4-\sqrt{3}i$

B $4+\sqrt{3}i$

C $-3-\sqrt{3}i$

D $-4+\sqrt{3}i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q146 | MCQ

C03-K01-G-MCQ-045

For the expression State the complex conjugate of $7i$:, the required value is:

A $1 - 7i$

B 3

C $-7i$

D $7i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q147 | MCQ

C03-K01-G-MCQ-046

For the expression State the complex conjugate of $-\sqrt{5}$:, the required value is:

A $1-\sqrt{5}$

B 3

C $-\sqrt{5}$

D $\sqrt{5}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q148 | MCQ

C03-K01-G-MCQ-047

For the expression State the complex conjugate of $1/2 - 3i$:, the required value is:

A $\frac{1}{2} - 3i$

B $\frac{1}{2} + 3i$

C $-\frac{1}{2} - 3i$

D $\frac{3}{2} + 3i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q149 | MCQ

C03-K01-G-MCQ-048

For $(2+i)/(1-i)$, select the value in the form a+bi:

A $\frac{1}{2}+\frac{3i}{2}$

B $\frac{3}{2}+\frac{3i}{2}$

C $-\frac{1}{2}+\frac{3i}{2}$

D $-\frac{1}{2}-\frac{3i}{2}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F04 | V02

Q150 | MCQ

C03-K01-G-MCQ-049

For $(4-3i)/(2+i)$, select the value in the form a+bi:

A $1-2i$

B $2-2i$

C $-2i$

D $-1+2i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q151 | MCQ

C03-K01-G-MCQ-050

For $(1+2i)/(3-i)$, select the value in the form a+bi:

A $-\frac{1}{10}-\frac{7i}{10}$

B $\frac{1}{10}+\frac{7i}{10}$

C $\frac{11}{10}+\frac{7i}{10}$

D $-\frac{9}{10}+\frac{7i}{10}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q152 | MCQ

C03-K01-G-MCQ-051

For $5i/(2-i)$, select the value in the form a+bi:

A $-2+2i$

B $1-2i$

C $i(2+i)$

D $2i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q153 | MCQ

C03-K01-G-MCQ-052

For $(3 - i)/(1 + 3i)$, select the value in the form a+bi:

A $1 - i$

B $-1 - i$

C i

D $-i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q154 | MCQ

C03-K01-G-MCQ-053

For $1/i$, select the value in the form a+bi:

A $1 - i$

B $-1 - i$

C i

D $-i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q155 | MCQ

C03-K01-G-MCQ-054

For $(2+3i)/(2-3i)$, select the value in the form a+bi:

A $\frac{5}{13}-\frac{12i}{13}$

B $-\frac{5}{13}+\frac{12i}{13}$

C $\frac{8}{13}+\frac{12i}{13}$

D $-\frac{18}{13}+\frac{12i}{13}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q156 | MCQ

C03-K01-G-MCQ-055

For $(\sqrt{2}+i)/(\sqrt{2}-i)$, select the value in the form a+bi:

A $\dfrac{-\sqrt{2}-i}{\sqrt{2}-i}$

B $\dfrac{\sqrt{2}+i}{\sqrt{2}-i}$

C $\dfrac{2\sqrt{2}}{\sqrt{2}-i}$

D $\dfrac{2i}{\sqrt{2}-i}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q157 | MCQ

C03-K01-G-MCQ-056

For $(1-4i)/(3+2i)$, select the value in the form a+bi:

A $\frac{8}{13}-\frac{14i}{13}$

B $-\frac{18}{13}-\frac{14i}{13}$

C $\frac{5}{13}+\frac{14i}{13}$

D $-\frac{5}{13}-\frac{14i}{13}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q158 | MCQ

C03-K01-G-MCQ-057

For $7i/(1-i)$, select the value in the form a+bi:

A $-\frac{9}{2}+\frac{7i}{2}$

B $\frac{7}{2}-\frac{7i}{2}$

C $-\frac{7}{2}+\frac{7i}{2}$

D $-\frac{5}{2}+\frac{7i}{2}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q159 | MCQ

C03-K01-G-MCQ-058

For the expression State the complex conjugate of $-2+5i$:, the required value is:

A $-2+5i$

B $-2-5i$

C $2+5i$

D $-1-5i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F04 | V01

Q160 | MCQ

C03-K01-G-MCQ-059

For the expression State the complex conjugate of $6 - \sqrt{7}i$:, the required value is:

A $-6 - \sqrt{7}i$

B $7 + \sqrt{7}i$

C $6 - \sqrt{7}i$

D $6 + \sqrt{7}i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q161 | MCQ

C03-K01-G-MCQ-060

For the expression State the complex conjugate of $-i\sqrt{2}$:, the required value is:

A 3

B $\sqrt{2}i$

C $-\sqrt{2}i$

D $1+\sqrt{2}i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q162 | MCQ

C03-K01-G-MCQ-061

For the expression State the complex conjugate of 9:, the required value is:

A 10

B 3

C 9

D −9

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q163 | MCQ

C03-K01-G-MCQ-062

For the expression State the complex conjugate of $-3/4 + 2i$:, the required value is:

A $-\frac{3}{4} - 2i$

B $\frac{3}{4} + 2i$

C $\frac{1}{4} - 2i$

D $-\frac{3}{4} + 2i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q164 | MCQ

C03-K01-G-MCQ-063

For $(5+2i)/(1-2i)$, select the value in the form a+bi:

A $\frac{6}{5}+\frac{12i}{5}$

B $-\frac{4}{5}+\frac{12i}{5}$

C $-\frac{1}{5}-\frac{12i}{5}$

D $\frac{1}{5}+\frac{12i}{5}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q165 | MCQ

C03-K01-G-MCQ-064

For $(2-i)/(4+i)$, select the value in the form a+bi:

A $\frac{7}{17}-\frac{6i}{17}$

B $\frac{24}{17}-\frac{6i}{17}$

C $-\frac{10}{17}-\frac{6i}{17}$

D $-\frac{7}{17}+\frac{6i}{17}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q166 | MCQ

C03-K01-G-MCQ-065

For $3i/(2+3i)$, select the value in the form a+bi:

A $\frac{9}{13}+\frac{6i}{13}$

B $\frac{22}{13}+\frac{6i}{13}$

C $-\frac{4}{13}+\frac{6i}{13}$

D $-\frac{9}{13}-\frac{6i}{13}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q167 | MCQ

C03-K01-G-MCQ-066

For $(\sqrt{3}-i)/(\sqrt{3}+i)$, select the value in the form a+bi:

A $-\dfrac{2i}{\sqrt{3}+i}$

B $\dfrac{-\sqrt{3}+i}{\sqrt{3}+i}$

C $\dfrac{\sqrt{3}-i}{\sqrt{3}+i}$

D $\dfrac{2\sqrt{3}}{\sqrt{3}+i}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q168 | MCQ

C03-K01-G-MCQ-067

For $(1 + i)/(2i)$, select the value in the form a+bi:

A $\frac{1}{2} - \frac{i}{2}$

B $\frac{3}{2} - \frac{i}{2}$

C $-\frac{1}{2} - \frac{i}{2}$

D $-\frac{1}{2} + \frac{i}{2}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q169 | MCQ

C03-K01-G-MCQ-068

For the expression State the complex conjugate of $4 - 7i$:, the required value is:

A $-4 - 7i$

B $5 + 7i$

C $4 - 7i$

D $4 + 7i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V01

Q170 | MCQ

C03-K01-G-MCQ-069

For the expression State the complex conjugate of $\sqrt{10}+2i$:, the required value is:

A $\sqrt{10}-2i$

B $-\sqrt{10}+2i$

C $1+\sqrt{10}-2i$

D $\sqrt{10}+2i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F04 | V01

Q171 | MCQ

C03-K01-G-MCQ-070

For the expression State the complex conjugate of $-8i$:, the required value is:

A 3

B $8i$

C $-8i$

D $1+8i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | V02

Q172 | MCQ

C03-K01-G-MCQ-071

For $(3+2i)/(3-2i)$, select the value in the form a+bi:

A $-\frac{5}{13}-\frac{12i}{13}$

B $\frac{5}{13}+\frac{12i}{13}$

C $\frac{18}{13}+\frac{12i}{13}$

D $-\frac{8}{13}+\frac{12i}{13}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q173 | MCQ

C03-K01-G-MCQ-072

For $\sqrt{-5}$, select the simplified value in terms of i:

A $5i$

B $i\sqrt{5}$

C $-i\sqrt{5}$

D $\sqrt{5}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q174 | MCQ

C03-K01-G-MCQ-073

For $\sqrt{-20}$, select the simplified value in terms of i:

A $2i\sqrt{5}$

B $-2i\sqrt{5}$

C $4i\sqrt{5}$

D $i\sqrt{20}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q175 | MCQ

C03-K01-G-MCQ-074

For $-\sqrt{-18}$, select the simplified value in terms of i:

A $-3i\sqrt{2}$

B $3i\sqrt{2}$

C $-6i$

D $-i\sqrt{18}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q176 | MCQ

C03-K01-G-MCQ-075

For $squarerootsof\ -8$, select the simplified value in terms of i:

A $2i\sqrt{2}$

B $\pm 8i$

C $\pm 2i\sqrt{2}$

D $\pm i\sqrt{8}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q177 | MCQ

C03-K01-G-MCQ-076

For $\sqrt{-45}/\sqrt{-5}$, select the simplified value in terms of i:

A 3

B -3

C $3i$

D $\sqrt{9}i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q178 | MCQ

C03-K01-G-MCQ-077

For $\sqrt{-2}\sqrt{-8}$, select the simplified value in terms of i:

A 2

B -4

C 4

D $-4i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q179 | MCQ

C03-K01-G-MCQ-078

For $\sqrt{12}/\sqrt{-3}$, select the simplified value in terms of i:

A -2

B $i\sqrt{4}$

C $-2i$

D $2i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q180 | MCQ

C03-K01-G-MCQ-079

For $(2+\sqrt{-3})^2$, select the simplified value in terms of i:

A $1-4i\sqrt{3}$

B $7+4i$

C $4+2i\sqrt{3}$

D $1+4i\sqrt{3}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F05 | V01

Q181 | MCQ

C03-K01-G-MCQ-080

For $\sqrt{-72}$, select the simplified value in terms of i:

A $-6i\sqrt{2}$

B $12i$

C $i\sqrt{72}$

D $6i\sqrt{2}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q182 | MCQ

C03-K01-G-MCQ-081

For $squarerootsof\ -50$, select the simplified value in terms of i:

A $\pm i\sqrt{50}$

B $5i\sqrt{2}$

C $\pm 10i$

D $\pm 5i\sqrt{2}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q183 | MCQ

C03-K01-G-MCQ-082

For $\sqrt{-3}\sqrt{-12}$, select the simplified value in terms of i:

A -6

B 6

C $-6i$

D 3

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q184 | MCQ

C03-K01-G-MCQ-083

For $\sqrt{8}/\sqrt{-2}$, select the simplified value in terms of i:

A $2i$

B -2

C $-i\sqrt{2}$

D $-2i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q185 | MCQ

C03-K01-G-MCQ-084

For $\sqrt{-32} + \sqrt{-8}$, select the simplified value in terms of i:

A $6\sqrt{2}$

B $6i\sqrt{2}$

C $2i\sqrt{2}$

D $-6i\sqrt{2}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q186 | MCQ

C03-K01-G-MCQ-085

For $\sqrt{-98} - \sqrt{-18}$, select the simplified value in terms of i:

A $4\sqrt{2}$

B $4i\sqrt{2}$

C $8i\sqrt{2}$

D $-4i\sqrt{2}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q187 | MCQ

C03-K01-G-MCQ-086

For $(\sqrt{5}+\sqrt{-2})^2$, select the simplified value in terms of i:

A $3+2i\sqrt{10}$

B $7+2i\sqrt{10}$

C $3-2i\sqrt{10}$

D $5+2i\sqrt{2}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F05 | V01

Q188 | MCQ

C03-K01-G-MCQ-087

For $(3+\sqrt{-5})(3-\sqrt{-5})$, select the simplified value in terms of i:

A 4

B $14i$

C $9-5i$

D 14

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q189 | MCQ

C03-K01-G-MCQ-088

For $\sqrt{-7}$, select the simplified value in terms of i:

A $7i$

B $\sqrt{7}$

C $i\sqrt{7}$

D $-i\sqrt{7}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q190 | MCQ

C03-K01-G-MCQ-089

For $\sqrt{-28}$, select the simplified value in terms of i:

A $2i\sqrt{7}$

B $-2i\sqrt{7}$

C $4i\sqrt{7}$

D $i\sqrt{28}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q191 | MCQ

C03-K01-G-MCQ-090

For $squarerootsof\ -12$, select the simplified value in terms of i:

A $\pm 2i\sqrt{3}$

B $\pm i\sqrt{12}$

C $2i\sqrt{3}$

D $\pm 4i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q192 | MCQ

C03-K01-G-MCQ-091

For $\sqrt{27}/\sqrt{-3}$, select the simplified value in terms of i:

A $-3i$

B $3i$

C -3

D $i\sqrt{3}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q193 | MCQ

C03-K01-G-MCQ-092

For $\sqrt{-2}\sqrt{-18}$, select the simplified value in terms of i:

A 6

B $-6i$

C -3

D -6

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q194 | MCQ

C03-K01-G-MCQ-093

For $\sqrt{-48}/\sqrt{-3}$, select the simplified value in terms of i:

A -4

B $-i\sqrt{4}$

C $-4i$

D $4i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q195 | MCQ

C03-K01-G-MCQ-094

For $\sqrt{-8} + \sqrt{-18}$, select the simplified value in terms of i:

A $-5i\sqrt{2}$

B $5\sqrt{2}$

C $5i\sqrt{2}$

D $i\sqrt{26}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q196 | MCQ

C03-K01-G-MCQ-095

For $(1+\sqrt{-2})^2$, select the simplified value in terms of i:

A $-1+2i\sqrt{2}$

B $3+2i\sqrt{2}$

C $-1-2i\sqrt{2}$

D $1+2i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F05 | V01

Q197 | MCQ

C03-K01-G-MCQ-096

For $(4+\sqrt{-3})(4-\sqrt{-3})$, select the simplified value in terms of i:

A $16-3i$

B 19

C 13

D $19i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | V01

Q198 | MCQ

C03-K01-G-MCQ-097

For $\sqrt{-75}$, select the simplified value in terms of i:

A $-5i\sqrt{3}$

B $15i$

C $i\sqrt{75}$

D $5i\sqrt{3}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F99 | V01

Q199 | MCQ

C03-K01-G-MCQ-098

Solve for the real values x and y: $(1 + 3i)(x + i) = x(y + i)$:

A $\left(-\frac{1}{2}, -7\right)$

B $\left(-\frac{1}{2}, 7\right)$

C $\left(-\frac{1}{2}, 6\right)$

D $\left(\frac{1}{2}, 7\right)$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F99 | V02

Q200 | MCQ

C03-K01-G-MCQ-099

Given x is real, solve: $(4x-4i)(x^2+xi)=10x^2i^{32}$:

A $\{0,\ 1,\ 2\}$

B $\left\{2,\ \frac{1}{2}\right\}$

C $\left\{-2,\ 2,\ \frac{1}{2}\right\}$

D $\left\{0,\ 2,\ \frac{1}{2}\right\}$

WORKING AREA

FORMULA BANK

Standard form

$$z=a+bi$$

Equality

$$a+bi=c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4=1 \qquad i^{4q+r}=i^r$$

Conjugate and division

$$\overline{a+bi}=a-bi \qquad \frac{z}{w}=\frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a}=i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F99 | V03

Q201 | MCQ

C03-K01-G-MCQ-100

Simplify exactly: $(i(8-6i)/((1+2i)(3-i)))^{2027}$:

A $((1+7i)/5)^{2027}$

B $((7+i)/5)^{2027}$

C $((7-i)/5)^{2027}$

D $(7+i)^{2027}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F99 | V04

Q202 | MCQ

C03-K01-G-MCQ-101

Solve over the complex numbers: $(3x-6)^2=-8$:

A $x=2\pm 2i\sqrt{2}$

B $x=2\pm (2/3)i\sqrt{2}$

C $x=2\pm i\sqrt{2}$

D $x=3\pm i\sqrt{2}$

WORKING AREA

FORMULA BANK

Standard form

$$z=a+bi$$

Equality

$$a+bi=c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4=1 \qquad i^{4q+r}=i^r$$

Conjugate and division

$$\overline{a+bi}=a-bi \qquad \frac{z}{w}=\frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a}=i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F01 | C03-T01-F01-VQ

Quiz M1 | QUIZ MCQ

C03-K01-G-MCQ-151

For 4-3i, select the ordered pair (real part, imaginary part):

A $(4, -3)$

B $(4, 3)$

C $(-4, -3)$

D $(-3, 4)$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F03 | C03-T01-F03-VQ

Quiz M2 | QUIZ MCQ

C03-K01-G-MCQ-152

For (1+2i)(2-i), select the simplified value:

A $4 + 3i$

B 1

C 2

D $-4 - 3i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F04 | C03-T01-F04-VQ

Quiz M3 | QUIZ MCQ

C03-K01-G-MCQ-153

For (3+i)/(1-i), select the value in the form a+bi:

A 1

B 2

C $-1-2i$

D $1+2i$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | C03-T01-F05-VQ

Quiz M4 | QUIZ MCQ

C03-K01-G-MCQ-154

For sqrt(-27), select the expression in terms of i:

A $3i\sqrt{3}$

B $-3i\sqrt{3}$

C $9i$

D $i\sqrt{27}$

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F01 | C03-T01-F01-VQ

Quiz W1 | QUIZ WRITTEN

C03-K01-QUIZ-WRITTEN-1

State the real and imaginary parts of $\frac{5-\sqrt{5}i}{2}$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F02 | C03-T01-F02-VQ

Quiz W2 | QUIZ WRITTEN C03-K01-QUIZ-WRITTEN-2

Solve for real x,y: $(2+i)x+(1-i)y=3+i$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a+bi = c+di \Longrightarrow a=c,\ b=d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a+bi} = a-bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a>0)$$

Concept 1 | Complex Numbers

F03 | C03-T01-F03-VQ

Quiz W3 | QUIZ WRITTEN

C03-K01-QUIZ-WRITTEN-3

Calculate $i^{18} + i^7 - i^3$ in standard form.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 1 | Complex Numbers

F05 | C03-T01-F05-VQ

Quiz W4 | QUIZ WRITTEN

C03-K01-QUIZ-WRITTEN-4

Solve over the complex numbers: $(x-3)^2 = -12$.

WORKING AREA

FORMULA BANK

Standard form

$$z = a + bi$$

Equality

$$a + bi = c + di \Longrightarrow a = c,\ b = d$$

Powers of i

$$i^4 = 1 \qquad i^{4q+r} = i^r$$

Conjugate and division

$$\overline{a + bi} = a - bi \qquad \frac{z}{w} = \frac{z\,\overline{w}}{w\,\overline{w}}$$

Negative roots

$$\sqrt{-a} = i\sqrt{a}\ (a > 0)$$

Concept 2 | Quadratic Equations — **OFFICIAL LESSONS 3-5, 3-6, 3-7, 3-8, 3-9, 3-10, 3-11**

Quadratic Equations

Equation-first recall | use the same rail beside every question in this Concept

Quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Discriminant

$$D = b^2 - 4ac$$

Vieta sum and product

$$\alpha + \beta = -\frac{b}{a} \qquad \alpha\beta = \frac{c}{a}$$

Root expressions

$\alpha^2 + \beta^2 = S^2 - 2P$ $\alpha^3 + \beta^3 = S^3 - 3PS$

Root signs

$\alpha\beta > 0 \Rightarrow$ same sign $\alpha\beta < 0 \Rightarrow$ opposite signs

Transformed roots

$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Reciprocal roots

$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Complex factorisation

$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Square-root route

$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Start with the family cue, write the first move, then use the working grid.

Concept 2 | Quadratic Equations

F01 | V01

Q001 | WRITTEN

C03-T02-35-WU1a

Solve $x^2 + 8 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V01

Q002 | WRITTEN

C03-T02-35-TR1a

Solve $x^2 + 4 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$$ax^2 + bx + c = a(x - \alpha)(x - \beta)$$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V01

Q003 | WRITTEN

C03-T02-35-EX1a

Solve $x^2 + 49 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V01

Q004 | WRITTEN

C03-T02-35-EX1b

Solve $9x^2 - 4 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V01

Q005 | WRITTEN

C03-T02-35-EX2c

Solve $x^2 - 12 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V01

Q006 | WRITTEN

C03-T02-35-EX2f

Solve $4x^2 + 3 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V01

Q007 | MCQ

C03-K02-G-MCQ-001

Solve $x^2 + 8 = 0$ Select the correct answer:

A $x = \pm 2i\sqrt{2}$

B $x = 2i\sqrt{2}$

C $x = -2i\sqrt{2}$

D $x = +2i\sqrt{2}$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V01

Q008 | MCQ

C03-K02-G-MCQ-004

Solve $x^2 + 4 = 0$ Select the correct answer:

A $x = \pm 2i$

B $x = 2i$

C $x = -2i$

D $x = +2i$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V01

Q009 | MCQ

C03-K02-G-MCQ-008

Solve $x^2 + 49 = 0$ Select the correct answer:

A $x = -7i$

B $x = +7i$

C $x = \pm 7i$

D $x = 7i$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V01

Q010 | MCQ

C03-K02-G-MCQ-009

Solve $9x^2 - 4 = 0$ Select the correct answer:

A $x = -\frac{2}{3}$

B $x = +\frac{2}{3}$

C $x = \pm\frac{2}{3}$

D $x = \frac{2}{3}$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V01

Q011 | MCQ

C03-K02-G-MCQ-020

Solve $x^2 - 12 = 0$ Select the correct answer:

A $x = +2\sqrt{3}$

B $x = \pm 2\sqrt{3}$

C $x = 2\sqrt{3}$

D $x = -2\sqrt{3}$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V01

Q012 | MCQ

C03-K02-G-MCQ-023

Solve $4x^2 + 3 = 0$ Select the correct answer:

A $x = +\frac{i\sqrt{3}}{2}$

B $x = \pm\frac{i\sqrt{3}}{2}$

C $x = \frac{i\sqrt{3}}{2}$

D $x = -\frac{i\sqrt{3}}{2}$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V02

Q013 | WRITTEN

C03-T02-35-TR1b

Solve $(x-3)^2 = -8$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V02

Q014 | WRITTEN

C03-T02-35-EX1c

Solve $(x-2)^2 = 5$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V02

Q015 | WRITTEN C03-T02-35-EX1d

Solve $(x+6)^2 = -6$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V02

Q016 | WRITTEN

C03-T02-35-EX2b

Solve $(x+4)^2 = -18$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow$
$Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V02

Q017 | WRITTEN

C03-T02-35-EX2i

Solve $(2x-3)^2 = 7$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

Transformed roots
$u = \alpha+t,\ v = \beta+t \Rightarrow u+v = S+2t,\ uv = P+tS+t^2$

Discriminant
$$D = b^2-4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha+\beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2+bx+c = a(x-\alpha)(x-\beta)$

Root expressions
$$\alpha^2+\beta^2 = S^2-2P$$
$$\alpha^3+\beta^3 = S^3-3PS$$

Square-root route
$(x-h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V02

Q018 | MCQ

C03-K02-G-MCQ-005

Solve $(x-3)^2 = -8$ Select the correct answer:

A $x = 3 \pm 2i\sqrt{2}$

B $x = 32i\sqrt{2}$

C $x = 3 - 2i\sqrt{2}$

D $x = 3 + 2i\sqrt{2}$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V02

Q019 | MCQ

C03-K02-G-MCQ-010

Solve $(x-2)^2 = 5$ Select the correct answer:

A $x = 2 + \sqrt{5}$

B $x = 2 \pm \sqrt{5}$

C $x = 2\sqrt{5}$

D $x = 2 - \sqrt{5}$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V02

Q020 | MCQ

C03-K02-G-MCQ-011

Solve $(x+6)^2 = -6$ Select the correct answer:

A $x = -6 - i\sqrt{6}$

B $x = -6 + i\sqrt{6}$

C $x = -6 \pm i\sqrt{6}$

D $x = -6i\sqrt{6}$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V02

Q021 | MCQ

C03-K02-G-MCQ-019

Solve $(x+4)^2 = -18$ Select the correct answer:

A $x = -4 - 3i\sqrt{2}$

B $x = -4 + 3i\sqrt{2}$

C $x = -4 \pm 3i\sqrt{2}$

D $x = -43i\sqrt{2}$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F01 | V02

Q022 | MCQ

C03-K02-G-MCQ-026

Solve $(2x-3)^2 = 7$ Select the correct answer:

A $x = \frac{3\sqrt{7}}{2}$

B $x = \frac{3-\sqrt{7}}{2}$

C $x = \frac{3+\sqrt{7}}{2}$

D $x = \frac{3\pm\sqrt{7}}{2}$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

Transformed roots
$u = \alpha+t,\ v = \beta+t \Rightarrow u+v = S+2t,\ uv = P+tS+t^2$

Discriminant
$D = b^2-4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha+\beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2+bx+c = a(x-\alpha)(x-\beta)$

Root expressions
$\alpha^2+\beta^2 = S^2-2P$
$\alpha^3+\beta^3 = S^3-3PS$

Square-root route
$(x-h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F02 | V01

Q023 | WRITTEN

C03-T02-35-WU1b

Solve $2x^2 - 7x - 9 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F02 | V01

Q024 | WRITTEN

C03-T02-35-TR1c

Solve $2x^2 + 5x - 3 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow$
$Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F02 | V01

Q025 | WRITTEN C03-T02-35-EX1e

Solve $2x^2 + 7x = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$$ax^2 + bx + c = a(x - \alpha)(x - \beta)$$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F02 | V01

Q026 | WRITTEN

C03-T02-35-EX1f

Solve $2x^2 + 5x - 12 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F02 | V01

Q027 | WRITTEN

C03-T02-35-EX2e

Solve $x^2 - 8x + 15 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F02 | V01

Q028 | MCQ

C03-K02-G-MCQ-002

Solve $2x^2 - 7x - 9 = 0$ Select the correct answer:

A $x = -1, \frac{9}{2}$

B $-(x = -1, \frac{9}{2})$

C $x = -1, \frac{9}{2} + 1$

D $x = -1, \frac{9}{2} - 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F02 | V01

Q029 | MCQ

C03-K02-G-MCQ-006

Solve $2x^2 + 5x - 3 = 0$ Select the correct answer:

A $-(x = \frac{1}{2}, -3)$

B $x = \frac{1}{2}, -3 + 1$

C $x = \frac{1}{2}, -3 - 1$

D $x = \frac{1}{2}, -3$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F02 | V01

Q030 | MCQ

C03-K02-G-MCQ-012

Solve $2x^2 + 7x = 0$ Select the correct answer:

A $-(x = 0, -\frac{7}{2})$

B $x = 0, -\frac{7}{2} + 1$

C $x = 0, -\frac{7}{2} - 1$

D $x = 0, -\frac{7}{2}$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F02 | V01

Q031 | MCQ

C03-K02-G-MCQ-013

Solve $2x^2 + 5x - 12 = 0$ Select the correct answer:

A $x = \frac{3}{2}, -4$

B $-(x = \frac{3}{2}, -4)$

C $x = \frac{3}{2}, -4 + 1$

D $x = \frac{3}{2}, -4 - 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F02 | V01

Q032 | MCQ

C03-K02-G-MCQ-022

Solve $x^2 - 8x + 15 = 0$ Select the correct answer:

A $x = 3,\ 5$

B $x = 3,\ 6$

C $x = 3,\ 5 - 1$

D $x = 3,\ 5$ (sign error)

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V01

Q033 | WRITTEN

C03-T02-35-EX2d

Solve $3x^2 - 4x - 1 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V01

Q034 | MCQ

C03-K02-G-MCQ-021

Solve $3x^2 - 4x - 1 = 0$ Select the correct answer:

A $x = \frac{2+\sqrt{7}}{3}$

B $x = \frac{2\pm\sqrt{7}}{3}$

C $x = \frac{2\sqrt{7}}{3}$

D $x = \frac{2-\sqrt{7}}{3}$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V02

Q035 | WRITTEN

C03-T02-35-WU1c

Solve $2x^2 + 2\sqrt{6}\,x + 11 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V02

Q036 | WRITTEN

C03-T02-35-TR1d

Solve $2x^2 + 2\sqrt{3}\,x + 5 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V02

Q037 | WRITTEN

C03-T02-35-EX1g

Solve $x^2 + x + 1 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V02

Q038 | WRITTEN

C03-T02-35-EX1h

Solve $3x^2 - 5x + 3 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V02

Q039 | WRITTEN

C03-T02-35-EX1i

Solve $x^2 - 2\sqrt{3}\,x + 5 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V02

Q040 | WRITTEN

C03-T02-35-EX1j

Solve $3x^2 + 2\sqrt{2}\,x + 1 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V02

Q041 | WRITTEN

C03-T02-35-EX2a

Solve $x^2 - x + 2 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V02

Q042 | WRITTEN

C03-T02-35-EX2g

Solve $3x^2 - \sqrt{5}\,x + 1 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V02

Q043 | WRITTEN

C03-T02-35-EX2h

Solve $6x^2 - 12x + 15 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V02

Q044 | MCQ

C03-K02-G-MCQ-003

Solve $2x^2 + 2\sqrt{6}\,x + 11 = 0$ Select the correct answer:

A $x = \dfrac{-\sqrt{6} + 4i}{2}$

B $x = \dfrac{-\sqrt{6} \pm 4i}{2}$

C $x = \dfrac{-\sqrt{6}4i}{2}$

D $x = \dfrac{-\sqrt{6} - 4i}{2}$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \dfrac{1}{\alpha},\ v = \dfrac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\dfrac{b}{a}$
$\alpha\beta = \dfrac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V02

Q045 | MCQ

C03-K02-G-MCQ-007

Solve $2x^2 + 2\sqrt{3}\,x + 5 = 0$ Select the correct answer:

A $x = \dfrac{-\sqrt{3} - i\sqrt{7}}{2}$

B $x = \dfrac{-\sqrt{3} + i\sqrt{7}}{2}$

C $x = \dfrac{-\sqrt{3} \pm i\sqrt{7}}{2}$

D $x = \dfrac{-\sqrt{3}i\sqrt{7}}{2}$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \dfrac{1}{\alpha},\ v = \dfrac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\dfrac{b}{a}$
$\alpha\beta = \dfrac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V02

Q046 | MCQ

C03-K02-G-MCQ-014

Solve $x^2 + x + 1 = 0$ Select the correct answer:

A $x = \frac{-1i\sqrt{3}}{2}$

B $x = \frac{-1 - i\sqrt{3}}{2}$

C $x = \frac{-1 + i\sqrt{3}}{2}$

D $x = \frac{-1 \pm i\sqrt{3}}{2}$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V02

Q047 | MCQ

C03-K02-G-MCQ-015

Solve $3x^2 - 5x + 3 = 0$ Select the correct answer:

A $x = \frac{5 + i\sqrt{11}}{6}$

B $x = \frac{5 \pm i\sqrt{11}}{6}$

C $x = \frac{5i\sqrt{11}}{6}$

D $x = \frac{5 - i\sqrt{11}}{6}$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V02

Q048 | MCQ

C03-K02-G-MCQ-016

Solve $x^2 - 2\sqrt{3}\,x + 5 = 0$ Select the correct answer:

A $x = \sqrt{3}i\sqrt{2}$

B $x = \sqrt{3} - i\sqrt{2}$

C $x = \sqrt{3} + i\sqrt{2}$

D $x = \sqrt{3} \pm i\sqrt{2}$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V02

Q049 | MCQ

C03-K02-G-MCQ-017

Solve $3x^2 + 2\sqrt{2}\,x + 1 = 0$ Select the correct answer:

A $x = \dfrac{-\sqrt{2}+i}{3}$

B $x = \dfrac{-\sqrt{2}\pm i}{3}$

C $x = \dfrac{-\sqrt{2}i}{3}$

D $x = \dfrac{-\sqrt{2}-i}{3}$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

Transformed roots
$u = \alpha+t,\ v = \beta+t \Rightarrow u+v = S+2t,\ uv = P+tS+t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha+\beta = -\dfrac{b}{a}$
$\alpha\beta = \dfrac{c}{a}$

Complex factorisation
$ax^2+bx+c = a(x-\alpha)(x-\beta)$

Root expressions
$\alpha^2+\beta^2 = S^2-2P$
$\alpha^3+\beta^3 = S^3-3PS$

Square-root route
$(x-h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V02

Q050 | MCQ

C03-K02-G-MCQ-018

Solve $x^2 - x + 2 = 0$ Select the correct answer:

A $x = \frac{1 - i\sqrt{7}}{2}$

B $x = \frac{1 + i\sqrt{7}}{2}$

C $x = \frac{1 \pm i\sqrt{7}}{2}$

D $x = \frac{1i\sqrt{7}}{2}$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V02

Q051 | MCQ

C03-K02-G-MCQ-024

Solve $3x^2 - \sqrt{5}\,x + 1 = 0$ Select the correct answer:

A $x = \dfrac{\sqrt{5} - i\sqrt{7}}{6}$

B $x = \dfrac{\sqrt{5} + i\sqrt{7}}{6}$

C $x = \dfrac{\sqrt{5} \pm i\sqrt{7}}{6}$

D $x = \dfrac{\sqrt{5}i\sqrt{7}}{6}$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \dfrac{1}{\alpha},\ v = \dfrac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\dfrac{b}{a}$
$\alpha\beta = \dfrac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | V02

Q052 | MCQ

C03-K02-G-MCQ-025

Solve $6x^2 - 12x + 15 = 0$ Select the correct answer:

A $x = 1 + \frac{i\sqrt{6}}{2}$

B $x = 1 \pm \frac{i\sqrt{6}}{2}$

C $x = 1\frac{i\sqrt{6}}{2}$

D $x = 1 - \frac{i\sqrt{6}}{2}$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q053 | WRITTEN

C03-T02-36-WU11

Determine the nature of the solutions of $3x^2 + 4x + 7 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q054 | WRITTEN

C03-T02-36-WU12

Find the range of m for which $x^2 - mx + m^2 - 3m - 9 = 0$ has real solutions.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q055 | WRITTEN

C03-T02-36-WU13

For $x^2 + kx + 3 - k = 0$, determine the nature of the solutions as k varies.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q056 | WRITTEN C03-T02-36-TR1a

For $3x^2 - 5x + 4 = 0$, determine the nature of the solutions.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q057 | WRITTEN

C03-T02-36-TR1b

For $4x^2 - 7x - 2 = 0$, determine the nature of the solutions.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q058 | WRITTEN

C03-T02-36-TR1c

For $25x^2 - 10x + 1 = 0$, determine the nature of the solutions.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q059 | WRITTEN

C03-T02-36-EX1a

Determine the nature of the solutions of $x^2 - 5x + 3 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q060 | WRITTEN

C03-T02-36-EX1b

Determine the nature of the solutions of $9x^2 - 12x + 4 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q061 | WRITTEN

C03-T02-36-EX1c

Determine the nature of the solutions of $4x^2 - 8x + 5 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q062 | WRITTEN C03-T02-36-EX1d

Determine the nature of the solutions of $4x^2 - 4x + 1 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q063 | WRITTEN

C03-T02-36-EX1e

Determine the nature of the solutions of $x^2 - 3x + 5 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q064 | WRITTEN

C03-T02-36-EX1f

Determine the nature of the solutions of $x^2 - x - 2 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q065 | MCQ

C03-K02-G-MCQ-028

Determine the nature of the solutions of $3x^2 + 4x + 7 = 0$ Select the correct answer:

A Two distinct imaginary (non-real complex) solutions

B Two repeated imaginary (non-real complex) solutions

C Two distinct imaginary (non-imaginary complex) solutions

D Two distinct real (non-real complex) solutions

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q066 | MCQ

C03-K02-G-MCQ-029

Find the range of m for which $x^2 - mx + m^2 - 3m - 9 = 0$ has real solutions
Select the correct answer:

A $-2 >= m >= 6$

B $+2 \leq m \leq 6$

C $-2 \leq m \leq 7$

D $-2 \leq m \leq 6$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q067 | MCQ

C03-K02-G-MCQ-030

For $x^2+kx+3-k=0$, determine the nature of the solutions as k varies Select the correct answer:

A $k<-6$ or $k>2$: distinct imaginary; $k=-6,2$: repeated imaginary; $-6<k<2$: distinct imaginary

B $k<-6$ or $k>2$: distinct real; $k=-6,2$: repeated real; $-6<k<2$: distinct real

C $k<-6$ or $k>2$: distinct real; $k=-6,2$: repeated real; $-6<k<2$: distinct imaginary

D $k<-6$ or $k>2$: repeated real; $k=-6,2$: repeated real; $-6<k<2$: repeated imaginary

WORKING AREA

FORMULA BANK

Quadratic formula
$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

Transformed roots
$u=\alpha+t,\ v=\beta+t\Rightarrow u+v=S+2t,\ uv=P+tS+t^2$

Discriminant
$$D=b^2-4ac$$

Reciprocal roots
$u=\frac{1}{\alpha},\ v=\frac{1}{\beta}\Rightarrow Px^2-Sx+1=0$

Vieta sum and product
$$\alpha+\beta=-\frac{b}{a}$$
$$\alpha\beta=\frac{c}{a}$$

Complex factorisation
$ax^2+bx+c=a(x-\alpha)(x-\beta)$

Root expressions
$$\alpha^2+\beta^2=S^2-2P$$
$$\alpha^3+\beta^3=S^3-3PS$$

Square-root route
$(x-h)^2=k\Rightarrow x=h\pm\sqrt{k}$

Root signs
$\alpha\beta>0\Rightarrow$ same sign
$\alpha\beta<0\Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q068 | MCQ C03-K02-G-MCQ-031

For $3x^2 - 5x + 4 = 0$, determine the nature of the solutions Select the correct answer:

A Two distinct imaginary (non-imaginary complex) solutions

B Two distinct real (non-real complex) solutions

C Two distinct imaginary (non-real complex) solutions

D Two repeated imaginary (non-real complex) solutions

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q069 | MCQ

C03-K02-G-MCQ-032

For $4x^2 - 7x - 2 = 0$, determine the nature of the solutions Select the correct answer:

A Two distinct real solutions

B Two repeated real solutions

C Two distinct imaginary solutions

D Two distinct real solutions;(sign error)

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q070 | MCQ

C03-K02-G-MCQ-033

For $25x^2 - 10x + 1 = 0$, determine the nature of the solutions Select the correct answer:

A One repeated real solution

B One repeated real solution;(sign error)

C 0

D 1

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q071 | MCQ

C03-K02-G-MCQ-036

Determine the nature of the solutions of $x^2 - 5x + 3 = 0$ Select the correct answer:

A Two distinct imaginary solutions

B Two distinct real solutions;(sign error)

C Two distinct real solutions

D Two repeated real solutions

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q072 | MCQ

C03-K02-G-MCQ-037

Determine the nature of the solutions of $9x^2 - 12x + 4 = 0$ Select the correct answer:

A 0

B 1

C One repeated real solution

D One repeated real solution;(sign error)

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q073 | MCQ

C03-K02-G-MCQ-038

Determine the nature of the solutions of $4x^2 - 8x + 5 = 0$ Select the correct answer:

A Two distinct real (non-real complex) solutions

B Two distinct imaginary (non-real complex) solutions

C Two repeated imaginary (non-real complex) solutions

D Two distinct imaginary (non-imaginary complex) solutions

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q074 | MCQ

C03-K02-G-MCQ-039

Determine the nature of the solutions of $4x^2 - 4x + 1 = 0$ Select the correct answer:

A One repeated real solution

B One repeated real solution;(sign error)

C 0

D 1

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q075 | MCQ

C03-K02-G-MCQ-040

Determine the nature of the solutions of $x^2 - 3x + 5 = 0$ Select the correct answer:

A Two distinct imaginary (non-real complex) solutions

B Two repeated imaginary (non-real complex) solutions

C Two distinct imaginary (non-imaginary complex) solutions

D Two distinct real (non-real complex) solutions

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V01

Q076 | MCQ

C03-K02-G-MCQ-041

Determine the nature of the solutions of $x^2 - x - 2 = 0$ Select the correct answer:

A Two distinct real solutions

B Two repeated real solutions

C Two distinct imaginary solutions

D Two distinct real solutions;(sign error)

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V02

Q077 | WRITTEN

C03-T02-36-TR22

Find the range of m for which $x^2 - 2mx + m + 2 = 0$ has two distinct imaginary solutions.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V02

Q078 | WRITTEN C03-T02-36-TR33

For $x^2 - ax + 2a - 3 = 0$, determine the nature of the solutions as a varies.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V02

Q079 | WRITTEN

C03-T02-36-EX2a

Find the values of a for which $x^2 - (a+1)x + 4 = 0$ has a repeated solution.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V02

Q080 | WRITTEN C03-T02-36-EX2b

Find the range of m for which $x^2+(m+6)x-2m=0$ has two distinct imaginary solutions.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

Transformed roots
$u=\alpha+t,\ v=\beta+t\Rightarrow u+v=S+2t,\ uv=P+tS+t^2$

Discriminant
$$D=b^2-4ac$$

Reciprocal roots
$u=\frac{1}{\alpha},\ v=\frac{1}{\beta}\Rightarrow Px^2-Sx+1=0$

Vieta sum and product
$$\alpha+\beta=-\frac{b}{a}$$
$$\alpha\beta=\frac{c}{a}$$

Complex factorisation
$ax^2+bx+c=a(x-\alpha)(x-\beta)$

Root expressions
$$\alpha^2+\beta^2=S^2-2P$$
$$\alpha^3+\beta^3=S^3-3PS$$

Square-root route
$(x-h)^2=k\Rightarrow x=h\pm\sqrt{k}$

Root signs
$\alpha\beta>0\Rightarrow$ same sign
$\alpha\beta<0\Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V02

Q081 | WRITTEN C03-T02-36-EX2c

Find the range of m for which $x^2 - 2mx + 2m^2 - 3m = 0$ has real solutions.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V02

Q082 | MCQ

C03-K02-G-MCQ-034

Find the range of m for which $x^2 - 2mx + m + 2 = 0$ has two distinct imaginary solutions Select the correct answer:

A $+1 < m < 2$

B $-1 < m < 3$

C $-1 < m < 2$

D $-1 > m > 2$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V02

Q083 | MCQ

C03-K02-G-MCQ-035

For $x^2 - ax + 2a - 3 = 0$, determine the nature of the solutions as a varies Select the correct answer:

A $a < 2$ or $a > 6$: distinct imaginary; $a = 2, 6$: repeated imaginary; $2 < a < 6$: distinct imaginary

B $a < 2$ or $a > 6$: distinct real; $a = 2, 6$: repeated real; $2 < a < 6$: distinct real

C $a < 2$ or $a > 6$: distinct real; $a = 2, 6$: repeated real; $2 < a < 6$: distinct imaginary

D $a < 2$ or $a > 6$: repeated real; $a = 2, 6$: repeated real; $2 < a < 6$: repeated imaginary

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V02

Q084 | MCQ

C03-K02-G-MCQ-042

Find the values of a for which $x^2-(a+1)x+4=0$ has a repeated solution Select the correct answer:

A $a=3$ or $a=-5$

B $a=3$ or $a=-4$

C $a=3$ or $a=-5-1$

D $a=3$ or $a=-5$ (sign error)

WORKING AREA

FORMULA BANK

Quadratic formula
$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

Transformed roots
$u=\alpha+t,\ v=\beta+t\Rightarrow u+v=S+2t,\ uv=P+tS+t^2$

Discriminant
$$D=b^2-4ac$$

Reciprocal roots
$u=\frac{1}{\alpha},\ v=\frac{1}{\beta}\Rightarrow Px^2-Sx+1=0$

Vieta sum and product
$$\alpha+\beta=-\frac{b}{a}$$
$$\alpha\beta=\frac{c}{a}$$

Complex factorisation
$ax^2+bx+c=a(x-\alpha)(x-\beta)$

Root expressions
$$\alpha^2+\beta^2=S^2-2P$$
$$\alpha^3+\beta^3=S^3-3PS$$

Square-root route
$(x-h)^2=k\Rightarrow x=h\pm\sqrt{k}$

Root signs
$\alpha\beta>0\Rightarrow$ same sign
$\alpha\beta<0\Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V02

Q085 | MCQ

C03-K02-G-MCQ-043

Find the range of m for which $x^2+(m+6)x-2m=0$ has two distinct imaginary solutions Select the correct answer:

A $-18 > m > -2$

B $+18 < m < -2$

C $-18 < m < -1$

D $-18 < m < -2$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

Transformed roots
$u = \alpha+t,\ v = \beta+t \Rightarrow u+v = S+2t,\ uv = P+tS+t^2$

Discriminant
$$D = b^2-4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2-Sx+1=0$

Vieta sum and product
$$\alpha+\beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2+bx+c = a(x-\alpha)(x-\beta)$

Root expressions
$$\alpha^2+\beta^2 = S^2-2P$$
$$\alpha^3+\beta^3 = S^3-3PS$$

Square-root route
$(x-h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V02

Q086 | MCQ

C03-K02-G-MCQ-044

Find the range of m for which $x^2 - 2mx + 2m^2 - 3m = 0$ has real solutions Select the correct answer:

A $0 \leq m \leq 4$

B $0 \leq m \leq 3 - 1$

C $0 \leq m \leq 3$

D $0 >= m >= 3$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V01

Q087 | WRITTEN

C03-T02-37-WU11

Find the sum and product of the two roots of $3x^2 - 6x - 5 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V01

Q088 | WRITTEN

C03-T02-37-TR11

Find the sum and product of the roots of $4x^2 + 2x - 7 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V01

Q089 | WRITTEN

C03-T02-37-EX1a

Find the sum and product of the roots of $x^2 + x + 2 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V01

Q090 | WRITTEN C03-T02-37-EX1b

Find the sum and product of the roots of $3x^2 - 7x - 6 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V01

Q091 | MCQ

C03-K02-G-MCQ-081

Find the sum and product of the two roots of $3x^2 - 6x - 5 = 0$ Select the correct answer:

A $\alpha + \beta = 2, \quad \alpha\beta = -\frac{5}{3} + 1$

B $\alpha + \beta = 2, \quad \alpha\beta = -\frac{5}{3} - 1$

C $\alpha + \beta = 2, \quad \alpha\beta = -\frac{5}{3}$

D $-(\alpha + \beta = 2, \quad \alpha\beta = -\frac{5}{3})$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V01

Q092 | MCQ

C03-K02-G-MCQ-086

Find the sum and product of the roots of $4x^2 + 2x - 7 = 0$ Select the correct answer:

A $\alpha + \beta = -\frac{1}{2}, \quad \alpha\beta = -\frac{7}{4}$

B $-(\alpha + \beta = -\frac{1}{2}, \quad \alpha\beta = -\frac{7}{4})$

C $\alpha + \beta = -\frac{1}{2}, \quad \alpha\beta = -\frac{7}{4} + 1$

D $\alpha + \beta = -\frac{1}{2}, \quad \alpha\beta = -\frac{7}{4} - 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V01

Q093 | MCQ

C03-K02-G-MCQ-091

Find the sum and product of the roots of $x^2 + x + 2 = 0$ Select the correct answer:

A $S = -1, \quad P = 2$ (sign error)

B $S = -1, \quad P = 2$

C $S = -1, \quad P = 3$

D $S = -1, \quad P = 2 - 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V01

Q094 | MCQ

C03-K02-G-MCQ-092

Find the sum and product of the roots of $3x^2 - 7x - 6 = 0$ Select the correct answer:

A $S = \frac{7}{3}, \quad P = -2$

B $-(S = \frac{7}{3}, \quad P = -2)$

C $S = \frac{7}{3}, \quad P = -2 + 1$

D $S = \frac{7}{3}, \quad P = -2 - 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V02

Q095 | WRITTEN

C03-T02-37-WU2a

If α, β are roots of $2x^2 - 6x - 3 = 0$, find $\alpha^2 + \beta^2$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V02

Q096 | WRITTEN

C03-T02-37-WU2b

If α, β are roots of $2x^2 - 6x - 3 = 0$, find $\alpha^3 + \beta^3$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V02

Q097 | WRITTEN

C03-T02-37-TR2a

If α, β are roots of $2x^2 - 4x + 3 = 0$, find $\alpha^2 + \beta^2$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V02

Q098 | WRITTEN

C03-T02-37-TR2b

If α, β are roots of $2x^2 - 4x + 3 = 0$, find $\alpha^3 + \beta^3$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V02

Q099 | WRITTEN

C03-T02-37-EX2a

If α, β are roots of $x^2 - 2x + 3 = 0$, find $\alpha^2 + \beta^2$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V02

Q100 | WRITTEN

C03-T02-37-EX2b

If α, β are roots of $x^2 - 2x + 3 = 0$, find $\alpha^3 + \beta^3$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V02

Q101 | WRITTEN

C03-T02-37-EX3a

If α, β are roots of $3x^2 + 6x - 1 = 0$, find $\alpha^2 + \beta^2$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V02

Q102 | WRITTEN

C03-T02-37-EX3b

If α, β are roots of $3x^2 + 6x - 1 = 0$, find $\alpha^3 + \beta^3$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V02

Q103 | MCQ

C03-K02-G-MCQ-082

If α, β are roots of $2x^2 - 6x - 3 = 0$, find $\alpha^2 + \beta^2$ Select the correct answer:

A 12

B 13

C $12 - 1$

D 12 (sign error)

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V02

Q104 | MCQ

C03-K02-G-MCQ-083

If α, β are roots of $2x^2 - 6x - 3 = 0$, find $\alpha^3 + \beta^3$ Select the correct answer:

A $\frac{81}{2} - 1$

B $\frac{81}{2}$

C $-(\frac{81}{2})$

D $\frac{81}{2} + 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V02

Q105 | MCQ

C03-K02-G-MCQ-087

If α, β are roots of $2x^2 - 4x + 3 = 0$, find $\alpha^2 + \beta^2$ Select the correct answer:

A 1

B 2

C $1 - 1$

D 1 (sign error)

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V02

Q106 | MCQ

C03-K02-G-MCQ-088

If α, β are roots of $2x^2 - 4x + 3 = 0$, find $\alpha^3 + \beta^3$ Select the correct answer:

A -1 (sign error)

B -1

C 0

D $-1 - 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V02

Q107 | MCQ

C03-K02-G-MCQ-094

If α, β are roots of $x^2 - 2x + 3 = 0$, find $\alpha^2 + \beta^2$ Select the correct answer:

A -1

B $-2 - 1$

C -2 (sign error)

D -2

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V02

Q108 | MCQ

C03-K02-G-MCQ-095

If α, β are roots of $x^2 - 2x + 3 = 0$, find $\alpha^3 + \beta^3$ Select the correct answer:

A -10 (sign error)

B -10

C -9

D $-10 - 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V02

Q109 | MCQ

C03-K02-G-MCQ-098

If α, β are roots of $3x^2 + 6x - 1 = 0$, find $\alpha^2 + \beta^2$ Select the correct answer:

A $\frac{14}{3} - 1$

B $\frac{14}{3}$

C $-(\frac{14}{3})$

D $\frac{14}{3} + 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V02

Q110 | MCQ

C03-K02-G-MCQ-099

If α, β are roots of $3x^2 + 6x - 1 = 0$, find $\alpha^3 + \beta^3$ Select the correct answer:

A -9

B $-10 - 1$

C -10 (sign error)

D -10

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V03

Q111 | WRITTEN

C03-T02-37-WU2c

If α, β are roots of $2x^2 - 6x - 3 = 0$, find $\frac{2}{\alpha} + \frac{2}{\beta}$.

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V03

Q112 | WRITTEN

C03-T02-37-TR2c

If α, β are roots of $2x^2 - 4x + 3 = 0$, find $\frac{\beta}{\alpha} + \frac{\alpha}{\beta}$.

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V03

Q113 | WRITTEN

C03-T02-37-EX1c

Find the sum and product of the roots of $5x^2 - 3 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V03

Q114 | WRITTEN

C03-T02-37-EX2c

If α, β are roots of $x^2 - 2x + 3 = 0$, find $\frac{1}{\alpha} + \frac{1}{\beta}$.

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V03

Q115 | WRITTEN

C03-T02-37-EX3c

If α, β are roots of $3x^2 + 6x - 1 = 0$, find $\frac{1}{\alpha} + \frac{1}{\beta}$.

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V03

Q116 | MCQ

C03-K02-G-MCQ-084

If α, β are roots of $2x^2 - 6x - 3 = 0$, find $\frac{2}{\alpha} + \frac{2}{\beta}$ Select the correct answer:

A $-4 - 1$

B -4 (sign error)

C -4

D -3

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V03

Q117 | MCQ

C03-K02-G-MCQ-089

If α, β are roots of $2x^2 - 4x + 3 = 0$, find $\frac{\beta}{\alpha} + \frac{\alpha}{\beta}$ Select the correct answer:

A $-(\frac{2}{3})$

B $\frac{2}{3} + 1$

C $\frac{2}{3} - 1$

D $\frac{2}{3}$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V03

Q118 | MCQ

C03-K02-G-MCQ-093

Find the sum and product of the roots of $5x^2 - 3 = 0$ Select the correct answer:

A $-(S = 0, \quad P = -\frac{3}{5})$

B $S = 0, \quad P = -\frac{3}{5} + 1$

C $S = 0, \quad P = -\frac{3}{5} - 1$

D $S = 0, \quad P = -\frac{3}{5}$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t, \ v = \beta + t \Rightarrow u + v = S + 2t, \ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha}, \ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V03

Q119 | MCQ

C03-K02-G-MCQ-096

If α, β are roots of $x^2 - 2x + 3 = 0$, find $\frac{1}{\alpha} + \frac{1}{\beta}$ Select the correct answer:

A $-(\frac{2}{3})$

B $\frac{2}{3} + 1$

C $\frac{2}{3} - 1$

D $\frac{2}{3}$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V03

Q120 | MCQ

C03-K02-G-MCQ-100

If α, β are roots of $3x^2 + 6x - 1 = 0$, find $\frac{1}{\alpha} + \frac{1}{\beta}$ Select the correct answer:

A 7

B $6 - 1$

C 6 (sign error)

D 6

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V04

Q121 | WRITTEN

C03-T02-37-WU2d

If α, β are roots of $2x^2 - 6x - 3 = 0$, find $(\alpha + 1)(\beta + 1)$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V04

Q122 | WRITTEN

C03-T02-37-TR2d

If α, β are roots of $2x^2 - 4x + 3 = 0$, find $(\alpha - 1)(\beta - 1)$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V04

Q123 | WRITTEN

C03-T02-37-EX2d

If α, β are roots of $x^2 - 2x + 3 = 0$, find $(\alpha + 2)(\beta + 2)$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V04

Q124 | WRITTEN

C03-T02-37-EX3d

If α, β are roots of $3x^2 + 6x - 1 = 0$, find $(\alpha - 2)(\beta - 2)$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V04

Q125 | MCQ

C03-K02-G-MCQ-085

If α, β are roots of $2x^2 - 6x - 3 = 0$, find $(\alpha + 1)(\beta + 1)$ Select the correct answer:

A $\frac{5}{2}$

B $-(\frac{5}{2})$

C $\frac{5}{2} + 1$

D $\frac{5}{2} - 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V04

Q126 | MCQ

C03-K02-G-MCQ-090

If α, β are roots of $2x^2 - 4x + 3 = 0$, find $(\alpha - 1)(\beta - 1)$ Select the correct answer:

A $\frac{1}{2} + 1$

B $\frac{1}{2} - 1$

C $\frac{1}{2}$

D $-(\frac{1}{2})$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V04

Q127 | MCQ

C03-K02-G-MCQ-097

If α, β are roots of $x^2 - 2x + 3 = 0$, find $(\alpha + 2)(\beta + 2)$ Select the correct answer:

A 12

B $11 - 1$

C 11 (sign error)

D 11

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V04

Q128 | MCQ

C03-K02-G-MCQ-101

If α, β are roots of $3x^2 + 6x - 1 = 0$, find $(\alpha - 2)(\beta - 2)$ Select the correct answer:

A $-(\frac{23}{3})$

B $\frac{23}{3} + 1$

C $\frac{23}{3} - 1$

D $\frac{23}{3}$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V01

Q129 | WRITTEN

C03-T02-38-TR11

If one root of $x^2 - 8x + k = 0$ is three times the other, find k and the roots.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V01

Q130 | WRITTEN

C03-T02-38-EX11

If one root of $x^2 + 6x + m = 0$ is twice the other, find m and the roots.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V01

Q131 | WRITTEN C03-T02-38-EX12

If one root of $8x^2 - mx + 1 = 0$ is twice the other, find m and the roots.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V01

Q132 | MCQ C03-K02-G-MCQ-049

If one root of $x^2 - 8x + k = 0$ is three times the other, find k and the roots Select the correct answer:

A $k = 6, \quad x = 2, 6$

B $k = 6, \quad x = 2, 7$

C $k = 6, \quad x = 2, 6 - 1$

D $k = 6, \quad x = 2, 6$ (sign error)

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V01

Q133 | MCQ C03-K02-G-MCQ-051

If one root of $x^2 + 6x + m = 0$ is twice the other, find m and the roots Select the correct answer:

A $m = 8, \quad x = -2, -4$

B $m = 8, \quad x = -2, -3$

C $m = 8, \quad x = -2, -4 - 1$

D $m = 8, \quad x = -2, -4$ (sign error)

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V01

Q134 | MCQ

C03-K02-G-MCQ-052

If one root of $8x^2 - mx + 1 = 0$ is twice the other, find m and the roots Select the correct answer:

A $(m, x_1, x_2) = (6, \frac{1}{4}, \frac{1}{2})$ or $(-6, -\frac{1}{4}, -\frac{1}{3})$

B $(m, x_1, x_2) = (6, \frac{1}{4}, \frac{1}{2})$ or $(-6, -\frac{1}{4}, -\frac{1}{2}) - 1$

C $(m, x_1, x_2) = (6, \frac{1}{4}, \frac{1}{2})$ or $(-6, -\frac{1}{4}, -\frac{1}{2})$ (sign error)

D $(m, x_1, x_2) = (6, \frac{1}{4}, \frac{1}{2})$ or $(-6, -\frac{1}{4}, -\frac{1}{2})$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V02

Q135 | WRITTEN

C03-T02-38-WU11

If the difference between the two roots of $x^2-(m-1)x-6=0$ is 5, find m and the roots.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

Transformed roots
$u=\alpha+t,\ v=\beta+t\Rightarrow u+v=S+2t,\ uv=P+tS+t^2$

Discriminant
$$D=b^2-4ac$$

Reciprocal roots
$u=\frac{1}{\alpha},\ v=\frac{1}{\beta}\Rightarrow Px^2-Sx+1=0$

Vieta sum and product
$$\alpha+\beta=-\frac{b}{a}$$
$$\alpha\beta=\frac{c}{a}$$

Complex factorisation
$ax^2+bx+c=a(x-\alpha)(x-\beta)$

Root expressions
$$\alpha^2+\beta^2=S^2-2P$$
$$\alpha^3+\beta^3=S^3-3PS$$

Square-root route
$(x-h)^2=k\Rightarrow x=h\pm\sqrt{k}$

Root signs
$\alpha\beta>0\Rightarrow$ same sign
$\alpha\beta<0\Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V02

Q136 | WRITTEN

C03-T02-38-TR12

If the difference between the roots of $x^2 - (m+1)x + 2 = 0$ is 1, find m and the roots.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V02

Q137 | WRITTEN

C03-T02-38-EX13

If the difference between the roots of $x^2 + 6x + m = 0$ is 4, find m and the roots.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V02

Q138 | WRITTEN

C03-T02-38-EX14

If the difference between the roots of $4x^2 + mx + 3 = 0$ is 1, find m and the roots.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V02

Q139 | MCQ

C03-K02-G-MCQ-048

If the difference between the two roots of $x^2-(m-1)x-6=0$ is 5, find m and the roots
Select the correct answer:

A $(m, x_1, x_2) = (2, -2, 3)$ or $(0, -3, 3)$

B $(m, x_1, x_2) = (2, -2, 3)$ or $(0, -3, 2) - 1$

C $(m, x_1, x_2) = (2, -2, 3)$ or $(0, -3, 2)$ (sign error)

D $(m, x_1, x_2) = (2, -2, 3)$ or $(0, -3, 2)$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

Transformed roots
$u = \alpha+t,\ v = \beta+t \Rightarrow u+v = S+2t,\ uv = P+tS+t^2$

Discriminant
$$D = b^2-4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha+\beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2+bx+c = a(x-\alpha)(x-\beta)$

Root expressions
$$\alpha^2+\beta^2 = S^2-2P$$
$$\alpha^3+\beta^3 = S^3-3PS$$

Square-root route
$(x-h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V02

Q140 | MCQ

C03-K02-G-MCQ-050

If the difference between the roots of $x^2 - (m+1)x + 2 = 0$ is 1, find m and the roots
Select the correct answer:

A $(m, x_1, x_2) = (2, 1, 2)$ or $(-4, -2, -1)$

B $(m, x_1, x_2) = (2, 1, 2)$ or $(-4, -2, 0)$

C $(m, x_1, x_2) = (2, 1, 2)$ or $(-4, -2, -1) - 1$

D $(m, x_1, x_2) =$ $(2, 1, 2)$ or $(-4, -2, -1)$ (sign error)

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V02

Q141 | MCQ

C03-K02-G-MCQ-053

If the difference between the roots of $x^2 + 6x + m = 0$ is 4, find m and the roots
Select the correct answer:

A $m = 5, \quad x = -5, -1$ (sign error)

B $m = 5, \quad x = -5, -1$

C $m = 5, \quad x = -5, 0$

D $m = 5, \quad x = -5, -1 - 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V02

Q142 | MCQ

C03-K02-G-MCQ-054

If the difference between the roots of $4x^2 + mx + 3 = 0$ is 1, find m and the roots Select the correct answer:

A $(m, x_1, x_2) = (-8, \frac{1}{2}, \frac{3}{2})$ or $(8, -\frac{3}{2}, -\frac{1}{2})$ (sign error)

B $(m, x_1, x_2) = (-8, \frac{1}{2}, \frac{3}{2})$ or $(8, -\frac{3}{2}, -\frac{1}{2})$

C $(m, x_1, x_2) = (-8, \frac{1}{2}, \frac{3}{2})$ or $(8, -\frac{3}{2}, -\frac{1}{3})$

D $(m, x_1, x_2) = (-8, \frac{1}{2}, \frac{3}{2})$ or $(8, -\frac{3}{2}, -\frac{1}{2}) - 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V03

Q143 | WRITTEN C03-T02-38-EX15

If the ratio of the roots of $x^2 - 2x + m = 0$ is $2 : 3$, find m and the roots.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V03

Q144 | MCQ

C03-K02-G-MCQ-055

If the ratio of the roots of $x^2 - 2x + m = 0$ is $2 : 3$, find m and the roots Select the correct answer:

A $m = \frac{24}{25}, \quad x = \frac{4}{5}, \frac{6}{5}$

B $-(m = \frac{24}{25}, \quad x = \frac{4}{5}, \frac{6}{5})$

C $m = \frac{24}{25}, \quad x = \frac{4}{5}, \frac{6}{5} + 1$

D $m = \frac{24}{25}, \quad x = \frac{4}{5}, \frac{6}{5} - 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t, \ v = \beta + t \Rightarrow u + v = S + 2t, \ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha}, \ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V04

Q145 | WRITTEN C03-T02-38-EX16

If one root of $x^2 - 6x + k = 0$ is the square of the other, find k and the roots.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V04

Q146 | MCQ C03-K02-G-MCQ-056

If one root of $x^2 - 6x + k = 0$ is the square of the other, find k and the roots Select the correct answer:

A $(k, x_1, x_2) = (8, 2, 4)$ or $(-27, -3, 9)$ (sign error)

B $(k, x_1, x_2) = (8, 2, 4)$ or $(-27, -3, 9)$

C $(k, x_1, x_2) = (8, 2, 4)$ or $(-27, -3, 10)$

D $(k, x_1, x_2) = (8, 2, 4)$ or $(-27, -3, 9) - 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q147 | WRITTEN

C03-T02-39-WU1a

Factorise $2x^2 - 3x + 2$ over the complex numbers.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q148 | WRITTEN

C03-T02-39-TR1a

Factorise $x^2 + 2x + 5$ over the complex numbers.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q149 | WRITTEN

C03-T02-39-TR1b

Factorise $2x^2 - 6x + 1$ over the complex numbers.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q150 | WRITTEN

C03-T02-39-EX1a

Factorise $x^2 + 4x + 5$ over the complex numbers.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q151 | WRITTEN

C03-T02-39-EX1b

Factorise $x^2 + 4x + 2$ over the complex numbers.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q152 | WRITTEN

C03-T02-39-EX1c

Factorise $x^2 - 4x + 7$ over the complex numbers.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow$
$Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q153 | WRITTEN

C03-T02-39-EX1d

Factorise $2x^2 - x + 1$ over the complex numbers.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q154 | WRITTEN

C03-T02-39-EX1e

Factorise $3x^2 - 5x + 3$ over the complex numbers.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$$ax^2 + bx + c = a(x - \alpha)(x - \beta)$$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q155 | WRITTEN

C03-T02-39-EX1f

Factorise $2x^2 - 2x - 1$ over the complex numbers.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow$
$Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q156 | MCQ

C03-K02-G-MCQ-058

Factorise $2x^2 - 3x + 2$ over the complex numbers Select the correct answer:

A $2\left(x - \frac{3 - i\sqrt{7}}{4}\right)\left(x - \frac{3 - i\sqrt{7}}{4}\right)$

B $-(2\left(x - \frac{3 + i\sqrt{7}}{4}\right)\left(x - \frac{3 - i\sqrt{7}}{4}\right))$

C $2\left(x - \frac{3 + i\sqrt{7}}{4}\right)\left(x - \frac{3 - i\sqrt{7}}{4}\right)$

D $2\left(x - \frac{3 + \sqrt{7}}{4}\right)\left(x - \frac{3 - i\sqrt{7}}{4}\right)$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q157 | MCQ

C03-K02-G-MCQ-060

Factorise $x^2 + 2x + 5$ over the complex numbers Select the correct answer:

A $(x + 1 - 2i)(x + 1 + 2i)$

B $(x + 1 - 2)(x + 1 + 2i)$

C $(x + 1 - 2 - i)(x + 1 + 2i)$

D $(x + 1 - 2i)(x + 13i)$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q158 | MCQ

C03-K02-G-MCQ-061

Factorise $2x^2 - 6x + 1$ over the complex numbers Select the correct answer:

A $-(2\left(x - \frac{3+\sqrt{7}}{2}\right)\left(x - \frac{3-\sqrt{7}}{2}\right))$

B $2\left(x - \frac{3+\sqrt{7}}{2}\right)\left(x - \frac{3-\sqrt{7}}{2}\right) + 1$

C $2\left(x - \frac{3+\sqrt{7}}{2}\right)\left(x - \frac{3-\sqrt{7}}{2}\right) - 1$

D $2\left(x - \frac{3+\sqrt{7}}{2}\right)\left(x - \frac{3-\sqrt{7}}{2}\right)$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q159 | MCQ

C03-K02-G-MCQ-063

Factorise $x^2 + 4x + 5$ over the complex numbers Select the correct answer:

A $(x + 2-)(x + 2 + i)$

B $(x + 2 + i)(x + 2 + i)$

C $(x + 2 - i)(x3 + i)$

D $(x + 2 - i)(x + 2 + i)$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha+t,\ v = \beta+t \Rightarrow u+v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q160 | MCQ

C03-K02-G-MCQ-064

Factorise $x^2 + 4x + 2$ over the complex numbers Select the correct answer:

A $(x + 2 - \sqrt{2})(x + 2 + \sqrt{2})$ (sign error)

B $(x + 2 - \sqrt{2})(x + 2 + \sqrt{2})$

C $(x + 2 - \sqrt{2})(x + 2 + \sqrt{3})$

D $(x + 2 - \sqrt{2})(x + 2 + \sqrt{2}) - 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q161 | MCQ

C03-K02-G-MCQ-065

Factorise $x^2 - 4x + 7$ over the complex numbers Select the correct answer:

A $(x - 2 - i\sqrt{3})(x - 2 + i\sqrt{3})$

B $(x - 2 - \sqrt{3})(x - 2 + i\sqrt{3})$

C $(x - 2 + i\sqrt{3})(x - 2 + i\sqrt{3})$

D $(x - 2 - i\sqrt{3})(x - 2 + i\sqrt{4})$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q162 | MCQ C03-K02-G-MCQ-066

Factorise $2x^2 - x + 1$ over the complex numbers Select the correct answer:

A $2\left(x - \frac{1 - i\sqrt{7}}{4}\right)\left(x - \frac{1 - i\sqrt{7}}{4}\right)$

B $-(2\left(x - \frac{1 + i\sqrt{7}}{4}\right)\left(x - \frac{1 - i\sqrt{7}}{4}\right))$

C $2\left(x - \frac{1 + i\sqrt{7}}{4}\right)\left(x - \frac{1 - i\sqrt{7}}{4}\right)$

D $2\left(x - \frac{1 + \sqrt{7}}{4}\right)\left(x - \frac{1 - i\sqrt{7}}{4}\right)$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q163 | MCQ

C03-K02-G-MCQ-067

Factorise $3x^2 - 5x + 3$ over the complex numbers Select the correct answer:

A $3\left(x - \frac{5 + i\sqrt{11}}{6}\right)\left(x - \frac{5 - i\sqrt{11}}{6}\right)$

B $3\left(x - \frac{5 + \sqrt{11}}{6}\right)\left(x - \frac{5 - i\sqrt{11}}{6}\right)$

C $3\left(x - \frac{5 - i\sqrt{11}}{6}\right)\left(x - \frac{5 - i\sqrt{11}}{6}\right)$

D $-(3\left(x - \frac{5 + i\sqrt{11}}{6}\right)\left(x - \frac{5 - i\sqrt{11}}{6}\right))$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q164 | MCQ

C03-K02-G-MCQ-068

Factorise $2x^2 - 2x - 1$ over the complex numbers Select the correct answer:

A $2\left(x - \frac{1+\sqrt{3}}{2}\right)\left(x - \frac{1-\sqrt{3}}{2}\right) - 1$

B $2\left(x - \frac{1+\sqrt{3}}{2}\right)\left(x - \frac{1-\sqrt{3}}{2}\right)$

C $-(2\left(x - \frac{1+\sqrt{3}}{2}\right)\left(x - \frac{1-\sqrt{3}}{2}\right))$

D $2\left(x - \frac{1+\sqrt{3}}{2}\right)\left(x - \frac{1-\sqrt{3}}{2}\right) + 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V02

Q165 | WRITTEN

C03-T02-39-WU1b

Factorise $x^4 + 2x^2 - 3$ over the complex numbers.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V02

Q166 | WRITTEN

C03-T02-39-TR1c

Factorise $x^4 - x^2 - 6$ over the complex numbers.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V02

Q167 | WRITTEN

C03-T02-39-EX1g

Factorise $x^4 - 9$ over the complex numbers.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V02

Q168 | WRITTEN

C03-T02-39-EX1h

Factorise $x^4 - 3x^2 + 2$ over the complex numbers.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow$
$Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V02

Q169 | MCQ

C03-K02-G-MCQ-059

Factorise $x^4 + 2x^2 - 3$ over the complex numbers Select the correct answer:

A $(x-1)(x+1)(x-i\sqrt{3})(x+i\sqrt{4})$

B $(x-1)(x+1)(x-i\sqrt{3})(x+i\sqrt{3})$

C $(x-1)(x+1)(x-\sqrt{3})(x+i\sqrt{3})$

D $(x-1)(x+1)(x+i\sqrt{3})(x+i\sqrt{3})$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha+t,\ v = \beta+t \Rightarrow u+v = S+2t,\ uv = P+tS+t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x-\alpha)(x-\beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x-h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V02

Q170 | MCQ

C03-K02-G-MCQ-062

Factorise $x^4 - x^2 - 6$ over the complex numbers Select the correct answer:

A $(x-\sqrt{3})(x+\sqrt{3})(x-i\sqrt{2})(x+i\sqrt{3})$

B $(x-\sqrt{3})(x+\sqrt{3})(x-i\sqrt{2})(x+i\sqrt{2})$

C $(x-\sqrt{3})(x+\sqrt{3})(x-\sqrt{2})(x+i\sqrt{2})$

D $(x-\sqrt{3})(x+\sqrt{3})(x+i\sqrt{2})(x+i\sqrt{2})$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V02

Q171 | MCQ

C03-K02-G-MCQ-069

Factorise $x^4 - 9$ over the complex numbers Select the correct answer:

A $(x-\sqrt{3})(x+\sqrt{3})(x-\sqrt{3})(x+i\sqrt{3})$

B $(x-\sqrt{3})(x+\sqrt{3})(x+i\sqrt{3})(x+i\sqrt{3})$

C $(x-\sqrt{3})(x+\sqrt{3})(x-i\sqrt{3})(x+i\sqrt{4})$

D $(x-\sqrt{3})(x+\sqrt{3})(x-i\sqrt{3})(x+i\sqrt{3})$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

Transformed roots
$u = \alpha+t,\ v = \beta+t \Rightarrow u+v = S+2t,\ uv = P+tS+t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha+\beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2+bx+c = a(x-\alpha)(x-\beta)$

Root expressions
$\alpha^2+\beta^2 = S^2-2P$
$\alpha^3+\beta^3 = S^3-3PS$

Square-root route
$(x-h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V02

Q172 | MCQ C03-K02-G-MCQ-070

Factorise $x^4 - 3x^2 + 2$ over the complex numbers Select the correct answer:

A $(x-1)(x+1)(x-\sqrt{2})(x+\sqrt{2}) - 1$

B $(x-1)(x+1)(x-\sqrt{2})(x+\sqrt{2})$ (sign error)

C $(x-1)(x+1)(x-\sqrt{2})(x+\sqrt{2})$

D $(x-1)(x+1)(x-\sqrt{2})(x+\sqrt{3})$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V01

Q173 | WRITTEN

C03-T02-310-WU11

Create a quadratic equation with integer coefficients having $\frac{1+i}{2}$ and $\frac{1-i}{2}$ as roots.

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V01

Q174 | WRITTEN

C03-T02-310-WU12

Find two numbers whose sum is -1 and product is 2.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V01

Q175 | WRITTEN

C03-T02-310-TR11

Create a quadratic equation with roots $3 + 2i$ and $3 - 2i$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V01

Q176 | WRITTEN

C03-T02-310-TR12

Find two numbers whose sum and product are both 1.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V01

Q177 | WRITTEN

C03-T02-310-EX1a

Create a quadratic equation with roots -1 and 2.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V01

Q178 | WRITTEN

C03-T02-310-EX1b

Create a quadratic equation with roots $1 + 4i$ and $1 - 4i$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V01

Q179 | WRITTEN

C03-T02-310-EX1c

Create an integer-coefficient quadratic with roots $\frac{5+\sqrt{7}}{3}$ and $\frac{5-\sqrt{7}}{3}$.

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V01

Q180 | WRITTEN

C03-T02-310-EX2a

Find two numbers whose sum is 2 and product is 5.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V01

Q181 | WRITTEN

C03-T02-310-EX2b

Find two numbers whose sum is 4 and product is 2.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V01

Q182 | MCQ

C03-K02-G-MCQ-106

Create a quadratic equation with integer coefficients having $\frac{1+i}{2}$ and $\frac{1-i}{2}$ as roots Select the correct answer:

A $2x^2 - 2x + 1 = 0$ (sign error)

B $2x^2 - 2x + 1 = 0$

C $2x^2 - 2x + 1 = 1$

D $2x^2 - 2x + 1 = 0 - 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V01

Q183 | MCQ

C03-K02-G-MCQ-107

Find two numbers whose sum is -1 and product is 2 Select the correct answer:

A $-(\frac{-1+i\sqrt{7}}{2}, \frac{-1-i\sqrt{7}}{2})$

B $\frac{-1+i\sqrt{7}}{2}, \frac{-1-i\sqrt{7}}{2}$

C $\frac{-1+\sqrt{7}}{2}, \frac{-1-i\sqrt{7}}{2}$

D $\frac{-1-i\sqrt{7}}{2}, \frac{-1-i\sqrt{7}}{2}$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

Transformed roots
$u = \alpha+t,\ v = \beta+t \Rightarrow u+v = S+2t,\ uv = P+tS+t^2$

Discriminant
$D = b^2-4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2-Sx+1=0$

Vieta sum and product
$\alpha+\beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2+bx+c = a(x-\alpha)(x-\beta)$

Root expressions
$\alpha^2+\beta^2 = S^2-2P$
$\alpha^3+\beta^3 = S^3-3PS$

Square-root route
$(x-h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V01

Q184 | MCQ

C03-K02-G-MCQ-109

Create a quadratic equation with roots $3+2i$ and $3-2i$ Select the correct answer:

A $x^2-6x+13=0$ (sign error)

B $x^2-6x+13=0$

C $x^2-6x+13=1$

D $x^2-6x+13=0-1$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

Transformed roots
$u=\alpha+t,\ v=\beta+t\Rightarrow u+v=S+2t,\ uv=P+tS+t^2$

Discriminant
$$D=b^2-4ac$$

Reciprocal roots
$u=\frac{1}{\alpha},\ v=\frac{1}{\beta}\Rightarrow Px^2-Sx+1=0$

Vieta sum and product
$$\alpha+\beta=-\frac{b}{a}$$
$$\alpha\beta=\frac{c}{a}$$

Complex factorisation
$ax^2+bx+c=a(x-\alpha)(x-\beta)$

Root expressions
$$\alpha^2+\beta^2=S^2-2P$$
$$\alpha^3+\beta^3=S^3-3PS$$

Square-root route
$(x-h)^2=k\Rightarrow x=h\pm\sqrt{k}$

Root signs
$\alpha\beta>0\Rightarrow$ same sign
$\alpha\beta<0\Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V01

Q185 | MCQ

C03-K02-G-MCQ-110

Find two numbers whose sum and product are both 1 Select the correct answer:

A $\frac{1+i\sqrt{3}}{2}, \frac{1-i\sqrt{3}}{2}$

B $\frac{1+\sqrt{3}}{2}, \frac{1-i\sqrt{3}}{2}$

C $\frac{1-i\sqrt{3}}{2}, \frac{1-i\sqrt{3}}{2}$

D $-(\frac{1+i\sqrt{3}}{2}, \frac{1-i\sqrt{3}}{2})$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

Transformed roots
$u = \alpha+t,\ v = \beta+t \Rightarrow u+v = S+2t,\ uv = P+tS+t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha+\beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2+bx+c = a(x-\alpha)(x-\beta)$

Root expressions
$\alpha^2+\beta^2 = S^2-2P$
$\alpha^3+\beta^3 = S^3-3PS$

Square-root route
$(x-h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V01

Q186 | MCQ

C03-K02-G-MCQ-112

Create a quadratic equation with roots -1 and 2 Select the correct answer:

A $x^2 - x - 2 = 0$

B $x^2 - x - 2 = 1$

C $x^2 - x - 2 = 0 - 1$

D $x^2 - x - 2 = 0$ (sign error)

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V01

Q187 | MCQ

C03-K02-G-MCQ-113

Create a quadratic equation with roots $1+4i$ and $1-4i$ Select the correct answer:

A $x^2 - 2x + 17 = 1$

B $x^2 - 2x + 17 = 0 - 1$

C $x^2 - 2x + 17 = 0$ (sign error)

D $x^2 - 2x + 17 = 0$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha+t,\ v = \beta+t \Rightarrow u+v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V01

Q188 | MCQ

C03-K02-G-MCQ-114

Create an integer-coefficient quadratic with roots $\frac{5+\sqrt{7}}{3}$ and $\frac{5-\sqrt{7}}{3}$ Select the correct answer:

A $3x^2 - 10x + 6 = 0$

B $3x^2 - 10x + 6 = 1$

C $3x^2 - 10x + 6 = 0 - 1$

D $3x^2 - 10x + 6 = 0$ (sign error)

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V01

Q189 | MCQ

C03-K02-G-MCQ-115

Find two numbers whose sum is 2 and product is 5 Select the correct answer:

A $1+2i,\ 1-1i$

B $1+2i,\ 1-2i$

C $1+2,\ 1-2i$

D $1+2-i,\ 1-2i$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

Transformed roots
$u=\alpha+t,\ v=\beta+t\Rightarrow u+v=S+2t,\ uv=P+tS+t^2$

Discriminant
$$D=b^2-4ac$$

Reciprocal roots
$u=\frac{1}{\alpha},\ v=\frac{1}{\beta}\Rightarrow Px^2-Sx+1=0$

Vieta sum and product
$$\alpha+\beta=-\frac{b}{a}$$
$$\alpha\beta=\frac{c}{a}$$

Complex factorisation
$ax^2+bx+c=a(x-\alpha)(x-\beta)$

Root expressions
$$\alpha^2+\beta^2=S^2-2P$$
$$\alpha^3+\beta^3=S^3-3PS$$

Square-root route
$(x-h)^2=k\Rightarrow x=h\pm\sqrt{k}$

Root signs
$\alpha\beta>0\Rightarrow$ same sign
$\alpha\beta<0\Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V01

Q190 | MCQ

C03-K02-G-MCQ-116

Find two numbers whose sum is 4 and product is 2 Select the correct answer:

A $2+\sqrt{2},\ 2-\sqrt{2}$ (sign error)

B $2+\sqrt{2},\ 2-\sqrt{2}$

C $2+\sqrt{2},\ 2-\sqrt{3}$

D $2+\sqrt{2},\ 2-\sqrt{2}-1$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

Transformed roots
$u=\alpha+t,\ v=\beta+t\Rightarrow u+v=S+2t,\ uv=P+tS+t^2$

Discriminant
$$D=b^2-4ac$$

Reciprocal roots
$u=\frac{1}{\alpha},\ v=\frac{1}{\beta}\Rightarrow Px^2-Sx+1=0$

Vieta sum and product
$$\alpha+\beta=-\frac{b}{a}$$
$$\alpha\beta=\frac{c}{a}$$

Complex factorisation
$ax^2+bx+c=a(x-\alpha)(x-\beta)$

Root expressions
$$\alpha^2+\beta^2=S^2-2P$$
$$\alpha^3+\beta^3=S^3-3PS$$

Square-root route
$(x-h)^2=k\Rightarrow x=h\pm\sqrt{k}$

Root signs
$\alpha\beta>0\Rightarrow$ same sign
$\alpha\beta<0\Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V02

Q191 | WRITTEN

C03-T02-310-WU13

If α, β are roots of $x^2 + 2x - 4 = 0$, find a quadratic with coefficient of x^2 equal to 1 and roots $\alpha + 2, \beta + 2$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V02

Q192 | MCQ

C03-K02-G-MCQ-108

If α, β are roots of $x^2 + 2x - 4 = 0$, find a quadratic with coefficient of x^2 equal to 1 and roots $\alpha + 2, \beta + 2$ Select the correct answer:

A $x^2 - 2x - 4 = 0 - 1$

B $x^2 - 2x - 4 = 0$ (sign error)

C $x^2 - 2x - 4 = 0$

D $x^2 - 2x - 4 = 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V03

Q193 | WRITTEN

C03-T02-310-TR13

If α, β are roots of $x^2 + x - 3 = 0$, find a quadratic with roots α^2, β^2.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V03

Q194 | WRITTEN

C03-T02-310-EX44

If α, β are roots of $x^2 - 2x + 7 = 0$, find a quadratic with roots α^2, β^2.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V03

Q195 | MCQ C03-K02-G-MCQ-111

If α, β are roots of $x^2 + x - 3 = 0$, find a quadratic with roots α^2, β^2 Select the correct answer:

A $x^2 - 7x + 9 = 1$

B $x^2 - 7x + 9 = 0 - 1$

C $x^2 - 7x + 9 = 0$ (sign error)

D $x^2 - 7x + 9 = 0$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V03

Q196 | MCQ

C03-K02-G-MCQ-118

If α, β are roots of $x^2 - 2x + 7 = 0$, find a quadratic with roots α^2, β^2 Select the correct answer:

A $x^2 + 10x + 49 = 0 - 1$

B $x^2 + 10x + 49 = 0$ (sign error)

C $x^2 + 10x + 49 = 0$

D $x^2 + 10x + 49 = 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V04

Q197 | WRITTEN

C03-T02-310-EX55

If α, β are roots of $2x^2 + 3x + 4 = 0$, find an integer-coefficient quadratic with roots $\frac{1}{\alpha}, \frac{1}{\beta}$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V04

Q198 | MCQ

C03-K02-G-MCQ-119

If α, β are roots of $2x^2 + 3x + 4 = 0$, find an integer-coefficient quadratic with roots $\frac{1}{\alpha}, \frac{1}{\beta}$

Select the correct answer:

A $4x^2 + 3x + 2 = 0$

B $4x^2 + 3x + 2 = 1$

C $4x^2 + 3x + 2 = 0 - 1$

D $4x^2 + 3x + 2 = 0$ (sign error)

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V05

Q199 | WRITTEN

C03-T02-310-EX33

If α, β are roots of $x^2 + 2x + 3 = 0$, find a quadratic with roots $\alpha + 3\beta$ and $3\alpha + \beta$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V05

Q200 | MCQ

C03-K02-G-MCQ-117

If α, β are roots of $x^2 + 2x + 3 = 0$, find a quadratic with roots $\alpha + 3\beta$ and $3\alpha + \beta$
Select the correct answer:

A $x^2 + 8x + 24 = 1$

B $x^2 + 8x + 24 = 0 - 1$

C $x^2 + 8x + 24 = 0$ (sign error)

D $x^2 + 8x + 24 = 0$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F09 | V01

Q201 | WRITTEN

C03-T02-311-TR11

If $x^2 + 2mx + m + 2 = 0$ has two distinct positive roots, find the range of m.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F09 | V01

Q202 | WRITTEN

C03-T02-311-EX11

If $x^2 + 2(m-1)x + 2m^2 - 5m - 3 = 0$ has two distinct positive roots, find the range of m.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$$ax^2 + bx + c = a(x - \alpha)(x - \beta)$$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F09 | V01

Q203 | MCQ

C03-K02-G-MCQ-073

If $x^2+2mx+m+2=0$ has two distinct positive roots, find the range of m Select the correct answer:

A $-2<m<-1$

B $-2>m>-1$

C $+2<m<-1$

D $-2<m<0$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

Transformed roots
$u=\alpha+t,\ v=\beta+t\Rightarrow u+v=S+2t,\ uv=P+tS+t^2$

Discriminant
$$D=b^2-4ac$$

Reciprocal roots
$u=\frac{1}{\alpha},\ v=\frac{1}{\beta}\Rightarrow Px^2-Sx+1=0$

Vieta sum and product
$$\alpha+\beta=-\frac{b}{a}$$
$$\alpha\beta=\frac{c}{a}$$

Complex factorisation
$ax^2+bx+c=a(x-\alpha)(x-\beta)$

Root expressions
$$\alpha^2+\beta^2=S^2-2P$$
$$\alpha^3+\beta^3=S^3-3PS$$

Square-root route
$(x-h)^2=k\Rightarrow x=h\pm\sqrt{k}$

Root signs
$\alpha\beta>0\Rightarrow$ same sign
$\alpha\beta<0\Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F09 | V01

Q204 | MCQ

C03-K02-G-MCQ-075

If $x^2 + 2(m-1)x + 2m^2 - 5m - 3 = 0$ has two distinct positive roots, find the range of m Select the correct answer:

A $-1 < m < -\frac{1}{2} - 1$

B $-1 < m < -\frac{1}{2}$

C $-(-1 < m < -\frac{1}{2})$

D $-1 < m < -\frac{1}{2} + 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F09 | V02

Q205 | WRITTEN

C03-T02-311-WU11

If $x^2 - 2mx + m + 6 = 0$ has two distinct negative roots, find the range of m.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F09 | V02

Q206 | WRITTEN

C03-T02-311-EX13

If $x^2 + kx + 2k + 5 = 0$ has two distinct negative roots, find the range of k.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F09 | V02

Q207 | MCQ

C03-K02-G-MCQ-072

If $x^2 - 2mx + m + 6 = 0$ has two distinct negative roots, find the range of m
Select the correct answer:

A $+6 < m < -2$

B $-6 < m < -1$

C $-6 < m < -2$

D $-6 > m > -2$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F09 | V02

Q208 | MCQ

C03-K02-G-MCQ-077

If $x^2 + kx + 2k + 5 = 0$ has two distinct negative roots, find the range of k Select the correct answer:

A $k > 10$ (sign error)

B $k > 10$

C $k > 11$

D $k > 10 - 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F09 | V03

Q209 | WRITTEN

C03-T02-311-TR12

If $x^2 - (m-3)x - m - 4 = 0$ has roots of different signs, find the range of m.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F09 | V03

Q210 | WRITTEN

C03-T02-311-EX12

If $x^2 + 4kx - k - 3 = 0$ has roots of different signs, find the range of k.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F09 | V03

Q211 | MCQ

C03-K02-G-MCQ-074

If $x^2 - (m-3)x - m - 4 = 0$ has roots of different signs, find the range of m
Select the correct answer:

A $m > -4$

B $m > -3$

C $m > -4 - 1$

D $m > -4$ (sign error)

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F09 | V03

Q212 | MCQ

C03-K02-G-MCQ-076

If $x^2 + 4kx - k - 3 = 0$ has roots of different signs, find the range of k Select the correct answer:

A $k > -2$

B $k > -3 - 1$

C $k > -3$ (sign error)

D $k > -3$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V03

Q213 | CHALLENGE WRITTEN C03-T02-36-CHa

For $x^2 + ax - a = 0$, determine the nature of the solutions as a varies.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V03

Q214 | CHALLENGE WRITTEN C03-T02-36-CHb

For $x^2 - (k+2)x + k^2 = 0$, determine the nature of the solutions as k varies.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V03

Q215 | CHALLENGE WRITTEN

C03-T02-36-CHc

For $x^2 - 2(a-1)x + a^2 - 3a + 4 = 0$, determine the nature of the solutions as a varies.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V05

Q216 | CHALLENGE WRITTEN

C03-T02-37-CHa

If α, β are roots of $2x^2 - 6x + 3 = 0$, find $\alpha^2\beta + \alpha\beta^2$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V05

Q217 | CHALLENGE WRITTEN

C03-T02-37-CHb

If α, β are roots of $2x^2 - 6x + 3 = 0$, find $(\alpha - \beta)^2$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V05

Q218 | CHALLENGE WRITTEN

C03-T02-37-CHc

If α, β are roots of $2x^2 - 6x + 3 = 0$, find $\alpha^3 + \beta^3$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V05

Q219 | CHALLENGE WRITTEN

C03-T02-37-CHd

If α, β are roots of $2x^2 - 6x + 3 = 0$, find $\frac{\beta^2}{\alpha} + \frac{\alpha^2}{\beta}$.

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V05

Q220 | CHALLENGE WRITTEN C03-T02-38-CH

The quadratics $x^2 + ax + bc = 0$ and $x^2 + bx + ca = 0$ have a non-zero common root, with $a \neq b$ and $c \neq 0$. Show that the other two roots are roots of $x^2 + cx + ab = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q221 | CHALLENGE WRITTEN

C03-T02-39-CH

For $S(x) = 6x^4 - 7x^2 - 3$, determine the possible values of x and interpret the real values in the stress model.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

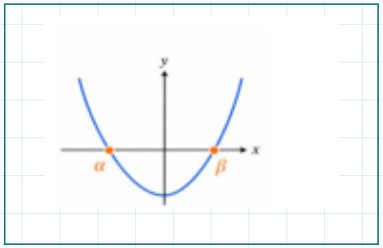
Concept 2 | Quadratic Equations

F08 | V04

Q222 | CHALLENGE WRITTEN C03-T02-310-CH

If α, β are non-zero roots of a quadratic, construct a quadratic whose roots are $\frac{1}{\alpha}, \frac{1}{\beta}$.

WORKING AREA



Official given figure

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F09 | V01

Q223 | CHALLENGE WRITTEN

C03-T02-311-CHa

For $x^2 + (m+1)x + m + 4 = 0$, find the range of m for two distinct real roots that are both positive.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F09 | V02

Q224 | CHALLENGE WRITTEN C03-T02-311-CHb

For $x^2 + (m+1)x + m + 4 = 0$, find the range of m for two distinct real roots that are both negative.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F09 | V03

Q225 | CHALLENGE WRITTEN C03-T02-311-CHc

For $x^2 + (m+1)x + m + 4 = 0$, find the range of m for two roots of opposite signs.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F99 | V01

Q226 | CHALLENGE WRITTEN C03-T02-35-CH

A model has $R = 3x^2 + 2\sqrt{3}\,x + 2$. Determine the values of x for which $R = 0$, and interpret the result.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V03

Q227 | CHALLENGE MCQ

C03-K02-G-MCQ-045

For $x^2 + ax - a = 0$, determine the nature of the solutions as a varies Select the correct answer:

A $a < -4$ or $a > 0$: distinct real; $a = -4, 0$: repeated real; $-4 < a < 0$: distinct real

B $a < -4$ or $a > 0$: distinct real; $a = -4, 0$: repeated real; $-4 < a < 0$: distinct imaginary

C $a < -4$ or $a > 0$: repeated real; $a = -4, 0$: repeated real; $-4 < a < 0$: repeated imaginary

D $a < -4$ or $a > 0$: distinct imaginary; $a = -4, 0$: repeated imaginary; $-4 < a < 0$: distinct imaginary

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V03

Q228 | CHALLENGE MCQ

C03-K02-G-MCQ-046

For $x^2 - (k+2)x + k^2 = 0$, determine the nature of the solutions as k varies Select the correct answer:

A $-\frac{2}{3} < k < 2$: distinct real; $k = -\frac{2}{3}, 2$: repeated; $k < -\frac{2}{3}$ or $k > 2$: distinct imaginary -1

B $-\frac{2}{3} < k < 2$: distinct real; $k = -\frac{2}{3}, 2$: repeated; $k < -\frac{2}{3}$ or $k > 2$: distinct imaginary

C $-(-\frac{2}{3} < k < 2$: distinct real; $k = -\frac{2}{3}, 2$: repeated; $k < -\frac{2}{3}$ or $k > 2$: distinct imaginary)

D $-\frac{2}{3} < k < 2$: distinct real; $k = -\frac{2}{3}, 2$: repeated; $k < -\frac{2}{3}$ or $k > 2$: distinct imaginary $+1$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | V03

Q229 | CHALLENGE MCQ

C03-K02-G-MCQ-047

For $x^2 - 2(a-1)x + a^2 - 3a + 4 = 0$, determine the nature of the solutions as a varies
Select the correct answer:

A $a > 3$: distinct real; $a = 3$: repeated real; $a < 3$: distinct real

B $a > 3$: distinct real; $a = 3$: repeated real; $a < 3$: distinct imaginary

C $a > 3$: repeated real; $a = 3$: repeated real; $a < 3$: repeated imaginary

D $a > 3$: distinct imaginary; $a = 3$: repeated imaginary; $a < 3$: distinct imaginary

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V05

Q230 | CHALLENGE MCQ C03-K02-G-MCQ-102

If α, β are roots of $2x^2 - 6x + 3 = 0$, find $\alpha^2\beta + \alpha\beta^2$ Select the correct answer:

A $\frac{9}{2} - 1$

B $\frac{9}{2}$

C $-(\frac{9}{2})$

D $\frac{9}{2} + 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha+t,\ v = \beta+t \Rightarrow u+v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V05

Q231 | CHALLENGE MCQ C03-K02-G-MCQ-103

If α, β are roots of $2x^2 - 6x + 3 = 0$, find $(\alpha - \beta)^2$ Select the correct answer:

A 4

B $3 - 1$

C 3 (sign error)

D 3

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V05

Q232 | CHALLENGE MCQ C03-K02-G-MCQ-104

If α, β are roots of $2x^2 - 6x + 3 = 0$, find $\alpha^3 + \beta^3$ Select the correct answer:

A $\frac{27}{2} - 1$

B $\frac{27}{2}$

C $-(\frac{27}{2})$

D $\frac{27}{2} + 1$

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | V05

Q233 | CHALLENGE MCQ

C03-K02-G-MCQ-105

If α, β are roots of $2x^2 - 6x + 3 = 0$, find $\frac{\beta^2}{\alpha} + \frac{\alpha^2}{\beta}$ Select the correct answer:

A 9

B 10

C $9 - 1$

D 9 (sign error)

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\frac{b}{a}$
$\alpha\beta = \frac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F06 | V05

Q234 | CHALLENGE MCQ C03-K02-G-MCQ-057

The quadratics $x^2 + ax + bc = 0$ and $x^2 + bx + ca = 0$ have a non-zero common root, with $a \neq b$ and $c \neq 0$. Show that the other two roots are roots of $x^2 + cx + ab = 0$ Select the correct answer:

A Common root c; other roots a,b; equation $x^2+cx+ab=0$ (equation = -1).

B Common root c; other roots a,b; equation $x^2+cx+ab=0$ (sign error).

C Common root c; other roots a,b; equation $x^2+cx+ab=0$.

D Common root c; other roots a,b; equation $x^2+cx+ab=0$ (equation = 1).

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha+t,\ v = \beta+t \Rightarrow u+v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F07 | V01

Q235 | CHALLENGE MCQ C03-K02-G-MCQ-071

For $S(x) = 6x^4 - 7x^2 - 3$, determine the possible values of x and interpret the real values in the stress model Select the correct answer:

A $x = \pm\frac{\sqrt{6}}{2}, \quad x = \pm\frac{i\sqrt{3}}{3}$; real: $\pm\sqrt{6}/2$

B $x = \frac{\sqrt{6}}{2}, \quad x = \frac{i\sqrt{3}}{3}$; real: $\sqrt{6}/2$

C $x = -\frac{\sqrt{6}}{2}, \quad x = -\frac{i\sqrt{3}}{3}$; real: $-\sqrt{6}/2$

D $x = +\frac{\sqrt{6}}{2}, \quad x = +\frac{i\sqrt{3}}{3}$; real: $+\sqrt{6}/2$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$$ax^2 + bx + c = a(x - \alpha)(x - \beta)$$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | V04

Q236 | CHALLENGE MCQ

C03-K02-G-MCQ-120

If α, β are non-zero roots of a quadratic, construct a quadratic whose roots are $\frac{1}{\alpha}, \frac{1}{\beta}$ Select the correct answer:

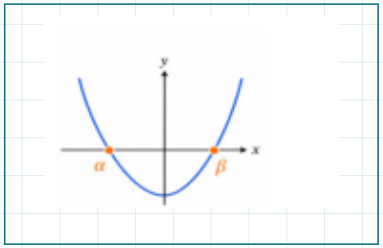
A If S=α+β and P=αβ≠0, then P x²-Sx+1=0.

B If S=α+β and P=αβ≠0, then P x²-Sx+1=1.

C If S=α+β and P=αβ≠0, then P x²-Sx+1=0.-1

D If S=α+β and P=αβ≠0, then P x²-Sx+1=0.;(sign error)

WORKING AREA



Official given figure

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow$
$Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F09 | V01

Q237 | CHALLENGE MCQ C03-K02-G-MCQ-078

For $x^2 + (m+1)x + m + 4 = 0$, find the range of m for two distinct real roots that are both positive Select the correct answer:

A $+4 < m < -3$

B $-4 < m < -2$

C $-4 < m < -3$

D $-4 > m > -3$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F09 | V02

Q238 | CHALLENGE MCQ C03-K02-G-MCQ-079

For $x^2 + (m+1)x + m + 4 = 0$, find the range of m for two distinct real roots that are both negative Select the correct answer:

A $m > 6$

B $m > 5 - 1$

C $m > 5$ (sign error)

D $m > 5$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F09 | V03

Q239 | CHALLENGE MCQ

C03-K02-G-MCQ-080

For $x^2 + (m+1)x + m + 4 = 0$, find the range of m for two roots of opposite signs Select the correct answer:

A $m > -4$

B $m < +4$

C $m < -3$

D $m < -4$

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F99 | V01

Q240 | CHALLENGE MCQ

C03-K02-G-MCQ-027

A model has $R = 3x^2 + 2\sqrt{3}\,x + 2$. Determine the values of x for which $R = 0$, and interpret the result Select the correct answer:

A $x = \dfrac{-\sqrt{3}i\sqrt{3}}{3}$; no real equilibrium

B $x = \dfrac{-\sqrt{3} - i\sqrt{3}}{3}$; no real equilibrium

C $x = \dfrac{-\sqrt{3} + i\sqrt{3}}{3}$; no real equilibrium

D $x = \dfrac{-\sqrt{3} \pm i\sqrt{3}}{3}$; no real equilibrium

WORKING AREA

FORMULA BANK

Quadratic formula
$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$D = b^2 - 4ac$

Reciprocal roots
$u = \dfrac{1}{\alpha},\ v = \dfrac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$\alpha + \beta = -\dfrac{b}{a}$
$\alpha\beta = \dfrac{c}{a}$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$\alpha^2 + \beta^2 = S^2 - 2P$
$\alpha^3 + \beta^3 = S^3 - 3PS$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F02 | C03-K02-F02-VQ

Quiz M1 | QUIZ MCQ — C03-K02-QUIZ-MCQ-1

Solve $x^2 - 5x + 6 = 0$ Select the correct answer:

A 2, 3 (sign error)

B 2, 3

C 2, 4

D 2, 3 − 1

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | C03-K02-F04-VQ

Quiz M2 | QUIZ MCQ

C03-K02-QUIZ-MCQ-2

For $x^2 - 4x + 7 = 0$, determine the nature of the roots Select the correct answer:

A Two distinct non-real complex roots

B Two repeated non-real complex roots

C Two distinct non-imaginary complex roots

D Two distinct non-real complex roots;(sign error)

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | C03-K02-F05-VQ

Quiz M3 | QUIZ MCQ

C03-K02-QUIZ-MCQ-3

If alpha,beta are roots of $x^2 - 3x + 1 = 0$, find $\alpha^2 + \beta^2$ Select the correct answer:

A $7 - 1$

B 7 (sign error)

C 7

D 8

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | C03-K02-F08-VQ

Quiz M4 | QUIZ MCQ

C03-K02-QUIZ-MCQ-4

Create a monic quadratic with roots $2+i$ and $2-i$ Select the correct answer:

A $x^2-4x+5=0$

B $x^2-4x+5=1$

C $x^2-4x+5=0-1$

D $x^2-4x+5=0$ (sign error)

WORKING AREA

FORMULA BANK

Quadratic formula
$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

Transformed roots
$u=\alpha+t,\ v=\beta+t\Rightarrow u+v=S+2t,\ uv=P+tS+t^2$

Discriminant
$D=b^2-4ac$

Reciprocal roots
$u=\frac{1}{\alpha},\ v=\frac{1}{\beta}\Rightarrow Px^2-Sx+1=0$

Vieta sum and product
$\alpha+\beta=-\frac{b}{a}$
$\alpha\beta=\frac{c}{a}$

Complex factorisation
$ax^2+bx+c=a(x-\alpha)(x-\beta)$

Root expressions
$\alpha^2+\beta^2=S^2-2P$
$\alpha^3+\beta^3=S^3-3PS$

Square-root route
$(x-h)^2=k\Rightarrow x=h\pm\sqrt{k}$

Root signs
$\alpha\beta>0\Rightarrow$ same sign
$\alpha\beta<0\Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F03 | C03-K02-F03-VQ

Quiz W1 | QUIZ WRITTEN

C03-K02-QUIZ-WRITTEN-1

Solve $2x^2 + 3x - 2 = 0$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F04 | C03-K02-F04-VQ

Quiz W2 | QUIZ WRITTEN

C03-K02-QUIZ-WRITTEN-2

Find the range of m for which $x^2 - 2mx + m + 2 = 0$ has two distinct imaginary roots.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F05 | C03-K02-F05-VQ

Quiz W3 | QUIZ WRITTEN

C03-K02-QUIZ-WRITTEN-3

If alpha,beta are roots of $x^2 - 4x + 3 = 0$, find $\alpha^3 + \beta^3$.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 2 | Quadratic Equations

F08 | C03-K02-F08-VQ

Quiz W4 | QUIZ WRITTEN C03-K02-QUIZ-WRITTEN-4

If alpha,beta are roots of $x^2 - 2x + 5 = 0$, form the quadratic with roots α^2, β^2.

WORKING AREA

FORMULA BANK

Quadratic formula
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Transformed roots
$u = \alpha + t,\ v = \beta + t \Rightarrow u + v = S + 2t,\ uv = P + tS + t^2$

Discriminant
$$D = b^2 - 4ac$$

Reciprocal roots
$u = \frac{1}{\alpha},\ v = \frac{1}{\beta} \Rightarrow Px^2 - Sx + 1 = 0$

Vieta sum and product
$$\alpha + \beta = -\frac{b}{a}$$
$$\alpha\beta = \frac{c}{a}$$

Complex factorisation
$ax^2 + bx + c = a(x - \alpha)(x - \beta)$

Root expressions
$$\alpha^2 + \beta^2 = S^2 - 2P$$
$$\alpha^3 + \beta^3 = S^3 - 3PS$$

Square-root route
$(x - h)^2 = k \Rightarrow x = h \pm \sqrt{k}$

Root signs
$\alpha\beta > 0 \Rightarrow$ same sign
$\alpha\beta < 0 \Rightarrow$ opposite signs

Concept 3 | Polynomial Theorems — **OFFICIAL LESSONS 3-12, 3-13, 3-14, 3-15, 3-16**

Polynomial Theorems

Equation-first recall | use the same rail beside every question in this Concept

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Start with the family cue, write the first move, then use the working grid.

Concept 3 | Polynomial Theorems

F01 | V01

Q001 | WRITTEN

C03-T03-312-EX1

Find the remainder when $x^3 + 2x^2 - 3x - 4$ is divided by $x + 2$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F01 | V01

Q002 | WRITTEN

C03-T03-312-EX2

Find the remainder when $3x^3 + 2x^2 - 5x + 6$ is divided by $x - 1$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F01 | V01

Q003 | MCQ

C03-K03-G-MCQ-005

Find the remainder when $x^3 + 2x^2 - 3x - 4$ is divided by $x + 2$ Select the correct answer:

A $2 - 1$

B 2 (sign error)

C 2

D 3

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F01 | V01

Q004 | MCQ

C03-K03-G-MCQ-006

Find the remainder when $3x^3+2x^2-5x+6$ is divided by $x-1$ Select the correct answer:

A $6-1$

B 6 (sign error)

C 6

D 7

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F01 | V02

Q005 | WRITTEN

C03-T03-312-WU1

Find the remainder when $3x^4 - 8x^3 - 5x^2 + 12$ is divided by $3x - 2$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F01 | V02

Q006 | WRITTEN

C03-T03-312-TR1

Find the remainder when $x^3 - 5x^2 + 4x - 1$ is divided by $2x - 1$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F01 | V02

Q007 | WRITTEN

C03-T03-312-EX3

Find the remainder when $6x^3 - x^2 + x - 2$ is divided by $3x - 2$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F01 | V02

Q008 | WRITTEN

C03-T03-312-EX4

Find the remainder when $4x^3 - 2x^2 - 4x + 3$ is divided by $2x + 1$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F01 | V02

Q009 | MCQ

C03-K03-G-MCQ-001

Find the remainder when $3x^4 - 8x^3 - 5x^2 + 12$ is divided by $3x - 2$ Select the correct answer:

A 9

B $8 - 1$

C 8 (sign error)

D 8

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F01 | V02

Q010 | MCQ

C03-K03-G-MCQ-003

Find the remainder when $x^3 - 5x^2 + 4x - 1$ is divided by $2x - 1$ Select the correct answer:

A $-\frac{1}{8}$

B $-(-\frac{1}{8})$

C $-\frac{1}{8} + 1$

D $-\frac{1}{8} - 1$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F01 | V02

Q011 | MCQ

C03-K03-G-MCQ-007

Find the remainder when $6x^3 - x^2 + x - 2$ is divided by $3x - 2$ Select the correct answer:

A 1

B $0 - 1$

C 0 (sign error)

D 0

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F01 | V02

Q012 | MCQ

C03-K03-G-MCQ-008

Find the remainder when $4x^3-2x^2-4x+3$ is divided by $2x+1$ Select the correct answer:

A 4

B 5

C $4-1$

D 4 (sign error)

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F02 | V01

Q013 | WRITTEN

C03-T03-312-WU2

If the remainder when $x^3 + ax^2 + 3x + 1$ is divided by $x + 3$ is 4, find a.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F02 | V01

Q014 | WRITTEN

C03-T03-312-TR2

If the remainder when $x^3 + ax^2 + 3x + 1$ is divided by $x - 3$ is 1, find a.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F02 | V01

Q015 | WRITTEN

C03-T03-312-EX5

If the remainder when $x^3 - x^2 + ax - 4$ is divided by $x + 1$ is -2, find a.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F02 | V01

Q016 | WRITTEN

C03-T03-312-EX6

If the remainder when $x^3 + 4x^2 - 5x + a$ is divided by $x + 3$ is 8, find a.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F02 | V01

Q017 | MCQ

C03-K03-G-MCQ-002

If the remainder when $x^3 + ax^2 + 3x + 1$ is divided by $x + 3$ is 4, find a Select the correct answer:

A $a = 13/3$ (sign error)

B $a = 13/3$

C $a = 13/3 + 1$

D $a = 13/3 - 1$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F02 | V01

Q018 | MCQ

C03-K03-G-MCQ-004

If the remainder when $x^3 + ax^2 + 3x + 1$ is divided by $x - 3$ is 1, find a Select the correct answer:

A $a = -4$ (sign error)

B $a = -4$

C $a = -3$

D $a = -4 - 1$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F02 | V01

Q019 | MCQ

C03-K03-G-MCQ-009

If the remainder when $x^3 - x^2 + ax - 4$ is divided by $x + 1$ is -2, find a Select the correct answer:

A $a = -4 - 1$

B $a = -4$ (sign error)

C $a = -4$

D $a = -3$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F02 | V01

Q020 | MCQ

C03-K03-G-MCQ-010

If the remainder when $x^3 + 4x^2 - 5x + a$ is divided by $x + 3$ is 8, find a Select the correct answer:

A $a = -16$

B $a = -15$

C $a = -16 - 1$

D $a = -16$ (sign error)

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F02 | V02

Q021 | WRITTEN

C03-T03-312-EX7

If $x^3 - 3x^2 + 4x + a$ is divisible by $x - 2$, find a.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F02 | V02

Q022 | MCQ

C03-K03-G-MCQ-011

If $x^3 - 3x^2 + 4x + a$ is divisible by $x - 2$, find a Select the correct answer:

A $a = -4$

B $a = -3$

C $a = -4 - 1$

D $a = -4$ (sign error)

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F03 | V01

Q023 | WRITTEN

C03-T03-313-WU1

A polynomial $P(x)$ leaves remainders 3 on division by $x-1$ and -5 on division by $x+3$. Find the remainder on division by x^2+2x-3.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax+b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F03 | V01

Q024 | WRITTEN

C03-T03-313-TR1

A polynomial $P(x)$ leaves remainders 3 on division by $x-2$ and -7 on division by $x+3$. Find the remainder on division by x^2+x-6.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax+b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F03 | V01

Q025 | WRITTEN

C03-T03-313-EX1

A polynomial $P(x)$ leaves remainders 5 on division by $x-1$ and -1 on division by $x+2$. Find the remainder on division by $(x-1)(x+2)$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F03 | V01

Q026 | WRITTEN

C03-T03-313-EX2

A polynomial $P(x)$ leaves remainders 4 on division by $x-2$ and -11 on division by $x+3$. Find the remainder on division by x^2+x-6.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F03 | V01

Q027 | MCQ

C03-K03-G-MCQ-013

A polynomial $P(x)$ leaves remainders 3 on division by $x-1$ and -5 on division by $x+3$. Find the remainder on division by x^2+2x-3 Select the correct answer:

A $2x+1$

B $2x2$

C $2x+1-1$

D $2x+1$ (sign error)

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax+b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F03 | V01

Q028 | MCQ

C03-K03-G-MCQ-014

A polynomial $P(x)$ leaves remainders 3 on division by $x-2$ and -7 on division by $x+3$. Find the remainder on division by x^2+x-6 Select the correct answer:

A $-10x+13$

B $-10x14$

C $-10x+13-1$

D $-10x+13$ (sign error)

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a)=0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax+b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F03 | V01

Q029 | MCQ

C03-K03-G-MCQ-015

A polynomial $P(x)$ leaves remainders 5 on division by $x-1$ and -1 on division by $x+2$. Find the remainder on division by $(x-1)(x+2)$ Select the correct answer:

A $2x+3$

B $2x4$

C $2x+3-1$

D $2x+3$ (sign error)

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax+b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F03 | V01

Q030 | MCQ

C03-K03-G-MCQ-016

A polynomial $P(x)$ leaves remainders 4 on division by $x-2$ and -11 on division by $x+3$. Find the remainder on division by x^2+x-6 Select the correct answer:

A $-15x+19$

B $-15x20$

C $-15x+19-1$

D $-15x+19$ (sign error)

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a)=0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax+b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F04 | V01

Q031 | WRITTEN

C03-T03-314-WU1

A polynomial $P(x)$ leaves remainder $7x + 6$ on division by $x^2 - x - 6$, and $4x - 3$ on division by $x^2 + 2x - 3$. Find the remainder on division by $x^2 + x - 2$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F04 | V01

Q032 | WRITTEN

C03-T03-314-TR1

A polynomial $P(x)$ leaves remainder $3x + 2$ on division by $x^2 - x - 2$, and $7x - 6$ on division by $x^2 + 2x - 3$. Find the remainder on division by $x^2 - 1$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F04 | V01

Q033 | WRITTEN

C03-T03-314-EX1

A polynomial $P(x)$ leaves remainder $2x-2$ on division by x^2-2x-3, and $-x+7$ on division by x^2-4. Find the remainder on division by x^2-x-2.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax+b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F04 | V01

Q034 | WRITTEN

C03-T03-314-EX2

A polynomial $P(x)$ leaves remainder $-x+4$ on division by x^2-3x+2, and $3x$ on division by x^2-4x+3. Find the remainder on division by x^2-5x+6.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F04 | V01

Q035 | MCQ

C03-K03-G-MCQ-018

A polynomial $P(x)$ leaves remainder $7x + 6$ on division by $x^2 - x - 6$, and $4x - 3$ on division by $x^2 + 2x - 3$. Find the remainder on division by $x^2 + x - 2$ Select the correct answer:

A $3x - 2$ (sign error)

B $3x - 2$

C $3x - 1$

D $3x - 2 - 1$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F04 | V01

Q036 | MCQ

C03-K03-G-MCQ-019

A polynomial $P(x)$ leaves remainder $3x + 2$ on division by $x^2 - x - 2$, and $7x - 6$ on division by $x^2 + 2x - 3$. Find the remainder on division by $x^2 - 1$ Select the correct answer:

A 1

B x

C x (sign error)

D 0

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F04 | V01

Q037 | MCQ

C03-K03-G-MCQ-020

A polynomial $P(x)$ leaves remainder $2x-2$ on division by x^2-2x-3, and $-x+7$ on division by x^2-4. Find the remainder on division by x^2-x-2 Select the correct answer:

A $3x-1$

B $3x0$

C $3x-1-1$

D $3x-1$ (sign error)

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax+b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F04 | V01

Q038 | MCQ

C03-K03-G-MCQ-021

A polynomial $P(x)$ leaves remainder $-x+4$ on division by x^2-3x+2, and $3x$ on division by x^2-4x+3. Find the remainder on division by x^2-5x+6 Select the correct answer:

A $7x-11$

B $7x-12-1$

C $7x-12$ (sign error)

D $7x-12$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a)=0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax+b$

Two-value remainder
$R(r_1)=P(r_1), \quad R(r_2)=P(r_2)$

Synthetic division
$P(x)=(x-a)Q(x)+P(a)$

Factorisation route
$P(a)=0 \Rightarrow P(x)=(x-a)Q(x)$

Concept 3 | Polynomial Theorems

F04 | V02

Q039 | WRITTEN

C03-T03-314-EX3

A polynomial $P(x)$ leaves remainder $x-5$ on division by $(x+1)^2$, and 6 on division by $x-2$. Find the remainder on division by $(x+1)^2(x-2)$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F04 | V02

Q040 | MCQ

C03-K03-G-MCQ-022

A polynomial $P(x)$ leaves remainder $x-5$ on division by $(x+1)^2$, and 6 on division by $x-2$. Find the remainder on division by $(x+1)^2(x-2)$ Select the correct answer:

A x^2+3x-4

B x^2+3x-3

C $x^2+3x-4-1$

D x^2+3x-4 (sign error)

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a)=0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax+b$

Two-value remainder
$R(r_1)=P(r_1), \quad R(r_2)=P(r_2)$

Synthetic division
$P(x)=(x-a)Q(x)+P(a)$

Factorisation route
$P(a)=0 \Rightarrow P(x)=(x-a)Q(x)$

Concept 3 | Polynomial Theorems

F05 | V01

Q041 | WRITTEN

C03-T03-315-WU1

Using synthetic division, find the quotient and remainder when $x^3 + 5x + 11$ is divided by $x + 2$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F05 | V01

Q042 | MCQ

C03-K03-G-MCQ-024

Using synthetic division, find the quotient and remainder when $x^3 + 5x + 11$ is divided by $x + 2$ Select the correct answer:

A $Q = x^2 - 2x + 9, R = -7$

B $Q = x^2 - 2x + 9, R = -6$

C $Q = x^2 - 2x + 9, R = -7 - 1$

D $Q = x^2 - 2x + 9, R = -7$ (sign error)

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x), \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F05 | V02

Q043 | WRITTEN

C03-T03-315-TR1a

Using synthetic division, find the quotient and remainder when $A = x^3 + 5x - 6$ is divided by $B = x - 1$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F05 | V02

Q044 | WRITTEN

C03-T03-315-TR1b

Using synthetic division, find the quotient and remainder when $A = 3x^3 - 5x^2 - 3x - 1$ is divided by $B = x - 3$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F05 | V02

Q045 | WRITTEN

C03-T03-315-EX1a

Using synthetic division, find the quotient and remainder when $A = x^3 - 5x + 6$ is divided by $B = x - 2$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F05 | V02

Q046 | WRITTEN

C03-T03-315-EX1b

Using synthetic division, find the quotient and remainder when $A = x^3 + 2x^2 - x - 3$ is divided by $B = x - 1$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F05 | V02

Q047 | WRITTEN

C03-T03-315-EX1c

Using synthetic division, find the quotient and remainder when $A = 4x^2 - 2x + 2$ is divided by $B = x - 1$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F05 | V02

Q048 | MCQ

C03-K03-G-MCQ-025

Using synthetic division, find the quotient and remainder when $A = x^3 + 5x - 6$ is divided by $B = x - 1$ Select the correct answer:

A $Q = x^2 + x + 6, R = 0$ (sign error)

B $Q = x^2 + x + 6, R = 0$

C $Q = x^2 + x + 6, R = 1$

D $Q = x^2 + x + 6, R = 0 - 1$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F05 | V02

Q049 | MCQ

C03-K03-G-MCQ-026

Using synthetic division, find the quotient and remainder when $A = 3x^3 - 5x^2 - 3x - 1$ is divided by $B = x - 3$ Select the correct answer:

A $Q = 3x^2 + 4x + 9, R = 27$

B $Q = 3x^2 + 4x + 9, R = 26 - 1$

C $Q = 3x^2 + 4x + 9, R = 26$ (sign error)

D $Q = 3x^2 + 4x + 9, R = 26$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F05 | V02

Q050 | MCQ

C03-K03-G-MCQ-027

Using synthetic division, find the quotient and remainder when $A = x^3 - 5x + 6$ is divided by $B = x - 2$ Select the correct answer:

A $Q = x^2 + 2x - 1, R = 5$

B $Q = x^2 + 2x - 1, R = 4 - 1$

C $Q = x^2 + 2x - 1, R = 4$ (sign error)

D $Q = x^2 + 2x - 1, R = 4$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F05 | V02

Q051 | MCQ

C03-K03-G-MCQ-028

Using synthetic division, find the quotient and remainder when $A = x^3 + 2x^2 - x - 3$ is divided by $B = x - 1$ Select the correct answer:

A $Q = x^2 + 3x + 2, R = -1$

B $Q = x^2 + 3x + 2, R = 0$

C $Q = x^2 + 3x + 2, R = -1 - 1$

D $Q = x^2 + 3x + 2, R = -1$ (sign error)

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x), \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F05 | V02

Q052 | MCQ

C03-K03-G-MCQ-029

Using synthetic division, find the quotient and remainder when $A = 4x^2 - 2x + 2$ is divided by $B = x - 1$ Select the correct answer:

A $Q = 4x + 2, R = 4$ (sign error)

B $Q = 4x + 2, R = 4$

C $Q = 4x + 2, R = 5$

D $Q = 4x + 2, R = 4 - 1$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x), \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F05 | V03

Q053 | WRITTEN

C03-T03-315-EX1d

Using synthetic division, find the quotient and remainder when $A = 3x^4 + 5x^3 - 2x - 12$ is divided by $B = x + 2$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F05 | V03

Q054 | MCQ

C03-K03-G-MCQ-030

Using synthetic division, find the quotient and remainder when $A = 3x^4 + 5x^3 - 2x - 12$ is divided by $B = x + 2$ Select the correct answer:

A $Q = 3x^3 - x^2 + 2x - 6, R = 1$

B $Q = 3x^3 - x^2 + 2x - 6, R = 0 - 1$

C $Q = 3x^3 - x^2 + 2x - 6, R = 0$ (sign error)

D $Q = 3x^3 - x^2 + 2x - 6, R = 0$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x), \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q055 | WRITTEN

C03-T03-316-WU1a

Factorise $x^3 + 2x^2 - x - 2$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q056 | WRITTEN

C03-T03-316-TR1a

Factorise $x^3 - 2x^2 - 5x + 6$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q057 | WRITTEN

C03-T03-316-TR1b

Factorise $x^3 - x^2 - 16x - 20$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q058 | WRITTEN

C03-T03-316-TR1c

Factorise $2x^3 - x^2 - 5x - 2$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q059 | WRITTEN

C03-T03-316-EX1a

Factorise $x^3 - 7x - 6$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q060 | WRITTEN

C03-T03-316-EX1b

Factorise $x^3 + 4x^2 + x - 6$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q061 | WRITTEN

C03-T03-316-EX1c

Factorise $x^3 + 6x^2 + 11x + 6$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q062 | WRITTEN

C03-T03-316-EX1d

Factorise $x^3 - 3x + 2$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q063 | WRITTEN

C03-T03-316-EX1e

Factorise $x^3 + x^2 - 8x - 12$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q064 | WRITTEN

C03-T03-316-EX1f

Factorise $x^3 - 3x^2 - 9x - 5$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q065 | WRITTEN

C03-T03-316-EX1g

Factorise $2x^3 - 3x^2 - 3x + 2$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q066 | WRITTEN

C03-T03-316-EX1h

Factorise $3x^3 + x^2 - 8x + 4$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q067 | WRITTEN

C03-T03-316-EX1i

Factorise $2x^3 + 7x^2 + 8x + 3$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q068 | MCQ

C03-K03-G-MCQ-032

Factorise $x^3 + 2x^2 - x - 2$ Select the correct answer:

A $(x-1)(x+1)(x3)$

B $(x-1)(x+1)(x+2)-1$

C $(x-1)(x+1)(x+2)$ (sign error)

D $(x-1)(x+1)(x+2)$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q069 | MCQ

C03-K03-G-MCQ-034

Factorise $x^3 - 2x^2 - 5x + 6$ Select the correct answer:

A $(x-1)(x-3)(x3)$

B $(x-1)(x-3)(x+2)-1$

C $(x-1)(x-3)(x+2)$ (sign error)

D $(x-1)(x-3)(x+2)$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q070 | MCQ

C03-K03-G-MCQ-035

Factorise $x^3 - x^2 - 16x - 20$ Select the correct answer:

A $(x+2)^2(x-5) - 1$

B $(x+2)^2(x-5)$ (sign error)

C $(x+2)^2(x-5)$

D $(x+2)^2(x-4)$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q071 | MCQ

C03-K03-G-MCQ-036

Factorise $2x^3 - x^2 - 5x - 2$ Select the correct answer:

A $(x-2)(2x+1)(x+1)$ (sign error)

B $(x-2)(2x+1)(x+1)$

C $(x-2)(2x+1)(x2)$

D $(x-2)(2x+1)(x+1)-1$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q072 | MCQ

C03-K03-G-MCQ-040

Factorise $x^3 - 7x - 6$ Select the correct answer:

A $(x-3)(x+1)(x+2)$ (sign error)

B $(x-3)(x+1)(x+2)$

C $(x-3)(x+1)(x3)$

D $(x-3)(x+1)(x+2)-1$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q073 | MCQ

C03-K03-G-MCQ-041

Factorise $x^3 + 4x^2 + x - 6$ Select the correct answer:

A $(x-1)(x+2)(x+3) - 1$

B $(x-1)(x+2)(x+3)$ (sign error)

C $(x-1)(x+2)(x+3)$

D $(x-1)(x+2)(x4)$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q074 | MCQ

C03-K03-G-MCQ-042

Factorise $x^3 + 6x^2 + 11x + 6$ Select the correct answer:

A $(x+1)(x+2)(x+3)$ (sign error)

B $(x+1)(x+2)(x+3)$

C $(x+1)(x+2)(x4)$

D $(x+1)(x+2)(x+3)-1$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q075 | MCQ

C03-K03-G-MCQ-043

Factorise $x^3 - 3x + 2$ Select the correct answer:

A $(x-1)^2(x3)$

B $(x-1)^2(x+2)-1$

C $(x-1)^2(x+2)$ (sign error)

D $(x-1)^2(x+2)$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q076 | MCQ

C03-K03-G-MCQ-044

Factorise $x^3 + x^2 - 8x - 12$ Select the correct answer:

A $(x-3)(x+2)^3$

B $(x-3)(x+2)^2 - 1$

C $(x-3)(x+2)^2$ (sign error)

D $(x-3)(x+2)^2$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q077 | MCQ

C03-K03-G-MCQ-045

Factorise $x^3 - 3x^2 - 9x - 5$ Select the correct answer:

A $(x-5)(x+1)^3$

B $(x-5)(x+1)^2 - 1$

C $(x-5)(x+1)^2$ (sign error)

D $(x-5)(x+1)^2$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q078 | MCQ

C03-K03-G-MCQ-046

Factorise $2x^3 - 3x^2 - 3x + 2$ Select the correct answer:

A $(x-2)(x+1)(2x-1)$

B $(x-2)(x+1)(2x0)$

C $(x-2)(x+1)(2x-1)-1$

D $(x-2)(x+1)(2x-1)$ (sign error)

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q079 | MCQ

C03-K03-G-MCQ-047

Factorise $3x^3 + x^2 - 8x + 4$ Select the correct answer:

A $(x-1)(x+2)(3x-2) - 1$

B $(x-1)(x+2)(3x-2)$ (sign error)

C $(x-1)(x+2)(3x-2)$

D $(x-1)(x+2)(3x-1)$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V01

Q080 | MCQ

C03-K03-G-MCQ-048

Factorise $2x^3 + 7x^2 + 8x + 3$ Select the correct answer:

A $(x+1)^2(2x4)$

B $(x+1)^2(2x+3) - 1$

C $(x+1)^2(2x+3)$ (sign error)

D $(x+1)^2(2x+3)$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V02

Q081 | WRITTEN

C03-T03-316-WU1b

Factorise $x^4 - 6x^3 + 8x^2 + 8x - 16$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V02

Q082 | WRITTEN

C03-T03-316-TR1e

Factorise $x^4 + 3x^3 - 27x^2 + 13x + 42$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V02

Q083 | WRITTEN

C03-T03-316-TR1f

Factorise $x^4 - 4x^3 + 8x^2 - 8x + 3$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V02

Q084 | WRITTEN

C03-T03-316-EX1m

Factorise $x^4 - 10x^3 + 35x^2 - 50x + 24$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V02

Q085 | WRITTEN

C03-T03-316-EX1n

Factorise $x^4 - 5x^3 - 3x^2 + 17x - 10$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V02

Q086 | WRITTEN

C03-T03-316-EX1o

Factorise $2x^4 - 5x^3 - 20x^2 + 20x + 48$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V02

Q087 | WRITTEN

C03-T03-316-EX1p

Factorise $x^4 - 4x^3 - 4x^2 + 13x - 6$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V02

Q088 | WRITTEN

C03-T03-316-EX1q

Factorise $x^4 - 4x^3 + 3x^2 + 2x - 6$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V02

Q089 | WRITTEN

C03-T03-316-EX1r

Factorise $x^4 - x^3 + x^2 + x - 2$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V02

Q090 | MCQ

C03-K03-G-MCQ-033

Factorise $x^4 - 6x^3 + 8x^2 + 8x - 16$ Select the correct answer:

A $(x-2)^2(x^2-2x-3)$

B $(x-2)^2(x^2-2x-4)-1$

C $(x-2)^2(x^2-2x-4)$ (sign error)

D $(x-2)^2(x^2-2x-4)$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V02

Q091 | MCQ

C03-K03-G-MCQ-038

Factorise $x^4 + 3x^3 - 27x^2 + 13x + 42$ Select the correct answer:

A $(x-3)(x-2)(x+1)(x+7)$

B $(x-3)(x-2)(x+1)(x8)$

C $(x-3)(x-2)(x+1)(x+7)-1$

D $(x-3)(x-2)(x+1)(x+7)$ (sign error)

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V02

Q092 | MCQ

C03-K03-G-MCQ-039

Factorise $x^4 - 4x^3 + 8x^2 - 8x + 3$ Select the correct answer:

A $(x-1)^2(x^2-2x4)$

B $(x-1)^2(x^2-2x+3)-1$

C $(x-1)^2(x^2-2x+3)$ (sign error)

D $(x-1)^2(x^2-2x+3)$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V02

Q093 | MCQ

C03-K03-G-MCQ-052

Factorise $x^4 - 10x^3 + 35x^2 - 50x + 24$ Select the correct answer:

A $(x-4)(x-3)(x-2)(x0)$

B $(x-4)(x-3)(x-2)(x-1)-1$

C $(x-4)(x-3)(x-2)(x-1)$ (sign error)

D $(x-4)(x-3)(x-2)(x-1)$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V02

Q094 | MCQ

C03-K03-G-MCQ-053

Factorise $x^4 - 5x^3 - 3x^2 + 17x - 10$ Select the correct answer:

A $(x-5)(x-1)^2(x+2) - 1$

B $(x-5)(x-1)^2(x+2)$ (sign error)

C $(x-5)(x-1)^2(x+2)$

D $(x-5)(x-1)^2(x3)$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V02

Q095 | MCQ

C03-K03-G-MCQ-054

Factorise $2x^4 - 5x^3 - 20x^2 + 20x + 48$ Select the correct answer:

A $(x-4)(x-2)(x+2)(2x4)$

B $(x-4)(x-2)(x+2)(2x+3) - 1$

C $(x-4)(x-2)(x+2)(2x+3)$ (sign error)

D $(x-4)(x-2)(x+2)(2x+3)$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V02

Q096 | MCQ

C03-K03-G-MCQ-055

Factorise $x^4 - 4x^3 - 4x^2 + 13x - 6$ Select the correct answer:

A $(x-1)(x+2)(x^2-5x+3)$

B $(x-1)(x+2)(x^2-5x4)$

C $(x-1)(x+2)(x^2-5x+3)-1$

D $(x-1)(x+2)(x^2-5x+3)$ (sign error)

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V02

Q097 | MCQ

C03-K03-G-MCQ-056

Factorise $x^4 - 4x^3 + 3x^2 + 2x - 6$ Select the correct answer:

A $(x-3)(x+1)(x^2-2x+2)$ (sign error)

B $(x-3)(x+1)(x^2-2x+2)$

C $(x-3)(x+1)(x^2-2x3)$

D $(x-3)(x+1)(x^2-2x+2)-1$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V02

Q098 | MCQ

C03-K03-G-MCQ-057

Factorise $x^4 - x^3 + x^2 + x - 2$ Select the correct answer:

A $(x-1)(x+1)(x^2-x+2)-1$

B $(x-1)(x+1)(x^2-x+2)$ (sign error)

C $(x-1)(x+1)(x^2-x+2)$

D $(x-1)(x+1)(x^2-x3)$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V03

Q099 | WRITTEN

C03-T03-316-TR1d

Factorise $2x^3 - 3x^2 - x - 2$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V03

Q100 | WRITTEN

C03-T03-316-EX1j

Factorise $2x^3 - 7x^2 + 3x + 6$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V03

Q101 | WRITTEN

C03-T03-316-EX1k

Factorise $x^3 + 4x^2 + 2x - 4$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V03

Q102 | WRITTEN

C03-T03-316-EX1I

Factorise $x^3 - 3x^2 + 2$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V03

Q103 | MCQ

C03-K03-G-MCQ-037

Factorise $2x^3 - 3x^2 - x - 2$ Select the correct answer:

A $(x-2)(2x^2+x+1)-1$

B $(x-2)(2x^2+x+1)$ (sign error)

C $(x-2)(2x^2+x+1)$

D $(x-2)(2x^2+x2)$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V03

Q104 | MCQ

C03-K03-G-MCQ-049

Factorise $2x^3 - 7x^2 + 3x + 6$ Select the correct answer:

A $(x-2)(2x^2-3x-3)$ (sign error)

B $(x-2)(2x^2-3x-3)$

C $(x-2)(2x^2-3x-2)$

D $(x-2)(2x^2-3x-3)-1$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V03

Q105 | MCQ

C03-K03-G-MCQ-050

Factorise $x^3 + 4x^2 + 2x - 4$ Select the correct answer:

A $(x+2)(x^2+2x-2)$ (sign error)

B $(x+2)(x^2+2x-2)$

C $(x+2)(x^2+2x-1)$

D $(x+2)(x^2+2x-2)-1$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V03

Q106 | MCQ

C03-K03-G-MCQ-051

Factorise $x^3 - 3x^2 + 2$ Select the correct answer:

A $(x-1)(x^2-2x-1)$

B $(x-1)(x^2-2x-2)-1$

C $(x-1)(x^2-2x-2)$ (sign error)

D $(x-1)(x^2-2x-2)$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F01 | V04

Q107 | CHALLENGE WRITTEN

C03-T03-314-CH

Evaluate the exact remainder when $x^{57} + 57$ is divided by $x + 1$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F02 | V03

Q108 | CHALLENGE WRITTEN C03-T03-312-CH

A model is $P(x) = 2x^3 - 3x^2 + ax + 6$. It must be divisible by $2x + 1$. Find a, then state what changes for divisor $x + 2$ and when more than one linear factor can divide a polynomial.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F03 | V02

Q109 | CHALLENGE WRITTEN C03-T03-313-CH

A polynomial $P(x)$ is divisible by $x-1$ and leaves remainder -4 on division by $x+3$. Find the remainder on division by x^2+2x-3.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax+b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F05 | V04

Q110 | CHALLENGE WRITTEN

C03-T03-315-CH

The polynomial $P(x) = 4x^4 - 4x^3 - 11x^2 + 12x - 3$ has a horizontal intercept at $x = 1/2$ with multiplicity 2. Find the other intercepts.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V04

Q111 | CHALLENGE WRITTEN

C03-T03-316-CH1

Let $P(x) = x^4 - 3x^3 + ax^2 + bx + 12$. If both $x - 1$ and $x + 2$ are factors, find a, b.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V04

Q112 | CHALLENGE WRITTEN

C03-T03-316-CH2

For the polynomial above with $a = -12, b = 2$, determine all roots of $P(x) = 0$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x), \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F01 | V04

Q113 | CHALLENGE MCQ

C03-K03-G-MCQ-023

Evaluate the exact remainder when $x^{57}+57$ is divided by $x+1$ Select the correct answer:

A 56 (sign error)

B 56

C 57

D $56-1$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a)=0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax+b$

Two-value remainder
$R(r_1)=P(r_1), \quad R(r_2)=P(r_2)$

Synthetic division
$P(x)=(x-a)Q(x)+P(a)$

Factorisation route
$P(a)=0 \Rightarrow P(x)=(x-a)Q(x)$

Concept 3 | Polynomial Theorems

F02 | V03

Q114 | CHALLENGE MCQ

C03-K03-G-MCQ-012

A model is $P(x) = 2x^3 - 3x^2 + ax + 6$. It must be divisible by $2x + 1$. Find a, then state what changes for divisor $x + 2$ and when more than one linear factor can divide a polynomial Select the correct answer:

A $a = 10$; for $x + 2$, $a = -10$; linear factors correspond to roots.

B $a = 10$; for $x + 2$, $a = -11$; linear factors correspond to roots (minus 1).

C $a = 10$; for $x + 2$, $a = -11$; linear factors correspond to roots (sign error).

D $a = 10$; for $x + 2$, $a = -11$; linear factors correspond to roots.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x), \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F03 | V02

Q115 | CHALLENGE MCQ

C03-K03-G-MCQ-017

A polynomial $P(x)$ is divisible by $x-1$ and leaves remainder -4 on division by $x+3$. Find the remainder on division by x^2+2x-3 Select the correct answer:

A $x-1-1$

B $x-1$ (sign error)

C $x-1$

D $x0$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax+b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F05 | V04

Q116 | CHALLENGE MCQ

C03-K03-G-MCQ-031

The polynomial $P(x) = 4x^4 - 4x^3 - 11x^2 + 12x - 3$ has a horizontal intercept at $x = 1/2$ with multiplicity 2. Find the other intercepts Select the correct answer:

A $x = \sqrt{3}, -\sqrt{3}$

B $x = \sqrt{3}, -\sqrt{4}$

C $x = \sqrt{3}, -\sqrt{3} - 1$

D $x = \sqrt{3}, -\sqrt{3}$ (sign error)

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x), \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V04

Q117 | CHALLENGE MCQ

C03-K03-G-MCQ-058

Let $P(x) = x^4 - 3x^3 + ax^2 + bx + 12$. If both $x - 1$ and $x + 2$ are factors, find a, b Select the correct answer:

A $a = -12, b = 2 - 1$

B $a = -12, b = 2$ (sign error)

C $a = -12, b = 2$

D $a = -12, b = 3$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | V04

Q118 | CHALLENGE MCQ

C03-K03-G-MCQ-059

For the polynomial above with $a = -12, b = 2$, determine all roots of $P(x) = 0$ Select the correct answer:

A $x = 1, -2, 2 \pm \sqrt{10}$

B $x = 1, -2, 2\sqrt{10}$

C $x = 1, -2, 2 - \sqrt{10}$

D $x = 1, -2, 2 + \sqrt{10}$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x), \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F01 | C03-K03-F01-VQ

Quiz M1 | QUIZ MCQ

C03-K03-QUIZ-MCQ-1

Find the remainder when $P(x) = x^3 - 2x + 5$ is divided by $x - 2$ Select the correct answer:

A $9 - 1$

B 9 (sign error)

C 9

D 10

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F02 | C03-K03-F02-VQ

Quiz M2 | QUIZ MCQ — C03-K03-QUIZ-MCQ-2

If $P(x)$ is divisible by $x+1$, which statement is true? Select the correct answer:

A $P(-1) = 0 - 1$

B $P(-1) = 0$ (sign error)

C $P(-1) = 0$

D $P(-1) = 1$

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 3 | Polynomial Theorems

F03 | C03-K03-F03-VQ

Quiz M3 | QUIZ MCQ

C03-K03-QUIZ-MCQ-3

The remainder on division by a quadratic divisor has the form Select the correct answer:

A 1

B $ax + b$

C $ax + b$ (sign error)

D 0

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F05 | C03-K03-F05-VQ

Quiz M4 | QUIZ MCQ

C03-K03-QUIZ-MCQ-4

Which method records quotient and remainder for division by $x - a$? Select the correct answer:

A 0

B 1

C *Syntheticdivision*

D *Syntheticdivision* (sign error)

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F01 | C03-K03-F01-VQ

Quiz W1 | QUIZ WRITTEN

C03-K03-QUIZ-WRITTEN-1

Find the remainder when $2x^3 + 3x^2 - x + 4$ is divided by $2x + 1$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F03 | C03-K03-F03-VQ

Quiz W2 | QUIZ WRITTEN C03-K03-QUIZ-WRITTEN-2

Find the remainder $R = ax + b$ when $P(x)$ has values $P(1) = 3$ and $P(-2) = -6$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | C03-K03-F06-VQ

Quiz W3 | QUIZ WRITTEN

C03-K03-QUIZ-WRITTEN-3

Factorise $x^3 - 6x^2 + 11x - 6$.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x - a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x - a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x), \deg Q = 2 \Rightarrow R = ax + b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x - a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x - a)Q(x)$

Concept 3 | Polynomial Theorems

F06 | C03-K03-F06-VQ

Quiz W4 | QUIZ WRITTEN

C03-K03-QUIZ-WRITTEN-4

If $x-1$ and $x+2$ are factors of $x^4-3x^3+ax^2+bx+12$, find a, b.

WORKING AREA

FORMULA BANK

Remainder theorem
$P(x) \div (x-a) \Rightarrow \text{remainder} = P(a)$

Factor theorem
$(x-a) \mid P(x) \iff P(a) = 0$

Quadratic remainder
$P(x) \div Q(x),\ \deg Q = 2 \Rightarrow R = ax+b$

Two-value remainder
$R(r_1) = P(r_1), \quad R(r_2) = P(r_2)$

Synthetic division
$P(x) = (x-a)Q(x) + P(a)$

Factorisation route
$P(a) = 0 \Rightarrow P(x) = (x-a)Q(x)$

Concept 4 | Higher-Degree Equations — **OFFICIAL LESSONS 3-17, 3-18, 3-19, 3-20**

Higher-Degree Equations

Equation-first recall | use the same rail beside every question in this Concept

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$$P(a) = 0 \iff (x-a) \mid P(x)$$

Biquadratic substitution

$$x^4 + bx^2 + c = 0 \quad u = x^2$$

Real-coefficient conjugates

$$a + bi \text{ root} \Rightarrow a - bi \text{ root}$$

Cube roots of unity

$$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$$

Repeated cubic root

$D = b^2 - 4ac = 0$ **for the remaining quadratic**

Start with the family cue, write the first move, then use the working grid.

Concept 4 | Higher-Degree Equations

F01 | V01

Q001 | WRITTEN

C03-T04-17-WU1a

$x^3 - 8 = 0$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V01

Q002 | WRITTEN

C03-T04-17-TR1a

$x^3 = -1$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V01

Q003 | WRITTEN

C03-T04-17-EX1a

$x^3 = 27$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V01

Q004 | WRITTEN

C03-T04-17-EX1b

$x^3 = -125$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V01

Q005 | WRITTEN

C03-T04-17-EX1c

$8x^3 = 1$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V01

Q006 | MCQ

C03-K04-G-MCQ-001

$x^3 - 8 = 0$ Select the correct answer:

A $x = 2, -1 - \sqrt{3}\,i, -1 + \sqrt{4}\,i$

B $x = 2, -1 - \sqrt{3}\,i, -1 + \sqrt{3}\,i$

C $x = 2, -1 - \sqrt{3}, -1 + \sqrt{3}\,i$

D $x = 2, -1 - \sqrt{3} - i, -1 + \sqrt{3}\,i$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V01

Q007 | MCQ

C03-K04-G-MCQ-005

$x^3 = -1$ Select the correct answer:

A $x = -1, (1 - \sqrt{3})/2, (1 + \sqrt{3}\,i)/2$

B $x = -1, (1 - \sqrt{3} - i)/2, (1 + \sqrt{3}\,i)/2$

C $x = -1, (1 - \sqrt{3}\,i)/2, (1 + \sqrt{3}\,i)/3$

D $x = -1, (1 - \sqrt{3}\,i)/2, (1 + \sqrt{3}\,i)/2$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V01

Q008 | MCQ

C03-K04-G-MCQ-011

$x^3 = 27$ Select the correct answer:

A $x = 3, (-3 - 3\sqrt{3}\,i)/2, (-3 + 3\sqrt{3}\,i)/3$

B $x = 3, (-3 - 3\sqrt{3}\,i)/2, (-3 + 3\sqrt{3}\,i)/2$

C $x = 3, (-3 - 3\sqrt{3})/2, (-3 + 3\sqrt{3}\,i)/2$

D $x = 3, (-3 - 3\sqrt{3} - i)/2, (-3 + 3\sqrt{3}\,i)/2$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V01

Q009 | MCQ

C03-K04-G-MCQ-012

$x^3 = -125$ Select the correct answer:

A $x = -5, (5 - 5\sqrt{3}\,i)/2, (5 + 5\sqrt{3}\,i)/2$

B $x = -5, (5 - 5\sqrt{3})/2, (5 + 5\sqrt{3}\,i)/2$

C $x = -5, (5 - 5\sqrt{3} - i)/2, (5 + 5\sqrt{3}\,i)/2$

D $x = -5, (5 - 5\sqrt{3}\,i)/2, (5 + 5\sqrt{3}\,i)/3$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V01

Q010 | MCQ

C03-K04-G-MCQ-013

$8x^3 = 1$ Select the correct answer:

A $x = 1/2, (-1 - \sqrt{3} - i)/4, (-1 + \sqrt{3}\,i)/4$

B $x = 1/2, (-1 - \sqrt{3}\,i)/4, (-1 + \sqrt{3}\,i)/5$

C $x = 1/2, (-1 - \sqrt{3}\,i)/4, (-1 + \sqrt{3}\,i)/4$

D $x = 1/2, (-1 - \sqrt{3})/4, (-1 + \sqrt{3}\,i)/4$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q011 | WRITTEN

C03-T04-17-WU1b

$$x^3 - 2x^2 - 5x + 6 = 0$$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q012 | WRITTEN

C03-T04-17-TR1b

$3x^3 + x^2 - 8x + 4 = 0$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q013 | WRITTEN

C03-T04-17-TR1c

$$2x^3 - 3x^2 - x - 2 = 0$$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q014 | WRITTEN

C03-T04-17-TR1d

$$x^3 - x^2 - 16x - 20 = 0$$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q015 | WRITTEN

C03-T04-17-EX1d

$x^3 + 6x^2 + 11x + 6 = 0$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q016 | WRITTEN

C03-T04-17-EX1e

$x^3 + 3x^2 - 4x - 12 = 0$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q017 | WRITTEN

C03-T04-17-EX1f

$3x^3 - 2x^2 - 3x + 2 = 0$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q018 | WRITTEN

C03-T04-17-EX1g

$$x^3 - x^2 - 4 = 0$$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$$P(a) = 0 \iff (x-a) \mid P(x)$$

Biquadratic substitution

$$x^4 + bx^2 + c = 0 \quad u = x^2$$

Real-coefficient conjugates

$$a + bi \text{ root} \Rightarrow a - bi \text{ root}$$

Cube roots of unity

$$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q019 | WRITTEN

C03-T04-17-EX1h

$$x^3 + 4x^2 + 2x - 4 = 0$$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q020 | WRITTEN

C03-T04-17-EX1i

$$x^3 - 4x^2 + 9x - 10 = 0$$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q021 | WRITTEN

C03-T04-17-EX1j

$$x^3 + x^2 - 8x - 12 = 0$$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q022 | WRITTEN

C03-T04-17-EX1k

$2x^3 + 7x^2 + 8x + 3 = 0$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q023 | WRITTEN

C03-T04-17-EX1I

$$x^3 + 6x^2 + 12x + 8 = 0$$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q024 | MCQ

C03-K04-G-MCQ-002

$x^3 - 2x^2 - 5x + 6 = 0$ Select the correct answer:

A $x = -2, 1, 3 - 1$

B $x = -2, 1, 3$ (sign error)

C $x = -2, 1, 3$

D $x = -2, 1, 4$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q025 | MCQ

C03-K04-G-MCQ-006

$3x^3 + x^2 - 8x + 4 = 0$ Select the correct answer:

A $x = -2, 2/3, 2$

B $x = -2, 2/3, 1 - 1$

C $x = -2, 2/3, 1$ (sign error)

D $x = -2, 2/3, 1$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q026 | MCQ

C03-K04-G-MCQ-007

$2x^3 - 3x^2 - x - 2 = 0$ Select the correct answer:

A $x = 2, (-1 - \sqrt{7})/4, (-1 + \sqrt{7}\,i)/4$

B $x = 2, (-1 - \sqrt{7} - i)/4, (-1 + \sqrt{7}\,i)/4$

C $x = 2, (-1 - \sqrt{7}\,i)/4, (-1 + \sqrt{7}\,i)/5$

D $x = 2, (-1 - \sqrt{7}\,i)/4, (-1 + \sqrt{7}\,i)/4$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q027 | MCQ

C03-K04-G-MCQ-008

$x^3 - x^2 - 16x - 20 = 0$ Select the correct answer:

A $x = -2$(repeated), 5 (sign error)

B $x = -2$(repeated), 5

C $x = -2$(repeated), 6

D $x = -2$(repeated), $5 - 1$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q028 | MCQ

C03-K04-G-MCQ-014

$x^3 + 6x^2 + 11x + 6 = 0$ Select the correct answer:

A $x = -3, -2, -1 - 1$

B $x = -3, -2, -1$ (sign error)

C $x = -3, -2, -1$

D $x = -3, -2, 0$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q029 | MCQ

C03-K04-G-MCQ-015

$x^3 + 3x^2 - 4x - 12 = 0$ Select the correct answer:

A $x = -3, -2, 3$

B $x = -3, -2, 2 - 1$

C $x = -3, -2, 2$ (sign error)

D $x = -3, -2, 2$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q030 | MCQ

C03-K04-G-MCQ-016

$3x^3 - 2x^2 - 3x + 2 = 0$ Select the correct answer:

A $x = -1, 2/3, 2$

B $x = -1, 2/3, 1 - 1$

C $x = -1, 2/3, 1$ (sign error)

D $x = -1, 2/3, 1$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q031 | MCQ

C03-K04-G-MCQ-017

$x^3 - x^2 - 4 = 0$ Select the correct answer:

A $x = 2, (-1 - \sqrt{7}\,i)/2, (-1 + \sqrt{7}\,i)/2$

B $x = 2, (-1 - \sqrt{7})/2, (-1 + \sqrt{7}\,i)/2$

C $x = 2, (-1 - \sqrt{7} - i)/2, (-1 + \sqrt{7}\,i)/2$

D $x = 2, (-1 - \sqrt{7}\,i)/2, (-1 + \sqrt{7}\,i)/3$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q032 | MCQ

C03-K04-G-MCQ-018

$x^3 + 4x^2 + 2x - 4 = 0$ Select the correct answer:

A $x = -2, -1 - \sqrt{3}, -1 + \sqrt{4}$

B $x = -2, -1 - \sqrt{3}, -1 + \sqrt{3} - 1$

C $x = -2, -1 - \sqrt{3}, -1 + \sqrt{3}$ (sign error)

D $x = -2, -1 - \sqrt{3}, -1 + \sqrt{3}$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q033 | MCQ

C03-K04-G-MCQ-019

$x^3 - 4x^2 + 9x - 10 = 0$ Select the correct answer:

A $x = 2, 1 - 2, 1 + 2i$

B $x = 2, 1 - 2 - i, 1 + 2i$

C $x = 2, 1 - 2i, 1 + 3i$

D $x = 2, 1 - 2i, 1 + 2i$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q034 | MCQ

C03-K04-G-MCQ-020

$x^3 + x^2 - 8x - 12 = 0$ Select the correct answer:

A $x = -2$(repeated), 4

B $x = -2$(repeated), $3 - 1$

C $x = -2$(repeated), 3 (sign error)

D $x = -2$(repeated), 3

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q035 | MCQ

C03-K04-G-MCQ-021

$2x^3 + 7x^2 + 8x + 3 = 0$ Select the correct answer:

A $x = -1$(repeated), $-3/2$ (sign error)

B $x = -1$(repeated), $-3/2$

C $x = -1$(repeated), $-3/2 + 1$

D $x = -1$(repeated), $-3/2 - 1$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V02

Q036 | MCQ

C03-K04-G-MCQ-022

$x^3 + 6x^2 + 12x + 8 = 0$ Select the correct answer:

A $x = -1$(triple)

B $x = -2$(triple) $- 1$

C $x = -2$(triple) (sign error)

D $x = -2$(triple)

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V03

Q037 | WRITTEN

C03-T04-17-WU1c

$x^4 - 7x^2 - 18 = 0$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V03

Q038 | WRITTEN

C03-T04-17-TR1e

$x^4 - 5x^2 + 4 = 0$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V03

Q039 | WRITTEN

C03-T04-17-EX1m

$x^4 - 5x^2 - 36 = 0$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V03

Q040 | WRITTEN

C03-T04-17-EX1n

$x^4 - 6x^2 - 27 = 0$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V03

Q041 | WRITTEN

C03-T04-17-EX1o

$x^4 - x^2 - 2 = 0$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ **for the remaining quadratic**

Concept 4 | Higher-Degree Equations

F01 | V03

Q042 | MCQ

C03-K04-G-MCQ-003

$x^4 - 7x^2 - 18 = 0$ Select the correct answer:

A $x = -3, 3, -\sqrt{2}, \sqrt{2}\,i$

B $x = -3, 3, -\sqrt{2} - i, \sqrt{2}\,i$

C $x = -3, 3, -\sqrt{2}\,i, \sqrt{3}\,i$

D $x = -3, 3, -\sqrt{2}\,i, \sqrt{2}\,i$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V03

Q043 | MCQ

C03-K04-G-MCQ-009

$x^4 - 5x^2 + 4 = 0$ Select the correct answer:

A $x = -2, -1, 1, 3$

B $x = -2, -1, 1, 2 - 1$

C $x = -2, -1, 1, 2$ (sign error)

D $x = -2, -1, 1, 2$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V03

Q044 | MCQ

C03-K04-G-MCQ-023

$x^4 - 5x^2 - 36 = 0$ Select the correct answer:

A $x = -3, 3, -2 - i, 2i$

B $x = -3, 3, -2i, 3i$

C $x = -3, 3, -2i, 2i$

D $x = -3, 3, -2, 2i$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V03

Q045 | MCQ

C03-K04-G-MCQ-024

$x^4 - 6x^2 - 27 = 0$ Select the correct answer:

A $x = -3, 3, -\sqrt{3} - i, \sqrt{3}\,i$

B $x = -3, 3, -\sqrt{3}\,i, \sqrt{4}\,i$

C $x = -3, 3, -\sqrt{3}\,i, \sqrt{3}\,i$

D $x = -3, 3, -\sqrt{3}, \sqrt{3}\,i$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V03

Q046 | MCQ

C03-K04-G-MCQ-025

$x^4 - x^2 - 2 = 0$ Select the correct answer:

A $x = -\sqrt{2}, \sqrt{3}, -i, i$

B $x = -\sqrt{2}, \sqrt{2}, -i, i$

C $x = -\sqrt{2}, \sqrt{2}, -, i$

D $x = -\sqrt{2}, \sqrt{2}, +i, i$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V04

Q047 | WRITTEN

C03-T04-17-WU1d

$$x^4 - 6x^3 + 8x^2 + 8x - 16 = 0$$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V04

Q048 | WRITTEN

C03-T04-17-TR1f

$$x^4 - 10x^3 + 35x^2 - 50x + 24 = 0$$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V04

Q049 | WRITTEN

C03-T04-17-EX1p

$$x^4 - 9x^3 + 29x^2 - 39x + 18 = 0$$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V04

Q050 | WRITTEN

C03-T04-17-EX1q

$$x^4 - 4x^3 + 3x^2 + 2x - 6 = 0$$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V04

Q051 | MCQ

C03-K04-G-MCQ-004

$x^4 - 6x^3 + 8x^2 + 8x - 16 = 0$ Select the correct answer:

A $x = 2(\text{repeated}), 1 - \sqrt{5}, 1 + \sqrt{5}$ (sign error)

B $x = 2(\text{repeated}), 1 - \sqrt{5}, 1 + \sqrt{5}$

C $x = 2(\text{repeated}), 1 - \sqrt{5}, 1 + \sqrt{6}$

D $x = 2(\text{repeated}), 1 - \sqrt{5}, 1 + \sqrt{5} - 1$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V04

Q052 | MCQ

C03-K04-G-MCQ-010

$x^4 - 10x^3 + 35x^2 - 50x + 24 = 0$ Select the correct answer:

A $x = 1, 2, 3, 4$

B $x = 1, 2, 3, 5$

C $x = 1, 2, 3, 4 - 1$

D $x = 1, 2, 3, 4$ (sign error)

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V04

Q053 | MCQ

C03-K04-G-MCQ-026

$x^4 - 9x^3 + 29x^2 - 39x + 18 = 0$ Select the correct answer:

A $x = 1, 2, 3$(repeated) $- 1$

B $x = 1, 2, 3$(repeated) (sign error)

C $x = 1, 2, 3$(repeated)

D $x = 1, 2, 4$(repeated)

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | V04

Q054 | MCQ

C03-K04-G-MCQ-027

$x^4 - 4x^3 + 3x^2 + 2x - 6 = 0$ Select the correct answer:

A $x = -1, 3, 1 - -i, 1 + i$

B $x = -1, 3, 1 - i, 2 + i$

C $x = -1, 3, 1 - i, 1 + i$

D $x = -1, 3, 1-, 1 + i$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | V01

Q055 | WRITTEN

C03-T04-18-TR1

$x^3 + 4x^2 + ax + b = 0$ has roots -3 and 1; find a,b and the other root.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | V01

Q056 | WRITTEN

C03-T04-18-EX1

$x^3 - ax^2 - x + b = 0$ has roots -1 and 2; find a,b and the other root.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | V01

Q057 | WRITTEN

C03-T04-18-EX2

$x^3 + ax^2 + bx - 8 = 0$ has roots 1 and 2; find a,b and the other root.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | V01

Q058 | MCQ

C03-K04-G-MCQ-032

$x^3 + 4x^2 + ax + b = 0$ has roots -3 and 1; find a,b and the other root Select the correct answer:

A $a = 1, b = -6;$ other roots: $-2 - 1$

B $a = 1, b = -6;$ other roots: -2 (sign error)

C $a = 1, b = -6;$ other roots: -2

D $a = 1, b = -6;$ other roots: -1

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | V01

Q059 | MCQ

C03-K04-G-MCQ-034

$x^3 - ax^2 - x + b = 0$ has roots -1 and 2; find a,b and the other root Select the correct answer:

A $a = 2, b = 2;$ other roots: 1 (sign error)

B $a = 2, b = 2;$ other roots: 1

C $a = 2, b = 2;$ other roots: 2

D $a = 2, b = 2;$ other roots: $1 - 1$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | V01

Q060 | MCQ

C03-K04-G-MCQ-035

$x^3 + ax^2 + bx - 8 = 0$ has roots 1 and 2; find a,b and the other root Select the correct answer:

A $a = -7, b = 14;$ other roots: $4 - 1$

B $a = -7, b = 14;$ other roots: 4 (sign error)

C $a = -7, b = 14;$ other roots: 4

D $a = -7, b = 14;$ other roots: 5

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | V02

Q061 | WRITTEN

C03-T04-18-WU1

$x^3 + ax^2 + bx + 5 = 0$ has root 2+i; find real a,b and the other roots.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | V02

Q062 | WRITTEN

C03-T04-18-TR2

$x^3 + ax^2 + bx - 4 = 0$ has root 1+i; find a,b and the other roots.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | V02

Q063 | WRITTEN

C03-T04-18-EX4

$x^3 + ax^2 + bx - 20 = 0$ has root $1 - 3\,i$; find real a,b and the other roots.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | V02

Q064 | WRITTEN

C03-T04-18-EX5

$x^3 + ax^2 + bx + 10 = 0$ has root $1 + 2\,i$; find real a,b and the other roots.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | V02

Q065 | MCQ

C03-K04-G-MCQ-031

$x^3 + ax^2 + bx + 5 = 0$ has root 2+i; find real a,b and the other roots Select the correct answer:

A $a = -3, b = 1;$ other roots: $-1, 2 - i$

B $a = -3, b = 1;$ other roots: $-1, 2-$

C $a = -3, b = 1;$ other roots: $-1, 2 + i$

D $a = -3, b = 1;$ other roots: $-1, 3 - i$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | V02

Q066 | MCQ

C03-K04-G-MCQ-033

$x^3 + ax^2 + bx - 4 = 0$ has root 1+i; find a,b and the other roots Select the correct answer:

A $a = -4, b = 6;$ other roots: $1 - i, 3$

B $a = -4, b = 6;$ other roots: $1 - i, 2$

C $a = -4, b = 6;$ other roots: $1-, 2$

D $a = -4, b = 6;$ other roots: $1 + i, 2$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | V02

Q067 | MCQ

C03-K04-G-MCQ-037

$x^3 + ax^2 + bx - 20 = 0$ has root $1 - 3\,i$; find real a,b and the other roots Select the correct answer:

A $a = -4, b = 14;$ other roots: $1 + 3, 2$

B $a = -4, b = 14;$ other roots: $1 + 3 - i, 2$

C $a = -4, b = 14;$ other roots: $1 + 3i, 3$

D $a = -4, b = 14;$ other roots: $1 + 3i, 2$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | V02

Q068 | MCQ

C03-K04-G-MCQ-038

$x^3 + ax^2 + bx + 10 = 0$ has root $1 + 2\,i$; find real a,b and the other roots Select the correct answer:

A $a = 0, b = 1;$ other roots: $1 - 2i, -1$

B $a = 0, b = 1;$ other roots: $1 - 2i, -2$

C $a = 0, b = 1;$ other roots: $1 - 2, -2$

D $a = 0, b = 1;$ other roots: $1 - 2 - i, -2$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | V03

Q069 | WRITTEN

C03-T04-18-EX3

$x^3 - kx^2 + (3k-1)x - 24 = 0$ has root 2; find k and the other roots.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | V03

Q070 | MCQ

C03-K04-G-MCQ-036

$x^3 - kx^2 + (3k-1)x - 24 = 0$ has root 2; find k and the other roots Select the correct answer:

A $k = 9$; other roots: $3, 4$ (sign error)

B $k = 9$; other roots: $3, 4$

C $k = 9$; other roots: $3, 5$

D $k = 9$; other roots: $3, 4 - 1$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V01

Q071 | WRITTEN

C03-T04-19-WU1a

For an imaginary cube root of unity w, evaluate w^9.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V01

Q072 | WRITTEN

C03-T04-19-TR1a

For an imaginary cube root of unity w, evaluate w^{2010}.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V01

Q073 | WRITTEN

C03-T04-19-EX1a

For an imaginary cube root of unity w, evaluate w^3.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V01

Q074 | MCQ

C03-K04-G-MCQ-040

For an imaginary cube root of unity w, evaluate w^9 Select the correct answer:

A 1

B 2

C $1 - 1$

D 1 (sign error)

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V01

Q075 | MCQ

C03-K04-G-MCQ-043

For an imaginary cube root of unity w, evaluate w^{2010} Select the correct answer:

A 1 (sign error)

B 1

C 2

D $1-1$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3-a^3=(x-a)(x^2+ax+a^2)\quad x^3+a^3=(x+a)(x^2-ax+a^2)$

Factor theorem

$P(a)=0 \iff (x-a)\mid P(x)$

Biquadratic substitution

$x^4+bx^2+c=0 \quad u=x^2$

Real-coefficient conjugates

$a+bi$ **root** $\Rightarrow a-bi$ **root**

Cube roots of unity

$w^3=1,\ w\neq 1 \Rightarrow w^2+w+1=0$

Repeated cubic root

$D=b^2-4ac=0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V01

Q076 | MCQ

C03-K04-G-MCQ-046

For an imaginary cube root of unity w, evaluate w^3 Select the correct answer:

A 2

B $1-1$

C 1 (sign error)

D 1

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3-a^3=(x-a)(x^2+ax+a^2)$ $x^3+a^3=(x+a)(x^2-ax+a^2)$

Factor theorem

$P(a)=0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4+bx^2+c=0 \quad u=x^2$

Real-coefficient conjugates

$a+bi$ **root** $\Rightarrow a-bi$ **root**

Cube roots of unity

$w^3=1,\ w\neq 1 \Rightarrow w^2+w+1=0$

Repeated cubic root

$D=b^2-4ac=0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V02

Q077 | WRITTEN

C03-T04-19-WU1b

For an imaginary cube root of unity w, evaluate $w^4 + w^5$.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V02

Q078 | WRITTEN

C03-T04-19-TR1b

For an imaginary cube root of unity w, evaluate $w^2 + w$.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V02

Q079 | WRITTEN

C03-T04-19-EX1b

For an imaginary cube root of unity w, evaluate $w^2 + w^4 + w^6$.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V02

Q080 | MCQ

C03-K04-G-MCQ-041

For an imaginary cube root of unity w, evaluate $w^4 + w^5$ Select the correct answer:

A -1

B 0

C $-1 - 1$

D -1 (sign error)

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V02

Q081 | MCQ

C03-K04-G-MCQ-044

For an imaginary cube root of unity w, evaluate $w^2 + w$ Select the correct answer:

A -1 (sign error)

B -1

C 0

D $-1 - 1$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V02

Q082 | MCQ

C03-K04-G-MCQ-047

For an imaginary cube root of unity w, evaluate $w^2 + w^4 + w^6$ Select the correct answer:

A 1

B $0 - 1$

C 0 (sign error)

D 0

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V03

Q083 | WRITTEN

C03-T04-19-WU1c

For an imaginary cube root of unity w, evaluate $w + 1/w$.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V03

Q084 | WRITTEN

C03-T04-19-TR1c

For an imaginary cube root of unity w, evaluate $(1+w)(1+w^2)$.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V03

Q085 | WRITTEN

C03-T04-19-EX1c

For an imaginary cube root of unity w, evaluate $1/w + 1/w^2 + 1$.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V03

Q086 | MCQ

C03-K04-G-MCQ-042

For an imaginary cube root of unity w, evaluate $w + 1/w$ Select the correct answer:

A 0

B $-1 - 1$

C -1 (sign error)

D -1

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V03

Q087 | MCQ

C03-K04-G-MCQ-045

For an imaginary cube root of unity w, evaluate $(1+w)(1+w^2)$ Select the correct answer:

A $1-1$

B 1 (sign error)

C 1

D 2

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V03

Q088 | MCQ

C03-K04-G-MCQ-048

For an imaginary cube root of unity w, evaluate $1/w+1/w^2+1$ Select the correct answer:

A 1

B $0-1$

C 0 (sign error)

D 0

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3-a^3=(x-a)(x^2+ax+a^2)$ $x^3+a^3=(x+a)(x^2-ax+a^2)$

Factor theorem

$P(a)=0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4+bx^2+c=0 \quad u=x^2$

Real-coefficient conjugates

$a+bi$ **root** $\Rightarrow a-bi$ **root**

Cube roots of unity

$w^3=1,\ w\neq 1 \Rightarrow w^2+w+1=0$

Repeated cubic root

$D=b^2-4ac=0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F04 | V03

Q089 | WRITTEN

C03-T04-20-WU1

$x^3 - 2x^2 + (a-3)x + a = 0$ Find all real parameter values a producing a repeated root.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F04 | V03

Q090 | WRITTEN

C03-T04-20-TR1

$x^3 - x^2 + (a-2)x + a = 0$ Find all real parameter values a producing a repeated root.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F04 | V03

Q091 | WRITTEN

C03-T04-20-EX1

$x^3 - 7x^2 + (a+6)x - a = 0$ Find all real parameter values a producing a repeated root.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F04 | V03

Q092 | WRITTEN

C03-T04-20-EX2

$x^3-(a+1)x^2+(3a+5)x-2a-5=0$ Find all real parameter values a producing a repeated root.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3-a^3=(x-a)(x^2+ax+a^2)$ $x^3+a^3=(x+a)(x^2-ax+a^2)$

Factor theorem

$P(a)=0 \iff (x-a)\mid P(x)$

Biquadratic substitution

$x^4+bx^2+c=0 \quad u=x^2$

Real-coefficient conjugates

$a+bi$ **root** $\Rightarrow a-bi$ **root**

Cube roots of unity

$w^3=1,\ w\neq 1 \Rightarrow w^2+w+1=0$

Repeated cubic root

$D=b^2-4ac=0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F04 | V03

Q093 | WRITTEN

C03-T04-20-EX3

$x^3 + (2a-1)x^2 - 3(a-2)x + a - 6 = 0$ Find all real parameter values a producing a repeated root.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F04 | V03

Q094 | MCQ

C03-K04-G-MCQ-050

$x^3 - 2x^2 + (a-3)x + a = 0$ Find all real parameter values a producing a repeated root Select the correct answer:

A $a = -4$ or $9/4 + 1$

B $a = -4$ or $9/4 - 1$

C $a = -4$ or $9/4$ (sign error)

D $a = -4$ or $9/4$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F04 | V03

Q095 | MCQ

C03-K04-G-MCQ-051

$x^3 - x^2 + (a-2)x + a = 0$ Find all real parameter values a producing a repeated root Select the correct answer:

A $a = -3$ or 2

B $a = -3$ or $1 - 1$

C $a = -3$ or 1 (sign error)

D $a = -3$ or 1

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F04 | V03

Q096 | MCQ

C03-K04-G-MCQ-052

$x^3 - 7x^2 + (a+6)x - a = 0$ Find all real parameter values a producing a repeated root
Select the correct answer:

A $a = 5$ or 9 (sign error)

B $a = 5$ or 9

C $a = 5$ or 10

D $a = 5$ or $9 - 1$

WORKING AREA

FORMULA BANK

Difference / sum of cubes
$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem
$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution
$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates
$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity
$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root
$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F04 | V03

Q097 | MCQ

C03-K04-G-MCQ-053

$x^3-(a+1)x^2+(3a+5)x-2a-5=0$ Find all real parameter values a producing a repeated root
Select the correct answer:

A $a=-6,-2,$ or 10

B $a=-6,-2,$ or 11

C $a=-6,-2,$ or $10-1$

D $a=-6,-2,$ or 10 (sign error)

WORKING AREA

FORMULA BANK

Difference / sum of cubes
$x^3-a^3=(x-a)(x^2+ax+a^2)\quad x^3+a^3=(x+a)(x^2-ax+a^2)$

Factor theorem
$P(a)=0 \iff (x-a)\mid P(x)$

Biquadratic substitution
$x^4+bx^2+c=0 \quad u=x^2$

Real-coefficient conjugates
$a+bi$ **root** $\Rightarrow a-bi$ **root**

Cube roots of unity
$w^3=1,\ w\neq 1 \Rightarrow w^2+w+1=0$

Repeated cubic root
$D=b^2-4ac=0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F04 | V03

Q098 | MCQ

C03-K04-G-MCQ-054

$x^3+(2a-1)x^2-3(a-2)x+a-6=0$ Find all real parameter values a producing a repeated root
Select the correct answer:

A $a=-7,-3,$ or 2

B $a=-7,-3,$ or 3

C $a=-7,-3,$ or $2-1$

D $a=-7,-3,$ or 2 (sign error)

WORKING AREA

FORMULA BANK

Difference / sum of cubes
$x^3-a^3=(x-a)(x^2+ax+a^2)$ $x^3+a^3=(x+a)(x^2-ax+a^2)$

Factor theorem
$P(a)=0 \iff (x-a)\mid P(x)$

Biquadratic substitution
$x^4+bx^2+c=0 \quad u=x^2$

Real-coefficient conjugates
$a+bi$ **root** $\Rightarrow a-bi$ **root**

Cube roots of unity
$w^3=1,\ w\neq 1 \Rightarrow w^2+w+1=0$

Repeated cubic root
$D=b^2-4ac=0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | V02

Q099 | CHALLENGE WRITTEN

C03-T04-18-CH1

$x^3 + ax + b = 0$ has root $1 + \sqrt{2}\,i$; find real a,b and the other roots.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V02

Q100 | CHALLENGE WRITTEN C03-T04-19-CH1

For an imaginary cube root of unity w, evaluate $(1 - w + w^2)(1 + w - w^2)$ without direct expansion.

WORKING AREA

FORMULA BANK

Difference / sum of cubes
$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem
$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution
$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates
$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity
$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root
$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F04 | V03

Q101 | CHALLENGE WRITTEN C03-T04-20-CH1

$x^3 + (a-1)x^2 + (a-3)x - 2a + 3 = 0$ Find all real parameter values a producing a repeated root.

WORKING AREA

FORMULA BANK

Difference / sum of cubes
$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem
$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution
$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates
$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity
$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root
$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F99 | V01

Q102 | CHALLENGE WRITTEN C03-T04-17-CH1

Write the balance equation: inflow $x^4 + x^2 + x$ equals outflow $x^3 + 2$.

WORKING AREA

FORMULA BANK

Difference / sum of cubes
$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem
$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution
$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates
$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity
$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root
$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F99 | V01

Q103 | CHALLENGE WRITTEN C03-T04-17-CH2

Solve $x^4 - x^3 + x^2 + x - 2 = 0$ for the stable pressure levels.

WORKING AREA

FORMULA BANK

Difference / sum of cubes
$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem
$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution
$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates
$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity
$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root
$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F99 | V01

Q104 | CHALLENGE WRITTEN C03-T04-17-CH3

Classify the stable pressure solutions as real or complex.

WORKING AREA

FORMULA BANK

Difference / sum of cubes
$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem
$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution
$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates
$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity
$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root
$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | V02

Q105 | CHALLENGE MCQ

C03-K04-G-MCQ-039

$x^3 + ax + b = 0$ has root $1 + \sqrt{2}\,i$; find real a,b and the other roots Select the correct answer:

A $a = -1, b = 6$; other roots: $1 - \sqrt{2} - i, -2$

B $a = -1, b = 6$; other roots: $1 - \sqrt{2}i, -1$

C $a = -1, b = 6$; other roots: $1 - \sqrt{2}i, -2$

D $a = -1, b = 6$; other roots: $1 - \sqrt{2}, -2$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | V02

Q106 | CHALLENGE MCQ

C03-K04-G-MCQ-049

For an imaginary cube root of unity w, evaluate $(1 - w + w^2)(1 + w - w^2)$ without direct expansion Select the correct answer:

A 5

B $4 - 1$

C 4 (sign error)

D 4

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F04 | V03

Q107 | CHALLENGE MCQ

C03-K04-G-MCQ-055

$x^3 + (a-1)x^2 + (a-3)x - 2a + 3 = 0$ Find all real parameter values a producing a repeated root
Select the correct answer:

A $a = 2/3, 2,$ or 7

B $a = 2/3, 2,$ or $6 - 1$

C $a = 2/3, 2,$ or 6 (sign error)

D $a = 2/3, 2,$ or 6

WORKING AREA

FORMULA BANK

Difference / sum of cubes
$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem
$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution
$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates
$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity
$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root
$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F99 | V01

Q108 | CHALLENGE MCQ

C03-K04-G-MCQ-028

Write the balance equation: inflow $x^4 + x^2 + x$ equals outflow $x^3 + 2$ Select the correct answer:

A $x^4 - x^3 + x^2 + x - 2 = 0$

B $x^4 - x^3 + x^2 + x - 2 = 1$

C $x^4 - x^3 + x^2 + x - 2 = 0 - 1$

D $x^4 - x^3 + x^2 + x - 2 = 0$ (sign error)

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F99 | V01

Q109 | CHALLENGE MCQ

C03-K04-G-MCQ-029

Solve $x^4 - x^3 + x^2 + x - 2 = 0$ for the stable pressure levels Select the correct answer:

A $x = -1, 1, (1 - \sqrt{7})/2, (1 + \sqrt{7}\,i)/2$

B $x = -1, 1, (1 - \sqrt{7} - i)/2, (1 + \sqrt{7}\,i)/2$

C $x = -1, 1, (1 - \sqrt{7}\,i)/2, (1 + \sqrt{7}\,i)/3$

D $x = -1, 1, (1 - \sqrt{7}\,i)/2, (1 + \sqrt{7}\,i)/2$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F99 | V01

Q110 | CHALLENGE MCQ

C03-K04-G-MCQ-030

Classify the stable pressure solutions as real or complex Select the correct answer:

A $Bothtypesoccur : realx = -1, 1andnon - realconjugatesx = (1 \pm \sqrt{7}i)/2.Ifpressureisrestrictedtox >= 0, therealphysicallevelisx = 2.$

B $Bothtypesoccur : realx = -1, 1andnon - realconjugatesx = (1 \pm \sqrt{7}i)/2.Ifpressureisrestrictedtox >= 0, therealphysicallevelisx = 1.$

C $Bothtypesoccur : realx = -1, 1andnon - realconjugatesx = (1 \pm \sqrt{7})/2.Ifpressureisrestrictedtox >= 0, therealphysicallevelisx = 1.$

D $Bothtypesoccur : realx = -1, 1andnon - realconjugatesx = (1 \pm \sqrt{7} - i)/2.Ifpressureisrestrictedtox >= 0, therealphysicallevelisx = 1.$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2) \quad x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | C03-K04-F01-VQ

Quiz M1 | QUIZ MCQ

C03-K04-QUIZ-MCQ-1

Solve $x^3 - 8 = 0$. Select the correct answer:

A $x = 2, -1 - \sqrt{3}, -1 + \sqrt{3}\,i$

B $x = 2, -1 - \sqrt{3} - i, -1 + \sqrt{3}\,i$

C $x = 2, -1 - \sqrt{3}\,i, -1 + \sqrt{4}\,i$

D $x = 2, -1 - \sqrt{3}\,i, -1 + \sqrt{3}\,i$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | C03-K04-F02-VQ

Quiz M2 | QUIZ MCQ

C03-K04-QUIZ-MCQ-2

A real cubic has root $1+2i$. Which root must also occur? Select the correct answer:

A $1-2$

B $1-2-i$

C $1-1i$

D $1-2i$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3-a^3=(x-a)(x^2+ax+a^2)$ $x^3+a^3=(x+a)(x^2-ax+a^2)$

Factor theorem

$P(a)=0 \iff (x-a)\mid P(x)$

Biquadratic substitution

$x^4+bx^2+c=0 \quad u=x^2$

Real-coefficient conjugates

$a+bi$ **root** $\Rightarrow a-bi$ **root**

Cube roots of unity

$w^3=1,\ w\neq 1 \Rightarrow w^2+w+1=0$

Repeated cubic root

$D=b^2-4ac=0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | C03-K04-F03-VQ

Quiz M3 | QUIZ MCQ

C03-K04-QUIZ-MCQ-3

For an imaginary cube root of unity w, evaluate $w^2 + w$ Select the correct answer:

A -1 (sign error)

B -1

C 0

D $-1 - 1$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F04 | C03-K04-F04-VQ

Quiz M4 | QUIZ MCQ

C03-K04-QUIZ-MCQ-4

For the remaining quadratic factor, a repeated root requires Select the correct answer:

A $D = 0$ (sign error)

B $D = 0$

C $D = 1$

D $D = 0 - 1$

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) \quad x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F01 | C03-K04-F01-VQ

Quiz W1 | QUIZ WRITTEN

C03-K04-QUIZ-WRITTEN-1

Solve $x^4 - 5x^2 + 4 = 0$.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F02 | C03-K04-F02-VQ

Quiz W2 | QUIZ WRITTEN

C03-K04-QUIZ-WRITTEN-2

For $x^3 + ax^2 + bx + 10 = 0$ with root $1 + 2i$, find a, b, and the other roots.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$P(a) = 0 \iff (x - a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F03 | C03-K04-F03-VQ

Quiz W3 | QUIZ WRITTEN

C03-K04-QUIZ-WRITTEN-3

For an imaginary cube root of unity w, evaluate $(1 + w)(1 + w^2)$.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x - a)(x^2 + ax + a^2)$ $x^3 + a^3 = (x + a)(x^2 - ax + a^2)$

Factor theorem

$$P(a) = 0 \iff (x - a) \mid P(x)$$

Biquadratic substitution

$$x^4 + bx^2 + c = 0 \quad u = x^2$$

Real-coefficient conjugates

$$a + bi \text{ root} \Rightarrow a - bi \text{ root}$$

Cube roots of unity

$$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

Concept 4 | Higher-Degree Equations

F04 | C03-K04-F04-VQ

Quiz W4 | QUIZ WRITTEN

C03-K04-QUIZ-WRITTEN-4

Find all real a for $x^3 - 2x^2 + (a-3)x + a = 0$ to have a repeated root.

WORKING AREA

FORMULA BANK

Difference / sum of cubes

$x^3 - a^3 = (x-a)(x^2+ax+a^2)$ $x^3 + a^3 = (x+a)(x^2-ax+a^2)$

Factor theorem

$P(a) = 0 \iff (x-a) \mid P(x)$

Biquadratic substitution

$x^4 + bx^2 + c = 0 \quad u = x^2$

Real-coefficient conjugates

$a + bi$ **root** $\Rightarrow a - bi$ **root**

Cube roots of unity

$w^3 = 1,\ w \neq 1 \Rightarrow w^2 + w + 1 = 0$

Repeated cubic root

$D = b^2 - 4ac = 0$ for the remaining quadratic

EGYPTIAN BACCALAUREATE • 2026

MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 04

Geometry and Equations

3 Concepts | 734 questions

B5 Landscape | one question per teaching page

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Chapter 04 | Geometry and Equations

CLASSROOM ROUTE

Concept 1 | Coordinate Geometry Basics — 224 questions

Official lessons: 4-1, 4-2, 4-3, 4-4, 4-5, 4-6

Concept 2 | Triangles and Lines — 260 questions

Official lessons: 4-7, 4-8, 4-9, 4-10, 4-11, 4-12, 4-13, 4-14, 4-15

Concept 3 | Circles — 250 questions

Official lessons: 4-16, 4-17, 4-18, 4-19, 4-20, 4-21, 4-22, 4-23, 4-24, 4-25, 4-26

Formula Bank changes at each Concept boundary.

Concept 1 | Coordinate Geometry Basics — **OFFICIAL LESSONS 4-1, 4-2, 4-3, 4-4, 4-5, 4-6**

Coordinate Geometry Basics

Equation-first recall | use the same rail beside every question in this Concept

Number line

$$AB = |b - a| \qquad M = \frac{a + b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m + n}, \frac{ny_1 + my_2}{m + n} \right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3} \right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Start with the family cue, write the first move, then use the working grid.

Concept 1 | Coordinate Geometry Basics

F01 | V01

Q001 | WRITTEN

C04-K01-41-WA-001

A (−4), B (8): distance AB

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V01

Q002 | WRITTEN

C04-K01-41-TR-005

A (−5), B (7): distance AB

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V01

Q003 | WRITTEN

C04-K01-41-EX-009

For two points A (-2) and B (6), find the distance AB.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V01

Q004 | WRITTEN

C04-K01-41-EX-013

For two points A (4) and B (10), find the distance AB.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V01

Q005 | MCQ

C04-K01-41-WA-001-MCQ

Find a (−4), B (8): distance AB:

A 11

B −12

C 12

D 13

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V01

Q006 | MCQ

C04-K01-41-TR-005-MCQ

Find a (−5), B (7): distance AB:

A 11

B −12

C 12

D 13

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V01

Q007 | MCQ

C04-K01-41-EX-009-MCQ

For two points A (-2) and B (6), find the distance AB:

A 7

B -8

C 8

D 9

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V01

Q008 | MCQ

C04-K01-41-EX-013-MCQ

For two points A (4) and B (10), find the distance AB:

A 5

B -6

C 6

D 7

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V02

Q009 | WRITTEN

C04-K01-41-WA-002

A (−4), B (8): internal point C in ratio 2:1

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V02

Q010 | WRITTEN

C04-K01-41-TR-006

A (−5), B (7): internal point C in ratio 2:1

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V02

Q011 | WRITTEN C04-K01-41-EX-010

For two points A (-2) and B (6), find the coordinate of point C dividing segment AB internally in the ratio 3:1.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V02

Q012 | WRITTEN

C04-K01-41-EX-014

For two points A (4) and B (10), find the coordinate of point C dividing segment AB internally in the ratio 2:1.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V02

Q013 | MCQ

C04-K01-41-WA-002-MCQ

Find a (−4), B (8): internal point C in ratio 2:1:

A −4

B 4

C 5

D 3

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V02

Q014 | MCQ

C04-K01-41-TR-006-MCQ

Find a (−5), B (7): internal point C in ratio 2:1:

A 2

B −3

C 3

D 4

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V02

Q015 | MCQ

C04-K01-41-EX-010-MCQ

For two points A (-2) and B (6), find the coordinate of point C dividing segment AB internally in the ratio 3:1:

A -4

B 4

C 5

D 3

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V02

Q016 | MCQ

C04-K01-41-EX-014-MCQ

For two points A (4) and B (10), find the coordinate of point C dividing segment AB internally in the ratio 2:1:

A -8

B 8

C 9

D 7

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V03

Q017 | WRITTEN

C04-K01-41-WA-003

A (−4), B (8): external point D in ratio 2:3

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V03

Q018 | WRITTEN

C04-K01-41-TR-007

A (-5), B (7): external point D in ratio 2:5

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V03

Q019 | WRITTEN

C04-K01-41-EX-011

For two points A (-2) and B (6), find the coordinate of point D dividing segment AB externally in the ratio 5:3.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V03

Q020 | WRITTEN

C04-K01-41-EX-015

For two points A (4) and B (10), find the coordinate of point D dividing segment AB externally in the ratio 1:3.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V03

Q021 | MCQ

C04-K01-41-WA-003-MCQ

Find a (−4), B (8): external point D in ratio 2:3:

A −28

B −27

C −29

D 28

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V03

Q022 | MCQ

C04-K01-41-TR-007-MCQ

Find a (−5), B (7): external point D in ratio 2:5:

A 13

B −13

C −12

D −14

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V03

Q023 | MCQ

C04-K01-41-EX-011-MCQ

For two points A (-2) and B (6), find the coordinate of point D dividing segment AB externally in the ratio 5:3:

A 18

B 19

C 17

D -18

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V03

Q024 | MCQ

C04-K01-41-EX-015-MCQ

For two points A (4) and B (10), find the coordinate of point D dividing segment AB externally in the ratio 1:3:

A -1

B 1

C 2

D 0

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a|$ $\quad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V04

Q025 | WRITTEN

C04-K01-41-WA-004

A (−4), B (8): midpoint M

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V04

Q026 | WRITTEN

C04-K01-41-TR-008

A (−5), B (7): midpoint M

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V04

Q027 | WRITTEN C04-K01-41-EX-012

For two points A (-2) and B (6), find the coordinate of midpoint M of segment AB.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F01 | V04

Q028 | WRITTEN C04-K01-41-EX-016

For two points A (4) and B (10), find the coordinate of midpoint M of segment AB.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V04

Q029 | MCQ

C04-K01-41-WA-004-MCQ

Find a (−4), B (8): midpoint M:

A 1

B −2

C 2

D 3

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F01 | V04

Q030 | MCQ

C04-K01-41-TR-008-MCQ

Find a (−5), B (7): midpoint M:

A 1

B 2

C 0

D −1

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F01 | V04

Q031 | MCQ

C04-K01-41-EX-012-MCQ

For two points A (-2) and B (6), find the coordinate of midpoint M of segment AB:

A 3

B 1

C -2

D 2

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F01 | V04

Q032 | MCQ

C04-K01-41-EX-016-MCQ

For two points A (4) and B (10), find the coordinate of midpoint M of segment AB:

A 7

B 8

C 6

D −7

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F99 | V01

Q033 | CHALLENGE WRITTEN

C04-K01-41-CH-017

Pods A (-8) and B (-3): fibre-optic tether length

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F99 | V01

Q034 | CHALLENGE WRITTEN

C04-K01-41-CH-018

Pods A (-8), B (-3): internal sensor point in ratio 1:4

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F99 | V01

Q035 | CHALLENGE WRITTEN C04-K01-41-CH-019

Pods A (−8), B (−3): external outpost in ratio 3:4

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F99 | V01

Q036 | CHALLENGE WRITTEN

C04-K01-41-CH-020

Pods A (-8), B (-3): midpoint supply hub

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F99 | V01

Q037 | CHALLENGE MCQ

C04-K01-41-CH-017-MCQ

Find pods A (-8) and B (-3): fibre-optic tether length:

A 5

B 6

C 4

D -5

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F99 | V01

Q038 | CHALLENGE MCQ C04-K01-41-CH-018-MCQ

Find pods A (-8), B (-3): internal sensor point in ratio 1:4:

A -8

B 7

C -7

D -6

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F99 | V01

Q039 | CHALLENGE MCQ

C04-K01-41-CH-019-MCQ

Find pods A (−8), B (−3): external outpost in ratio 3:4:

A 23

B −23

C −22

D −24

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F99 | V01

Q040 | CHALLENGE MCQ C04-K01-41-CH-020-MCQ

Find pods A (-8), B (-3): midpoint supply hub:

A $-13/2$

B $11/2$

C $-11/2$

D $-9/2$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q041 | WRITTEN C04-K01-42-WA-021

Point a has coordinates (2,3): determine its quadrant

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q042 | WRITTEN

C04-K01-42-WA-022

Point b has coordinates (2,-3): determine its quadrant

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q043 | WRITTEN

C04-K01-42-WA-023

Point c has coordinates (-2,3): determine its quadrant

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q044 | WRITTEN

C04-K01-42-WA-024

Point d has coordinates (-2,-3): determine its quadrant

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q045 | WRITTEN

C04-K01-42-TR-028

Point a has coordinates (-4,2): determine its quadrant

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q046 | WRITTEN C04-K01-42-TR-029

Point b has coordinates (1,2): determine its quadrant

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q047 | WRITTEN

C04-K01-42-TR-030

Point c has coordinates (3,-2): determine its quadrant

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q048 | WRITTEN

C04-K01-42-TR-031

Point d has coordinates (-3,-1): determine its quadrant

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q049 | WRITTEN

C04-K01-42-EX-035

Point a has coordinates (-3,1): determine its quadrant

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q050 | WRITTEN

C04-K01-42-EX-036

Point b has coordinates (2,-8): determine its quadrant

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q051 | WRITTEN

C04-K01-42-EX-037

Point c has coordinates (4,4): determine its quadrant

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q052 | WRITTEN

C04-K01-42-EX-038

Point d has coordinates (-6,-4): determine its quadrant

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q053 | WRITTEN

C04-K01-42-EX-039

Point e has coordinates (-2,6): determine its quadrant

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q054 | WRITTEN

C04-K01-42-EX-040

Point f has coordinates (3,-3): determine its quadrant

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q055 | WRITTEN

C04-K01-42-EX-041

Point g has coordinates (-5,-7): determine its quadrant

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q056 | WRITTEN

C04-K01-42-EX-042

Point h has coordinates (1,4): determine its quadrant

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q057 | MCQ

C04-K01-42-WA-021-MCQ

Point a has coordinates (2,3): determine its quadrant:

A III

B IV

C I

D II

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q058 | MCQ

C04-K01-42-WA-022-MCQ

Point b has coordinates (2,-3): determine its quadrant:

A III

B IV

C I

D II

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q059 | MCQ

C04-K01-42-WA-023-MCQ

Point c has coordinates (-2,3): determine its quadrant:

A *II*

B *I*

C *III*

D *IV*

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q060 | MCQ

C04-K01-42-WA-024-MCQ

Point d has coordinates (-2,-3): determine its quadrant:

A II

B IV

C III

D I

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q061 | MCQ

C04-K01-42-TR-028-MCQ

Point a has coordinates (-4,2): determine its quadrant:

A *II*

B *I*

C *III*

D *IV*

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q062 | MCQ

C04-K01-42-TR-029-MCQ

Point b has coordinates (1,2): determine its quadrant:

A III

B IV

C I

D II

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q063 | MCQ

C04-K01-42-TR-030-MCQ

Point c has coordinates (3,-2): determine its quadrant:

A III

B IV

C I

D II

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q064 | MCQ

C04-K01-42-TR-031-MCQ

Point d has coordinates (-3,-1): determine its quadrant:

A *III*

B *I*

C *II*

D *IV*

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q065 | MCQ

C04-K01-42-EX-035-MCQ

Point a has coordinates (-3,1): determine its quadrant:

A IV

B II

C I

D III

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q066 | MCQ

C04-K01-42-EX-036-MCQ

Point b has coordinates (2,-8): determine its quadrant:

A IV

B I

C II

D III

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q067 | MCQ

C04-K01-42-EX-037-MCQ

Point c has coordinates (4,4): determine its quadrant:

A I

B II

C III

D IV

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q068 | MCQ

C04-K01-42-EX-038-MCQ

Point d has coordinates (-6,-4): determine its quadrant:

A II

B IV

C III

D I

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q069 | MCQ

C04-K01-42-EX-039-MCQ

Point e has coordinates (-2,6): determine its quadrant:

A IV

B II

C I

D III

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q070 | MCQ

C04-K01-42-EX-040-MCQ

Point f has coordinates (3,-3): determine its quadrant:

A II

B III

C IV

D I

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q071 | MCQ

C04-K01-42-EX-041-MCQ

Point g has coordinates (-5,-7): determine its quadrant:

A II

B IV

C III

D I

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V01

Q072 | MCQ

C04-K01-42-EX-042-MCQ

Point h has coordinates (1,4): determine its quadrant:

A II

B III

C IV

D I

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V02

Q073 | WRITTEN C04-K01-42-WA-025

For point A $(-3,\ \ 2)$, find the coordinates of point P symmetric with respect to the x-axis.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V02

Q074 | WRITTEN

C04-K01-42-TR-032

For point A $(-1,\ \ 2)$, find the coordinates of point P symmetric with respect to the x-axis.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V02

Q075 | WRITTEN C04-K01-42-EX-043

For point A $(-4,\ -2)$, find the coordinates of point P symmetric with respect to the x-axis.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V02

Q076 | WRITTEN

C04-K01-42-EX-046

For point A $(1, \ -2)$, find the coordinates of point P symmetric with respect to the x-axis.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V02

Q077 | WRITTEN

C04-K01-42-EX-049

For point A $(-3,\ \ 4)$, find the coordinates of point P symmetric with respect to the x-axis.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V02

Q078 | MCQ

C04-K01-42-WA-025-MCQ

For point A $(-3,\ \ 2)$, find the coordinates of point P symmetric with respect to the x-axis:

A $(-3,\ \ 2)$

B $(3,\ \ -2)$

C $(-3,\ \ -2)$

D $(-2,\ \ -3)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V02

Q079 | MCQ

C04-K01-42-TR-032-MCQ

For point A $(-1,\ 2)$, find the coordinates of point P symmetric with respect to the x-axis:

A $(-2,\ -1)$

B $(-1,\ 2)$

C $(1,\ -2)$

D $(-1,\ -2)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V02

Q080 | MCQ C04-K01-42-EX-043-MCQ

For point A $(-4,\ -2)$, find the coordinates of point P symmetric with respect to the x-axis:

A $(-4,\ -2)$

B $(4,\ 2)$

C $(-4,\ 2)$

D $(2,\ -4)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V02

Q081 | MCQ

C04-K01-42-EX-046-MCQ

For point A $(1, \ -2)$, find the coordinates of point P symmetric with respect to the x-axis:

A $(2, \ 1)$

B $(1, \ -2)$

C $(-1, \ 2)$

D $(1, \ 2)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V02

Q082 | MCQ

C04-K01-42-EX-049-MCQ

For point A $(-3,\ 4)$, find the coordinates of point P symmetric with respect to the x-axis:

A $(-3,\ 4)$

B $(3,\ -4)$

C $(-3,\ -4)$

D $(-4,\ -3)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V03

Q083 | WRITTEN

C04-K01-42-WA-026

For point A $(-3, \quad 2)$, find the coordinates of point Q symmetric with respect to the y-axis.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V03

Q084 | WRITTEN

C04-K01-42-TR-033

For point A $(-1,\ \ 2)$, find the coordinates of point Q symmetric with respect to the y-axis.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V03

Q085 | WRITTEN C04-K01-42-EX-044

For point A $(-4, \ -2)$, find the coordinates of point Q symmetric with respect to the y-axis.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V03

Q086 | WRITTEN

C04-K01-42-EX-047

For point A $(1, \ -2)$, find the coordinates of point Q symmetric with respect to the y-axis.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V03

Q087 | WRITTEN C04-K01-42-EX-050

For point A $(-3,\ \ 4)$, find the coordinates of point Q symmetric with respect to the y-axis.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V03

Q088 | MCQ

C04-K01-42-WA-026-MCQ

For point A $(-3,\ 2)$, find the coordinates of point Q symmetric with respect to the y-axis:

A $(3,\ -2)$

B $(-3,\ 2)$

C $(3,\ 2)$

D $(2,\ 3)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V03

Q089 | MCQ

C04-K01-42-TR-033-MCQ

For point A $(-1,\ 2)$, find the coordinates of point Q symmetric with respect to the y-axis:

A $(1,\ -2)$

B $(-1,\ 2)$

C $(1,\ 2)$

D $(2,\ 1)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V03

Q090 | MCQ

C04-K01-42-EX-044-MCQ

For point A $(-4,\ -2)$, find the coordinates of point Q symmetric with respect to the y-axis:

A $(4,\ -2)$

B $(-2,\ 4)$

C $(4,\ 2)$

D $(-4,\ -2)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V03

Q091 | MCQ

C04-K01-42-EX-047-MCQ

For point A $(1, \ -2)$, find the coordinates of point Q symmetric with respect to the y-axis:

A $(-1, \ -2)$

B $(-2, \ -1)$

C $(-1, \ 2)$

D $(1, \ -2)$

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V03

Q092 | MCQ

C04-K01-42-EX-050-MCQ

For point A $(-3,\ 4)$, find the coordinates of point Q symmetric with respect to the y-axis:

A $(3,\ 4)$

B $(4,\ 3)$

C $(3,\ -4)$

D $(-3,\ 4)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V04

Q093 | WRITTEN C04-K01-42-WA-027

For point A $(-3,\ \ 2)$, find the coordinates of point R symmetric with respect to the origin.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V04

Q094 | WRITTEN

C04-K01-42-TR-034

For point A $(-1,\ \ 2)$, find the coordinates of point R symmetric with respect to the origin.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V04

Q095 | WRITTEN C04-K01-42-EX-045

For point A $(-4,\ -2)$, find the coordinates of point R symmetric with respect to the origin.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V04

Q096 | WRITTEN

C04-K01-42-EX-048

For point A $(1, \ -2)$, find the coordinates of point R symmetric with respect to the origin.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V04

Q097 | WRITTEN

C04-K01-42-EX-051

For point A $(-3,\ \ 4)$, find the coordinates of point R symmetric with respect to the origin.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V04

Q098 | MCQ

C04-K01-42-WA-027-MCQ

For point A $(-3,\ 2)$, find the coordinates of point R symmetric with respect to the origin:

A $(-3,\ -2)$

B $(3,\ -2)$

C $(-2,\ 3)$

D $(3,\ 2)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V04

Q099 | MCQ

C04-K01-42-TR-034-MCQ

For point A $(-1,\ 2)$, find the coordinates of point R symmetric with respect to the origin:

A $(-1,\ -2)$

B $(1,\ -2)$

C $(-2,\ 1)$

D $(1,\ 2)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | V04

Q100 | MCQ

C04-K01-42-EX-045-MCQ

For point A $(-4,\ -2)$, find the coordinates of point R symmetric with respect to the origin:

A $(-4,\ 2)$

B $(4,\ 2)$

C $(2,\ 4)$

D $(4,\ -2)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V04

Q101 | MCQ

C04-K01-42-EX-048-MCQ

For point A $(1, \ -2)$, find the coordinates of point R symmetric with respect to the origin:

A $(-1, \ 2)$

B $(2, \ -1)$

C $(-1, \ -2)$

D $(1, \ 2)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F02 | V04

Q102 | MCQ

C04-K01-42-EX-051-MCQ

For point A $(-3,\ 4)$, find the coordinates of point R symmetric with respect to the origin:

A $(-4,\ 3)$

B $(3,\ 4)$

C $(-3,\ -4)$

D $(3,\ -4)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F99 | V01

Q103 | CHALLENGE WRITTEN C04-K01-42-CH-052

A robotic welding arm is programmed at point A $(-3,\ 4)$ on a metal sheet. To weld identical support brackets, the arm must mirror this point: find the coordinates of point P symmetric with respect to the x-axis.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F99 | V01

Q104 | CHALLENGE WRITTEN C04-K01-42-CH-053

A robotic welding arm is programmed at point A $(-3,\ 4)$ on a metal sheet. To weld identical support brackets, the arm must mirror this point: find the coordinates of point Q symmetric with respect to the y-axis.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F99 | V01

Q105 | CHALLENGE WRITTEN C04-K01-42-CH-054

A robotic welding arm is programmed at point A $(-3,\ 4)$ on a metal sheet. To weld identical support brackets, the arm must mirror this point: find the coordinates of point R symmetric with respect to the origin.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F99 | V01

Q106 | CHALLENGE MCQ

C04-K01-42-CH-052-MCQ

A robotic welding arm is programmed at point A $(-3,\ 4)$ on a metal sheet. To weld identical support brackets, the arm must mirror this point: find the coordinates of point P symmetric with respect to the x-axis:

A $(-3,\ -4)$

B $(-4,\ -3)$

C $(-3,\ 4)$

D $(3,\ -4)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F99 | V01

Q107 | CHALLENGE MCQ

C04-K01-42-CH-053-MCQ

A robotic welding arm is programmed at point A $(-3,\ 4)$ on a metal sheet. To weld identical support brackets, the arm must mirror this point: find the coordinates of point Q symmetric with respect to the y-axis:

A $(-3,\ 4)$

B $(3,\ 4)$

C $(4,\ 3)$

D $(3,\ -4)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F99 | V01

Q108 | CHALLENGE MCQ

C04-K01-42-CH-054-MCQ

A robotic welding arm is programmed at point A $(-3,\ 4)$ on a metal sheet. To weld identical support brackets, the arm must mirror this point: find the coordinates of point R symmetric with respect to the origin:

A $(3,\ 4)$

B $(-3,\ -4)$

C $(3,\ -4)$

D $(-4,\ 3)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F03 | V01

Q109 | WRITTEN

C04-K01-43-WA-055

Distance between A (2, 6) and B (5, 10)

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F03 | V01

Q110 | WRITTEN

C04-K01-43-TR-057

Distance between A (4, 3) and B (1, 2)

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F03 | V01

Q111 | WRITTEN

C04-K01-43-TR-058

Distance between A($\sqrt{3}$,-1) and B (0, 1)

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a|$ $M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F03 | V01

Q112 | WRITTEN

C04-K01-43-EX-061

Distance between A (1, 2) and B (11, 7)

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F03 | V01

Q113 | WRITTEN

C04-K01-43-EX-062

Distance between A $(3,\ -1)$ and B $(-1,\ 3)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F03 | V01

Q114 | MCQ

C04-K01-43-WA-055-MCQ

Find distance between A (2, 6) and B (5, 10):

A 4

B −5

C 5

D 6

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F03 | V01

Q115 | MCQ

C04-K01-43-TR-057-MCQ

Find distance between A (4, 3) and B (1, 2):

A $\sqrt{10}$

B $2\sqrt{10}$

C (10)

D 1

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F03 | V01

Q116 | MCQ

C04-K01-43-TR-058-MCQ

Find distance between A($\sqrt{3}$,-1) and B (0, 1):

A (7)

B 1

C $\sqrt{7}$

D $2\sqrt{7}$

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a|$ $M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F03 | V01

Q117 | MCQ

C04-K01-43-EX-061-MCQ

Find distance between A (1, 2) and B (11, 7):

A 1

B $5\sqrt{5}$

C $52\sqrt{5}$

D 5(5)

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a|$ $M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F03 | V01

Q118 | MCQ

C04-K01-43-EX-062-MCQ

Find distance between A (3, −1) and B (−1, 3):

A $4\sqrt{2}$

B $42\sqrt{2}$

C 4(2)

D 1

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F03 | V02

Q119 | WRITTEN

C04-K01-43-WA-056

A $(3, \ -2)$, B $(x, \ 1)$, distance 5: find x

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F03 | V02

Q120 | WRITTEN

C04-K01-43-TR-060

A $(-1,\ \ 3)$, B $(x,\ \ 1)$, distance $\sqrt{5}$: find x

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F03 | V02

Q121 | WRITTEN

C04-K01-43-EX-064

A $(3,\ -1)$, B $(x,\ 2)$, distance 5: find x

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F03 | V02

Q122 | WRITTEN

C04-K01-43-EX-065

A $(1, \ -3)$, B $(-2, \ y)$, distance $\sqrt{13}$: find y

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F03 | V02

Q123 | WRITTEN

C04-K01-43-EX-066

A $(-4, \ -2)$, B $(x, \ 3)$, distance 5sqrt(5): find x

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F03 | V02

Q124 | MCQ

C04-K01-43-WA-056-MCQ

A $(3,\ -2)$, B $(x,\ 1)$, distance 5: find x:

A $x = -1,\ 7 (one value only)$

B $x = -1,\ 7$

C $x = +1,\ 7$

D $x = -17$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F03 | V02

Q125 | MCQ

C04-K01-43-TR-060-MCQ

A $(-1,\ 3)$, B $(x,\ 1)$, distance $\sqrt{5}$: find x:

A $x = -20$

B $x = -2,\ 0 (one value only)$

C $x = -2,\ 0$

D $x = +2,\ 0$

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F03 | V02

Q126 | MCQ

C04-K01-43-EX-064-MCQ

A $(3,\ -1)$, B $(x,\ 2)$, distance 5: find x:

A $x = -1,\ 7 (one value only)$

B $x = -1,\ 7$

C $x = +1,\ 7$

D $x = -17$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F03 | V02

Q127 | MCQ

C04-K01-43-EX-065-MCQ

A $(1,\ -3)$, B $(-2,\ y)$, distance $\sqrt{13}$: find y:

A $y = -5,\ -1$

B $y = +5,\ -1$

C $y = -5 - 1$

D $y = -5,\ -1 (onevalueonly)$

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F03 | V02

Q128 | MCQ

C04-K01-43-EX-066-MCQ

A (−4, −2), B (x, 3), distance 5sqrt(5): find x:

A $x = +14,\ 6$

B $x = -146$

C $x = -14,\ 6 (onevalueonly)$

D $x = -14,\ 6$

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F03 | V03

Q129 | WRITTEN

C04-K01-43-TR-059

Distance from origin to A $(2, \ -4)$

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F03 | V03

Q130 | WRITTEN

C04-K01-43-EX-063

Distance from origin to A $(-3,\ \ 4)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F03 | V03

Q131 | MCQ

C04-K01-43-TR-059-MCQ

Find distance from origin to A $(2, \ -4)$:

A $2(5)$

B 1

C $2\sqrt{5}$

D $22\sqrt{5}$

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F03 | V03

Q132 | MCQ

C04-K01-43-EX-063-MCQ

Find distance from origin to A $(-3,\ 4)$:

A 4

B -5

C 5

D 6

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a|$ $\quad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F99 | V02

Q133 | CHALLENGE WRITTEN

C04-K01-43-CH-067

Distance between (x,7) and (3x-1,-5) is 13: find x

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F99 | V02

Q134 | CHALLENGE MCQ

C04-K01-43-CH-067-MCQ

Distance between (x,7) and (3x-1,-5) is 13: find x:

A $x = -23$

B $x = -2,\ 3 (onevalueonly)$

C $x = -2,\ 3$

D $x = +2,\ 3$

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F04 | V01

Q135 | WRITTEN

C04-K01-44-WA-068

Point on the x-axis equidistant from A $(-2,\ \ 1)$ and B $(3,\ \ 4)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F04 | V01

Q136 | WRITTEN

C04-K01-44-TR-070

Point on the y-axis equidistant from A (4, 2) and B (1, −1)

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F04 | V01

Q137 | WRITTEN

C04-K01-44-EX-072

Point on the x-axis equidistant from A $(-1,\ \ 2)$ and B $(4,\ \ 3)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F04 | V01

Q138 | WRITTEN

C04-K01-44-EX-073

Point on the y-axis equidistant from A $(-5,\ \ 2)$ and B $(3,\ \ 5)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F04 | V01

Q139 | WRITTEN

C04-K01-44-EX-074

Point on the x-axis equidistant from A $(-1,\ \ 2)$ and B $(3,\ \ 8)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F04 | V01

Q140 | MCQ

C04-K01-44-WA-068-MCQ

Find point on the x-axis equidistant from A $(-2,\ 1)$ and B $(3,\ 4)$:

A $(-2,\ 0)$

B $(-3,\ 0)$

C $(2,\ 0)$

D $(0,\ 2)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F04 | V01

Q141 | MCQ

C04-K01-44-TR-070-MCQ

Find point on the y-axis equidistant from A (4, 2) and B (1, −1):

A (0, 3)

B (3, 0)

C (0, −3)

D (−1, 3)

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F04 | V01

Q142 | MCQ

C04-K01-44-EX-072-MCQ

Find point on the x-axis equidistant from A $(-1,\ 2)$ and B $(4,\ 3)$:

A $(-2,\ 0)$

B $(-3,\ 0)$

C $(2,\ 0)$

D $(0,\ 2)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F04 | V01

Q143 | MCQ

C04-K01-44-EX-073-MCQ

Find point on the y-axis equidistant from A $(-5,\ 2)$ and B $(3,\ 5)$:

A $(0,\ -5/6)$

B $(-1,\ 5/6)$

C $(0,\ 5/6)$

D $(5/6,\ 0)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F04 | V01

Q144 | MCQ

C04-K01-44-EX-074-MCQ

Find point on the x-axis equidistant from A $(-1,\ 2)$ and B $(3,\ 8)$:

A $(-19/2,\ 0)$

B $(17/2,\ 0)$

C $(0,\ 17/2)$

D $(-17/2,\ 0)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F04 | V02

Q145 | WRITTEN

C04-K01-44-WA-069

Point on $y = 2x - 1$ equidistant from A $(1,\ \ 4)$ and B $(3,\ \ 1)$

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F04 | V02

Q146 | WRITTEN

C04-K01-44-TR-071

Point on $y = 3x + 1$ equidistant from A $(4, \ -5)$ and B $(2, \ -3)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a + b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m + n}, \frac{ny_1 + my_2}{m + n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F04 | V02

Q147 | WRITTEN

C04-K01-44-EX-075

Point on $y = 2x - 3$ equidistant from A $(1, \ 4)$ and B $(3, \ -2)$

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F04 | V02

Q148 | WRITTEN

C04-K01-44-EX-076

Point on $y = x - 1$ equidistant from A $(-1,\ \ 5)$ and B $(7,\ \ -1)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F04 | V02

Q149 | WRITTEN

C04-K01-44-EX-077

Point on $y = -x + 1$ equidistant from A $(1,\ \ 2)$ and B $(-3,\ \ 6)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F04 | V02

Q150 | MCQ

C04-K01-44-WA-069-MCQ

Find point on $y = 2x - 1$ equidistant from A $(1,\ 4)$ and B $(3,\ 1)$:

A $(-13/8,\ 9/4)$

B $(13/8,\ 9/4)$

C $(9/4,\ 13/8)$

D $(13/8,\ -9/4)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F04 | V02

Q151 | MCQ

C04-K01-44-TR-071-MCQ

Find point on $y = 3x + 1$ equidistant from A $(4,\ -5)$ and B $(2,\ -3)$:

A $(-4,\ 11)$

B $(4,\ -11)$

C $(-4,\ -11)$

D $(-11,\ -4)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F04 | V02

Q152 | MCQ

C04-K01-44-EX-075-MCQ

Find point on $y = 2x - 3$ equidistant from A $(1,\ 4)$ and B $(3,\ -2)$:

A $(2,\ 1)$

B $(1,\ 2)$

C $(2,\ -1)$

D $(-2,\ 1)$

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F04 | V02

Q153 | MCQ

C04-K01-44-EX-076-MCQ

Find point on $y = x - 1$ equidistant from A $(-1,\ 5)$ and B $(7,\ -1)$:

A $(3,\ -2)$

B $(-3,\ 2)$

C $(3,\ 2)$

D $(2,\ 3)$

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F04 | V02

Q154 | MCQ

C04-K01-44-EX-077-MCQ

Find point on $y = -x + 1$ equidistant from A $(1,\ \ 2)$ and B $(-3,\ \ 6)$:

A $(2,\ \ 3)$

B $(-2,\ \ 3)$

C $(3,\ \ -2)$

D $(-2,\ \ -3)$

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \dfrac{a+b}{2}$

Plane division

$P = \left(\dfrac{nx_1 + mx_2}{m+n}, \dfrac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\dfrac{x_1 + x_2 + x_3}{3}, \dfrac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F99 | V02

Q155 | CHALLENGE WRITTEN C04-K01-44-CH-078

A (2, 1), B (4, 5), C (3, y) with CA=CB and D (x, 0) with DA=DB: find CD

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a|$ $M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F99 | V02

Q156 | CHALLENGE MCQ

C04-K01-44-CH-078-MCQ

A (2, 1), B (4, 5), C (3, y) with CA=CB and D (x, 0) with DA=DB: find CD:

A $3\sqrt{5}$

B $32\sqrt{5}$

C 3(5)

D 1

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F05 | V01

Q157 | WRITTEN

C04-K01-45-WA-079

Given A $(-2,\ -3)$, B $(3,\ 7)$, and C $(5,\ 2)$, find the coordinates of point P dividing segment BA internally in the ratio 1:2.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V01

Q158 | WRITTEN

C04-K01-45-TR-083

Given A $(-3,\ 4)$, B $(1,\ -4)$, and C $(-4,\ 3)$, find the coordinates of point P dividing segment AC internally in the ratio 3:1.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V01

Q159 | WRITTEN

C04-K01-45-EX-087

Given A $(2,\ 3)$, B $(2,\ -3)$, and C $(-2,\ 3)$, find the coordinates of point P dividing segment AB internally in the ratio 4:1.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V01

Q160 | WRITTEN

C04-K01-45-EX-091

Given A $(-2,\ 1)$, B $(6,\ -3)$, and C $(1,\ 7)$, find the coordinates of point P dividing segment BC internally in the ratio 3:2.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V01

Q161 | WRITTEN

C04-K01-45-EX-095

Given A $(-4,\ 5)$, B $(1,\ -5)$, and C $(3,\ 0)$, find the coordinates of point P dividing segment BA internally in the ratio 1:2.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V01

Q162 | MCQ

C04-K01-45-WA-079-MCQ

Given A $(-2,\ -3)$, B $(3,\ 7)$, and C $(5,\ 2)$, find the coordinates of point P dividing segment BA internally in the ratio 1:2:

A $(4/3,\ -11/3)$

B $(-4/3,\ 11/3)$

C $(4/3,\ 11/3)$

D $(11/3,\ 4/3)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F05 | V01

Q163 | MCQ

C04-K01-45-TR-083-MCQ

Given A $(-3,\ 4)$, B $(1,\ -4)$, and C $(-4,\ 3)$, find the coordinates of point P dividing segment AC internally in the ratio 3:1:

A $(-15/4,\ -13/4)$

B $(15/4,\ 13/4)$

C $(-15/4,\ 13/4)$

D $(13/4,\ -15/4)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V01

Q164 | MCQ

C04-K01-45-EX-087-MCQ

Given A (2, 3), B (2, −3), and C (−2, 3), find the coordinates of point P dividing segment AB internally in the ratio 4:1:

A (2, 9/5)

B (−2, −9/5)

C (2, −9/5)

D (−9/5, 2)

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V01

Q165 | MCQ C04-K01-45-EX-091-MCQ

Given A $(-2,\ 1)$, B $(6,\ -3)$, and C $(1,\ 7)$, find the coordinates of point P dividing segment BC internally in the ratio 3:2:

A $(-3,\ 3)$

B $(-3,\ -3)$

C $(3,\ 3)$

D $(3,\ -3)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V01

Q166 | MCQ C04-K01-45-EX-095-MCQ

Given A $(-4,\ 5)$, B $(1,\ -5)$, and C $(3,\ 0)$, find the coordinates of point P dividing segment BA internally in the ratio 1:2:

A $(-2/3,\ -5/3)$

B $(-5/3,\ -2/3)$

C $(-2/3,\ 5/3)$

D $(2/3,\ -5/3)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F05 | V02

Q167 | WRITTEN

C04-K01-45-WA-080

Given A $(-2,\ -3)$, B $(3,\ 7)$, and C $(5,\ 2)$, find the coordinates of point Q dividing segment BC externally in the ratio 1:3.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V02

Q168 | WRITTEN

C04-K01-45-TR-084

Given A $(-3,\ 4)$, B $(1,\ -4)$, and C $(-4,\ 3)$, find the coordinates of point Q dividing segment BC externally in the ratio 2:3.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V02

Q169 | WRITTEN

C04-K01-45-EX-088

Given A $(2,\ 3)$, B $(2,\ -3)$, and C $(-2,\ 3)$, find the coordinates of point Q dividing segment BC externally in the ratio 2:3.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F05 | V02

Q170 | WRITTEN

C04-K01-45-EX-092

Given A $(-2,\ 1)$, B $(6,\ -3)$, and C $(1,\ 7)$, find the coordinates of point Q dividing segment CA externally in the ratio 3:2.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F05 | V02

Q171 | WRITTEN

C04-K01-45-EX-096

Given A $(-4,\ 5)$, B $(1,\ -5)$, and C $(3,\ 0)$, find the coordinates of point Q dividing segment BC externally in the ratio 1:3.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V02

Q172 | MCQ

C04-K01-45-WA-080-MCQ

Given A $(-2,\ -3)$, B $(3,\ 7)$, and C $(5,\ 2)$, find the coordinates of point Q dividing segment BC externally in the ratio 1:3:

A $(-2,\ 19/2)$

B $(2,\ 19/2)$

C $(19/2,\ 2)$

D $(2,\ -19/2)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V02

Q173 | MCQ

C04-K01-45-TR-084-MCQ

Given A $(-3,\ 4)$, B $(1,\ -4)$, and C $(-4,\ 3)$, find the coordinates of point Q dividing segment BC externally in the ratio 2:3:

A $(11,\ 18)$

B $(-11,\ -18)$

C $(11,\ -18)$

D $(-18,\ 11)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F05 | V02

Q174 | MCQ

C04-K01-45-EX-088-MCQ

Given A (2, 3), B (2, −3), and C (−2, 3), find the coordinates of point Q dividing segment BC externally in the ratio 2:3:

A (−10, −15)

B (10, −15)

C (−15, 10)

D (10, 15)

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V02

Q175 | MCQ C04-K01-45-EX-092-MCQ

Given A $(-2,\ 1)$, B $(6,\ -3)$, and C $(1,\ 7)$, find the coordinates of point Q dividing segment CA externally in the ratio 3:2:

A $(8,\ -11)$

B $(-8,\ -11)$

C $(-11,\ -8)$

D $(-8,\ 11)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F05 | V02

Q176 | MCQ

C04-K01-45-EX-096-MCQ

Given A $(-4,\ 5)$, B $(1,\ -5)$, and C $(3,\ 0)$, find the coordinates of point Q dividing segment BC externally in the ratio 1:3:

A $(0,\ 15/2)$

B $(-1,\ -15/2)$

C $(0,\ -15/2)$

D $(-15/2,\ 0)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q177 | WRITTEN

C04-K01-45-WA-081

Given A $(-2,\ -3)$, B $(3,\ 7)$, and C $(5,\ 2)$, find the coordinates of midpoint M of segment CA.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q178 | WRITTEN

C04-K01-45-WA-082

Given A $(-2,\ -3)$, B $(3,\ 7)$, and C $(5,\ 2)$, find the coordinates of centroid G of triangle ABC.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q179 | WRITTEN

C04-K01-45-TR-085

Given A $(-3,\ 4)$, B $(1,\ -4)$, and C $(-4,\ 3)$, find the coordinates of midpoint M of segment AB.

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q180 | WRITTEN

C04-K01-45-TR-086

Given A $(-3,\ 4)$, B $(1,\ -4)$, and C $(-4,\ 3)$, find the coordinates of centroid G of triangle ABC.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q181 | WRITTEN

C04-K01-45-EX-089

Given A (2, 3), B (2, −3), and C (−2, 3), find the coordinates of midpoint M of segment CA.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q182 | WRITTEN

C04-K01-45-EX-090

Given A (2, 3), B (2, −3), and C (−2, 3), find the coordinates of centroid G of triangle ABC.

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q183 | WRITTEN

C04-K01-45-EX-093

Given A $(-2,\ 1)$, B $(6,\ -3)$, and C $(1,\ 7)$, find the coordinates of midpoint M of segment AB.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q184 | WRITTEN

C04-K01-45-EX-094

Given A $(-2,\ 1)$, B $(6,\ -3)$, and C $(1,\ 7)$, find the coordinates of centroid G of triangle ABC.

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q185 | WRITTEN

C04-K01-45-EX-097

Given A $(-4,\ 5)$, B $(1,\ -5)$, and C $(3,\ 0)$, find the coordinates of midpoint M of segment BC.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q186 | WRITTEN

C04-K01-45-EX-098

Given A $(-4,\ 5)$, B $(1,\ -5)$, and C $(3,\ 0)$, find the coordinates of centroid G of triangle ABC.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q187 | MCQ C04-K01-45-WA-081-MCQ

Given A $(-2,\ -3)$, B $(3,\ 7)$, and C $(5,\ 2)$, find the coordinates of midpoint M of segment CA:

A $(3/2,\ -1/2)$

B $(-1/2,\ 3/2)$

C $(3/2,\ 1/2)$

D $(-3/2,\ -1/2)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q188 | MCQ

C04-K01-45-WA-082-MCQ

Given A $(-2,\ -3)$, B $(3,\ 7)$, and C $(5,\ 2)$, find the coordinates of centroid G of triangle ABC:

A $(-2,\ 2)$

B $(-2,\ -2)$

C $(2,\ 2)$

D $(2,\ -2)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q189 | MCQ

C04-K01-45-TR-085-MCQ

Given A $(-3,\ 4)$, B $(1,\ -4)$, and C $(-4,\ 3)$, find the coordinates of midpoint M of segment AB:

A $(0,\ 0)$

B $(-1,\ 0)$

C $(0,\ -1)$

D $(1,\ 0)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q190 | MCQ

C04-K01-45-TR-086-MCQ

Given A $(-3,\ 4)$, B $(1,\ -4)$, and C $(-4,\ 3)$, find the coordinates of centroid G of triangle ABC:

A $(-2,\ 1)$

B $(1,\ -2)$

C $(-2,\ -1)$

D $(2,\ 1)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q191 | MCQ

C04-K01-45-EX-089-MCQ

Given A (2, 3), B (2, −3), and C (−2, 3), find the coordinates of midpoint M of segment CA:

A (0, 3)

B (3, 0)

C (0, −3)

D (−1, 3)

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q192 | MCQ

C04-K01-45-EX-090-MCQ

Given A (2, 3), B (2, −3), and C (−2, 3), find the coordinates of centroid G of triangle ABC:

A (1, 2/3)

B (2/3, −1)

C (−2/3, 1)

D (2/3, 1)

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q193 | MCQ C04-K01-45-EX-093-MCQ

Given A $(-2,\ 1)$, B $(6,\ -3)$, and C $(1,\ 7)$, find the coordinates of midpoint M of segment AB:

A $(-2,\ -1)$

B $(2,\ -1)$

C $(-1,\ 2)$

D $(2,\ 1)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q194 | MCQ

C04-K01-45-EX-094-MCQ

Given A $(-2,\ 1)$, B $(6,\ -3)$, and C $(1,\ 7)$, find the coordinates of centroid G of triangle ABC:

A $(5/3,\ 5/3)$

B $(5/3,\ -5/3)$

C $(-5/3,\ 5/3)$

D $(-5/3,\ -5/3)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q195 | MCQ

C04-K01-45-EX-097-MCQ

Given A $(-4,\ 5)$, B $(1,\ -5)$, and C $(3,\ 0)$, find the coordinates of midpoint M of segment BC:

A $(-2,\ -5/2)$

B $(2,\ -5/2)$

C $(-5/2,\ 2)$

D $(2,\ 5/2)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F05 | V03

Q196 | MCQ

C04-K01-45-EX-098-MCQ

Given A $(-4,\ 5)$, B $(1,\ -5)$, and C $(3,\ 0)$, find the coordinates of centroid G of triangle ABC:

A 1

B 2

C $(0,\ 0)$

D $(-1,\ 0)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F99 | V02

Q197 | CHALLENGE WRITTEN

C04-K01-45-CH-099

A $(-2,\ 3)$, B $(6,\ 1)$, C $(0,\ y)$, CA=CB: find the centroid G

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F99 | V02

Q198 | CHALLENGE MCQ

C04-K01-45-CH-099-MCQ

A $(-2,\ 3)$, B $(6,\ 1)$, C $(0,\ y)$, CA=CB: find the centroid G:

A $(4/3,\ 2/3)$

B $(-4/3,\ -2/3)$

C $(4/3,\ -2/3)$

D $(-2/3,\ 4/3)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F06 | V01

Q199 | WRITTEN

C04-K01-46-WA-100

Point with A $(-3,\ \ 2)$ symmetric about centre $(2, 6)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F06 | V01

Q200 | WRITTEN

C04-K01-46-TR-101

Point with A $(1, \ -2)$ symmetric about centre $(2, 3)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a + b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m + n}, \frac{ny_1 + my_2}{m + n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F06 | V01

Q201 | WRITTEN

C04-K01-46-TR-102

Point with A (3, 2) symmetric about centre (-1, 5)

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F06 | V01

Q202 | WRITTEN

C04-K01-46-EX-103

Point with A $(-3,\ \ 1)$ symmetric about centre $(2,\ 0)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F06 | V01

Q203 | WRITTEN

C04-K01-46-EX-104

Point with A (7, 4) symmetric about centre (-3, 5)

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F06 | V01

Q204 | WRITTEN

C04-K01-46-EX-105

Point with A (4, −8) symmetric about centre (-3, 2)

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F06 | V01

Q205 | WRITTEN

C04-K01-46-EX-106

Point with A (0, −4) symmetric about centre (-4, 1)

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F06 | V01

Q206 | WRITTEN

C04-K01-46-EX-107

Point with A (−4, 2) symmetric about centre (-1, -3)

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F06 | V01

Q207 | MCQ

C04-K01-46-WA-100-MCQ

Find point with A $(-3,\ 2)$ symmetric about centre $(2,\ 6)$:

A $(7,\ -10)$

B $(-7,\ 10)$

C $(7,\ 10)$

D $(10,\ 7)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F06 | V01

Q208 | MCQ

C04-K01-46-TR-101-MCQ

Find point with A $(1,\ -2)$ symmetric about centre $(2,\ 3)$:

A $(-3,\ 8)$

B $(3,\ 8)$

C $(8,\ 3)$

D $(3,\ -8)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F06 | V01

Q209 | MCQ

C04-K01-46-TR-102-MCQ

Find point with A (3, 2) symmetric about centre (-1, 5):

A (−5, 8)

B (8, −5)

C (−5, −8)

D (5, 8)

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F06 | V01

Q210 | MCQ

C04-K01-46-EX-103-MCQ

Find point with A $(-3,\ 1)$ symmetric about centre $(2,\ 0)$:

A $(7,\ 1)$

B $(-7,\ -1)$

C $(7,\ -1)$

D $(-1,\ 7)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F06 | V01

Q211 | MCQ

C04-K01-46-EX-104-MCQ

Find point with A (7, 4) symmetric about centre (-3, 5):

A $(-13, -6)$

B $(13, 6)$

C $(-13, 6)$

D $(6, -13)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F06 | V01

Q212 | MCQ

C04-K01-46-EX-105-MCQ

Find point with A (4, −8) symmetric about centre (-3, 2):

A (−10, −12)

B (10, 12)

C (−10, 12)

D (12, −10)

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F06 | V01

Q213 | MCQ

C04-K01-46-EX-106-MCQ

Find point with A $(0, \ -4)$ symmetric about centre (-4, 1):

A $(8, \ 6)$

B $(-8, \ 6)$

C $(6, \ -8)$

D $(-8, \ -6)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F06 | V01

Q214 | MCQ

C04-K01-46-EX-107-MCQ

Find point with A (−4, 2) symmetric about centre (-1, -3):

A (2, −8)

B (−8, 2)

C (2, 8)

D (−2, −8)

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F99 | V02

Q215 | CHALLENGE WRITTEN

C04-K01-46-CH-108

B $(m,\ 5)$, C $(4,\ n)$ symmetric about A $(1,\ -1)$: find m+n

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a|$ $\quad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F99 | V02

Q216 | CHALLENGE MCQ

C04-K01-46-CH-108-MCQ

B $(m,\ 5)$, C $(4,\ n)$ symmetric about A $(1,\ -1)$: find m+n:

A -10

B 9

C -9

D -8

WORKING AREA

FORMULA BANK

Number line

$AB = |b - a| \qquad M = \frac{a+b}{2}$

Plane division

$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$

Distance

$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Centroid

$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

Symmetry

$B = 2A - P$ (centre is the midpoint)

Concept 1 | Coordinate Geometry Basics

F02 | C04-K01-F02-VQ

Quiz M1 | QUIZ MCQ

C04-K01-QUIZ-MCQ-1

Point A $(-3,\ \ 4)$ lies in which quadrant?:

A II

B I

C III

D IV

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F03 | C04-K01-F03-VQ

Quiz M2 | QUIZ MCQ

C04-K01-QUIZ-MCQ-2

Find the distance between A (1, 2) and B (4, 6):

A -5

B 5

C 6

D 4

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F05 | C04-K01-F05-VQ

Quiz M3 | QUIZ MCQ

C04-K01-QUIZ-MCQ-3

Point P divides the segment from A $(-2,\ 3)$ to B $(6,\ 1)$ internally in ratio 1:3. Find P:

A $(0,\ -5/2)$

B $(-1,\ 5/2)$

C $(0,\ 5/2)$

D $(5/2,\ 0)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F06 | C04-K01-F06-VQ

Quiz M4 | QUIZ MCQ

C04-K01-QUIZ-MCQ-4

Point B is symmetric to A $(2,\ -1)$ about P $(-3,\ 4)$. Find B:

A $(-8,\ -9)$

B $(8,\ 9)$

C $(-8,\ 9)$

D $(9,\ -8)$

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F04 | C04-K01-F04-VQ

Quiz W1 | QUIZ WRITTEN

C04-K01-QUIZ-WRITTEN-1

Find the point on $y = 2x + 1$ equidistant from A $(0,\ \ 2)$ and B $(4,\ \ 0)$.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F01 | C04-K01-F01-VQ

Quiz W2 | QUIZ WRITTEN

C04-K01-QUIZ-WRITTEN-2

For points A (-5) and B (7), find the point dividing AB externally in ratio 2:5.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F03 | C04-K01-F03-VQ

Quiz W3 | QUIZ WRITTEN

C04-K01-QUIZ-WRITTEN-3

If the distance between A $(3,\ -1)$ and B $(x,\ 2)$ is 5, find x.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 1 | Coordinate Geometry Basics

F05 | C04-K01-F05-VQ

Quiz W4 | QUIZ WRITTEN

C04-K01-QUIZ-WRITTEN-4

Find the centroid of A $(-2,\ \ 1)$, B $(6,\ \ -3)$, C $(1,\ \ 7)$.

WORKING AREA

FORMULA BANK

Number line

$$AB = |b - a| \qquad M = \frac{a+b}{2}$$

Plane division

$$P = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Distance

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Centroid

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Symmetry

$B = 2A - P$ **(centre is the midpoint)**

Concept 2 | Triangles and Lines — **OFFICIAL LESSONS 4-7, 4-8, 4-9, 4-10, 4-11, 4-12, 4-13, 4-14, 4-15**

Triangles and Lines

Equation-first recall | use the same rail beside every question in this Concept

Triangle type

$a^2 + b^2 = c^2$ (c **longest**)

Line through two points

$m = \dfrac{y_2 - y_1}{x_2 - x_1}$ $\quad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $\quad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2}\,\textbf{base} \times \textbf{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Start with the family cue, write the first move, then use the working grid.

Concept 2 | Triangles and Lines

F01 | V01

Q001 | WRITTEN

C04-K02-47-TR-003

Determine the shape of triangle ABC with A $(3,\ \ 2)$, B $(-1,\ \ 0)$, C $\left(1+\sqrt{3},\ \ 1-2\sqrt{3}\right)$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F01 | V01

Q002 | WRITTEN

C04-K02-47-EX-005

Determine the shape of triangle ABC with A $(2,\ \ 2)$, B $(2,\ \ 0)$, C $\left(2+\sqrt{3},\ \ 1\right)$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $\quad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2}\ \text{base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F01 | V01

Q003 | MCQ

C04-K02-47-TR-003-MCQ

Determine the shape of triangle ABC with A $(3,\ \ 2)$, B $(-1,\ \ 0)$, C $\left(1+\sqrt{3},\ \ 1-2\sqrt{3}\right)$:

A *isosceles (not right − angled)*

B *scalene (not right − angled)*

C *scalene right − angled*

D *equilateral*

WORKING AREA

FORMULA BANK

Triangle type

$a^2+b^2=c^2 \quad (c \text{ longest})$

Line through two points

$m=\frac{y_2-y_1}{x_2-x_1} \qquad y-y_1=m(x-x_1)$

Parallel / perpendicular

$m_1=m_2 \qquad m_1m_2=-1$

Point-to-line distance

$$d=\frac{|ax_1+by_1+c|}{\sqrt{a^2+b^2}}$$

Triangle area

$$A=\frac{1}{2}\ \text{base}\times\text{height}$$

Fixed point

$(A_1k+A_0)x+(B_1k+B_0)y+C_1k+C_0=0$

Concept 2 | Triangles and Lines

F01 | V01

Q004 | MCQ

C04-K02-47-EX-005-MCQ

Determine the shape of triangle ABC with A $(2,\ \ 2)$, B $(2,\ \ 0)$, C $\left(2+\sqrt{3},\ \ 1\right)$:

A *scalene (not right − angled)*

B *scalene right − angled*

C *equilateral*

D *isosceles (not right − angled)*

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F01 | V02

Q005 | WRITTEN

C04-K02-47-TR-002

Determine the shape of triangle ABC with A $(-1,\ \ 2)$, B $(1,\ \ 1)$, C $(0,\ \ 4)$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F01 | V02

Q006 | WRITTEN

C04-K02-47-EX-004

Determine the shape of triangle ABC with A (0, 2), B (−1, −2), C (4, 1).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F01 | V02

Q007 | MCQ

C04-K02-47-TR-002-MCQ

Determine the shape of triangle ABC with A $(-1,\ 2)$, B $(1,\ 1)$, C $(0,\ 4)$:

A *scalene right – angled*

B *isosceles right – angled; right angle at A*

C *equilateral*

D *isosceles (not right – angled)*

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F01 | V02

Q008 | MCQ

C04-K02-47-EX-004-MCQ

Determine the shape of triangle ABC with A (0, 2), B (−1, −2), C (4, 1):

A *equilateral*

B *isosceles (not right − angled)*

C *scalene right − angled*

D *isosceles right − angled; right angle at A*

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F01 | V03

Q009 | WRITTEN

C04-K02-47-EX-007

Determine the shape of triangle ABC with A $(-3,\ 4)$, B $(1,\ 7)$, C $(3,\ -4)$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F01 | V03

Q010 | MCQ

C04-K02-47-EX-007-MCQ

Determine the shape of triangle ABC with A $(-3,\ 4)$, B $(1,\ 7)$, C $(3,\ -4)$:

A *equilateral*

B *isosceles (not right − angled)*

C *scalene (not right − angled)*

D *scalene right − angled; right angle at A*

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F01 | V04

Q011 | WRITTEN

C04-K02-47-WA-001

Determine the shape of triangle ABC with A (4, 9), B (0, 6), C (3, 2).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F01 | V04

Q012 | WRITTEN

C04-K02-47-EX-006

Determine the shape of triangle ABC with A (1, 2), B (5, 8), C (11, 4).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F01 | V04

Q013 | WRITTEN

C04-K02-47-EX-008

Determine the shape of triangle ABC with A $(-1,\ \ 1)$, B $(4,\ \ 2)$, C $(1,\ \ 4)$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F01 | V04

Q014 | MCQ

C04-K02-47-WA-001-MCQ

Determine the shape of triangle ABC with A (4, 9), B (0, 6), C (3, 2):

A *scalene right – angled*

B *isosceles right – angled; right angle at B*

C *equilateral*

D *isosceles (not right – angled)*

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F01 | V04

Q015 | MCQ

C04-K02-47-EX-006-MCQ

Determine the shape of triangle ABC with A (1, 2), B (5, 8), C (11, 4):

A *isosceles (not right − angled)*

B *scalene right − angled*

C *isosceles right − angled; right angle at B*

D *equilateral*

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F01 | V04

Q016 | MCQ

C04-K02-47-EX-008-MCQ

Determine the shape of triangle ABC with A $(-1,\ 1)$, B $(4,\ 2)$, C $(1,\ 4)$:

A *scalene right – angled*

B *isosceles right – angled; right angle at C*

C *equilateral*

D *isosceles (not right – angled)*

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F99 | V01

Q017 | CHALLENGE WRITTEN

C04-K02-47-CH-009

If A (1, 2), B (2k, k), C (4, 5) and ABC is isosceles and right-angled at B, find k.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F99 | V01

Q018 | CHALLENGE MCQ

C04-K02-47-CH-009-MCQ

If A (1, 2), B (2k, k), C (4, 5) and ABC is isosceles and right-angled at B, find k:

A $k = 1$

B $k = -2$

C $k = 2$

D $k = 3$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q019 | WRITTEN C04-K02-48-WA-010

Find the equation of the line through (3,-4) parallel to the x-axis.

WORKING AREA

FORMULA BANK

Triangle type

$$a^2 + b^2 = c^2 \quad (c \text{ longest})$$

Line through two points

$$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$$

Parallel / perpendicular

$$m_1 = m_2 \qquad m_1 m_2 = -1$$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$$

Concept 2 | Triangles and Lines

F02 | V01

Q020 | WRITTEN

C04-K02-48-WA-011

Find the equation of the line through (-3,8) parallel to the y-axis.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q021 | WRITTEN

C04-K02-48-TR-016

Find the equation of the line through (2,6) parallel to the x-axis.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q022 | WRITTEN

C04-K02-48-TR-017

Find the equation of the line through (3,5) perpendicular to the x-axis.

WORKING AREA

FORMULA BANK

Triangle type

$$a^2 + b^2 = c^2 \quad (c \text{ longest})$$

Line through two points

$$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$$

Parallel / perpendicular

$$m_1 = m_2 \qquad m_1 m_2 = -1$$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$$

Concept 2 | Triangles and Lines

F02 | V01

Q023 | WRITTEN

C04-K02-48-EX-022

Find the equation of the line through (-4,5) parallel to x-axis.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q024 | WRITTEN

C04-K02-48-EX-023

Find the equation of the line through (2,1) parallel to x-axis.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q025 | WRITTEN

C04-K02-48-EX-024

Find the equation of the line through (-4,-7) parallel to x-axis.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q026 | WRITTEN

C04-K02-48-EX-025

Find the equation of the line through (1,-2) perpendicular to x-axis.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q027 | WRITTEN

C04-K02-48-EX-026

Find the equation of the line through (-3,-4) perpendicular to x-axis.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q028 | WRITTEN

C04-K02-48-EX-027

Find the equation of the line through (3,-5) perpendicular to x-axis.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q029 | WRITTEN

C04-K02-48-EX-028

Find the equation of the line through (2,-7) parallel to y-axis.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q030 | WRITTEN

C04-K02-48-EX-029

Find the equation of the line through (4,3) parallel to y-axis.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q031 | WRITTEN

C04-K02-48-EX-030

Find the equation of the line through (-6,-2) parallel to y-axis.

WORKING AREA

FORMULA BANK

Triangle type

$$a^2 + b^2 = c^2 \quad (c \text{ longest})$$

Line through two points

$$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$$

Parallel / perpendicular

$$m_1 = m_2 \qquad m_1 m_2 = -1$$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$$

Concept 2 | Triangles and Lines

F02 | V01

Q032 | MCQ

C04-K02-48-WA-010-MCQ

Find the equation of the line through (3,-4) parallel to the x-axis:

A $y = 4$

B $y = -4$

C $y = -3$

D $y = -5$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q033 | MCQ

C04-K02-48-WA-011-MCQ

Find the equation of the line through (-3,8) parallel to the y-axis:

A $x = -4$

B $x = 3$

C $x = -3$

D $x = -2$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q034 | MCQ

C04-K02-48-TR-016-MCQ

Find the equation of the line through (2,6) parallel to the x-axis:

A $y = 7$

B $y = 5$

C $y = -6$

D $y = 6$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q035 | MCQ

C04-K02-48-TR-017-MCQ

Find the equation of the line through (3,5) perpendicular to the x-axis:

A $x = 4$

B $x = 2$

C $x = -3$

D $x = 3$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q036 | MCQ

C04-K02-48-EX-022-MCQ

Find the equation of the line through (-4,5) parallel to x-axis:

A $y = -5$

B $y = 5$

C $y = 6$

D $y = 4$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q037 | MCQ

C04-K02-48-EX-023-MCQ

Find the equation of the line through (2,1) parallel to x-axis:

A $y = 2$

B $y = 0$

C $y = -1$

D $y = 1$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q038 | MCQ

C04-K02-48-EX-024-MCQ

Find the equation of the line through (-4,-7) parallel to x-axis:

A $y = 7$

B $y = -7$

C $y = -6$

D $y = -8$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q039 | MCQ

C04-K02-48-EX-025-MCQ

Find the equation of the line through (1,-2) perpendicular to x-axis:

A $x = 0$

B $x = -1$

C $x = 1$

D $x = 2$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q040 | MCQ

C04-K02-48-EX-026-MCQ

Find the equation of the line through (-3,-4) perpendicular to x-axis:

A $x = -2$

B $x = -4$

C $x = 3$

D $x = -3$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q041 | MCQ

C04-K02-48-EX-027-MCQ

Find the equation of the line through (3,-5) perpendicular to x-axis:

A $x = 4$

B $x = 2$

C $x = -3$

D $x = 3$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q042 | MCQ

C04-K02-48-EX-028-MCQ

Find the equation of the line through (2,-7) parallel to y-axis:

A $x = -2$

B $x = 2$

C $x = 3$

D $x = 1$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q043 | MCQ

C04-K02-48-EX-029-MCQ

Find the equation of the line through (4,3) parallel to y-axis:

A $x = 5$

B $x = 3$

C $x = -4$

D $x = 4$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V01

Q044 | MCQ

C04-K02-48-EX-030-MCQ

Find the equation of the line through (-6,-2) parallel to y-axis:

A $x = -6$

B $x = -5$

C $x = -7$

D $x = 6$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q045 | WRITTEN

C04-K02-48-WA-012

Find the equation of the line through (-3,1) and (-3,2).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q046 | WRITTEN

C04-K02-48-WA-013

Find the equation of the line through (-2,3) and (-5,3).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q047 | WRITTEN

C04-K02-48-WA-015

Find the equation of the line through (1,-1) and (4,0).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q048 | WRITTEN

C04-K02-48-TR-018

Find the equation of the line through (-2,-2) and (2,-2).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q049 | WRITTEN

C04-K02-48-TR-019

Find the equation of the line through (-4,2) and (-4,8).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q050 | WRITTEN

C04-K02-48-TR-021

Find the equation of the line through (-2,-6) and (-4,1).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q051 | WRITTEN

C04-K02-48-EX-031

Find the equation of the line through (4,0) and (4,3).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q052 | WRITTEN

C04-K02-48-EX-032

Find the equation of the line through (-1,2) and (-1,6).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q053 | WRITTEN

C04-K02-48-EX-033

Find the equation of the line through (-5,-3) and (-5,2).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q054 | WRITTEN

C04-K02-48-EX-034

Find the equation of the line through (-2,3) and (-3,3).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q055 | WRITTEN

C04-K02-48-EX-035

Find the equation of the line through (4,-2) and (1,-2).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q056 | WRITTEN

C04-K02-48-EX-036

Find the equation of the line through (-3,6) and (2,6).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q057 | WRITTEN

C04-K02-48-EX-040

Find the equation of the line through (1,2) and (3,10).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q058 | WRITTEN

C04-K02-48-EX-041

Find the equation of the line through (-1,-8) and (4,2).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q059 | MCQ

C04-K02-48-WA-012-MCQ

Find the equation of the line through (-3,1) and (-3,2):

A $x = 3$

B $x = -3$

C $x = -2$

D $x = -4$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q060 | MCQ

C04-K02-48-WA-013-MCQ

Find the equation of the line through (-2,3) and (-5,3):

A $y = 2$

B $y = -3$

C $y = 3$

D $y = 4$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q061 | MCQ

C04-K02-48-WA-015-MCQ

Find the equation of the line through (1,-1) and (4,0):

A $y = -x/3 - 4/3$

B $y = 4/3 - x/3$

C $y = x/3 - 4/3 + 1$

D $y = x/3 - 4/3$(equivalently$x - 3y - 4 = 0$)

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q062 | MCQ

C04-K02-48-TR-018-MCQ

Find the equation of the line through (-2,-2) and (2,-2):

A $y = -2$

B $y = -1$

C $y = -3$

D $y = 2$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q063 | MCQ

C04-K02-48-TR-019-MCQ

Find the equation of the line through (-4,2) and (-4,8):

A $x = 4$

B $x = -4$

C $x = -3$

D $x = -5$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q064 | MCQ

C04-K02-48-TR-021-MCQ

Find the equation of the line through (-2,-6) and (-4,1):

A $7x + 2y + 26 + 1 = 0$

B $7x - 2y + 26 = 0$

C $2(7x + 2y + 26) + 1 = 0$

D $7x + 2y + 26 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q065 | MCQ

C04-K02-48-EX-031-MCQ

Find the equation of the line through (4,0) and (4,3):

A $x = 3$

B $x = -4$

C $x = 4$

D $x = 5$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q066 | MCQ

C04-K02-48-EX-032-MCQ

Find the equation of the line through (-1,2) and (-1,6):

A $x = -1$

B $x = 0$

C $x = -2$

D $x = 1$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q067 | MCQ

C04-K02-48-EX-033-MCQ

Find the equation of the line through (-5,-3) and (-5,2):

A $x = -6$

B $x = 5$

C $x = -5$

D $x = -4$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q068 | MCQ

C04-K02-48-EX-034-MCQ

Find the equation of the line through (-2,3) and (-3,3):

A $y = 4$

B $y = 2$

C $y = -3$

D $y = 3$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q069 | MCQ

C04-K02-48-EX-035-MCQ

Find the equation of the line through (4,-2) and (1,-2):

A $y = -1$

B $y = -3$

C $y = 2$

D $y = -2$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q070 | MCQ

C04-K02-48-EX-036-MCQ

Find the equation of the line through (-3,6) and (2,6):

A $y = 5$

B $y = -6$

C $y = 6$

D $y = 7$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q071 | MCQ

C04-K02-48-EX-040-MCQ

Find the equation of the line through (1,2) and (3,10):

A $y = -4x - 2$

B $y = 4x - 2 + 1$

C 0

D $y = 4x - 2$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V02

Q072 | MCQ

C04-K02-48-EX-041-MCQ

Find the equation of the line through (-1,-8) and (4,2):

A $y = -2x - 6$

B $y = 2x - 6 + 1$

C 0

D $y = 2x - 6$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V03

Q073 | WRITTEN

C04-K02-48-WA-014

Find the equation of the line through (2,-1) with gradient 3.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V03

Q074 | WRITTEN

C04-K02-48-TR-020

Find the equation of the line through (-3,4) with gradient 2.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V03

Q075 | WRITTEN

C04-K02-48-EX-037

Find the equation of the line through (-1,5) with gradient -1.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V03

Q076 | WRITTEN

C04-K02-48-EX-038

Find the equation of the line through (-3,-8) with gradient 1.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V03

Q077 | WRITTEN

C04-K02-48-EX-039

Find the equation of the line through (2,-1) with gradient -2.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V03

Q078 | MCQ

C04-K02-48-WA-014-MCQ

Find the equation of the line through (2,-1) with gradient 3:

A $y = -3x - 7$

B $y = 3x - 7 + 1$

C 0

D $y = 3x - 7$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V03

Q079 | MCQ

C04-K02-48-TR-020-MCQ

Find the equation of the line through (-3,4) with gradient 2:

A $y = 2x + 10 + 1$

B 0

C $y = 2x + 10$

D $y = -2x + 10$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V03

Q080 | MCQ

C04-K02-48-EX-037-MCQ

Find the equation of the line through (-1,5) with gradient -1:

A $y = x + 4$

B $y = x - 4$

C $y = -x + 4 + 1$

D $y = -x + 4$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V03

Q081 | MCQ

C04-K02-48-EX-038-MCQ

Find the equation of the line through (-3,-8) with gradient 1:

A $y = x - 5 + 1$

B $y = x - 5$

C $y = -x - 5$

D $y = 5 - x$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | V03

Q082 | MCQ

C04-K02-48-EX-039-MCQ

Find the equation of the line through (2,-1) with gradient -2:

A $y = 2x + 3$

B $y = -2x + 3 + 1$

C 0

D $y = -2x + 3$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F99 | V02

Q083 | CHALLENGE WRITTEN

C04-K02-48-CH-042

Sensors A $(-4,\ \ 2)$ and B $(9,\ \ 2)$ have the same height. Find the straight-line boundary through A and B.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F99 | V02

Q084 | CHALLENGE MCQ

C04-K02-48-CH-042-MCQ

Sensors A $(-4,\ \ 2)$ and B $(9,\ \ 2)$ have the same height. Find the straight-line boundary through A and B:

A $y = 3$

B $y = 1$

C $y = -2$

D $y = 2$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $\quad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F03 | V01

Q085 | WRITTEN

C04-K02-49-WA-043

A (2, 3), B (4, −1), and C $(a-1,\ 2-a)$ are collinear. Find a.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F03 | V01

Q086 | WRITTEN

C04-K02-49-TR-045

A (2, 5), B (4, 9), and C $(-1, a)$ are collinear. Find a.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F03 | V01

Q087 | WRITTEN

C04-K02-49-EX-047

A $(1,\ -1)$, B $(-2,\ -3)$, and C $(4,\ a)$ are collinear. Find a.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F03 | V01

Q088 | WRITTEN

C04-K02-49-EX-048

A (1, 2), B (3, 1), and C (a, -1) are collinear. Find a.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F03 | V01

Q089 | WRITTEN

C04-K02-49-EX-049

A $(-3,\ -9)$, B $(5,\ 7)$, and C $(a+3,\ 3a-2)$ are collinear. Find a.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F03 | V01

Q090 | MCQ

C04-K02-49-WA-043-MCQ

A (2, 3), B (4, −1), and C $(a-1,\ 2-a)$ are collinear. Find a:

A $a = 8$

B $a = 6$

C $a = -7$

D $a = 7$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F03 | V01

Q091 | MCQ

C04-K02-49-TR-045-MCQ

A (2, 5), B (4, 9), and C $(-1, a)$ are collinear. Find a:

A $a = 0$

B $a = -2$

C $a = 1$

D $a = -1$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F03 | V01

Q092 | MCQ

C04-K02-49-EX-047-MCQ

A $(1, \ -1)$, B $(-2, \ -3)$, and C $(4, \ a)$ are collinear. Find a:

A $a = 0$

B $a = -1$

C $a = 1$

D $a = 2$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $\quad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F03 | V01

Q093 | MCQ

C04-K02-49-EX-048-MCQ

A (1, 2), B (3, 1), and C (a, -1) are collinear. Find a:

A $a = 8$

B $a = 6$

C $a = -7$

D $a = 7$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F03 | V01

Q094 | MCQ

C04-K02-49-EX-049-MCQ

A $(-3,\ -9)$, B $(5,\ 7)$, and C $(a+3,\ 3a-2)$ are collinear. Find a:

A $a=6$

B $a=4$

C $a=-5$

D $a=5$

WORKING AREA

FORMULA BANK

Triangle type

$a^2+b^2=c^2$ (c longest)

Line through two points

$m=\frac{y_2-y_1}{x_2-x_1}$ $\quad y-y_1=m(x-x_1)$

Parallel / perpendicular

$m_1=m_2$ $\quad m_1m_2=-1$

Point-to-line distance

$$d=\frac{|ax_1+by_1+c|}{\sqrt{a^2+b^2}}$$

Triangle area

$A=\frac{1}{2}$ base × height

Fixed point

$(A_1k+A_0)x+(B_1k+B_0)y+C_1k+C_0=0$

Concept 2 | Triangles and Lines

F03 | V02

Q095 | WRITTEN

C04-K02-49-WA-044

Find the line through the intersection of $2x - 3y + 1 = 0$ and $x + 2y - 3 = 0$, passing through (-1,3).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F03 | V02

Q096 | WRITTEN

C04-K02-49-TR-046

Find the line through the intersection of $x + 2y - 10 = 0$ and $2x + 3y - 7 = 0$, passing through (5,6).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F03 | V02

Q097 | WRITTEN

C04-K02-49-EX-050

Find the line through the intersection of $3x + 5y - 1 = 0$ and $7x + 8y - 6 = 0$, passing through (-1,2).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F03 | V02

Q098 | WRITTEN

C04-K02-49-EX-051

Find the line through the intersection of $x + 2y - 4 = 0$ and $2x - y - 3 = 0$, passing through (-3,-1).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F03 | V02

Q099 | MCQ

C04-K02-49-WA-044-MCQ

Find the line through the intersection of $2x - 3y + 1 = 0$ and $x + 2y - 3 = 0$, passing through (-1,3):

A $2(x + y - 2) + 1 = 0$

B $x + y - 2 = 0$

C $x + y - 2 + 1 = 0$

D $x - y - 2 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F03 | V02

Q100 | MCQ

C04-K02-49-TR-046-MCQ

Find the line through the intersection of $x + 2y - 10 = 0$ and $2x + 3y - 7 = 0$, passing through (5,6):

A $x + 3y - 23 = 0$

B $x + 3y - 23 + 1 = 0$

C $x - 3y - 23 = 0$

D $2(x + 3y - 23) + 1 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F03 | V02

Q101 | MCQ

C04-K02-49-EX-050-MCQ

Find the line through the intersection of $3x + 5y - 1 = 0$ and $7x + 8y - 6 = 0$, passing through (-1,2):

A $2(x + y - 1) + 1 = 0$

B $x + y - 1 = 0$

C $x + y - 1 + 1 = 0$

D $x - y - 1 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F03 | V02

Q102 | MCQ

C04-K02-49-EX-051-MCQ

Find the line through the intersection of $x + 2y - 4 = 0$ and $2x - y - 3 = 0$, passing through (-3,-1):

A $2x - 5y + 1 + 1 = 0$

B $2x - 5y - 1 = 0$

C $2(2x - 5y + 1) + 1 = 0$

D $2x - 5y + 1 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F99 | V02

Q103 | CHALLENGE WRITTEN

C04-K02-49-CH-052

The intersection of $6x + 5y + 7 = 0$ and $3x - 2y + 5 = 0$ is joined to the origin. Find the equation of that trajectory.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $\quad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F99 | V02

Q104 | CHALLENGE MCQ

C04-K02-49-CH-052-MCQ

The intersection of $6x + 5y + 7 = 0$ and $3x - 2y + 5 = 0$ is joined to the origin. Find the equation of that trajectory:

A $3x - 13y = 0$

B $2(3x + 13y) + 1 = 0$

C $3x + 13y = 0$

D $3x + 13y + 1 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q105 | WRITTEN

C04-K02-410-WA-053

Find the gradient of line $y = 2x + 3$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q106 | WRITTEN

C04-K02-410-WA-054

Find the gradient of line $y = -3x + 2$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q107 | WRITTEN

C04-K02-410-WA-055

Find the gradient of line $x - 3y + 1 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$$a^2 + b^2 = c^2 \quad (c \text{ longest})$$

Line through two points

$$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$$

Parallel / perpendicular

$$m_1 = m_2 \qquad m_1 m_2 = -1$$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$$

Concept 2 | Triangles and Lines

F04 | V01

Q108 | WRITTEN

C04-K02-410-WA-056

Find the gradient of line $2x - y - 1 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$$a^2 + b^2 = c^2 \quad (c \text{ longest})$$

Line through two points

$$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$$

Parallel / perpendicular

$$m_1 = m_2 \qquad m_1 m_2 = -1$$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$$

Concept 2 | Triangles and Lines

F04 | V01

Q109 | WRITTEN

C04-K02-410-WA-057

Find the gradient of line $x + 3y + 3 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q110 | WRITTEN

C04-K02-410-TR-060

Find the gradient of line $y = 3x + 1$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q111 | WRITTEN

C04-K02-410-TR-061

Find the gradient of line $y = 4x - 1$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q112 | WRITTEN

C04-K02-410-TR-062

Find the gradient of line $y = -4x - 7$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q113 | WRITTEN

C04-K02-410-TR-063

Find the gradient of line $6x - 2y = 5$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q114 | WRITTEN

C04-K02-410-TR-064

Find the gradient of line $8x + 2y - 3 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q115 | WRITTEN

C04-K02-410-TR-065

Find the gradient of line $x + 4y - 4 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q116 | WRITTEN

C04-K02-410-EX-068

Find the gradient of line $y = 3x - 1$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q117 | WRITTEN

C04-K02-410-EX-069

Find the gradient of line $y = -3x + 4$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q118 | WRITTEN

C04-K02-410-EX-070

Find the gradient of line $y = x - 3$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q119 | WRITTEN

C04-K02-410-EX-071

Find the gradient of line $6x + 2y + 5 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q120 | WRITTEN

C04-K02-410-EX-072

Find the gradient of line $2x - 2y - 1 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q121 | WRITTEN

C04-K02-410-EX-073

Find the gradient of line $x + 3y - 2 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q122 | WRITTEN

C04-K02-410-EX-074

Find the gradient of line $y = 2x - 1$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q123 | WRITTEN

C04-K02-410-EX-075

Find the gradient of line $y = -x + 4$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q124 | WRITTEN

C04-K02-410-EX-076

Find the gradient of line $y = 3x/2 + 6$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q125 | WRITTEN

C04-K02-410-EX-077

Find the gradient of line $x + y + 3 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q126 | WRITTEN

C04-K02-410-EX-078

Find the gradient of line $2x + 3y + 8 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q127 | WRITTEN

C04-K02-410-EX-079

Find the gradient of line $3x + 6y - 1 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$$a^2 + b^2 = c^2 \quad (c \text{ longest})$$

Line through two points

$$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$$

Parallel / perpendicular

$$m_1 = m_2 \qquad m_1 m_2 = -1$$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$$

Concept 2 | Triangles and Lines

F04 | V01

Q128 | MCQ

C04-K02-410-WA-053-MCQ

Find the gradient of line $y = 2x + 3$:

A $m = 3$

B $m = 1$

C $m = -2$

D $m = 2$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q129 | MCQ

C04-K02-410-WA-054-MCQ

Find the gradient of line $y = -3x + 2$:

A $m = -4$

B $m = 3$

C $m = -3$

D $m = -2$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q130 | MCQ

C04-K02-410-WA-055-MCQ

Find the gradient of line $x - 3y + 1 = 0$:

A $m = 1/3$

B $m = 4/3$

C $m = -2/3$

D $m = -1/3$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q131 | MCQ

C04-K02-410-WA-056-MCQ

Find the gradient of line $2x - y - 1 = 0$:

A $m = -2$

B $m = 2$

C $m = 3$

D $m = 1$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q132 | MCQ

C04-K02-410-WA-057-MCQ

Find the gradient of line $x + 3y + 3 = 0$:

A $m = -1/3$

B $m = 2/3$

C $m = -4/3$

D $m = 1/3$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q133 | MCQ

C04-K02-410-TR-060-MCQ

Find the gradient of line $y = 3x + 1$:

A $m = 3$

B $m = 4$

C $m = 2$

D $m = -3$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q134 | MCQ

C04-K02-410-TR-061-MCQ

Find the gradient of line $y = 4x - 1$:

A $m = -4$

B $m = 4$

C $m = 5$

D $m = 3$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q135 | MCQ

C04-K02-410-TR-062-MCQ

Find the gradient of line $y = -4x - 7$:

A $m = -3$

B $m = -5$

C $m = 4$

D $m = -4$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q136 | MCQ

C04-K02-410-TR-063-MCQ

Find the gradient of line $6x - 2y = 5$:

A $m = 3$

B $m = 4$

C $m = 2$

D $m = -3$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q137 | MCQ

C04-K02-410-TR-064-MCQ

Find the gradient of line $8x + 2y - 3 = 0$:

A $m = -5$

B $m = 4$

C $m = -4$

D $m = -3$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q138 | MCQ

C04-K02-410-TR-065-MCQ

Find the gradient of line $x + 4y - 4 = 0$:

A $m = -5/4$

B $m = 1/4$

C $m = -1/4$

D $m = 3/4$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q139 | MCQ

C04-K02-410-EX-068-MCQ

Find the gradient of line $y = 3x - 1$:

A $m = 4$

B $m = 2$

C $m = -3$

D $m = 3$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q140 | MCQ

C04-K02-410-EX-069-MCQ

Find the gradient of line $y = -3x + 4$:

A $m = -3$

B $m = -2$

C $m = -4$

D $m = 3$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q141 | MCQ

C04-K02-410-EX-070-MCQ

Find the gradient of line $y = x - 3$:

A $m = 2$

B $m = 0$

C $m = -1$

D $m = 1$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q142 | MCQ

C04-K02-410-EX-071-MCQ

Find the gradient of line $6x + 2y + 5 = 0$:

A $m = -4$

B $m = 3$

C $m = -3$

D $m = -2$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q143 | MCQ

C04-K02-410-EX-072-MCQ

Find the gradient of line $2x - 2y - 1 = 0$:

A $m = 0$

B $m = -1$

C $m = 1$

D $m = 2$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q144 | MCQ

C04-K02-410-EX-073-MCQ

Find the gradient of line $x + 3y - 2 = 0$:

A $m = -1/3$

B $m = 2/3$

C $m = -4/3$

D $m = 1/3$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q145 | MCQ

C04-K02-410-EX-074-MCQ

Find the gradient of line $y = 2x - 1$:

A $m = 3$

B $m = 1$

C $m = -2$

D $m = 2$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q146 | MCQ

C04-K02-410-EX-075-MCQ

Find the gradient of line $y = -x + 4$:

A $m = -1$

B $m = 0$

C $m = -2$

D $m = 1$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q147 | MCQ

C04-K02-410-EX-076-MCQ

Find the gradient of line $y = 3x/2 + 6$:

A $m = -3/2$

B $m = 3/2$

C $m = 5/2$

D $m = 1/2$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q148 | MCQ

C04-K02-410-EX-077-MCQ

Find the gradient of line $x + y + 3 = 0$:

A $m = 0$

B $m = -2$

C $m = 1$

D $m = -1$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q149 | MCQ

C04-K02-410-EX-078-MCQ

Find the gradient of line $2x + 3y + 8 = 0$:

A $m = 2/3$

B $m = -2/3$

C $m = 1/3$

D $m = -5/3$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V01

Q150 | MCQ

C04-K02-410-EX-079-MCQ

Find the gradient of line $3x + 6y - 1 = 0$:

A 0

B $m = -1/2$

C $m = 1/2$

D $m = -3/2$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V02

Q151 | WRITTEN

C04-K02-410-WA-058

Find the line through (2,-4) parallel to $3x - 2y + 1 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V02

Q152 | WRITTEN

C04-K02-410-TR-066

Find the line through (1,-3) parallel to $6x + 3y - 5 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V02

Q153 | WRITTEN

C04-K02-410-EX-080

Find the equation of the line through (1,-2) parallel to $2x - y + 5 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V02

Q154 | WRITTEN

C04-K02-410-EX-081

Find the equation of the line through (-1,2) parallel to $2x + 3y = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V02

Q155 | WRITTEN

C04-K02-410-EX-082

Find the equation of the line through (3,-1) parallel to $3x + 2y + 1 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V02

Q156 | MCQ

C04-K02-410-WA-058-MCQ

Find the line through (2,-4) parallel to $3x - 2y + 1 = 0$:

A $3x + 2y - 14 = 0$

B $2(3x - 2y - 14) + 1 = 0$

C $3x - 2y - 14 = 0$

D $3x - 2y - 14 + 1 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V02

Q157 | MCQ

C04-K02-410-TR-066-MCQ

Find the line through (1,-3) parallel to $6x + 3y - 5 = 0$:

A $2x + y + 1 + 1 = 0$

B $2x - y + 1 = 0$

C $2(2x + y + 1) + 1 = 0$

D $2x + y + 1 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V02

Q158 | MCQ

C04-K02-410-EX-080-MCQ

Find the equation of the line through (1,-2) parallel to $2x - y + 5 = 0$:

A $2x + y - 4 = 0$

B $2(2x - y - 4) + 1 = 0$

C $2x - y - 4 = 0$

D $2x - y - 4 + 1 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V02

Q159 | MCQ

C04-K02-410-EX-081-MCQ

Find the equation of the line through (-1,2) parallel to $2x + 3y = 0$:

A $2x + 3y - 4 + 1 = 0$

B $2x - 3y - 4 = 0$

C $2(2x + 3y - 4) + 1 = 0$

D $2x + 3y - 4 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V02

Q160 | MCQ

C04-K02-410-EX-082-MCQ

Find the equation of the line through (3,-1) parallel to $3x + 2y + 1 = 0$:

A $3x + 2y - 7 + 1 = 0$

B $3x - 2y - 7 = 0$

C $2(3x + 2y - 7) + 1 = 0$

D $3x + 2y - 7 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V03

Q161 | WRITTEN

C04-K02-410-WA-059

Find the line through (-2,5) perpendicular to $3x + 5y + 1 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V03

Q162 | WRITTEN

C04-K02-410-TR-067

Find the line through (2,1) perpendicular to $2x + 3y + 4 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V03

Q163 | WRITTEN

C04-K02-410-EX-083

Find the equation of the line through (2,-5) perpendicular to $2x + y - 1 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V03

Q164 | WRITTEN

C04-K02-410-EX-084

Find the equation of the line through (-1,3) perpendicular to $5x - 2y + 3 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V03

Q165 | WRITTEN

C04-K02-410-EX-085

Find the equation of the line through (-2,-5) perpendicular to $3x - 2y - 7 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V03

Q166 | MCQ

C04-K02-410-WA-059-MCQ

Find the line through (-2,5) perpendicular to $3x + 5y + 1 = 0$:

A $5x - 3y + 25 + 1 = 0$

B $5x - 3y - 25 = 0$

C $2(5x - 3y + 25) + 1 = 0$

D $5x - 3y + 25 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V03

Q167 | MCQ

C04-K02-410-TR-067-MCQ

Find the line through (2,1) perpendicular to $2x + 3y + 4 = 0$:

A $3x - 2y - 4 + 1 = 0$

B $3x + 2y - 4 = 0$

C $2(3x - 2y - 4) + 1 = 0$

D $3x - 2y - 4 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V03

Q168 | MCQ

C04-K02-410-EX-083-MCQ

Find the equation of the line through (2,-5) perpendicular to $2x + y - 1 = 0$:

A $2(x - 2y - 12) + 1 = 0$

B $x - 2y - 12 = 0$

C $x - 2y - 12 + 1 = 0$

D $x + 2y - 12 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V03

Q169 | MCQ

C04-K02-410-EX-084-MCQ

Find the equation of the line through (-1,3) perpendicular to $5x - 2y + 3 = 0$:

A $2x + 5y - 13 = 0$

B $2x + 5y - 13 + 1 = 0$

C $2x - 5y - 13 = 0$

D $2(2x + 5y - 13) + 1 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | V03

Q170 | MCQ

C04-K02-410-EX-085-MCQ

Find the equation of the line through (-2,-5) perpendicular to $3x - 2y - 7 = 0$:

A $2x + 3y + 19 + 1 = 0$

B $2x - 3y + 19 = 0$

C $2(2x + 3y + 19) + 1 = 0$

D $2x + 3y + 19 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F99 | V03

Q171 | CHALLENGE WRITTEN

C04-K02-410-CH-086

If $L1 : 2x + 3y - 10 = 0$ is perpendicular to $L2 : kx - 2y + 5 = 0$ and parallel to $L3 : 4x + my - 1 = 0$, find m/k.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F99 | V03

Q172 | CHALLENGE MCQ

C04-K02-410-CH-086-MCQ

If $L1 : 2x+3y-10 = 0$ is perpendicular to $L2 : kx-2y+5 = 0$ and parallel to $L3 : 4x+my-1 = 0$, find m/k:

A $m/k = 1\,(k = 2,\ m = 2)$

B $m/k = 3\,(k = 2,\ m = 6)$

C $m/k = -2\,(k = 1,\ m = -2)$

D $m/k = 2\,(k = 3,\ m = 6)$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $\quad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F05 | V01

Q173 | WRITTEN

C04-K02-411-WA-087

For A (5, 11), B (1, −1), find the equation of the perpendicular bisector of AB.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F05 | V01

Q174 | WRITTEN

C04-K02-411-TR-089

For A $(-1,\ 2)$, B $(3,\ -4)$, find the equation of the perpendicular bisector of AB.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F05 | V01

Q175 | WRITTEN

C04-K02-411-EX-091

Find the perpendicular bisector of segment A $(-2,\ 3)$, B $(2,\ 1)$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F05 | V01

Q176 | WRITTEN

C04-K02-411-EX-092

Find the perpendicular bisector of segment A $(-1,\ \ 2)$, B $(5,\ \ -2)$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F05 | V01

Q177 | WRITTEN

C04-K02-411-EX-093

Find the perpendicular bisector of segment A (0, 6), B (4, 4).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F05 | V01

Q178 | MCQ

C04-K02-411-WA-087-MCQ

For A (5, 11), B (1, −1), find the equation of the perpendicular bisector of AB:

A $x + 3y - 18 = 0$

B $x + 3y - 18 + 1 = 0$

C $x - 3y - 18 = 0$

D $2(x + 3y - 18) + 1 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F05 | V01

Q179 | MCQ

C04-K02-411-TR-089-MCQ

For A $(-1,\ \ 2)$, B $(3,\ \ -4)$, find the equation of the perpendicular bisector of AB:

A $2x + 3y - 5 = 0$

B $2(2x - 3y - 5) + 1 = 0$

C $2x - 3y - 5 = 0$

D $2x - 3y - 5 + 1 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F05 | V01

Q180 | MCQ

C04-K02-411-EX-091-MCQ

Find the perpendicular bisector of segment A $(-2,\ 3)$, B $(2,\ 1)$:

A $2x - y - 2 = 0$

B $2(2x - y + 2) + 1 = 0$

C $2x - y + 2 = 0$

D $2x - y + 2 + 1 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F05 | V01

Q181 | MCQ

C04-K02-411-EX-092-MCQ

Find the perpendicular bisector of segment A $(-1,\ 2)$, B $(5,\ -2)$:

A $3x - 2y - 6 + 1 = 0$

B $3x + 2y - 6 = 0$

C $2(3x - 2y - 6) + 1 = 0$

D $3x - 2y - 6 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $\quad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F05 | V01

Q182 | MCQ

C04-K02-411-EX-093-MCQ

Find the perpendicular bisector of segment A (0, 6), B (4, 4):

A $2x - y + 1 = 0$

B $2x - y + 1 + 1 = 0$

C $2x - y - 1 = 0$

D $2(2x - y + 1) + 1 = 0$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F05 | V02

Q183 | WRITTEN

C04-K02-411-WA-088

Find the point B symmetric to A $(-4,\ \ 3)$ with respect to $3x - y + 5 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F05 | V02

Q184 | WRITTEN

C04-K02-411-TR-090

Find the point B symmetric to A $(0,\ \ 4)$ with respect to $2x - y - 1 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F05 | V02

Q185 | WRITTEN

C04-K02-411-EX-094

Find the point B symmetric to A (1, 2) with respect to $x + 2y - 10 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F05 | V02

Q186 | WRITTEN

C04-K02-411-EX-095

Find the point B symmetric to A $(4,\ -1)$ with respect to $4x - 2y - 3 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $\quad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F05 | V02

Q187 | MCQ

C04-K02-411-WA-088-MCQ

Find the point B symmetric to A $(-4,\ 3)$ with respect to $3x - y + 5 = 0$:

A $B = (2,\ 1)$

B $B = (1,\ 2)$

C $B = (-2,\ 1)$

D $B = (2,\ -1)$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $\quad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F05 | V02

Q188 | MCQ

C04-K02-411-TR-090-MCQ

Find the point B symmetric to A $(0,\ 4)$ with respect to $2x - y - 1 = 0$:

A $B = (4,\ 2)$

B $B = (2,\ 4)$

C $B = (-4,\ 2)$

D $B = (4,\ -2)$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $\quad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F05 | V02

Q189 | MCQ

C04-K02-411-EX-094-MCQ

Find the point B symmetric to A $(1,\ 2)$ with respect to $x + 2y - 10 = 0$:

A $B = (-3,\ 6)$

B $B = (3,\ -6)$

C $B = (3,\ 6)$

D $B = (6,\ 3)$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $\quad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F05 | V02

Q190 | MCQ

C04-K02-411-EX-095-MCQ

Find the point B symmetric to A $(4,\ -1)$ with respect to $4x - 2y - 3 = 0$:

A $B = (2,\ 2)$

B $B = (-2,\ -2)$

C $B = (-2,\ 2)$

D $B = (2,\ -2)$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $\quad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F99 | V04

Q191 | CHALLENGE WRITTEN

C04-K02-411-CH-096

Reflect A (5, 0) across the targeting line $y = 2x$. Find the receiver point B.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F99 | V04

Q192 | CHALLENGE MCQ

C04-K02-411-CH-096-MCQ

Reflect A (5, 0) across the targeting line $y = 2x$. Find the receiver point B:

A $B = (3, 4)$

B $B = (-3, -4)$

C $B = (-3, 4)$

D $B = (4, -3)$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V01

Q193 | WRITTEN

C04-K02-412-WA-097

Find the distance from (-2,1) to $3x - 2y + 5 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V01

Q194 | WRITTEN

C04-K02-412-TR-099

Find the distance from (3,-2) to $x + 2y - 4 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V01

Q195 | WRITTEN

C04-K02-412-EX-101

Find the perpendicular distance from (-3,2) to $2x - 3y + 6 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V01

Q196 | WRITTEN

C04-K02-412-EX-102

Find the perpendicular distance from (-3,7) to $12x - 5y = 7$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V01

Q197 | WRITTEN

C04-K02-412-EX-103

Find the perpendicular distance from (-8,1) to $y = 2x - 3$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V01

Q198 | WRITTEN

C04-K02-412-EX-104

Find the perpendicular distance from the origin to $3x - 4y - 5 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V01

Q199 | WRITTEN

C04-K02-412-EX-105

Find the perpendicular distance from (2,3) to $3x + 2y + 1 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V01

Q200 | WRITTEN

C04-K02-412-EX-106

Find the perpendicular distance from $(13,4)$ to $3x + 4y - 5 = 0$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V01

Q201 | WRITTEN

C04-K02-412-EX-107

Find the perpendicular distance from $(1,2)$ to $y = 3x + 1$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V01

Q202 | MCQ

C04-K02-412-WA-097-MCQ

Find the distance from (-2,1) to $3x - 2y + 5 = 0$:

A $3/\sqrt{13} = 3\sqrt{13}/13$

B $3 \cdot \sqrt{13}/13 + 1$

C $-1 + 3 \cdot \sqrt{13}/13$

D $-3 \cdot \sqrt{13}/13$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V01

Q203 | MCQ

C04-K02-412-TR-099-MCQ

Find the distance from (3,-2) to $x + 2y - 4 = 0$:

A $1 + \sqrt{5}$

B $-1 + \sqrt{5}$

C $-\sqrt{5}$

D $\sqrt{5}$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V01

Q204 | MCQ

C04-K02-412-EX-101-MCQ

Find the perpendicular distance from (-3,2) to $2x - 3y + 6 = 0$:

A $1 + 6 \cdot \sqrt{13}/13$

B $-1 + 6 \cdot \sqrt{13}/13$

C $-6 \cdot \sqrt{13}/13$

D $6/\sqrt{13} = 6\sqrt{13}/13$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1 k + A_0)x + (B_1 k + B_0)y + C_1 k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V01

Q205 | MCQ

C04-K02-412-EX-102-MCQ

Find the perpendicular distance from (-3,7) to $12x - 5y = 7$:

A -6

B 6

C 7

D 5

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V01

Q206 | MCQ

C04-K02-412-EX-103-MCQ

Find the perpendicular distance from (-8,1) to $y = 2x - 3$:

A $4\sqrt{5} + 1$

B $4\sqrt{5} - 1$

C 0

D $4\sqrt{5}$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V01

Q207 | MCQ

C04-K02-412-EX-104-MCQ

Find the perpendicular distance from the origin to $3x - 4y - 5 = 0$:

A 2

B 0

C -1

D 1

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V01

Q208 | MCQ

C04-K02-412-EX-105-MCQ

Find the perpendicular distance from (2,3) to $3x + 2y + 1 = 0$:

A $\sqrt{13}$

B $1 + \sqrt{13}$

C $-1 + \sqrt{13}$

D $-\sqrt{13}$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V01

Q209 | MCQ

C04-K02-412-EX-106-MCQ

Find the perpendicular distance from $(13,4)$ to $3x + 4y - 5 = 0$:

A -10

B 10

C 11

D 9

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V01

Q210 | MCQ

C04-K02-412-EX-107-MCQ

Find the perpendicular distance from $(1,2)$ to $y = 3x + 1$:

A $\sqrt{10}/5 + 1$

B $-1 + \sqrt{10}/5$

C $-\sqrt{10}/5$

D $\sqrt{10}/5$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $\quad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1 k + A_0)x + (B_1 k + B_0)y + C_1 k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V02

Q211 | WRITTEN

C04-K02-412-WA-098

Find the perpendicular length from the origin to $3x - y = 5$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V02

Q212 | WRITTEN

C04-K02-412-TR-100

Find the perpendicular length from (-1,5) to $y = 3x - 2$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V02

Q213 | MCQ

C04-K02-412-WA-098-MCQ

Find the perpendicular length from the origin to $3x - y = 5$:

A $1 + \sqrt{10}/2$

B $-1 + \sqrt{10}/2$

C $-\sqrt{10}/2$

D $\sqrt{10}/2$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | V02

Q214 | MCQ

C04-K02-412-TR-100-MCQ

Find the perpendicular length from (-1,5) to $y = 3x - 2$:

A $-\sqrt{10}$

B $\sqrt{10}$

C $1 + \sqrt{10}$

D $-1 + \sqrt{10}$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F99 | V05

Q215 | CHALLENGE WRITTEN

C04-K02-412-CH-108

Find the shortest distance from P $(-1,\ \ 5)$ to the radiation line $y = x/3 + 2$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F99 | V05

Q216 | CHALLENGE MCQ

C04-K02-412-CH-108-MCQ

Find the shortest distance from P $(-1,\ 5)$ to the radiation line $y = x/3 + 2$:

A $\sqrt{10}$

B $1 + \sqrt{10}$

C $-1 + \sqrt{10}$

D $-\sqrt{10}$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $\quad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F07 | V01

Q217 | WRITTEN

C04-K02-413-WA-109

Find the area of triangle ABC with A (1, 1), B (3, 7), C (−3, −1).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F07 | V01

Q218 | WRITTEN

C04-K02-413-TR-110

Find the area for A (1, 5), B (−3, −3), C (3, −6).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F07 | V01

Q219 | WRITTEN

C04-K02-413-TR-111

Find the area for A $(-2,\ 1)$, B $(2,\ -1)$, C $(0,\ 4)$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $\quad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F07 | V01

Q220 | WRITTEN

C04-K02-413-EX-112

Find the area for A (0, −6), B (2, −2), C (1, 5).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F07 | V01

Q221 | WRITTEN

C04-K02-413-EX-113

Find the area for A $(-2,\ 4)$, B $(-3,\ -5)$, C $(5,\ -1)$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F07 | V01

Q222 | WRITTEN

C04-K02-413-EX-114

Find the area for A (2, 5), B (0, 1), C (4, 2).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F07 | V01

Q223 | MCQ

C04-K02-413-WA-109-MCQ

Find the area of triangle ABC with A (1, 1), B (3, 7), C (−3, −1):

A 11

B 9

C −10

D 10

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F07 | V01

Q224 | MCQ

C04-K02-413-TR-110-MCQ

Find the area for A (1, 5), B (−3, −3), C (3, −6):

A 29

B −30

C 30

D 31

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F07 | V01

Q225 | MCQ

C04-K02-413-TR-111-MCQ

Find the area for A $(-2,\ 1)$, B $(2,\ -1)$, C $(0,\ 4)$:

A 8

B 9

C 7

D -8

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $\quad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F07 | V01

Q226 | MCQ

C04-K02-413-EX-112-MCQ

Find the area for A (0, −6), B (2, −2), C (1, 5):

A −9

B 9

C 10

D 8

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F07 | V01

Q227 | MCQ

C04-K02-413-EX-113-MCQ

Find the area for A $(-2,\ 4)$, B $(-3,\ -5)$, C $(5,\ -1)$:

A -34

B 34

C 35

D 33

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F07 | V01

Q228 | MCQ

C04-K02-413-EX-114-MCQ

Find the area for A (2, 5), B (0, 1), C (4, 2):

A 8

B 6

C −7

D 7

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F99 | V06

Q229 | CHALLENGE WRITTEN

C04-K02-413-CH-115

Find the area of the wound triangle A $(-2,\ \ 1)$, B $(1,\ \ 5)$, C $(-21,\ \ -21)$.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1 k + A_0)x + (B_1 k + B_0)y + C_1 k + C_0 = 0$

Concept 2 | Triangles and Lines

F99 | V06

Q230 | CHALLENGE MCQ

C04-K02-413-CH-115-MCQ

Find the area of the wound triangle A $(-2,\ 1)$, B $(1,\ 5)$, C $(-21,\ -21)$:

A 6

B 4

C -5

D 5

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $\quad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F08 | V01

Q231 | WRITTEN

C04-K02-414-WA-116

The line $(k-4)x+(k+2)y+k+5=0$ passes through a fixed point for every k. Find it.

WORKING AREA

FORMULA BANK

Triangle type

$a^2+b^2=c^2$ (c longest)

Line through two points

$m=\frac{y_2-y_1}{x_2-x_1}$ $y-y_1=m(x-x_1)$

Parallel / perpendicular

$m_1=m_2$ $m_1m_2=-1$

Point-to-line distance

$$d=\frac{|ax_1+by_1+c|}{\sqrt{a^2+b^2}}$$

Triangle area

$A=\frac{1}{2}$ base × height

Fixed point

$(A_1k+A_0)x+(B_1k+B_0)y+C_1k+C_0=0$

Concept 2 | Triangles and Lines

F08 | V01

Q232 | WRITTEN

C04-K02-414-TR-117

The line $(2k+1)x-(k+2)y+7k+8=0$ passes through a fixed point for every k. Find it.

WORKING AREA

FORMULA BANK

Triangle type

$a^2+b^2=c^2$ (c longest)

Line through two points

$m=\frac{y_2-y_1}{x_2-x_1}$ $y-y_1=m(x-x_1)$

Parallel / perpendicular

$m_1=m_2$ $m_1m_2=-1$

Point-to-line distance

$$d=\frac{|ax_1+by_1+c|}{\sqrt{a^2+b^2}}$$

Triangle area

$A=\frac{1}{2}$ base × height

Fixed point

$(A_1k+A_0)x+(B_1k+B_0)y+C_1k+C_0=0$

Concept 2 | Triangles and Lines

F08 | V01

Q233 | WRITTEN

C04-K02-414-EX-118

The line $(k+2)x + ky - 6 = 0$ passes through a fixed point for every k. Find it.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F08 | V01

Q234 | WRITTEN

C04-K02-414-EX-119

The line $(k+3)x-(2k+1)y+k-2=0$ passes through a fixed point for every k. Find it.

WORKING AREA

FORMULA BANK

Triangle type

$a^2+b^2=c^2$ (c longest)

Line through two points

$m=\frac{y_2-y_1}{x_2-x_1}$ $y-y_1=m(x-x_1)$

Parallel / perpendicular

$m_1=m_2$ $m_1m_2=-1$

Point-to-line distance

$$d=\frac{|ax_1+by_1+c|}{\sqrt{a^2+b^2}}$$

Triangle area

$A=\frac{1}{2}$ base × height

Fixed point

$(A_1k+A_0)x+(B_1k+B_0)y+C_1k+C_0=0$

Concept 2 | Triangles and Lines

F08 | V01

Q235 | WRITTEN

C04-K02-414-EX-120

The line $(k+3)x+(3k+2)y+7=0$ passes through a fixed point for every k. Find it.

WORKING AREA

FORMULA BANK

Triangle type

$a^2+b^2=c^2$ (c longest)

Line through two points

$m=\frac{y_2-y_1}{x_2-x_1}$ $y-y_1=m(x-x_1)$

Parallel / perpendicular

$m_1=m_2$ $m_1m_2=-1$

Point-to-line distance

$$d=\frac{|ax_1+by_1+c|}{\sqrt{a^2+b^2}}$$

Triangle area

$$A=\frac{1}{2}\text{ base}\times\text{height}$$

Fixed point

$(A_1k+A_0)x+(B_1k+B_0)y+C_1k+C_0=0$

Concept 2 | Triangles and Lines

F08 | V01

Q236 | MCQ

C04-K02-414-WA-116-MCQ

The line $(k-4)x+(k+2)y+k+5=0$ passes through a fixed point for every k. Find it:

A $(-3/2,\ 1/2)$

B $(-1/2,\ -3/2)$

C $(1/2,\ 3/2)$

D $(1/2,\ -3/2)$

WORKING AREA

FORMULA BANK

Triangle type

$a^2+b^2=c^2$ (c longest)

Line through two points

$m=\frac{y_2-y_1}{x_2-x_1}$ $y-y_1=m(x-x_1)$

Parallel / perpendicular

$m_1=m_2$ $m_1m_2=-1$

Point-to-line distance

$$d=\frac{|ax_1+by_1+c|}{\sqrt{a^2+b^2}}$$

Triangle area

$A=\frac{1}{2}$ base × height

Fixed point

$(A_1k+A_0)x+(B_1k+B_0)y+C_1k+C_0=0$

Concept 2 | Triangles and Lines

F08 | V01

Q237 | MCQ C04-K02-414-TR-117-MCQ

The line $(2k+1)x-(k+2)y+7k+8=0$ passes through a fixed point for every k. Find it:

A $(-2,\ -3)$

B $(-2,\ 3)$

C $(3,\ -2)$

D $(2,\ 3)$

WORKING AREA

FORMULA BANK

Triangle type

$a^2+b^2=c^2$ (c longest)

Line through two points

$m=\frac{y_2-y_1}{x_2-x_1}$ $y-y_1=m(x-x_1)$

Parallel / perpendicular

$m_1=m_2$ $m_1m_2=-1$

Point-to-line distance

$$d=\frac{|ax_1+by_1+c|}{\sqrt{a^2+b^2}}$$

Triangle area

$A=\frac{1}{2}$ base × height

Fixed point

$(A_1k+A_0)x+(B_1k+B_0)y+C_1k+C_0=0$

Concept 2 | Triangles and Lines

F08 | V01

Q238 | MCQ C04-K02-414-EX-118-MCQ

The line $(k+2)x + ky - 6 = 0$ passes through a fixed point for every k. Find it:

A $(-3,\ 3)$

B $(-3,\ -3)$

C $(3,\ 3)$

D $(3,\ -3)$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F08 | V01

Q239 | MCQ

C04-K02-414-EX-119-MCQ

The line $(k+3)x-(2k+1)y+k-2=0$ passes through a fixed point for every k. Find it:

A $(-1,\ 1)$

B $(1,\ -1)$

C 0

D $(1,\ 1)$

WORKING AREA

FORMULA BANK

Triangle type

$a^2+b^2=c^2$ (c longest)

Line through two points

$m=\frac{y_2-y_1}{x_2-x_1}$ $y-y_1=m(x-x_1)$

Parallel / perpendicular

$m_1=m_2$ $m_1m_2=-1$

Point-to-line distance

$$d=\frac{|ax_1+by_1+c|}{\sqrt{a^2+b^2}}$$

Triangle area

$A=\frac{1}{2}$ base × height

Fixed point

$(A_1k+A_0)x+(B_1k+B_0)y+C_1k+C_0=0$

Concept 2 | Triangles and Lines

F08 | V01

Q240 | MCQ

C04-K02-414-EX-120-MCQ

The line $(k+3)x+(3k+2)y+7=0$ passes through a fixed point for every k. Find it:

A $(-3,\ 1)$

B $(1,\ -3)$

C $(3,\ 1)$

D $(-3,\ -1)$

WORKING AREA

FORMULA BANK

Triangle type

$a^2+b^2=c^2$ (c longest)

Line through two points

$m=\frac{y_2-y_1}{x_2-x_1}$ $y-y_1=m(x-x_1)$

Parallel / perpendicular

$m_1=m_2$ $m_1m_2=-1$

Point-to-line distance

$$d=\frac{|ax_1+by_1+c|}{\sqrt{a^2+b^2}}$$

Triangle area

$A=\frac{1}{2}$ base × height

Fixed point

$(A_1k+A_0)x+(B_1k+B_0)y+C_1k+C_0=0$

Concept 2 | Triangles and Lines

F99 | V07

Q241 | CHALLENGE WRITTEN

C04-K02-414-CH-121

The line $-(k-2)x+(k-3)y=-3k+5$ passes through a fixed point for every k. Find it.

WORKING AREA

FORMULA BANK

Triangle type

$a^2+b^2=c^2$ (c longest)

Line through two points

$m=\frac{y_2-y_1}{x_2-x_1}$ $y-y_1=m(x-x_1)$

Parallel / perpendicular

$m_1=m_2$ $m_1m_2=-1$

Point-to-line distance

$$d=\frac{|ax_1+by_1+c|}{\sqrt{a^2+b^2}}$$

Triangle area

$$A=\frac{1}{2}\text{ base}\times\text{height}$$

Fixed point

$(A_1k+A_0)x+(B_1k+B_0)y+C_1k+C_0=0$

Concept 2 | Triangles and Lines

F99 | V07

Q242 | CHALLENGE MCQ

C04-K02-414-CH-121-MCQ

The line $-(k-2)x+(k-3)y=-3k+5$ passes through a fixed point for every k. Find it:

A $(4,\ 1)$

B $(1,\ 4)$

C $(-4,\ 1)$

D $(4,\ -1)$

WORKING AREA

FORMULA BANK

Triangle type

$a^2+b^2=c^2$ (c longest)

Line through two points

$m=\frac{y_2-y_1}{x_2-x_1}$ $y-y_1=m(x-x_1)$

Parallel / perpendicular

$m_1=m_2$ $m_1m_2=-1$

Point-to-line distance

$$d=\frac{|ax_1+by_1+c|}{\sqrt{a^2+b^2}}$$

Triangle area

$A=\frac{1}{2}$ base × height

Fixed point

$(A_1k+A_0)x+(B_1k+B_0)y+C_1k+C_0=0$

Concept 2 | Triangles and Lines

F09 | V01

Q243 | WRITTEN

C04-K02-415-WA-122

For $x - y + 1 = 0$, $2x + y + 2 = 0$, and $ax + 3y - 4 = 0$ not to form a triangle, find a.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F09 | V01

Q244 | WRITTEN

C04-K02-415-TR-123

For $x - 2y + 8 = 0$, $x + y - 1 = 0$, and $ax + y - 5 = 0$ not to form a triangle, find a.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F09 | V01

Q245 | WRITTEN

C04-K02-415-EX-124

For $x - 2y + 1 = 0$, $3x + 2y = 6$, and $ax - 3y + 2 = 0$ not to form a triangle, find a.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F09 | V01

Q246 | WRITTEN

C04-K02-415-EX-125

For $x - y = -1$, $3x + 2y = 12$, and $ax - y = a - 1$ not to form a triangle, find a.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F09 | V01

Q247 | MCQ

C04-K02-415-WA-122-MCQ

For $x - y + 1 = 0$, $2x + y + 2 = 0$, and $ax + 3y - 4 = 0$ not to form a triangle, find a:

A $a = -4,\ -3,\ or 6$

B $a = -3,\ -3,\ or 6$

C $a = -4,\ -2,\ or 6$

D $a = -4,\ -3,\ or 7$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1 k + A_0)x + (B_1 k + B_0)y + C_1 k + C_0 = 0$

Concept 2 | Triangles and Lines

F09 | V01

Q248 | MCQ

C04-K02-415-TR-123-MCQ

For $x - 2y + 8 = 0$, $x + y - 1 = 0$, and $ax + y - 5 = 0$ not to form a triangle, find a:

A $a = -1,\ -1/2,\ or 1$

B $a = 0,\ -1/2,\ or 1$

C $a = -1,\ 1/2,\ or 1$

D $a = -1,\ -1/2,\ or 2$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1 k + A_0)x + (B_1 k + B_0)y + C_1 k + C_0 = 0$

Concept 2 | Triangles and Lines

F09 | V01

Q249 | MCQ

C04-K02-415-EX-124-MCQ

For $x - 2y + 1 = 0$, $3x + 2y = 6$, and $ax - 3y + 2 = 0$ not to form a triangle, find a:

A $a = 11/10,\ 5/2,\ or - 9/2$

B $a = 11/10,\ 3/2,\ or - 7/2$

C $a = 11/10,\ 3/2,\ or - 9/2$

D $a = 21/10,\ 3/2,\ or - 9/2$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F09 | V01

Q250 | MCQ

C04-K02-415-EX-125-MCQ

For $x - y = -1$, $3x + 2y = 12$, and $ax - y = a - 1$ not to form a triangle, find a:

A $a = 2,\ -3/2,\ or 2$

B $a = 1,\ -1/2,\ or 2$

C $a = 1,\ -3/2,\ or 3$

D $a = 1,\ -3/2,\ or 2$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1 k + A_0)x + (B_1 k + B_0)y + C_1 k + C_0 = 0$

Concept 2 | Triangles and Lines

F99 | V08

Q251 | CHALLENGE WRITTEN

C04-K02-415-CH-126

For $x + 2y - 1 = 0$, $3x + y + 2 = 0$, and $mx + 4y - 3 = 0$ not to form a triangle, find the sum of all possible m.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F99 | V08

Q252 | CHALLENGE MCQ

C04-K02-415-CH-126-MCQ

For $x + 2y - 1 = 0$, $3x + y + 2 = 0$, and $mx + 4y - 3 = 0$ not to form a triangle, find the sum of all possible m:

A 15

B 16

C 14

D -15

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F01 | C04-K02-F01-VQ

Quiz M1 | QUIZ MCQ

C04-K02-QUIZ-MCQ-1

Determine the shape of triangle A (0, 0), B (3, 0), C (0, 4):

A *isosceles (not right – angled)*

B *scalene (not right – angled)*

C *scalene right – angled*

D *equilateral*

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1 k + A_0)x + (B_1 k + B_0)y + C_1 k + C_0 = 0$

Concept 2 | Triangles and Lines

F02 | C04-K02-F02-VQ

Quiz M2 | QUIZ MCQ

C04-K02-QUIZ-MCQ-2

Find the equation of the line through (2,-1) with gradient 3:

A 0

B $y = 3x - 7$

C $y = -3x - 7$

D $y = 3x - 7 + 1$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$A = \frac{1}{2}$ base × height

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F06 | C04-K02-F06-VQ

Quiz M3 | QUIZ MCQ

C04-K02-QUIZ-MCQ-3

Find the perpendicular distance from $(1,2)$ to $3x + 4y - 10 = 0$:

A $6/5$

B $-4/5$

C $-1/5$

D $1/5$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F08 | C04-K02-F08-VQ

Quiz M4 | QUIZ MCQ

C04-K02-QUIZ-MCQ-4

The line $(k+2)x + ky - 6 = 0$ passes through a fixed point. Find it:

A $(-3,\ -3)$

B $(3,\ 3)$

C $(3,\ -3)$

D $(-3,\ 3)$

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $\quad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 2 | Triangles and Lines

F07 | C04-K02-F07-VQ

Quiz W1 | QUIZ WRITTEN

C04-K02-QUIZ-WRITTEN-1

Find the area of triangle A (0, 0), B (4, 0), C (0, 3).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1 k + A_0)x + (B_1 k + B_0)y + C_1 k + C_0 = 0$

Concept 2 | Triangles and Lines

F05 | C04-K02-F05-VQ

Quiz W2 | QUIZ WRITTEN

C04-K02-QUIZ-WRITTEN-2

Find the perpendicular bisector of the segment joining A (1, 2) and B (5, 4).

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2 \quad (c \text{ longest})$

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2 \qquad m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1 k + A_0)x + (B_1 k + B_0)y + C_1 k + C_0 = 0$

Concept 2 | Triangles and Lines

F04 | C04-K02-F04-VQ

Quiz W3 | QUIZ WRITTEN

C04-K02-QUIZ-WRITTEN-3

Find the equation of the line through $(1,2)$ perpendicular to $y = 3x - 1$.

WORKING AREA

FORMULA BANK

Triangle type

$$a^2 + b^2 = c^2 \quad (c \text{ longest})$$

Line through two points

$$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y - y_1 = m(x - x_1)$$

Parallel / perpendicular

$$m_1 = m_2 \qquad m_1 m_2 = -1$$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$$(A_1 k + A_0)x + (B_1 k + B_0)y + C_1 k + C_0 = 0$$

Concept 2 | Triangles and Lines

F09 | C04-K02-F09-VQ

Quiz W4 | QUIZ WRITTEN

C04-K02-QUIZ-WRITTEN-4

For $x - y + 1 = 0$, $2x + y + 2 = 0$, and $ax + 3y - 4 = 0$ not to form a triangle, find a.

WORKING AREA

FORMULA BANK

Triangle type

$a^2 + b^2 = c^2$ (c longest)

Line through two points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $y - y_1 = m(x - x_1)$

Parallel / perpendicular

$m_1 = m_2$ $m_1 m_2 = -1$

Point-to-line distance

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

Triangle area

$$A = \frac{1}{2} \text{ base} \times \text{height}$$

Fixed point

$(A_1k + A_0)x + (B_1k + B_0)y + C_1k + C_0 = 0$

Concept 3 | Circles — OFFICIAL LESSONS 4-16, 4-17, 4-18, 4-19, 4-20, 4-21, 4-22, 4-23, 4-24, 4-25, 4-26

Circles

Equation-first recall | use the same rail beside every question in this Concept

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$ $x^2+y^2+2gx+2fy+c=0$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$ $M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Tangency and real circle

$r=d(\text{centre, axis})$ $r^2>0$

Line–circle position

$\Delta>0$: 2 points $\Delta=0$: tangent $\Delta<0$: none

Chord and tangent

$L=2\sqrt{r^2-d^2}$ $x\,x_1+y\,y_1=r^2$

Two-circle position

D vs $r_1+r_2,\ |r_1-r_2|$

Radical axis

$S_1-S_2=0$ $S_1=0,\ S_2=0$

Pencil of circles

$S_1+\lambda S_2=0$

Start with the family cue, write the first move, then use the working grid.

Concept 3 | Circles

F01 | V01

Q001 | WRITTEN C04-K03-416-WA-001

Find the equation of the circle with centre (3,-2) and radius 5.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F01 | V01

Q002 | WRITTEN C04-K03-416-TR-003

Find the equation of the circle with centre (-3,1) and radius 2.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F01 | V01

Q003 | WRITTEN C04-K03-416-TR-004

Find the equation of the circle with centre the origin and radius 4.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F01 | V01

Q004 | WRITTEN

C04-K03-416-EX-006

Find the equation of the circle with centre (3,4), radius 6.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F01 | V01

Q005 | WRITTEN

C04-K03-416-EX-007

Find the equation of the circle with centre (-2,6), radius 2sqrt(3).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F01 | V01

Q006 | WRITTEN C04-K03-416-EX-008

Find the equation of the circle with centre the origin, radius 5.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F01 | V01

Q007 | MCQ

C04-K03-416-WA-001-MCQ

Find the equation of the circle with centre (3,-2) and radius 5:

A $(x-3)^2+(y+2)^2=25$

B $(x+3)^2+(y+2)^2=25$

C $(x-3)^2+(y+2)^2=25+1$

D 4

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F01 | V01

Q008 | MCQ

C04-K03-416-TR-003-MCQ

Find the equation of the circle with centre (-3,1) and radius 2:

A $(x+3)^2+(y-1)^2=4$

B $(x+3)^2+(y+1)^2=4$

C $(x+3)^2+(y-1)^2=4+1$

D 6

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F01 | V01

Q009 | MCQ

C04-K03-416-TR-004-MCQ

Find the equation of the circle with centre the origin and radius 4:

A $x^2 + y^2 = 16 + 1$

B 6

C 7

D $x^2 + y^2 = 16$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F01 | V01

Q010 | MCQ

C04-K03-416-EX-006-MCQ

Find the equation of the circle with centre (3,4), radius 6:

A 9

B $(x-3)^2+(y-4)^2=36$

C $(x+3)^2+(y-4)^2=36$

D $(x-3)^2+(y-4)^2=36+1$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F01 | V01

Q011 | MCQ C04-K03-416-EX-007-MCQ

Find the equation of the circle with centre (-2,6), radius 2sqrt(3):

A 10

B $(x+2)^2+(y-6)^2=12$

C $(x+2)^2+(y+6)^2=12$

D $(x+2)^2+(y-6)^2=12+1$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F01 | V01

Q012 | MCQ

C04-K03-416-EX-008-MCQ

Find the equation of the circle with centre the origin, radius 5:

A $x^2 + y^2 = 25$

B $x^2 + y^2 = 25 + 1$

C 10

D 11

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F01 | V02

Q013 | WRITTEN C04-K03-416-WA-002

Determine what kind of figure $x^2 + y^2 - 6x + 2y + 6 = 0$ represents.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F01 | V02

Q014 | WRITTEN

C04-K03-416-TR-005

Determine what kind of figure $x^2 + y^2 - 4x - 6y + 4 = 0$ represents.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F01 | V02

Q015 | WRITTEN C04-K03-416-EX-009

Determine what kind of figure $x^2 + y^2 - 4x + 8y + 4 = 0$ represents.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F01 | V02

Q016 | WRITTEN

C04-K03-416-EX-010

Determine what kind of figure $x^2 + y^2 - 4x = 0$ represents.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F01 | V02

Q017 | WRITTEN C04-K03-416-EX-011

Determine what kind of figure $x^2 + y^2 + 2x - 4y - 20 = 0$ represents.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F01 | V02

Q018 | WRITTEN C04-K03-416-EX-012

Determine what kind of figure $x^2 + y^2 + 4x - 6y = 0$ represents.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F01 | V02

Q019 | MCQ

C04-K03-416-WA-002-MCQ

Determine what kind of figure $x^2 + y^2 - 6x + 2y + 6 = 0$ represents:

A circle; centre $(3, -1)$, radius 2

B 3

C 4

D 5

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F01 | V02

Q020 | MCQ

C04-K03-416-TR-005-MCQ

Determine what kind of figure $x^2 + y^2 - 4x - 6y + 4 = 0$ represents:

A 7

B 8

C circle; centre (2, 3), radius 3

D 6

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F01 | V02

Q021 | MCQ

C04-K03-416-EX-009-MCQ

Determine what kind of figure $x^2 + y^2 - 4x + 8y + 4 = 0$ represents:

A 10

B 11

C 12

D circle; centre $(2, -4)$, radius 4

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F01 | V02

Q022 | MCQ

C04-K03-416-EX-010-MCQ

Determine what kind of figure $x^2 + y^2 - 4x = 0$ represents:

A 12

B 13

C circle; centre (2, 0), radius 2

D 11

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F01 | V02

Q023 | MCQ C04-K03-416-EX-011-MCQ

Determine what kind of figure $x^2 + y^2 + 2x - 4y - 20 = 0$ represents:

A 13

B 14

C circle; centre $(-1, 2)$, radius 5

D circle; centre $(-1, 2)$, radius 10

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F01 | V02

Q024 | MCQ

C04-K03-416-EX-012-MCQ

Determine what kind of figure $x^2 + y^2 + 4x - 6y = 0$ represents:

A 14

B 15

C circle; centre $(-2, 3)$, radius $\sqrt{13}$

D 13

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F99 | V01

Q025 | CHALLENGE WRITTEN C04-K03-416-CH-013

A circle passes through A (2, 5), B (8, 1), and has its centre on $x + y = 8$. Find its standard equation, centre and radius.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F99 | V01

Q026 | CHALLENGE MCQ

C04-K03-416-CH-013-MCQ

A circle passes through A $(2,\ 5)$, B $(8,\ 1)$, and has its centre on $x+y=8$. Find its standard equation, centre and radius:

A 0

B centre $(5,\ 3)$, radius$^2=13$; $(x-5)^2+(y-3)^2=13$

C centre $(5,\ 3)$, radius$^2=13$; $(x-5)^2+(y-3)^2=13+1$

D centre $(5,\ 3)$, radius$^2=13$; $(x-5)^2+(y-3)^2=13-1$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V01

Q027 | WRITTEN C04-K03-417-WA-014

Find the equation of the circle with centre (2,3) passing through (4,6).

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V01

Q028 | WRITTEN C04-K03-417-TR-017

Find the equation of the circle with centre (-3,1) passing through (4,-2).

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V01

Q029 | WRITTEN

C04-K03-417-EX-020

Find the equation of the circle with centre (1,-3) through (-3,0).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V01

Q030 | WRITTEN

C04-K03-417-EX-021

Find the equation of the circle with centre (-4,1) through (3,-2).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V01

Q031 | WRITTEN C04-K03-417-EX-022

Find the equation of the circle with centre (2,-1) through the origin.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V01

Q032 | WRITTEN C04-K03-417-EX-023

Find the equation of the circle with centre the origin through (4,-3).

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V01

Q033 | MCQ

C04-K03-417-WA-014-MCQ

Find the equation of the circle with centre (2,3) passing through (4,6):

A $(x-2)^2+(y-3)^2=13+1$

B 4

C $(x-2)^2+(y-3)^2=13$

D $(x+2)^2+(y-3)^2=13$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V01

Q034 | MCQ

C04-K03-417-TR-017-MCQ

Find the equation of the circle with centre (-3,1) passing through (4,-2):

A $(x+3)^2+(y-1)^2=58$

B $(x+3)^2+(y+1)^2=58$

C $(x+3)^2+(y-1)^2=58+1$

D 7

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V01

Q035 | MCQ

C04-K03-417-EX-020-MCQ

Find the equation of the circle with centre (1,-3) through (-3,0):

A $(x+1)^2+(y+3)^2=25$

B $(x-1)^2+(y+3)^2=25+1$

C 10

D $(x-1)^2+(y+3)^2=25$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V01

Q036 | MCQ

C04-K03-417-EX-021-MCQ

Find the equation of the circle with centre (-4,1) through (3,-2):

A $(x+4)^2+(y-1)^2=58$

B $(x+4)^2+(y+1)^2=58$

C $(x+4)^2+(y-1)^2=58+1$

D 11

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V01

Q037 | MCQ

C04-K03-417-EX-022-MCQ

Find the equation of the circle with centre (2,-1) through the origin:

A 12

B $(x-2)^2+(y+1)^2=5$

C $(x+2)^2+(y+1)^2=5$

D $(x-2)^2+(y+1)^2=5+1$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V01

Q038 | MCQ

C04-K03-417-EX-023-MCQ

Find the equation of the circle with centre the origin through (4,-3):

A $x^2 + y^2 = 25$

B $x^2 + y^2 = 25 + 1$

C 12

D 13

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F02 | V02

Q039 | WRITTEN C04-K03-417-WA-015

Find the equation of the circle with diameter endpoints A $(1,\ 3)$, B $(3,\ -5)$.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V02

Q040 | WRITTEN C04-K03-417-TR-018

Find the equation of the circle with diameter endpoints (3,4), (5,-2).

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V02

Q041 | WRITTEN

C04-K03-417-EX-024

Find the equation of the circle with diameter endpoints (4,7), (-2,-1).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V02

Q042 | WRITTEN C04-K03-417-EX-025

Find the equation of the circle with diameter endpoints (4,-2), (-6,-2).

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V02

Q043 | WRITTEN

C04-K03-417-EX-026

Find the equation of the circle with diameter endpoints (-3,0), (-1,2).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V02

Q044 | WRITTEN C04-K03-417-EX-027

Find the equation of the circle with diameter endpoints (-3,6), (3,-2).

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V02

Q045 | MCQ

C04-K03-417-WA-015-MCQ

Find the equation of the circle with diameter endpoints A $(1,\ 3)$, B $(3,\ -5)$:

A $(x-2)^2+(y+1)^2=17$

B $(x+2)^2+(y+1)^2=17$

C $(x-2)^2+(y+1)^2=17+1$

D 5

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V02

Q046 | MCQ

C04-K03-417-TR-018-MCQ

Find the equation of the circle with diameter endpoints (3,4), (5,-2):

A $(x-4)^2+(y-1)^2=10+1$

B 8

C $(x-4)^2+(y-1)^2=10$

D $(x+4)^2+(y-1)^2=10$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V02

Q047 | MCQ

C04-K03-417-EX-024-MCQ

Find the equation of the circle with diameter endpoints (4,7), (-2,-1):

A $(x-1)^2+(y-3)^2=25+1$

B 14

C $(x-1)^2+(y-3)^2=25$

D $(x+1)^2+(y-3)^2=25$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V02

Q048 | MCQ

C04-K03-417-EX-025-MCQ

Find the equation of the circle with diameter endpoints (4,-2), (-6,-2):

A $(x+1)^2+(y+2)^2=25$

B $(x+1)^2+(y+2)^2=25+1$

C 14

D 15

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V02

Q049 | MCQ

C04-K03-417-EX-026-MCQ

Find the equation of the circle with diameter endpoints (-3,0), (-1,2):

A 16

B $(x+2)^2+(y-1)^2=2$

C $(x+2)^2+(y+1)^2=2$

D $(x+2)^2+(y-1)^2=2+1$

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$x\,x_1+y\,y_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V02

Q050 | MCQ

C04-K03-417-EX-027-MCQ

Find the equation of the circle with diameter endpoints (-3,6), (3,-2):

A $x^2 + (y-2)^2 = 25 + 1$

B 17

C $x^2 + (y-2)^2 = 25$

D $x^2 + (y+2)^2 = 25$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F02 | V03

Q051 | WRITTEN C04-K03-417-WA-016

Find the equation of the circle passing through (1,1), (2,-1), and (3,2).

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V03

Q052 | WRITTEN

C04-K03-417-TR-019

Find the equation of the circle passing through (0,1), (-1,2), and (3,1).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$x\,x_1+y\,y_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V03

Q053 | WRITTEN

C04-K03-417-EX-028

Find the equation of the circle with through (0,0), (-1,1), (2,4).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V03

Q054 | WRITTEN

C04-K03-417-EX-029

Find the equation of the circle with through (-4,6), (0,8), (3,-1).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$x\,x_1+y\,y_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V03

Q055 | WRITTEN

C04-K03-417-EX-030

Find the equation of the circle with through (1,1), (5,-1), (-3,-7).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F02 | V03

Q056 | MCQ

C04-K03-417-WA-016-MCQ

Find the equation of the circle passing through (1,1), (2,-1), and (3,2):

A $x^2 + y^2 - 5x - y + 4 = 0$

B $x^2 + y^2 + 5x - y + 4 = 0$

C $x^2 + y^2 - 5x - y + 4 = 0 + 1$

D 6

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F02 | V03

Q057 | MCQ

C04-K03-417-TR-019-MCQ

Find the equation of the circle passing through (0,1), (-1,2), and (3,1):

A 9

B $x^2 + y^2 - 3x - 7y + 6 = 0$

C $x^2 + y^2 + 3x - 7y + 6 = 0$

D $x^2 + y^2 - 3x - 7y + 6 = 0 + 1$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F02 | V03

Q058 | MCQ

C04-K03-417-EX-028-MCQ

Find the equation of the circle with through (0,0), (-1,1), (2,4):

A $x^2 + y^2 + 2x - 4y = 0$

B $x^2 + y^2 - 2x - 4y = 0 + 1$

C 18

D $x^2 + y^2 - 2x - 4y = 0$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F02 | V03

Q059 | MCQ

C04-K03-417-EX-029-MCQ

Find the equation of the circle with through (-4,6), (0,8), (3,-1):

A $x^2 + y^2 + 6y - 16 = 0$

B $x^2 + y^2 - 6y - 16 = 0 + 1$

C 19

D $x^2 + y^2 - 6y - 16 = 0$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F02 | V03

Q060 | MCQ

C04-K03-417-EX-030-MCQ

Find the equation of the circle with through (1,1), (5,-1), (-3,-7):

A $x^2 + y^2 + 2x + 8y - 8 = 0$

B $x^2 + y^2 - 2x + 8y - 8 = 0 + 1$

C 20

D $x^2 + y^2 - 2x + 8y - 8 = 0$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F99 | V01

Q061 | CHALLENGE WRITTEN C04-K03-417-CH-031

Find the circle through (0,2), (2,0), and (4,6), giving its centre and radius.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F99 | V01

Q062 | CHALLENGE MCQ

C04-K03-417-CH-031-MCQ

Find the circle through (0,2), (2,0), and (4,6), giving its centre and radius:

A $x^2 + y^2 - 6x - 6y + 8 = 0$; centre $(3, 3)$, radius $\sqrt{10}$

B $x^2 + y^2 - 6x - 6y + 8 = 0$; centre $(3, 3)$, radius $\sqrt{10} + 1$

C $x^2 + y^2 - 6x - 6y + 8 = 0$; centre $(3, 3)$, radius $\sqrt{10} - 1$

D 0

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F03 | V01

Q063 | WRITTEN

C04-K03-418-WA-032

Find the circle with centre (4,-2) tangent to the x-axis.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V01

Q064 | WRITTEN C04-K03-418-TR-035

Find the circle with centre (-2,3) tangent to the y-axis.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V01

Q065 | WRITTEN

C04-K03-418-EX-038

Find the circle with centre (-1,4) tangent to x-axis.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V01

Q066 | WRITTEN

C04-K03-418-EX-039

Find the circle with centre (3,-4) tangent to x-axis.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V01

Q067 | WRITTEN

C04-K03-418-EX-040

Find the circle with centre (5,-4) tangent to x-axis.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V01

Q068 | WRITTEN

C04-K03-418-EX-041

Find the circle with centre (-1,6) tangent to y-axis.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V01

Q069 | WRITTEN

C04-K03-418-EX-042

Find the circle with centre (2,-5) tangent to y-axis.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V01

Q070 | WRITTEN

C04-K03-418-EX-043

Find the circle with centre (-3,-4) tangent to y-axis.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V01

Q071 | MCQ

C04-K03-418-WA-032-MCQ

Find the circle with centre (4,-2) tangent to the x-axis:

A radius zero

B $(x-4)^2+(y+2)^2=4$

C no real circle

D centre on the wrong locus

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V01

Q072 | MCQ

C04-K03-418-TR-035-MCQ

Find the circle with centre (-2,3) tangent to the y-axis:

A radius zero

B $(x+2)^2+(y-3)^2=4$

C no real circle

D centre on the wrong locus

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V01

Q073 | MCQ

C04-K03-418-EX-038-MCQ

Find the circle with centre (-1,4) tangent to x-axis:

A radius zero

B $(x+1)^2+(y-4)^2=16$

C no real circle

D centre on the wrong locus

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V01

Q074 | MCQ

C04-K03-418-EX-039-MCQ

Find the circle with centre (3,-4) tangent to x-axis:

A no real circle

B centre on the wrong locus

C radius zero

D $(x-3)^2+(y+4)^2=16$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V01

Q075 | MCQ C04-K03-418-EX-040-MCQ

Find the circle with centre (5,-4) tangent to x-axis:

A no real circle

B centre on the wrong locus

C radius zero

D $(x-5)^2+(y+4)^2=16$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V01

Q076 | MCQ

C04-K03-418-EX-041-MCQ

Find the circle with centre (-1,6) tangent to y-axis:

A no real circle

B centre on the wrong locus

C radius zero

D $(x+1)^2+(y-6)^2=1$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V01

Q077 | MCQ

C04-K03-418-EX-042-MCQ

Find the circle with centre (2,-5) tangent to y-axis:

A radius zero

B $(x-2)^2+(y+5)^2=4$

C no real circle

D centre on the wrong locus

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V01

Q078 | MCQ

C04-K03-418-EX-043-MCQ

Find the circle with centre (-3,-4) tangent to y-axis:

A centre on the wrong locus

B radius zero

C $(x+3)^2+(y+4)^2=9$

D no real circle

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V02

Q079 | WRITTEN

C04-K03-418-WA-033

Find the circles through (-2,1) tangent to both the x-axis and y-axis.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V02

Q080 | WRITTEN

C04-K03-418-TR-036

Find the circles through (1,2) tangent to both axes.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V02

Q081 | WRITTEN

C04-K03-418-EX-044

Find the circle with through (-1,-2) tangent to both axes.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V02

Q082 | WRITTEN

C04-K03-418-EX-045

Find the circle with through (-2,-1) tangent to both axes.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V02

Q083 | WRITTEN

C04-K03-418-EX-046

Find the circle with through (8,-1) tangent to both axes.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V02

Q084 | MCQ

C04-K03-418-WA-033-MCQ

Find the circles through (-2,1) tangent to both the x-axis and y-axis:

A centre on the wrong locus

B radius zero

C $(x+1)^2+(y-1)^2=1$ or $(x+5)^2+(y-5)^2=25$

D no real circle

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V02

Q085 | MCQ

C04-K03-418-TR-036-MCQ

Find the circles through (1,2) tangent to both axes:

A no real circle

B centre on the wrong locus

C radius zero

D $(x-1)^2+(y-1)^2=1$ or $(x-5)^2+(y-5)^2=25$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V02

Q086 | MCQ

C04-K03-418-EX-044-MCQ

Find the circle with through (-1,-2) tangent to both axes:

A centre on the wrong locus

B radius zero

C $(x+1)^2+(y+1)^2=1$ or $(x+5)^2+(y+5)^2=25$

D no real circle

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V02

Q087 | MCQ

C04-K03-418-EX-045-MCQ

Find the circle with through (-2,-1) tangent to both axes:

A centre on the wrong locus

B radius zero

C $(x+1)^2+(y+1)^2=1$ or $(x+5)^2+(y+5)^2=25$

D no real circle

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V02

Q088 | MCQ

C04-K03-418-EX-046-MCQ

Find the circle with through (8,-1) tangent to both axes:

A radius zero

B $(x-5)^2+(y+5)^2=25$ or $(x-13)^2+(y+13)^2=169$

C no real circle

D centre on the wrong locus

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F03 | V03

Q089 | WRITTEN

C04-K03-418-WA-034

Find the circle whose centre is on $y = -x$ and which passes through (5,2) and (-2,3).

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F03 | V03

Q090 | WRITTEN

C04-K03-418-TR-037

Find the circle whose centre is on $y = x + 5$ and which passes through the origin and (1,2).

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F03 | V03

Q091 | WRITTEN

C04-K03-418-EX-047

Find the circle with centre on $y = x + 1$ through (3,4) and (1,4).

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F03 | V03

Q092 | WRITTEN

C04-K03-418-EX-048

Find the circle with centre on $y = 2x - 6$ through (3,7) and (-1,3).

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F03 | V03

Q093 | MCQ

C04-K03-418-WA-034-MCQ

Find the circle whose centre is on $y = -x$ and which passes through (5,2) and (-2,3):

A no real circle

B centre on the wrong locus

C radius zero

D $(x-1)^2 + (y+1)^2 = 25$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F03 | V03

Q094 | MCQ C04-K03-418-TR-037-MCQ

Find the circle whose centre is on $y = x + 5$ and which passes through the origin and (1,2):

A centre on the wrong locus

B radius zero

C $(x + 5/2)^2 + (y - 5/2)^2 = 25/2$

D no real circle

WORKING AREA

FORMULA BANK

Standard / general circle
$(x - h)^2 + (y - k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F03 | V03

Q095 | MCQ C04-K03-418-EX-047-MCQ

Find the circle with centre on $y = x + 1$ through (3,4) and (1,4):

A centre on the wrong locus

B radius zero

C $(x-2)^2 + (y-3)^2 = 2$

D no real circle

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F03 | V03

Q096 | MCQ

C04-K03-418-EX-048-MCQ

Find the circle with centre on $y = 2x - 6$ through (3,7) and (-1,3):

A no real circle

B centre on the wrong locus

C radius zero

D $(x-4)^2 + (y-2)^2 = 26$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F99 | V02

Q097 | CHALLENGE WRITTEN

C04-K03-418-CH-049

A circle centre is constrained to the x-axis and passes through P1(-2,2), P2(1,1). Find its standard equation, centre and radius.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F99 | V02

Q098 | CHALLENGE MCQ

C04-K03-418-CH-049-MCQ

A circle centre is constrained to the x-axis and passes through P1(-2,2), P2(1,1). Find its standard equation, centre and radius:

A $(x+1)^2+y^2=5$; centre $(-1,\,0)$, radius $\sqrt{5}-1$

B 0

C $(x+1)^2+y^2=5$; centre $(-1,\,0)$, radius $\sqrt{5}$

D $(x+1)^2+y^2=5$; centre $(-1,\,0)$, radius $\sqrt{5}+1$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\,\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F04 | V01

Q099 | WRITTEN

C04-K03-419-WA-050

Find the range of k for $x^2 + y^2 - 2kx + 2ky + 4k + 6 = 0$ to represent a circle.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$xx_1 + yy_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F04 | V01

Q100 | WRITTEN

C04-K03-419-TR-051

Find the range of k for $x^2 + y^2 + 2kx - 4ky + 4k^2 + 6 = 0$ to represent a circle.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F04 | V01

Q101 | WRITTEN

C04-K03-419-EX-052

Find the range of k for $x^2 + y^2 + 2x - y + k = 0$ to represent a circle.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F04 | V01

Q102 | WRITTEN

C04-K03-419-EX-053

Find the range of k for $x^2 + y^2 + 6kx - 2ky + 28k + 6 = 0$ to represent a circle.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F04 | V01

Q103 | WRITTEN

C04-K03-419-EX-054

Find the range of k for $x^2 + y^2 + 2kx - 2(k+3)y + 4k^2 + 1 = 0$ to represent a circle.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F04 | V01

Q104 | MCQ

C04-K03-419-WA-050-MCQ

Find the range of k for $x^2 + y^2 - 2kx + 2ky + 4k + 6 = 0$ to represent a circle:

A all real parameter values

B radius squared is negative

C $k < -1$ or $k > 3$

D radius squared is zero

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F04 | V01

Q105 | MCQ

C04-K03-419-TR-051-MCQ

Find the range of k for $x^2 + y^2 + 2kx - 4ky + 4k^2 + 6 = 0$ to represent a circle:

A radius squared is negative

B $k < -\sqrt{6}$ or $k > \sqrt{6}$

C radius squared is zero

D all real parameter values

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F04 | V01

Q106 | MCQ C04-K03-419-EX-052-MCQ

Find the range of k for $x^2 + y^2 + 2x - y + k = 0$ to represent a circle:

A all real parameter values

B radius squared is negative

C $k < 5/4$

D radius squared is zero

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F04 | V01

Q107 | MCQ

C04-K03-419-EX-053-MCQ

Find the range of k for $x^2 + y^2 + 6kx - 2ky + 28k + 6 = 0$ to represent a circle:

A radius squared is negative

B $k < -1/5$ or $k > 3$

C radius squared is zero

D all real parameter values

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$xx_1 + yy_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F04 | V01

Q108 | MCQ

C04-K03-419-EX-054-MCQ

Find the range of k for $x^2 + y^2 + 2kx - 2(k+3)y + 4k^2 + 1 = 0$ to represent a circle:

A radius squared is zero

B all real parameter values

C radius squared is negative

D $-1 < k < 4$

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F99 | V05

Q109 | CHALLENGE WRITTEN

C04-K03-419-CH-055

An acoustic-safety circle is $x^2+y^2+6x-2\text{ky}+2k^2-4k+9=0$. Find the exact k-range giving a positive radius.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$x\,x_1+y\,y_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F99 | V05

Q110 | CHALLENGE MCQ

C04-K03-419-CH-055-MCQ

An acoustic-safety circle is $x^2+y^2+6x-2\text{k}y+2k^2-4k+9=0$. Find the exact k-range giving a positive radius:

A 0

B $0<k<4$

C $0<k<4+1$

D $0<k<4-1$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F05 | V01

Q111 | WRITTEN

C04-K03-420-WA-056

Find the coordinates of the intersections of $(x+2)^2+y^2=10$ and $y=-2x+1$.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F05 | V01

Q112 | WRITTEN

C04-K03-420-TR-058

Find the coordinates of the intersections of $x^2 + y^2 = 4$ and $x + y = 2$.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V01

Q113 | WRITTEN

C04-K03-420-EX-060

Find the coordinates of the intersections of $x^2 + y^2 = 10$ with $y = 3x - 10$.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V01

Q114 | WRITTEN

C04-K03-420-EX-061

Find the coordinates of the intersections of $x^2 + y^2 = 5$ with $2x - y + 5 = 0$.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V01

Q115 | WRITTEN

C04-K03-420-EX-062

Find the coordinates of the intersections of $(x-1)^2+y^2=10$ with $x+3y-1=0$.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F05 | V01

Q116 | MCQ C04-K03-420-WA-056-MCQ

Find the coordinates of the intersections of $(x+2)^2 + y^2 = 10$ and $y = -2x + 1$:

A no real intersection

B two intersection points

C $(1, -1)$ and $(-1, 3)$

D tangent

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V01

Q117 | MCQ C04-K03-420-TR-058-MCQ

Find the coordinates of the intersections of $x^2 + y^2 = 4$ and $x + y = 2$:

A tangent

B no real intersection

C two intersection points

D $(0, 2)$ and $(2, 0)$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V01

Q118 | MCQ C04-K03-420-EX-060-MCQ

Find the coordinates of the intersections of $x^2 + y^2 = 10$ with $y = 3x - 10$:

A no real intersection

B two intersection points

C $(3, -1)$

D tangent

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V01

Q119 | MCQ C04-K03-420-EX-061-MCQ

Find the coordinates of the intersections of $x^2 + y^2 = 5$ with $2x - y + 5 = 0$:

A tangent

B no real intersection

C two intersection points

D $(-2, 1)$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V01

Q120 | MCQ C04-K03-420-EX-062-MCQ

Find the coordinates of the intersections of $(x-1)^2+y^2=10$ with $x+3y-1=0$:

A two intersection points

B $(-2,\,1)$ and $(4,\,-1)$

C tangent

D no real intersection

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\,\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F05 | V02

Q121 | WRITTEN

C04-K03-420-WA-057

Find the number of intersections of $x^2 + y^2 = 2$ and $x - y + 3 = 0$.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V02

Q122 | WRITTEN

C04-K03-420-TR-059

Find the number of intersections of $x^2 + y^2 = 10$ and $y = 2x - 5$.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V02

Q123 | WRITTEN

C04-K03-420-EX-063

Find the number of intersections of $x^2 + y^2 = 5$ with $y = x + 2$.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V02

Q124 | WRITTEN C04-K03-420-EX-064

Find the number of intersections of $x^2 + y^2 = 2$ with $2x + 3y - 6 = 0$.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V02

Q125 | WRITTEN

C04-K03-420-EX-065

Find the number of intersections of $(x+1)^2+(y-2)^2=5$ with $x+2y+2=0$.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F05 | V02

Q126 | MCQ

C04-K03-420-WA-057-MCQ

Find the number of intersections of $x^2 + y^2 = 2$ and $x - y + 3 = 0$:

A tangent

B no real intersection

C two intersection points

D 0 points

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V02

Q127 | MCQ C04-K03-420-TR-059-MCQ

Find the number of intersections of $x^2 + y^2 = 10$ and $y = 2x - 5$:

A 2 points : $(1, -3)$ and $(3, 1)$

B tangent

C no real intersection

D two intersection points

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V02

Q128 | MCQ

C04-K03-420-EX-063-MCQ

Find the number of intersections of $x^2 + y^2 = 5$ with $y = x + 2$:

A no real intersection

B two intersection points

C 2 points : $\left(-1 + \sqrt{6}/2,\ 1 + \sqrt{6}/2\right)$ and $\left(-1 - \sqrt{6}/2,\ 1 - \sqrt{6}/2\right)$

D tangent

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V02

Q129 | MCQ

C04-K03-420-EX-064-MCQ

Find the number of intersections of $x^2 + y^2 = 2$ with $2x + 3y - 6 = 0$:

A no real intersection

B two intersection points

C 0 points

D tangent

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V02

Q130 | MCQ

C04-K03-420-EX-065-MCQ

Find the number of intersections of $(x+1)^2+(y-2)^2=5$ with $x+2y+2=0$:

A tangent

B no real intersection

C two intersection points

D 1 point : $(-2,\ 0)$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F05 | V03

Q131 | WRITTEN

C04-K03-421-WA-066

If $x^2 + y^2 = 5$ and $y = 2x - k$ intersect at two distinct points, find the range of k.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V03

Q132 | WRITTEN

C04-K03-421-WA-067

If $x^2 + y^2 = r^2$ and $2x + y - 5 = 0$ are tangent, find r.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V03

Q133 | WRITTEN

C04-K03-421-TR-068

If $x^2 + y^2 = 4$ and $y = mx + 4$ are tangent, find m.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V03

Q134 | WRITTEN

C04-K03-421-TR-069

If $x^2+y^2=r^2$ and $x-3y-10=0$ have no intersections, find the positive-radius range.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F05 | V03

Q135 | WRITTEN

C04-K03-421-EX-070

If $x^2 + y^2 = 8$ and $y = x + m$ are tangent, find m.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V03

Q136 | WRITTEN

C04-K03-421-EX-071

If $x^2 + y^2 = 10$ and $y = 3x + n$ have no intersections, find n.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V03

Q137 | WRITTEN

C04-K03-421-EX-072

If $x^2 + y^2 = 5$ and $y = 2x + m$ have points of intersection, find the range of m.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V03

Q138 | WRITTEN

C04-K03-421-EX-073

If $x^2 + y^2 = r^2$ and $y = x + 2$ are tangent, find r.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V03

Q139 | WRITTEN

C04-K03-421-EX-074

If $x^2 + y^2 = r^2$ and $4x - y + 17 = 0$ intersect at two distinct points, find the positive-radius range.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V03

Q140 | MCQ C04-K03-421-WA-066-MCQ

If $x^2 + y^2 = 5$ and $y = 2x - k$ intersect at two distinct points, find the range of k:

A tangent

B no real intersection

C two intersection points

D $-5 < k < 5$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V03

Q141 | MCQ

C04-K03-421-WA-067-MCQ

If $x^2 + y^2 = r^2$ and $2x + y - 5 = 0$ are tangent, find r:

A two intersection points

B $r = \sqrt{5}$

C tangent

D no real intersection

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V03

Q142 | MCQ

C04-K03-421-TR-068-MCQ

If $x^2 + y^2 = 4$ and $y = mx + 4$ are tangent, find m:

A two intersection points

B $m = \pm\sqrt{3}$

C tangent

D no real intersection

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V03

Q143 | MCQ

C04-K03-421-TR-069-MCQ

If $x^2 + y^2 = r^2$ and $x - 3y - 10 = 0$ have no intersections, find the positive-radius range:

A two intersection points

B $0 < r < \sqrt{10}$

C tangent

D no real intersection

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V03

Q144 | MCQ C04-K03-421-EX-070-MCQ

If $x^2 + y^2 = 8$ and $y = x + m$ are tangent, find m:

A no real intersection

B two intersection points

C $m = \pm 4$

D tangent

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V03

Q145 | MCQ C04-K03-421-EX-071-MCQ

If $x^2 + y^2 = 10$ and $y = 3x + n$ have no intersections, find n:

A $n < -10$ or $n > 10$

B tangent

C no real intersection

D two intersection points

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V03

Q146 | MCQ C04-K03-421-EX-072-MCQ

If $x^2 + y^2 = 5$ and $y = 2x + m$ have points of intersection, find the range of m:

A no real intersection

B two intersection points

C $-5 <= m <= 5$

D tangent

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V03

Q147 | MCQ C04-K03-421-EX-073-MCQ

If $x^2 + y^2 = r^2$ and $y = x + 2$ are tangent, find r:

A two intersection points

B $r = \sqrt{2}$

C tangent

D no real intersection

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F05 | V03

Q148 | MCQ

C04-K03-421-EX-074-MCQ

If $x^2+y^2=r^2$ and $4x-y+17=0$ intersect at two distinct points, find the positive-radius range:

A tangent

B no real intersection

C two intersection points

D $r>\sqrt{17}$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F99 | V02

Q149 | CHALLENGE WRITTEN

C04-K03-421-CH-075

A radar circle $x^2 + y^2 = r^2$ must have no intersection with $3x + 4y - 10 = 0$. Find the positive range of r.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F99 | V02

Q150 | CHALLENGE MCQ

C04-K03-421-CH-075-MCQ

A radar circle $x^2 + y^2 = r^2$ must have no intersection with $3x + 4y - 10 = 0$. Find the positive range of r:

A $0 < r < 2 + 1$

B $0 < r < 2 - 1$

C 0

D $0 < r < 2$

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F06 | V01

Q151 | WRITTEN

C04-K03-422-WA-076

Find the chord length cut off by $x^2 + y^2 = 4$ on $x + y - 1 = 0$.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F06 | V01

Q152 | WRITTEN

C04-K03-422-TR-078

Find the chord length cut off by $(x-2)^2+(y+1)^2=9$ on $x+2y-5=0$.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F06 | V01

Q153 | WRITTEN

C04-K03-422-EX-080

Find the chord length cut off by $x^2 + y^2 = 10$ on $2x - y = 5$.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F06 | V01

Q154 | WRITTEN C04-K03-422-EX-081

Find the chord length cut off by $(x-2)^2+(y-1)^2=5$ on $x+y=4$.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F06 | V01

Q155 | WRITTEN

C04-K03-422-EX-082

Find the chord length cut off by $x^2 + y^2 = 3$ on $x - y = 2$.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F06 | V01

Q156 | MCQ

C04-K03-422-WA-076-MCQ

Find the chord length cut off by $x^2 + y^2 = 4$ on $x + y - 1 = 0$:

A $\sqrt{14}$

B $2\sqrt{r^2 + d^2}$

C $\sqrt{r^2 - d^2}$

D $2\sqrt{r^2 - d^2} + 1$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F06 | V01

Q157 | MCQ C04-K03-422-TR-078-MCQ

Find the chord length cut off by $(x-2)^2+(y+1)^2=9$ on $x+2y-5=0$:

A $\sqrt{r^2-d^2}$

B $2\sqrt{r^2-d^2}+1$

C 4

D $2\sqrt{r^2+d^2}$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F06 | V01

Q158 | MCQ C04-K03-422-EX-080-MCQ

Find the chord length cut off by $x^2 + y^2 = 10$ on $2x - y = 5$:

A $2\sqrt{r^2 + d^2}$

B $\sqrt{r^2 - d^2}$

C $2\sqrt{r^2 - d^2} + 1$

D $2\sqrt{5}$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F06 | V01

Q159 | MCQ

C04-K03-422-EX-081-MCQ

Find the chord length cut off by $(x-2)^2+(y-1)^2=5$ on $x+y=4$:

A $2\sqrt{r^2-d^2}+1$

B $3\sqrt{2}$

C $2\sqrt{r^2+d^2}$

D $\sqrt{r^2-d^2}$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F06 | V01

Q160 | MCQ

C04-K03-422-EX-082-MCQ

Find the chord length cut off by $x^2 + y^2 = 3$ on $x - y = 2$:

A $2\sqrt{r^2 + d^2}$

B $\sqrt{r^2 - d^2}$

C $2\sqrt{r^2 - d^2} + 1$

D 2

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F06 | V02

Q161 | WRITTEN

C04-K03-422-WA-077

For $x^2 + y^2 = 3$ and $x - y + k = 0$, find k when the chord length is 2.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F06 | V02

Q162 | WRITTEN

C04-K03-422-TR-079

For $x^2 + y^2 = 16$ and $y = x + k$, find k when the chord length is sqrt(2).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F06 | V02

Q163 | WRITTEN

C04-K03-422-EX-083

For $x^2 + y^2 = 10$ and $y = x + k$, find k when the chord length is 4sqrt(2).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F06 | V02

Q164 | WRITTEN

C04-K03-422-EX-084

For $(x-1)^2+y^2=5$ and $y=x+k$, find k when the chord length is 3sqrt(2).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F06 | V02

Q165 | MCQ C04-K03-422-WA-077-MCQ

For $x^2 + y^2 = 3$ and $x - y + k = 0$, find k when the chord length is 2:

A $\sqrt{r^2 - d^2}$

B $2\sqrt{r^2 - d^2} + 1$

C $k = \pm 2$

D $2\sqrt{r^2 + d^2}$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F06 | V02

Q166 | MCQ

C04-K03-422-TR-079-MCQ

For $x^2 + y^2 = 16$ and $y = x + k$, find k when the chord length is sqrt(2):

A $2\sqrt{r^2 + d^2}$

B $\sqrt{r^2 - d^2}$

C $2\sqrt{r^2 - d^2} + 1$

D $k = \pm\sqrt{31}$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F06 | V02

Q167 | MCQ C04-K03-422-EX-083-MCQ

For $x^2 + y^2 = 10$ and $y = x + k$, find k when the chord length is 4sqrt(2):

A $k = \pm 2$

B $2\sqrt{r^2 + d^2}$

C $\sqrt{r^2 - d^2}$

D $2\sqrt{r^2 - d^2} + 1$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F06 | V02

Q168 | MCQ C04-K03-422-EX-084-MCQ

For $(x-1)^2+y^2=5$ and $y=x+k$, find k when the chord length is 3sqrt(2):

A $2\sqrt{r^2-d^2}+1$

B $k=0$ or $k=-2$

C $2\sqrt{r^2+d^2}$

D $\sqrt{r^2-d^2}$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F99 | V05

Q169 | CHALLENGE WRITTEN

C04-K03-422-CH-085

For $x^2 + y^2 + 4x - 2y - 7 = 0$ and $y = x + k$, find k when the chord length is 4.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F99 | V05

Q170 | CHALLENGE MCQ

C04-K03-422-CH-085-MCQ

For $x^2 + y^2 + 4x - 2y - 7 = 0$ and $y = x + k$, find k when the chord length is 4:

A $k = -1$ or $k = 7$

B $k = -1$ or $k = 7 + 1$

C $k = -1$ or $k = 7 - 1$

D 0

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V01

Q171 | WRITTEN

C04-K03-423-WA-086

Find the tangent to $x^2 + y^2 = 25$ at (4,3).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V01

Q172 | WRITTEN

C04-K03-423-TR-088

Find the tangent to $x^2 + y^2 = 34$ at (5,3).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V01

Q173 | WRITTEN

C04-K03-423-EX-090

Find the tangents $x^2 + y^2 = 10$ at (3,-1).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V01

Q174 | WRITTEN

C04-K03-423-EX-091

Find the tangents $x^2 + y^2 = 29$ at (-5,-2).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V01

Q175 | WRITTEN

C04-K03-423-EX-092

Find the tangents $x^2 + y^2 = 5$ at (-2,1).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V01

Q176 | MCQ

C04-K03-423-WA-086-MCQ

Find the tangent to $x^2 + y^2 = 25$ at (4,3):

A $4x + 3y = 25$

B $4x - 3y = 25$

C $4x + 3y = 25 + 1$

D the radius line

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V01

Q177 | MCQ

C04-K03-423-TR-088-MCQ

Find the tangent to $x^2 + y^2 = 34$ at (5,3):

A $5x + 3y = 34 + 1$

B the radius line

C $5x + 3y = 34$

D $5x - 3y = 34$

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V01

Q178 | MCQ

C04-K03-423-EX-090-MCQ

Find the tangents $x^2 + y^2 = 10$ at (3,-1):

A $3x - y = 10$

B $3x - y = 10 + 1$

C the radius line

D 8

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V01

Q179 | MCQ

C04-K03-423-EX-091-MCQ

Find the tangents $x^2 + y^2 = 29$ at (-5,-2):

A the radius line

B 9

C $-5x - 2y = 29$

D $-5x - 2y = 29 + 1$

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V01

Q180 | MCQ

C04-K03-423-EX-092-MCQ

Find the tangents $x^2 + y^2 = 5$ at (-2,1):

A $-2x + y = 5$

B $-2x - y = 5$

C $-2x + y = 5 + 1$

D the radius line

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V02

Q181 | WRITTEN

C04-K03-423-WA-087

Find the tangents from (1,3) to $x^2 + y^2 = 5$.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V02

Q182 | WRITTEN

C04-K03-423-TR-089

Find the tangents from (-2,4) to $x^2 + y^2 = 10$.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V02

Q183 | WRITTEN

C04-K03-423-EX-093

Find the tangents from (-1,3) to $x^2 + y^2 = 5$.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V02

Q184 | WRITTEN

C04-K03-423-EX-094

Find the tangents from (2,1) to $x^2 + y^2 = 1$.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V02

Q185 | WRITTEN

C04-K03-423-EX-095

Find the tangents from (2,6) to $x^2 + y^2 = 20$.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V02

Q186 | MCQ

C04-K03-423-WA-087-MCQ

Find the tangents from (1,3) to $x^2 + y^2 = 5$:

A $2x - y = 5$ and $-x + 2y = 5$

B $2x + y = 5$ and $-x + 2y = 5 + 1$

C the radius line

D $2x + y = 5$ and $-x + 2y = 5$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V02

Q187 | MCQ

C04-K03-423-TR-089-MCQ

Find the tangents from (-2,4) to $x^2 + y^2 = 10$:

A $-3x + y = 10$ and $x + 3y = 10$

B $-3x - y = 10$ and $x + 3y = 10$

C $-3x + y = 10$ and $x + 3y = 10 + 1$

D the radius line

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V02

Q188 | MCQ

C04-K03-423-EX-093-MCQ

Find the tangents from (-1,3) to $x^2 + y^2 = 5$:

A $-2x - y = 5$ and $x + 2y = 5$

B $-2x + y = 5$ and $x + 2y = 5 + 1$

C the radius line

D $-2x + y = 5$ and $x + 2y = 5$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V02

Q189 | MCQ

C04-K03-423-EX-094-MCQ

Find the tangents from (2,1) to $x^2 + y^2 = 1$:

A 12

B $y = 1$ and $4x - 3y = 5$

C $y = 1$ and $4x - 3y = 5 + 1$

D the radius line

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | V02

Q190 | MCQ

C04-K03-423-EX-095-MCQ

Find the tangents from (2,6) to $x^2 + y^2 = 20$:

A $-x + 2y = 10$ and $2x + y = 10 + 1$

B the radius line

C $-x + 2y = 10$ and $2x + y = 10$

D $-x - 2y = 10$ and $2x + y = 10$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F99 | V03

Q191 | CHALLENGE WRITTEN

C04-K03-423-CH-096

A drone at (2,6) needs tangents to $x^2 + y^2 = 20$. Find both sightline equations and their exact contact points.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F99 | V03

Q192 | CHALLENGE MCQ

C04-K03-423-CH-096-MCQ

A drone at (2,6) needs tangents to $x^2 + y^2 = 20$. Find both sightline equations and their exact contact points:

A 0

B $-x + 2y = 10$ at $(-2, 4)$; $2x + y = 10$ at $(4, 2)$

C $-x+2y = 10$ at $(-2, 4)$; $2x+y = 10$ at $(4, 2)+1$

D $-x+2y = 10$ at $(-2, 4)$; $2x+y = 10$ at $(4, 2)-1$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F08 | V01

Q193 | WRITTEN

C04-K03-424-WA-097

Classify $x^2 + y^2 = 4$ and $(x-4)^2 + y^2 = 9$.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F08 | V01

Q194 | WRITTEN

C04-K03-424-TR-099

Classify $x^2 + y^2 = 9$ and $(x-3)^2 + (y-4)^2 = 4$ from A-E.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F08 | V01

Q195 | WRITTEN

C04-K03-424-TR-100

Classify $(x-1)^2+y^2=5^2$ and $x^2+y^2+2x-6y=3$ from A-E.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$x\,x_1+y\,y_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F08 | V01

Q196 | WRITTEN

C04-K03-424-EX-102

Classify $x^2 + y^2 = 4$ and $(x-1)^2 + y^2 = 1$ from A-E.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F08 | V01

Q197 | WRITTEN

C04-K03-424-EX-103

Classify $x^2 + y^2 = 18$ and $(x + 2)^2 + (y - 2)^2 = 2$ from A-E.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x - h)^2 + (y - k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F08 | V01

Q198 | WRITTEN C04-K03-424-EX-104

Classify $(x+3)^2+y^2=16$ and $x^2+y^2-2x-8y-8=0$ from A-E.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F08 | V01

Q199 | WRITTEN

C04-K03-424-EX-105

Classify $x^2 + (y-3)^2 = 45$ and $x^2 + y^2 + 2x - 2y = 3$ from A-E.

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1-h)^2 + (y_1-k)^2$
$M = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F08 | V01

Q200 | MCQ

C04-K03-424-WA-097-MCQ

For the expression Classify $x^2 + y^2 = 4$ and $(x-4)^2 + y^2 = 9$., the required value is:

A internally tangent

B intersecting at two points

C intersect at 2 points

D separate

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F08 | V01

Q201 | MCQ

C04-K03-424-TR-099-MCQ

For the expression Classify $x^2+y^2=9$ and $(x-3)^2+(y-4)^2=4$ from A-E., the required value is:

A separate

B internally tangent

C intersecting at two points

D B : touch externally

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F08 | V01

Q202 | MCQ

C04-K03-424-TR-100-MCQ

For the expression Classify $(x-1)^2+y^2=5^2$ and $x^2+y^2+2x-6y=3$ from A-E., the required value is:

A intersecting at two points

B E : intersect at 2 points

C separate

D internally tangent

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F08 | V01

Q203 | MCQ

C04-K03-424-EX-102-MCQ

For the expression Classify $x^2 + y^2 = 4$ and $(x-1)^2 + y^2 = 1$ from A-E., the required value is:

A C : touch internally

B separate

C internally tangent

D intersecting at two points

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F08 | V01

Q204 | MCQ

C04-K03-424-EX-103-MCQ

For the expression Classify $x^2+y^2=18$ and $(x+2)^2+(y-2)^2=2$ from A-E., the required value is:

A separate

B internally tangent

C intersecting at two points

D C : touch internally

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F08 | V01

Q205 | MCQ C04-K03-424-EX-104-MCQ

For the expression Classify $(x+3)^2+y^2=16$ and $x^2+y^2-2x-8y-8=0$ from A-E., the required value is:

A intersecting at two points

B E : intersect at 2 points

C separate

D internally tangent

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F08 | V01

Q206 | MCQ C04-K03-424-EX-105-MCQ

For the expression Classify $x^2 + (y-3)^2 = 45$ and $x^2 + y^2 + 2x - 2y = 3$ from A-E., the required value is:

A internally tangent

B intersecting at two points

C D : one is inside the other

D separate

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F08 | V02

Q207 | WRITTEN

C04-K03-424-WA-098

Find the circle with centre (3,1) touching $(x-1)^2+(y+3)^2=5$ internally.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F08 | V02

Q208 | WRITTEN

C04-K03-424-TR-101

Find the circle with centre (-3,-9) touching $(x+6)^2+(y+5)^2=1$ externally.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F08 | V02

Q209 | WRITTEN

C04-K03-424-EX-106

Find the circle with centre (3,-9) touching $(x-3)^2+y^2=9$ internally.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$x\,x_1+y\,y_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F08 | V02

Q210 | MCQ

C04-K03-424-WA-098-MCQ

Find the circle with centre (3,1) touching $(x-1)^2+(y+3)^2=5$ internally:

A $(x-3)^2+(y-1)^2=45$

B separate

C internally tangent

D intersecting at two points

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F08 | V02

Q211 | MCQ

C04-K03-424-TR-101-MCQ

Find the circle with centre (-3,-9) touching $(x+6)^2+(y+5)^2=1$ externally:

A separate

B internally tangent

C intersecting at two points

D $(x+3)^2+(y+9)^2=16$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F08 | V02

Q212 | MCQ

C04-K03-424-EX-106-MCQ

Find the circle with centre (3,-9) touching $(x-3)^2+y^2=9$ internally:

A $(x-3)^2+(y+9)^2=144$

B separate

C internally tangent

D intersecting at two points

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F99 | V02

Q213 | CHALLENGE WRITTEN

C04-K03-424-CH-107

Find the circle with centre (-1,-2) touching $x^2 + y^2 - 4x - 4y + 4 = 0$ externally.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F99 | V02

Q214 | CHALLENGE MCQ

C04-K03-424-CH-107-MCQ

Find the circle with centre (-1,-2) touching $x^2 + y^2 - 4x - 4y + 4 = 0$ externally:

A $(x+1)^2 + (y+2)^2 = 9 + 1$

B $(x+1)^2 + (y+2)^2 = 9 - 1$

C 0

D $(x+1)^2 + (y+2)^2 = 9$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F09 | V01

Q215 | WRITTEN

C04-K03-425-WA-108

Find the line through the intersections of $x^2 + y^2 = 4$ and $x^2 + y^2 + 2x - 4y = 9$.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F09 | V01

Q216 | WRITTEN

C04-K03-425-TR-110

Find the line through the intersections of $x^2 + y^2 = 6$ and $x^2 + y^2 + 3x + 3y = 9$.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F09 | V01

Q217 | WRITTEN

C04-K03-425-EX-112

Find the line through the intersections of $x^2+y^2=10$ and $x^2+y^2-12x+6y=3$.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F09 | V01

Q218 | WRITTEN

C04-K03-425-EX-113

Find the line through the intersections of $x^2 + y^2 = 4$ and $(x-1)^2 + y^2 = 4$.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F09 | V01

Q219 | MCQ

C04-K03-425-WA-108-MCQ

Find the line through the intersections of $x^2 + y^2 = 4$ and $x^2 + y^2 + 2x - 4y = 9$:

A $2x - 4y - 5 = 0$ (equivalently $y = x/2 - 5/4$)

B $2x - 4y - 5 = 0$ (equivalently $y = x/2 - 5/4) + 1$

C the radical axis only

D 4

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F09 | V01

Q220 | MCQ C04-K03-425-TR-110-MCQ

Find the line through the intersections of $x^2 + y^2 = 6$ and $x^2 + y^2 + 3x + 3y = 9$:

A $x + y - 1 = 0 + 1$

B the radical axis only

C $x + y - 1 = 0$

D $x - y - 1 = 0$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F09 | V01

Q221 | MCQ C04-K03-425-EX-112-MCQ

Find the line through the intersections of $x^2 + y^2 = 10$ and $x^2 + y^2 - 12x + 6y = 3$:

A 8

B $12x - 6y - 7 = 0$

C $12x - 6y - 7 = 0 + 1$

D the radical axis only

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F09 | V01

Q222 | MCQ C04-K03-425-EX-113-MCQ

Find the line through the intersections of $x^2 + y^2 = 4$ and $(x-1)^2 + y^2 = 4$:

A $x = 1/2 + 1$

B the radical axis only

C 9

D $x = 1/2$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F09 | V02

Q223 | WRITTEN

C04-K03-425-WA-109

Find the intersections of $x^2 + y^2 = 10$ and $x^2 + y^2 + 2x - y = 5$.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F09 | V02

Q224 | WRITTEN

C04-K03-425-TR-111

Find the intersections of $x^2 + y^2 = 4$ and $(x-4)^2 + (y-2)^2 = 16$.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F09 | V02

Q225 | WRITTEN

C04-K03-425-EX-114

Find the intersections of $x^2 + y^2 = 5$ and $(x-2)^2 + (y-2)^2 = 1$.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F09 | V02

Q226 | MCQ

C04-K03-425-WA-109-MCQ

Find the intersections of $x^2 + y^2 = 10$ and $x^2 + y^2 + 2x - y = 5$:

A 5

B $(-3, -1)$ and $(-1, 3)$

C $(-3, -1)$ and $(-1, 3) + 1$

D the radical axis only

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F09 | V02

Q227 | MCQ

C04-K03-425-TR-111-MCQ

Find the intersections of $x^2 + y^2 = 4$ and $(x-4)^2 + (y-2)^2 = 16$:

A the radical axis only

B 7

C $(0, 2)$ and $(8/5, -6/5)$

D $(0, 2)$ and $(8/5, -6/5) + 1$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F09 | V02

Q228 | MCQ C04-K03-425-EX-114-MCQ

Find the intersections of $x^2 + y^2 = 5$ and $(x-2)^2 + (y-2)^2 = 1$:

A 10

B (1, 2) and (2, 1)

C (1, 2) and (2, 1) + 1

D the radical axis only

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F99 | V04

Q229 | CHALLENGE WRITTEN

C04-K03-425-CH-115

Two radar circles are $x^2 + y^2 = 25$ and $(x + 5)^2 + (y + 5)^2 = 65$. Find their intersection points.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x - h)^2 + (y - k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F99 | V04

Q230 | CHALLENGE MCQ C04-K03-425-CH-115-MCQ

Two radar circles are $x^2 + y^2 = 25$ and $(x + 5)^2 + (y + 5)^2 = 65$. Find their intersection points:

A $(-4, 3)$ and $(3, -4) - 1$

B 0

C $(-4, 3)$ and $(3, -4)$

D $(-4, 3)$ and $(3, -4) + 1$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x - h)^2 + (y - k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F10 | V01

Q231 | WRITTEN

C04-K03-426-WA-116

Find the circle through the intersections of $x^2+y^2-2x-6y+5=0$ and $x^2+y^2=5$, passing through (3,0).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F10 | V01

Q232 | WRITTEN

C04-K03-426-TR-117

Find the circle through the intersections of $x^2+y^2-4x-2y-8=0$ and $x^2+y^2=4$, passing through the origin.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$x\,x_1+y\,y_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F10 | V01

Q233 | WRITTEN

C04-K03-426-EX-118

Find the circle through the intersections of $x^2+y^2-2x-4y+3=0$ and $x^2+y^2=4$, passing through (3,0).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$x\,x_1+y\,y_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F10 | V01

Q234 | WRITTEN

C04-K03-426-EX-119

Find the circle through the intersections of $x^2+y^2-6x-8y=0$ and $x^2+y^2-1=0$, passing through (-3,2).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$x\,x_1+y\,y_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F10 | V01

Q235 | WRITTEN

C04-K03-426-EX-120

Find the circle through the intersections of $x^2 + y^2 - 2x - 2y = 0$ and $x^2 + y^2 - 6x - 4y + 12 = 0$, passing through (4,0).

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F10 | V01

Q236 | MCQ

C04-K03-426-WA-116-MCQ

Find the circle through the intersections of $x^2 + y^2 - 2x - 6y + 5 = 0$ and $x^2 + y^2 = 5$, passing through (3,0):

A $x^2 - y^2 + 2x + 6y - 15 = 0$

B $x^2 + y^2 + 2x + 6y - 15 = 0 + 1$

C the radical axis only

D $x^2 + y^2 + 2x + 6y - 15 = 0$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F10 | V01

Q237 | MCQ C04-K03-426-TR-117-MCQ

Find the circle through the intersections of $x^2 + y^2 - 4x - 2y - 8 = 0$ and $x^2 + y^2 = 4$, passing through the origin:

A $x^2 + y^2 + 4x + 2y = 0$

B $x^2 - y^2 + 4x + 2y = 0$

C $x^2 + y^2 + 4x + 2y = 0 + 1$

D the radical axis only

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F10 | V01

Q238 | MCQ C04-K03-426-EX-118-MCQ

Find the circle through the intersections of $x^2 + y^2 - 2x - 4y + 3 = 0$ and $x^2 + y^2 = 4$, passing through (3,0):

A $x^2 - y^2 + 10x + 20y - 39 = 0$

B $x^2 + y^2 + 10x + 20y - 39 = 0 + 1$

C the radical axis only

D $x^2 + y^2 + 10x + 20y - 39 = 0$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F10 | V01

Q239 | MCQ

C04-K03-426-EX-119-MCQ

Find the circle through the intersections of $x^2 + y^2 - 6x - 8y = 0$ and $x^2 + y^2 - 1 = 0$, passing through (-3,2):

A $x^2 + y^2 + 24x + 32y - 5 = 0 + 1$

B the radical axis only

C $x^2 + y^2 + 24x + 32y - 5 = 0$

D $x^2 - y^2 + 24x + 32y - 5 = 0$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F10 | V01

Q240 | MCQ

C04-K03-426-EX-120-MCQ

Find the circle through the intersections of $x^2+y^2-2x-2y=0$ and $x^2+y^2-6x-4y+12=0$, passing through (4,0):

A the radical axis only

B $x^2+y^2-10x-6y+24=0$

C $x^2-y^2-10x-6y+24=0$

D $x^2+y^2-10x-6y+24=0+1$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F99 | V05

Q241 | CHALLENGE WRITTEN

C04-K03-426-CH-121

Find the circle through the intersections of $x^2 + y^2 - 2x - 6y + 6 = 0$ and $x^2 + y^2 + 4x - 2y - 11 = 0$, passing through (2,2).

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F99 | V05

Q242 | CHALLENGE MCQ

C04-K03-426-CH-121-MCQ

Find the circle through the intersections of $x^2 + y^2 - 2x - 6y + 6 = 0$ and $x^2 + y^2 + 4x - 2y - 11 = 0$, passing through (2,2):

A $x^2 + y^2 + 2x - (10/3)y - 16/3 = 0$

B $x^2 + y^2 + 2x - (10/3)y - 16/3 = 0 + 1$

C $x^2 + y^2 + 2x - (10/3)y - 16/3 = 0 - 1$

D 0

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F01 | C04-K03-F01-VQ

Quiz M1 | QUIZ MCQ C04-K03-QUIZ-MCQ-1

For the circle $(x-2)^2+(y+3)^2=25$, determine its centre and radius:

A centre $(-2,-3)$, radius 5

B centre $(2,-3)$, radius 5

C centre $(2,3)$, radius 5

D centre $(2,-3)$, radius 10

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$xx_1+yy_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F05 | C04-K03-F05-VQ

Quiz M2 | QUIZ MCQ C04-K03-QUIZ-MCQ-2

Determine the substitution discriminant when a line meets a circle at exactly one real point:

A tangent

B no real intersection

C two intersection points

D 0

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2+(y-k)^2=r^2$
$x^2+y^2+2gx+2fy+c=0$

Chord and tangent
$L=2\sqrt{r^2-d^2}$
$x\,x_1+y\,y_1=r^2$

Through points / diameter
$r^2=(x_1-h)^2+(y_1-k)^2$
$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position
D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle
$r=d(\text{centre, axis})$
$r^2>0$

Radical axis
$S_1-S_2=0$
$S_1=0,\ S_2=0$

Line–circle position
$\Delta>0$: 2 points
$\Delta=0$: tangent
$\Delta<0$: none

Pencil of circles
$S_1+\lambda S_2=0$

Concept 3 | Circles

F06 | C04-K03-F06-VQ

Quiz M3 | QUIZ MCQ

C04-K03-QUIZ-MCQ-3

Determine the chord length for radius r and centre-to-chord distance d:

A $2\sqrt{r^2 - d^2}$

B $2\sqrt{r^2 + d^2}$

C $\sqrt{r^2 - d^2}$

D $2\sqrt{r^2 - d^2} + 1$

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F08 | C04-K03-F08-VQ

Quiz M4 | QUIZ MCQ C04-K03-QUIZ-MCQ-4

Determine the relative position of two non-overlapping circles when $D = r1 + r2$:

A separate

B internally tangent

C intersecting at two points

D externally tangent

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F01 | C04-K03-F01-VQ

Quiz W1 | QUIZ WRITTEN

C04-K03-QUIZ-WRITTEN-1

Find the circle with centre (1,-2) passing through (4,2).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2+(y-k)^2=r^2$

$x^2+y^2+2gx+2fy+c=0$

Chord and tangent

$L=2\sqrt{r^2-d^2}$

$xx_1+yy_1=r^2$

Through points / diameter

$r^2=(x_1-h)^2+(y_1-k)^2$

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Two-circle position

D vs r_1+r_2, $|r_1-r_2|$

Tangency and real circle

$r=d(\text{centre, axis})$

$r^2>0$

Radical axis

$S_1-S_2=0$

$S_1=0,\ S_2=0$

Line–circle position

$\Delta>0$: 2 points

$\Delta=0$: tangent

$\Delta<0$: none

Pencil of circles

$S_1+\lambda S_2=0$

Concept 3 | Circles

F05 | C04-K03-F05-VQ

Quiz W2 | QUIZ WRITTEN

C04-K03-QUIZ-WRITTEN-2

Find the intersections of $x^2 + y^2 = 25$ and $y = 3$.

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F07 | C04-K03-F07-VQ

Quiz W3 | QUIZ WRITTEN

C04-K03-QUIZ-WRITTEN-3

Find the tangent to $x^2 + y^2 = 25$ at (3,4).

WORKING AREA

FORMULA BANK

Standard / general circle
$(x-h)^2 + (y-k)^2 = r^2$
$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent
$L = 2\sqrt{r^2 - d^2}$
$x\,x_1 + y\,y_1 = r^2$

Through points / diameter
$r^2 = (x_1 - h)^2 + (y_1 - k)^2$
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position
D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle
$r = d(\text{centre, axis})$
$r^2 > 0$

Radical axis
$S_1 - S_2 = 0$
$S_1 = 0,\ S_2 = 0$

Line–circle position
$\Delta > 0$: 2 points
$\Delta = 0$: tangent
$\Delta < 0$: none

Pencil of circles
$S_1 + \lambda S_2 = 0$

Concept 3 | Circles

F10 | C04-K03-F10-VQ

Quiz W4 | QUIZ WRITTEN

C04-K03-QUIZ-WRITTEN-4

The circles $S_1 = x^2 + y^2 - 5 = 0$ and $S_2 = x^2 + y^2 - 2x - 2y - 4 = 0$ meet. Find the circle $S_1 + \lambda S_2 = 0$ passing through (1,1).

WORKING AREA

FORMULA BANK

Standard / general circle

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + y^2 + 2gx + 2fy + c = 0$

Chord and tangent

$L = 2\sqrt{r^2 - d^2}$

$x\,x_1 + y\,y_1 = r^2$

Through points / diameter

$r^2 = (x_1 - h)^2 + (y_1 - k)^2$

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Two-circle position

D vs $r_1 + r_2$, $|r_1 - r_2|$

Tangency and real circle

$r = d(\text{centre, axis})$

$r^2 > 0$

Radical axis

$S_1 - S_2 = 0$

$S_1 = 0,\ S_2 = 0$

Line–circle position

$\Delta > 0$: 2 points

$\Delta = 0$: tangent

$\Delta < 0$: none

Pencil of circles

$S_1 + \lambda S_2 = 0$

EGYPTIAN BACCALAUREATE • 2026

MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 05

Trigonometric Functions

1 Concepts | 82 questions

B5 Landscape | one question per teaching page

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Chapter 05 | Trigonometric Functions

CLASSROOM ROUTE

Concept 1 | Defining Angles and Basic Trigonometric Functions

82 questions

Official lessons: 5-1, 5-2, 5-3, 5-4

The Formula Bank changes at each Concept boundary.

Concept 1 | Defining Angles and Basic Trigonometric Functions OFFICIAL LESSONS 5-1, 5-2, 5-3, 5-4

Defining Angles and Basic Trigonometric Functions

Equation-first recall | use the same rail beside every question in this Concept

Angle family

$$\theta = \alpha + 360^\circ \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Start with the family cue, write the first move, then use the working grid.

Concept 1 | Defining Angles and Basic Trigonometric Functions

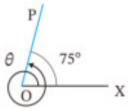
F01 | V01

Q001 | WRITTEN

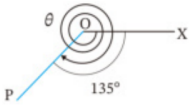
C05-K01-5-1-WU1

Find the measures of θ in the two figures: (a) one full counter-clockwise revolution plus 75°; (b) two full clockwise revolutions and a further 135°.

(a)



(b)



WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V02

Q002 | WRITTEN C05-K01-5-1-WU2

Draw the terminal side for 300° and −450°.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V03

Q003 | WRITTEN C05-K01-5-1-WU3

Express $420°$ and $-210°$ as $\alpha + 360° \times n$, where n is an integer and $0° \leq \alpha < 360°$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

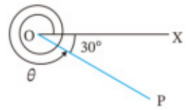
Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V01

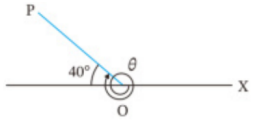
Q004 | WRITTEN C05-K01-5-1-TR1

Find the measures of θ in the two figures: (a) a clockwise turn of 30° from the positive x-axis; (b) a terminal side 40° above the negative x-axis, measured counter-clockwise from the positive x-axis).

(a)



(b)



WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V02

Q005 | WRITTEN C05-K01-5-1-TR2

Draw the terminal side for $500°$ and $-120°$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V03

Q006 | WRITTEN

C05-K01-5-1-TR3

Express $520°$ and $-140°$ as $\alpha + 360° \times n$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

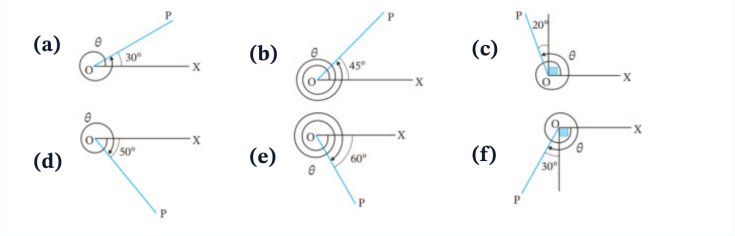
Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V01

Q007 | WRITTEN

C05-K01-5-1-EX1

Find the six diagram measures θ shown in the given figure (a)–(f).



WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V02

Q008 | WRITTEN C05-K01-5-1-EX2

Draw the terminal sides for $470°,\ 780°,\ 225°,\ -380°,\ -990°,\ -200°$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V03

Q009 | WRITTEN

C05-K01-5-1-EX3

Express $610°,\ 920°,\ 840°,\ -430°,\ -960°,\ -20°$ as $\alpha + 360° \times n$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V03

Q010 | WRITTEN

C05-K01-5-1-CH1

Express $129720°$ and $-2592100°$ as $\alpha + 360° \times n$, with $0° \leq \alpha < 360°$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V03

Q011 | MCQ

C05-K01-5-1-GM01

The principal angle coterminal with 765° is:

A 45°

B 135°

C 225°

D 315°

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V03

Q012 | MCQ

C05-K01-5-1-GM02

The principal angle coterminal with $-410°$ is:

A $-50°$

B $50°$

C $310°$

D $410°$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V02

Q013 | MCQ C05-K01-5-1-GM03

The terminal side of 540° lies on the:

A positive x-axis

B negative x-axis

C positive y-axis

D negative y-axis

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V02

Q014 | MCQ C05-K01-5-1-GM04

A positive angle of 315° terminates in:

A QI

B QII

C QIII

D QIV

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V03

Q015 | MCQ

C05-K01-5-1-GM05

Which is the general-angle form for $-75°$?:

A $75° + 360°n$

B $285° + 360°n$

C $-285° + 360°n$

D $360°n - 75°$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V01

Q016 | MCQ C05-K01-5-1-GM06

The direction of a negative angle is:

A counter-clockwise

B clockwise

C radial only

D undefined

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360^\circ \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V02

Q017 | MCQ C05-K01-5-1-GM07

The terminal side of $1080°$ is the:

A positive x-axis

B negative x-axis

C positive y-axis

D negative y-axis

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V03

Q018 | MCQ

C05-K01-5-1-GM08

For $\alpha = 0°$, the general-angle family is:

A $360°n$

B $0°n$

C $180° + 360°n$

D $90° + 360°n$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V03

Q019 | MCQ

C05-K01-5-1-GM09

The principal angle for $-990°$ is:

A $90°$

B $180°$

C $270°$

D $-270°$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V01

Q020 | MCQ C05-K01-5-1-GM10

A ray (P) is 25° above the negative x-axis. Its standard-position angle is:

A 25°

B 155°

C 205°

D 335°

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V01

Q021 | WRITTEN C05-K01-5-2-WU

(1) Convert $630°$ to radians. (2) Convert $-\frac{7\pi}{4}$ to degrees. (3) For a sector with $r = 3$ and $\theta = \frac{4\pi}{3}$, find arc length L and area S.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V01

Q022 | WRITTEN C05-K01-5-2-TR

Complete the standard-angle degree/radian table, then: convert $288°$, $-400°$ to radians; convert $\frac{11\pi}{6}$, $-\frac{3\pi}{5}$ to degrees; and find L, S for $r = 6$, $\theta = \frac{3\pi}{4}$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V01

Q023 | WRITTEN C05-K01-5-2-EX1

Convert $108°,\ 36°,\ -240°,\ -225°,\ 420°,\ 400°,\ -570°,\ -2700°$ to radians.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V02

Q024 | WRITTEN

C05-K01-5-2-EX2

Convert $\frac{7\pi}{6}$, $\frac{4\pi}{5}$, $\frac{2\pi}{3}$, $\frac{4\pi}{3}$, $-\frac{5\pi}{4}$, $-\frac{\pi}{2}$, $-\frac{11\pi}{2}$, $-\frac{7\pi}{18}$ to degrees.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V03

Q025 | WRITTEN

C05-K01-5-2-EX3

Find L and S for: (a) $r = 6,\ \theta = \frac{7\pi}{6}$; (b) $r = 4,\ \theta = \frac{2\pi}{5}$; (c) $r = 6,\ \theta = \frac{5\pi}{4}$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V04

Q026 | WRITTEN

C05-K01-5-2-EX4

Draw terminal sides for $\frac{\pi}{4}, \frac{\pi}{3}, \frac{5\pi}{6}, \frac{3\pi}{4}, \frac{4\pi}{3}, \frac{7\pi}{6}, -\frac{\pi}{3}, -\frac{\pi}{4}$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V04

Q027 | WRITTEN C05-K01-5-2-CH1

A sector of radius 9 cm and central angle $4\pi/3$ is joined to form a cone. Determine the exact vertical height and total volume.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V01

Q028 | MCQ

C05-K01-5-2-GM01

Convert 150° to radians:

A $\frac{5\pi}{6}$

B $\frac{3\pi}{5}$

C $\frac{5\pi}{3}$

D $\frac{\pi}{6}$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V02

Q029 | MCQ

C05-K01-5-2-GM02

Convert $-\frac{5\pi}{6}$ to degrees:

A $-120°$

B $-150°$

C $150°$

D $-300°$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V03

Q030 | MCQ

C05-K01-5-2-GM03

For $r = 5,\ \theta = \frac{2\pi}{3}$, the arc length is:

A $\frac{5\pi}{3}$

B $\frac{10\pi}{3}$

C $\frac{25\pi}{3}$

D 10π

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V03

Q031 | MCQ C05-K01-5-2-GM04

For $r = 4,\ \theta = \frac{\pi}{2}$, the sector area is:

A π

B 2π

C 4π

D 8π

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V01

Q032 | MCQ

C05-K01-5-2-GM05

The radian measure of a full turn is:

A π

B 2π

C 180

D 360

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360^\circ \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V02

Q033 | MCQ C05-K01-5-2-GM06

The degree measure of $\frac{7\pi}{4}$ is:

A 210°

B 270°

C 315°

D 360°

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V04

Q034 | MCQ

C05-K01-5-2-GM07

The principal angle for $-\frac{11\pi}{6}$ is:

A $\frac{\pi}{6}$

B $-\frac{\pi}{6}$

C $\frac{5\pi}{6}$

D $\frac{11\pi}{6}$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V03

Q035 | MCQ C05-K01-5-2-GM08

For $r = 3,\ \theta = \pi$, the sector area is:

A $\frac{3\pi}{2}$

B 3π

C 9π

D $\frac{9\pi}{2}$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V04

Q036 | MCQ C05-K01-5-2-GM09

The angle $\frac{5\pi}{3}$ lies in:

A QI

B QII

C QIII

D QIV

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V01

Q037 | WRITTEN C05-K01-5-2-GW01

Convert 252° to radians.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V03

Q038 | WRITTEN

C05-K01-5-2-GW02

A sector has $r = 8$ and $\theta = \frac{3\pi}{4}$. Find L and S.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F03 | V01

Q039 | WRITTEN

C05-K01-5-3-WU

If $\theta = \frac{4\pi}{3}$, find $\sin\theta,\ \cos\theta,\ \tan\theta$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F03 | V01

Q040 | WRITTEN

C05-K01-5-3-TR

Find the exact values (write undefined where appropriate): $\sin\frac{7\pi}{4}$, $\cos\frac{\pi}{3}$, $\tan\frac{\pi}{6}$, $\sin(-\frac{2\pi}{3})$, $\cos(-\pi)$, $\tan(-\frac{\pi}{2})$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F03 | V01

Q041 | WRITTEN

C05-K01-5-3-EX

Find the exact values of the eighteen trigonometric functions listed in the given exercise (a)–(r), including negative and undefined cases.

Find the values of the following trigonometric functions. If the value is undefined, write "undefined".

(a) $\sin\frac{\pi}{3}$	**(b)** $\sin\frac{7}{6}\pi$	**(c)** $\sin\pi$
(d) $\cos\frac{5}{4}\pi$	**(e)** $\cos\frac{5}{3}\pi$	**(f)** $\cos\frac{7}{6}\pi$
(g) $\tan\frac{2}{3}\pi$	**(h)** $\tan\frac{5}{4}\pi$	**(i)** $\tan\pi$
(j) $\sin(-\frac{\pi}{6})$	**(k)** $\sin(-\frac{5}{4}\pi)$	**(l)** $\sin(-\frac{5}{3}\pi)$
(m) $\cos(-\frac{\pi}{4})$	**(n)** $\cos(-\frac{5}{6}\pi)$	**(o)** $\cos(-\frac{4}{3}\pi)$
(p) $\tan(-\frac{4}{3}\pi)$	**(q)** $\tan(-\frac{11}{6}\pi)$	**(r)** $\tan(-\frac{3}{2}\pi)$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F03 | V02

Q042 | WRITTEN

C05-K01-5-3-CH1

The panel height is $h(t) = 3\sin(\frac{2\pi}{3}t - \frac{\pi}{4}) + 1.5$. Find the exact height at $t = 0$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F03 | V01

Q043 | MCQ

C05-K01-5-3-GM01

$\sin \frac{\pi}{6}$ equals:

A 0

B $\frac{1}{2}$

C $\frac{\sqrt{3}}{2}$

D 1

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F03 | V01

Q044 | MCQ

C05-K01-5-3-GM02

$\cos \frac{2\pi}{3}$ equals:

A -1

B $-\frac{1}{2}$

C $\frac{1}{2}$

D $\frac{\sqrt{3}}{2}$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F03 | V01

Q045 | MCQ C05-K01-5-3-GM03

$\tan \frac{3\pi}{4}$ equals:

A -1

B 0

C 1

D undefined

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F03 | V02

Q046 | MCQ C05-K01-5-3-GM04

$\sin(-\frac{\pi}{2})$ equals:

A -1

B 0

C 1

D undefined

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F03 | V01

Q047 | MCQ

C05-K01-5-3-GM05

$\tan \frac{\pi}{2}$ is:

A 0

B 1

C -1

D undefined

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F03 | V01

Q048 | MCQ

C05-K01-5-3-GM06

$\cos \frac{5\pi}{3}$ equals:

A $-\frac{1}{2}$

B $\frac{1}{2}$

C $-\frac{\sqrt{3}}{2}$

D $\frac{\sqrt{3}}{2}$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F03 | V01

Q049 | MCQ C05-K01-5-3-GM07

If $P(x,\ y)$ lies on the unit circle, then $\sin\theta$ is:

A x

B y

C x/y

D 1/x

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F03 | V02

Q050 | MCQ

C05-K01-5-3-GM08

$\tan(-\frac{3\pi}{4})$ equals:

A -1

B 0

C 1

D undefined

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F03 | V01

Q051 | MCQ

C05-K01-5-3-GM09

$\sin \frac{11\pi}{6}$ equals:

A $-\frac{1}{2}$

B $\frac{1}{2}$

C $-\frac{\sqrt{3}}{2}$

D $\frac{\sqrt{3}}{2}$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F03 | V01

Q052 | WRITTEN

C05-K01-5-3-GW01

Find $\sin\frac{5\pi}{6}$, $\cos\frac{4\pi}{3}$, $\tan\frac{7\pi}{4}$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F03 | V02

Q053 | WRITTEN

C05-K01-5-3-GW02

Find $\sin(-\frac{5\pi}{6})$, $\cos(-\frac{7\pi}{6})$, $\tan(-\frac{\pi}{3})$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F03 | V01

Q054 | WRITTEN

C05-K01-5-3-GW03

For $P = (-\frac{1}{2}, \frac{\sqrt{3}}{2})$ on the unit circle, find the corresponding $\sin\theta$, $\cos\theta$, $\tan\theta$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F03 | V01

Q055 | WRITTEN

C05-K01-5-3-GW04

Find the exact value of $3\sin\frac{3\pi}{2} - 2\cos\pi$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F03 | V01

Q056 | WRITTEN

C05-K01-5-3-GW05

State the two standard angles where $\tan\theta$ is undefined in $[0,\ 2\pi)$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V01

Q057 | WRITTEN

C05-K01-5-4-WU

Solve for θ, $0 \le \theta < 2\pi$: (a) $\sin\theta = -\frac{1}{2}$; (b) $\cos\theta = \frac{1}{\sqrt{2}}$; (c) $\tan\theta = -\sqrt{3}$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360^\circ \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V01

Q058 | WRITTEN C05-K01-5-4-TR

Solve the six trigonometric equations in the given Try set for $0 \le \theta < 2\pi$: $\sin\theta = 1/\sqrt{2}$, $\cos\theta = -\sqrt{3}/2$, $\tan\theta = 1/\sqrt{3}$, $\sin\theta = 0$, $\cos\theta = 1/2$, $\tan\theta = -1$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360^\circ \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V01

Q059 | WRITTEN C05-K01-5-4-EX

Solve the sixteen equations in the given Exercise set (a)–(p) for $0 \leq \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V03

Q060 | WRITTEN

C05-K01-5-4-CH1

Solve $\tan^2\theta + (1-\sqrt{3})\tan\theta = \sqrt{3}$ for $0 \leq \theta < 360°$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V01

Q061 | MCQ

C05-K01-5-4-GM01

For $0 \leq \theta < 2\pi$, $\sin\theta = \frac{1}{2}$ gives:

A $\frac{\pi}{6}, \frac{5\pi}{6}$

B $\frac{\pi}{3}, \frac{2\pi}{3}$

C $\frac{\pi}{6}, \frac{7\pi}{6}$

D $\frac{5\pi}{6}, \frac{11\pi}{6}$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V01

Q062 | MCQ

C05-K01-5-4-GM02

For $0 \le \theta < 2\pi$, $\cos\theta = -\frac{1}{2}$ gives:

A $\frac{\pi}{3}, \frac{5\pi}{3}$

B $\frac{2\pi}{3}, \frac{4\pi}{3}$

C $\frac{\pi}{6}, \frac{5\pi}{6}$

D $\frac{4\pi}{3}, \frac{5\pi}{3}$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V01

Q063 | MCQ

C05-K01-5-4-GM03

For $0 \leq \theta < 2\pi$, $\tan\theta = 1$ gives:

A $\frac{\pi}{4}, \frac{5\pi}{4}$

B $\frac{3\pi}{4}, \frac{7\pi}{4}$

C $\frac{\pi}{4}, \frac{7\pi}{4}$

D $\frac{3\pi}{4}, \frac{5\pi}{4}$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V01

Q064 | MCQ

C05-K01-5-4-GM04

The solutions of $\sin\theta = 0$ in $[0,\ 2\pi)$ are:

A $0,\ \pi$

B $\frac{\pi}{2},\ \frac{3\pi}{2}$

C $0,\ 2\pi$

D π

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V01

Q065 | MCQ

C05-K01-5-4-GM05

If $\cos\theta = 1$, then in $[0,\ 2\pi)$, θ is:

A 0

B $\frac{\pi}{2}$

C π

D $\frac{3\pi}{2}$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V01

Q066 | MCQ

C05-K01-5-4-GM06

For $0 \leq \theta < 2\pi$, $\tan\theta = -\sqrt{3}$ gives:

A $\frac{\pi}{3}, \frac{4\pi}{3}$

B $\frac{2\pi}{3}, \frac{5\pi}{3}$

C $\frac{\pi}{6}, \frac{7\pi}{6}$

D $\frac{5\pi}{6}, \frac{11\pi}{6}$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V01

Q067 | MCQ C05-K01-5-4-GM07

For $0 \leq \theta < 2\pi$, $\sin\theta = -1$ gives:

A $\frac{\pi}{2}$

B $\frac{3\pi}{2}$

C π

D 0

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V01

Q068 | MCQ

C05-K01-5-4-GM08

For $0 \leq \theta < 2\pi$, $\cos\theta = 0$ gives:

A $0, \pi$

B $\frac{\pi}{2}, \frac{3\pi}{2}$

C π

D $\frac{\pi}{4}, \frac{5\pi}{4}$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V01

Q069 | MCQ C05-K01-5-4-GM09

The equation $\tan\theta = 0$ has solutions in $[0,\ 2\pi)$:

A $0,\ \pi$

B $\frac{\pi}{2},\ \frac{3\pi}{2}$

C $\frac{\pi}{4},\ \frac{5\pi}{4}$

D $\pi,\ 2\pi$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V01

Q070 | WRITTEN

C05-K01-5-4-GW01

Solve $\cos\theta = \frac{\sqrt{3}}{2}$ for $0 \leq \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V01

Q071 | WRITTEN

C05-K01-5-4-GW02

Solve $\sin\theta = -\frac{\sqrt{3}}{2}$ for $0 \le \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V01

Q072 | WRITTEN

C05-K01-5-4-GW03

Solve $\tan\theta = \frac{1}{\sqrt{3}}$ for $0 \leq \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V01

Q073 | WRITTEN

C05-K01-5-4-GW04

Solve $2\cos\theta - 1 = 0$ for $0 \leq \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V01

Q074 | WRITTEN

C05-K01-5-4-GW05

Solve $2\sin\theta + \sqrt{2} = 0$ for $0 \leq \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V01

Quiz M1 | QUIZ MCQ

C05-K01-Q-M01

The radian measure of 240° is:

A $\frac{2\pi}{3}$

B $\frac{4\pi}{3}$

C $\frac{3\pi}{4}$

D $\frac{5\pi}{3}$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V01

Quiz M2 | QUIZ MCQ

C05-K01-Q-M02

If $\sin\theta = -\frac{\sqrt{3}}{2}$, $0 \le \theta < 2\pi$, then θ is:

A $\frac{\pi}{3}, \frac{2\pi}{3}$

B $\frac{4\pi}{3}, \frac{5\pi}{3}$

C $\frac{2\pi}{3}, \frac{4\pi}{3}$

D $\frac{5\pi}{6}, \frac{11\pi}{6}$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V03

Quiz M3 | QUIZ MCQ C05-K01-Q-M03

For a sector with $r = 6$ and $\theta = \frac{\pi}{3}$, the area is:

A 3π

B 6π

C 12π

D 18π

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F01 | V03

Quiz M4 | QUIZ MCQ

C05-K01-Q-M04

The general-angle family for $-300°$ is:

A $60° + 360°n$

B $300° + 360°n$

C $-60° + 360°n$

D $120° + 360°n$

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$$\sin\theta = y \quad \cos\theta = x \quad \tan\theta = \frac{y}{x}$$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F04 | V01

Quiz W1 | QUIZ WRITTEN C05-K01-Q-W01

Solve $\cos\theta = -\frac{\sqrt{2}}{2}$ for $0 \le \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360^\circ \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V02

Quiz W2 | QUIZ WRITTEN C05-K01-Q-W02

Convert $-\frac{13\pi}{6}$ to degrees and state its principal angle.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F02 | V03

Quiz W3 | QUIZ WRITTEN

C05-K01-Q-W03

Find L and S for a sector with $r = 10$ and $\theta = \frac{2\pi}{5}$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

Concept 1 | Defining Angles and Basic Trigonometric Functions

F03 | V01

Quiz W4 | QUIZ WRITTEN

C05-K01-Q-W04

Evaluate $3\sin\frac{7\pi}{6} - 2\cos\frac{4\pi}{3}$.

WORKING AREA

FORMULA BANK

Angle family

$$\theta = \alpha + 360° \times n$$

Degree / radian

$$\theta_{rad} = \theta_{deg} \times \frac{\pi}{180}$$

Sector measures

$$L = r\theta \qquad S = \frac{1}{2}r^2\theta$$

Unit circle

$\sin\theta = y$ $\cos\theta = x$ $\tan\theta = \frac{y}{x}$

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MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 05

Trigonometric Functions

1 Concept | 62 questions

B5 Landscape | one question per teaching page

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Chapter 05 | Trigonometric Functions

CLASSROOM ROUTE

Concept 2 | Trigonometric Identities and Expression Evaluation

62 questions

Official lessons: 5-5, 5-6, 5-7

Formula Bank changes at each Concept boundary.

Concept 2 | Trigonometric Identities and Expression Evaluation OFFICIAL LESSONS 5-5, 5-6, 5-7

Trigonometric Identities and Expression Evaluation

Equation-first recall | use the same rail beside every question in this Concept

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Start with the family cue, write the first move, then use the working grid.

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V01

Q001 | WRITTEN

C05-K02-5-5-WU1

Given (a) $\sin\theta = -\frac{1}{5}$ in QIII and (b) $\tan\theta = -\sqrt{6}$ with $\frac{3\pi}{2} < \theta < 2\pi$, find the other two trigonometric values in each case.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2) \quad a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

Proof target

$$\text{LHS} = \text{RHS}$$

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V01

Q002 | WRITTEN

C05-K02-5-5-TR1

Given one value and the quadrant, find the other two: (a) $\cos\theta = -1/\sqrt{3}$, QIII; (b) $\tan\theta = -2$, QIV; (c) $\sin\theta = 3/5$, QII; (d) $\tan\theta = \sqrt{3}/2$, $\pi < \theta < 3\pi/2$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V02

Q003 | WRITTEN C05-K02-5-5-EX1

For each of the twelve numbered cases in the given Exercise, one of $\sin\theta, \cos\theta, \tan\theta$ and a quadrant/interval is given. Find the other two values.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V03

Q004 | WRITTEN

C05-K02-5-5-CH1

Using trigonometric identities, find the other two values given $\tan\theta + \cot\theta = 12$ and $\pi < \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V01

Q005 | WRITTEN

C05-K02-5-5-GW01

Given $\sin\theta = \frac{5}{13}$ in QII, find $\cos\theta$ and $\tan\theta$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2) \qquad a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V01

Q006 | WRITTEN

C05-K02-5-5-GW02

Given $\cos\theta = -\frac{3}{5}$ in QIII, find $\sin\theta$ and $\tan\theta$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2) \quad a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V01

Q007 | WRITTEN

C05-K02-5-5-GW03

Given $\tan\theta = \frac{3}{4}$ in QI, find $\sin\theta$ and $\cos\theta$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V01

Q008 | WRITTEN

C05-K02-5-5-GW04

Given $\tan\theta = -\frac{5}{12}$ in QIV, find $\sin\theta$ and $\cos\theta$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V01

Q009 | WRITTEN

C05-K02-5-5-GW05

Given $\sin\theta = -\frac{\sqrt{2}}{2}$ in QIII, find $\cos\theta$ and $\tan\theta$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V01

Q010 | MCQ

C05-K02-5-5-GM01

If $\sin\theta = -\frac{3}{5}$ in QIII, $\cos\theta$ is:

A $\frac{4}{5}$

B $-\frac{4}{5}$

C $\frac{3}{5}$

D $-\frac{3}{5}$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V01

Q011 | MCQ

C05-K02-5-5-GM02

If $\tan\theta = 2$ in QI, $\sin\theta$ is:

A $\frac{2\sqrt{5}}{5}$

B $\frac{\sqrt{5}}{5}$

C $-\frac{2\sqrt{5}}{5}$

D $\frac{2}{5}$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V01

Q012 | MCQ

C05-K02-5-5-GM03

If $\cos\theta = \frac{1}{\sqrt{2}}$ in QIV, $\tan\theta$ is:

A 1

B -1

C $\sqrt{2}$

D $-\sqrt{2}$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V02

Q013 | MCQ

C05-K02-5-5-GM04

For $\tan\theta = -\sqrt{3}$ in QII, $\sin\theta$ is:

A $\frac{1}{2}$

B $-\frac{1}{2}$

C $\frac{\sqrt{3}}{2}$

D $-\frac{\sqrt{3}}{2}$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \quad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V01

Q014 | MCQ

C05-K02-5-5-GM05

If $\sin\theta = \frac{7}{25}$ in QI, $\tan\theta$ is:

A $\frac{7}{24}$

B $\frac{24}{7}$

C $-\frac{7}{24}$

D $\frac{25}{7}$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V01

Q015 | WRITTEN

C05-K02-5-6-WU

Given $\sin\theta + \cos\theta = \frac{1}{2}$, with θ in QII, evaluate (a) $\sin\theta\cos\theta$, (b) $\sin^3\theta + \cos^3\theta$, (c) $\sin\theta - \cos\theta$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V01

Q016 | WRITTEN

C05-K02-5-6-TR

Given $\sin\theta + \cos\theta = \frac{1}{3}$, with θ in QII, evaluate (a) $\sin\theta\cos\theta$, (b) $\sin^3\theta + \cos^3\theta$, (c) $\sin\theta - \cos\theta$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V02

Q017 | WRITTEN

C05-K02-5-6-EX1

Solve the three numbered Exercise problems: (1) given $\sin\theta - \cos\theta = \sqrt{3}/2$ in QI; (2) given $\sin\theta + \cos\theta = \sqrt{3}/2$ in QIV; (3) given $\sin\theta - \cos\theta = 1/2$ in QIII. Evaluate the three expressions requested in each case.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2) \quad a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

Proof target

$$\text{LHS} = \text{RHS}$$

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V03

Q018 | WRITTEN

C05-K02-5-6-CH1

Given $\sin\theta - \cos\theta = 0.5$ and θ in QIII, evaluate the exact value of $\sin^6\theta - \cos^6\theta$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V01

Q019 | WRITTEN

C05-K02-5-6-GW01

Given $\sin\theta + \cos\theta = \frac{2}{3}$ in QII, find $\sin\theta\cos\theta$ and $\sin\theta - \cos\theta$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V02

Q020 | WRITTEN

C05-K02-5-6-GW02

Given $\sin\theta - \cos\theta = \frac{\sqrt{5}}{2}$ in QI, find $\sin\theta\cos\theta$ and $\sin^3\theta - \cos^3\theta$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \quad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V01

Q021 | WRITTEN

C05-K02-5-6-GW03

Given $\sin\theta + \cos\theta = -\frac{1}{2}$ in QIII, find $\sin^3\theta + \cos^3\theta$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \quad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V01

Q022 | WRITTEN

C05-K02-5-6-GW04

Given $\sin\theta - \cos\theta = \frac{1}{3}$ in QIV, find $\sin\theta + \cos\theta$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V02

Q023 | WRITTEN

C05-K02-5-6-GW05

Given $\sin\theta - \cos\theta = 1$ in QIII, find $\sin^3\theta - \cos^3\theta$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V01

Q024 | MCQ

C05-K02-5-6-GM01

If $s + c = \frac{1}{2}$, then sc equals:

A $-\frac{3}{8}$

B $\frac{3}{8}$

C $-\frac{1}{4}$

D $\frac{1}{4}$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V01

Q025 | MCQ

C05-K02-5-6-GM02

If $s + c = \frac{1}{2}$, then $s^3 + c^3$ equals:

A $\frac{5}{16}$

B $\frac{11}{16}$

C $-\frac{11}{16}$

D $\frac{3}{16}$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V02

Q026 | MCQ

C05-K02-5-6-GM03

If $s - c = \frac{1}{2}$ in QIII, then $s + c$ equals:

A $\frac{\sqrt{7}}{2}$

B $-\frac{\sqrt{7}}{2}$

C $\frac{1}{2}$

D $-\frac{1}{2}$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V02

Q027 | MCQ

C05-K02-5-6-GM04

If $s - c = \frac{\sqrt{3}}{2}$ in QI, then sc equals:

A $\frac{1}{8}$

B $-\frac{1}{8}$

C $\frac{3}{8}$

D $-\frac{3}{8}$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

$$\text{LHS} = \text{RHS}$$

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V03

Q028 | MCQ

C05-K02-5-6-GM05

If $s - c = 0.5$ in QIII, then $s^6 - c^6$ equals:

A $-\frac{55\sqrt{7}}{256}$

B $\frac{55\sqrt{7}}{256}$

C $-\frac{11\sqrt{7}}{16}$

D $\frac{11}{16}$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V01

Q029 | WRITTEN

C05-K02-5-7-WU

Prove $\frac{\sin\theta}{1+\cos\theta}+\frac{1}{\tan\theta}=\frac{1}{\sin\theta}$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta+\cos^2\theta=1$$

Quotient

$$\tan\theta=\frac{\sin\theta}{\cos\theta} \quad \cot\theta=\frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1+\tan^2\theta=\frac{1}{\cos^2\theta}$$

Cubes

$a^3+b^3=(a+b)(a^2-ab+b^2)$ $a^3-b^3=(a-b)(a^2+ab+b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V01

Q030 | WRITTEN

C05-K02-5-7-TR

Prove (a) $\frac{1-\tan\theta}{1+\tan\theta} = \frac{\cos\theta-\sin\theta}{\cos\theta+\sin\theta}$; (b) $\frac{\cos\theta}{1-\sin\theta} - \tan\theta = \frac{1}{\cos\theta}$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \quad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V02

Q031 | WRITTEN

C05-K02-5-7-EX1

Prove the six identities in the given Exercise: (a) $\tan^2\theta - \sin^2\theta = \tan^2\theta\sin^2\theta$; (b) $\tan\theta + 1/\tan\theta = 1/(\sin\theta\cos\theta)$; (c) $\cos\theta/(1-\sin\theta) - 1/\cos\theta = \tan\theta$; (d) $\tan\theta/\sin\theta - \sin\theta/\tan\theta = \sin\theta\tan\theta$; (e) $(1+\sin\theta)/\cos\theta + \cos\theta/(1+\sin\theta) = 2/\cos\theta$; (f) $(\tan^2\theta - \sin^2\theta)/\sin^2\theta = \tan^2\theta$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V03

Q032 | WRITTEN

C05-K02-5-7-CH1

Prove that, for all defined values of x, $\frac{1+\sin x-\cos x}{1+\sin x+\cos x}+\frac{1+\sin x+\cos x}{1+\sin x-\cos x}=2\csc x$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta+\cos^2\theta=1$$

Quotient

$$\tan\theta=\frac{\sin\theta}{\cos\theta}\qquad \cot\theta=\frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1+\tan^2\theta=\frac{1}{\cos^2\theta}$$

Cubes

$$a^3+b^3=(a+b)(a^2-ab+b^2)\quad a^3-b^3=(a-b)(a^2+ab+b^2)$$

Proof target

$$\text{LHS}=\text{RHS}$$

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V01

Q033 | WRITTEN

C05-K02-5-7-GW01

Prove $\frac{1+\sin\theta}{\cos\theta} = \frac{\cos\theta}{1-\sin\theta}$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V01

Q034 | WRITTEN

C05-K02-5-7-GW02

Prove $\frac{1}{1+\cos\theta}+\frac{1}{1-\cos\theta}=2\sec^2\theta$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta+\cos^2\theta=1$$

Quotient

$$\tan\theta=\frac{\sin\theta}{\cos\theta}\qquad \cot\theta=\frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1+\tan^2\theta=\frac{1}{\cos^2\theta}$$

Cubes

$a^3+b^3=(a+b)(a^2-ab+b^2)$ $a^3-b^3=(a-b)(a^2+ab+b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V01

Q035 | WRITTEN

C05-K02-5-7-GW03

Prove $\frac{\tan\theta}{1+\tan\theta} = \frac{\sin\theta}{\sin\theta+\cos\theta}$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \quad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V02

Q036 | WRITTEN

C05-K02-5-7-GW04

Prove $\frac{\sin\theta}{1-\cos\theta} = \frac{1+\cos\theta}{\sin\theta}$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V02

Q037 | WRITTEN

C05-K02-5-7-GW05

Prove $\frac{\cos\theta}{1+\sin\theta} = \frac{1-\sin\theta}{\cos\theta}$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V01

Q038 | MCQ

C05-K02-5-7-GM01

The first move in proving a trig identity is usually to:

A Change both sides at once

B Simplify one side

C Substitute random values

D Take a square root

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V01

Q039 | MCQ

C05-K02-5-7-GM02

The identity used to replace $1 - \sin^2\theta$ is:

A $\cos^2\theta$

B $\tan^2\theta$

C $\sec^2\theta$

D $\sin^2\theta$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V01

Q040 | MCQ

C05-K02-5-7-GM03

$\tan\theta$ should be rewritten as:

A $\sin\theta\cos\theta$

B $\sin\theta/\cos\theta$

C $\cos\theta/\sin\theta$

D $1/\sin\theta$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V02

Q041 | MCQ

C05-K02-5-7-GM04

To add two trig fractions, first find a:

A common numerator

B common denominator

C new quadrant

D reference angle

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2) \qquad a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

Proof target

$$\text{LHS} = \text{RHS}$$

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V01

Q042 | MCQ

C05-K02-5-7-GM05

The result of a valid identity proof is:

A LHS=0

B LHS=RHS

C RHS=1

D undefined

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2) \qquad a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

Proof target

$$\text{LHS} = \text{RHS}$$

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V01

Q043 | MCQ

C05-K02-5-5-GM06

If $\cos\theta = -\frac{12}{13}$ in QII, $\sin\theta$ is:

A $\frac{5}{13}$

B $-\frac{5}{13}$

C $\frac{12}{13}$

D $-\frac{12}{5}$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V02

Q044 | MCQ

C05-K02-5-5-GM07

If $\tan\theta = -\frac{1}{2}$ in QII, $\cos\theta$ is:

A $\frac{2\sqrt{5}}{5}$

B $-\frac{2\sqrt{5}}{5}$

C $\frac{\sqrt{5}}{5}$

D $-\frac{\sqrt{5}}{5}$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V01

Q045 | MCQ

C05-K02-5-5-GM08

If $\sin\theta = \frac{8}{17}$ in QIV, $\tan\theta$ is:

A $\frac{8}{15}$

B $-\frac{8}{15}$

C $\frac{15}{8}$

D $-\frac{15}{8}$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V03

Q046 | MCQ

C05-K02-5-5-GM09

If $\tan\theta = \sqrt{3}$ and θ is in QIII, $\sin\theta$ is:

A $\frac{1}{2}$

B $-\frac{1}{2}$

C $\frac{\sqrt{3}}{2}$

D $-\frac{\sqrt{3}}{2}$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V01

Q047 | MCQ

C05-K02-5-6-GM06

If $s + c = 1$, then sc equals:

A 0

B $\frac{1}{2}$

C $-\frac{1}{2}$

D 1

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2) \qquad a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V02

Q048 | MCQ C05-K02-5-6-GM07

If $s - c = \sqrt{2}$, then sc equals:

A $-\frac{1}{2}$

B $\frac{1}{2}$

C -1

D 1

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \quad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V01

Q049 | MCQ

C05-K02-5-6-GM08

If $s + c = \frac{2}{3}$, then $s^3 + c^3$ equals:

A $\frac{19}{27}$

B $\frac{5}{27}$

C $-\frac{19}{27}$

D $\frac{11}{27}$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V03

Q050 | MCQ

C05-K02-5-6-GM09

If $s - c = \frac{1}{2}$ in QIII, then $s^3 - c^3$ equals:

A $\frac{11}{16}$

B $-\frac{11}{16}$

C $\frac{7}{16}$

D $-\frac{7}{16}$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V01

Q051 | MCQ

C05-K02-5-7-GM06

Which identity converts $\frac{1}{\tan\theta}$ into sine and cosine?:

A $\frac{\sin\theta}{\cos\theta}$

B $\frac{\cos\theta}{\sin\theta}$

C $\sin\theta\cos\theta$

D $\sec\theta$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \quad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

$$\text{LHS} = \text{RHS}$$

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V02

Q052 | MCQ

C05-K02-5-7-GM07

The identity $1 - \cos^2\theta$ simplifies to:

A $\sin^2\theta$

B $\tan^2\theta$

C $\cos^2\theta$

D 1

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V01

Q053 | MCQ

C05-K02-5-7-GM08

When proving an identity, which side should normally be transformed?:

A Both sides simultaneously

B One side only

C Neither side

D Only the denominator

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

$$\text{LHS} = \text{RHS}$$

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V03

Q054 | MCQ

C05-K02-5-7-GM09

After combining trig fractions, the next step is usually to use:

A A random angle

B The Pythagorean identity

C A logarithm

D A derivative

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2) \quad a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

Proof target

$$\text{LHS} = \text{RHS}$$

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V01

Quiz M1 | QUIZ MCQ

C05-K02-Q-M01

If $\sin\theta + \cos\theta = \frac{1}{2}$, then $\sin\theta\cos\theta$ is:

A $-\frac{3}{8}$

B $\frac{3}{8}$

C $-\frac{1}{4}$

D $\frac{1}{4}$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V01

Quiz M2 | QUIZ MCQ

C05-K02-Q-M02

If $\tan\theta = \frac{3}{4}$ in QI, then $\cos\theta$ is:

A $\frac{3}{5}$

B $\frac{4}{5}$

C $-\frac{4}{5}$

D $\frac{3}{4}$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V01

Quiz M3 | QUIZ MCQ

C05-K02-Q-M03

Which identity is always valid where defined?:

A $\tan\theta = \dfrac{\cos\theta}{\sin\theta}$

B $1 + \tan^2\theta = \dfrac{1}{\cos^2\theta}$

C $\sin\theta + \cos\theta = 1$

D $\sin\theta\cos\theta = 1$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

$$\text{LHS} = \text{RHS}$$

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V02

Quiz M4 | QUIZ MCQ

C05-K02-Q-M04

If $s - c = \frac{1}{2}$ in QIII, then $s + c$ is:

A $\frac{\sqrt{7}}{2}$

B $-\frac{\sqrt{7}}{2}$

C $\frac{1}{2}$

D $-\frac{1}{2}$

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V01

Quiz W1 | QUIZ WRITTEN

C05-K02-Q-W01

Given $\cos\theta = -\frac{5}{13}$ in QIII, find $\sin\theta$ and $\tan\theta$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2) \quad a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F02 | V01

Quiz W2 | QUIZ WRITTEN

C05-K02-Q-W02

Given $s + c = \frac{2}{3}$, find sc and $s^3 + c^3$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2) \qquad a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F03 | V02

Quiz W3 | QUIZ WRITTEN

C05-K02-Q-W03

Prove $\frac{1-\sin\theta}{\cos\theta} = \frac{\cos\theta}{1+\sin\theta}$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

Concept 2 | Trigonometric Identities and Expression Evaluation

F01 | V02

Quiz W4 | QUIZ WRITTEN C05-K02-Q-W04

Given $\tan\theta = -2$ in QIV, find $\sin\theta$ and $\cos\theta$, then verify $1 + \tan^2\theta = 1/\cos^2\theta$.

WORKING AREA

FORMULA BANK

Pythagorean

$$\sin^2\theta + \cos^2\theta = 1$$

Quotient

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Tangent identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Proof target

LHS = RHS

EGYPTIAN BACCALAUREATE • 2026

MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 05

Trigonometric Functions

1 Concepts | 88 questions

B5 Landscape | one question per teaching page

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01120009622

Chapter 05 | Trigonometric Functions

CLASSROOM ROUTE

Concept 3 | Properties and Graphs of Trigonometric Functions

88 questions

Official lessons: 5-8, 5-9, 5-10, 5-11, 5-12

The Formula Bank changes at each Concept boundary.

Concept 3 | Properties and Graphs of Trigonometric Functions — **OFFICIAL LESSONS 5-8, 5-9, 5-10, 5-11, 5-12**

Properties and Graphs of Trigonometric Functions

Equation-first recall | use the same rail beside every question in this Concept

Parent graphs

$$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$$

Periods

$$T_{\sin,\cos} = 2\pi \qquad T_{\tan} = \pi$$

Range

$\sin, \cos: \ -1 \le y \le 1 \qquad \tan: \ y \in \mathbb{R}$

Combined form

$$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$$

Transform order

shift $\frac{q}{b}$ → **horizontal scale** $\frac{1}{|b|}$ → **vertical scale** $|a|$

Start with the family cue, write the first move, then use the working grid.

Concept 3 | Properties and Graphs of Trigonometric Functions

F01 | V01

Q001 | WRITTEN C05-K03-5-8-WU

(1) Express $\sin\frac{9\pi}{5}$ as a trigonometric function of an acute angle. (2) Simplify $\sin\theta+\sin(\theta+\frac{\pi}{2})+\sin(\theta+\pi)+\sin(\theta+\frac{3\pi}{2})$.

WORKING AREA

FORMULA BANK

Parent graphs
$y=\sin\theta,\ y=\cos\theta,\ y=\tan\theta$

Periods
$T_{\sin,\cos}=2\pi \quad T_{\tan}=\pi$

Range
$\sin,\cos:\ -1\le y\le 1 \quad \tan:\ y\in\mathbb{R}$

Combined form
$y=af(b\theta-q)=af\left(b\left(\theta-\frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F01 | V02

Q002 | WRITTEN

C05-K03-5-8-TR

(1) Express $\cos(-\frac{\pi}{6})$ as a trigonometric function of an acute angle. (2) Express $\sin\frac{8\pi}{7}$ as a trigonometric function of an acute angle. (3) Simplify $\cos(\frac{\pi}{2}-\theta)\sin(\pi-\theta)-\sin(\frac{3\pi}{2}+\theta)\cos(\pi-\theta)$.

WORKING AREA

FORMULA BANK

Parent graphs

$y=\sin\theta,\ y=\cos\theta,\ y=\tan\theta$

Periods

$T_{\sin,\cos}=2\pi \quad T_{\tan}=\pi$

Range

$\sin,\cos:\ -1\le y\le 1 \quad \tan:\ y\in\mathbb{R}$

Combined form

$y=af(b\theta-q)=af\left(b\left(\theta-\frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F01 | V03

Q003 | WRITTEN

C05-K03-5-8-EX

Solve all three given demands: (1) express $\cos\frac{17\pi}{5}, \cos\frac{5\pi}{7}, \sin(-\frac{7\pi}{8}), \sin(-\frac{19\pi}{8})$ using acute angles; (2) find $\tan(-\frac{\pi}{6})$ and $\tan(-\frac{\pi}{4})$; (3) simplify (a) $\sin\theta + \cos(\pi+\theta) - \cos(\pi-\theta) + \sin(\pi+\theta)$, (b) $\sin(\theta+\frac{\pi}{2})\cos(\theta+\pi) + \sin(-\theta)\cos(\frac{\pi}{2}-\theta)$.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F01 | V03

Q004 | WRITTEN

C05-K03-5-8-CH

Simplify $\sin(\frac{3\pi}{2} - \theta)\sec(\pi + \theta) - \tan(\theta - \frac{\pi}{2})\cot(\frac{5\pi}{2} + \theta)$.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F02 | V01

Q005 | WRITTEN

C05-K03-5-9-WU

Draw the parent graphs $y = \sin\theta$, $y = \cos\theta$, and $y = \tan\theta$, and state each period and range.

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

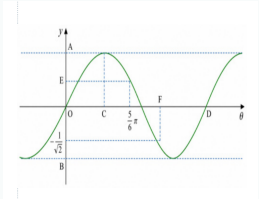
Concept 3 | Properties and Graphs of Trigonometric Functions

F02 | V02

Q006 | WRITTEN

C05-K03-5-9-WU2

For the given graph of $y = \sin\theta$, determine the labelled scales A to F.



WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

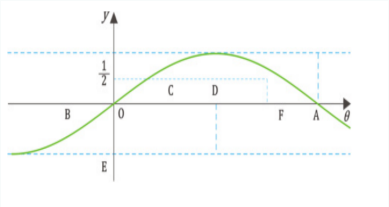
Concept 3 | Properties and Graphs of Trigonometric Functions

F02 | V02

Q007 | WRITTEN

C05-K03-5-9-TRY

(1) Draw the parent graphs $y = \sin\theta$, $y = \cos\theta$, $y = \tan\theta$, and state their periods. (2) For the given graph of $y = \cos\theta$, determine the labelled scales A to F.



WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

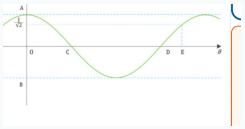
Concept 3 | Properties and Graphs of Trigonometric Functions

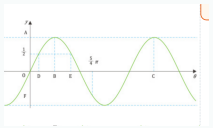
F02 | V03

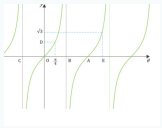
Q008 | WRITTEN

C05-K03-5-9-EX

Complete all four given graph tasks: draw the three parent graphs and find their periods; read the labelled scales on the given cosine graph; read the labelled scales on the given sine graph; and read the labelled scales on the given tangent graph.







WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

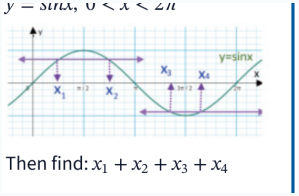
Concept 3 | Properties and Graphs of Trigonometric Functions

F02 | V04

Q009 | WRITTEN

C05-K03-5-9-CH

The given graph represents $y = \sin x$ for $0 < x < 2\pi$. Find $x_1 + x_2 + x_3 + x_4$ from the four marked x-coordinates.



Then find: $x_1 + x_2 + x_3 + x_4$

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F03 | V01

Q010 | WRITTEN

C05-K03-5-10-WU

Draw the graphs of $y = 2\cos\theta$ and $y = \tan\frac{\theta}{2}$, and find their periods.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F03 | V02

Q011 | WRITTEN

C05-K03-5-10-TRY

Draw the graphs of $y = 2\sin\theta$, $y = \tan 2\theta$, and $y = \cos\frac{\theta}{2}$, and find their periods.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F03 | V03

Q012 | WRITTEN C05-K03-5-10-EX

Draw the nine given graphs and find each period: (a) $3\sin\theta$, (b) $3\cos\theta$, (c) $\frac{1}{2}\cos\theta$, (d) $\sin 3\theta$, (e) $\cos 2\theta$, (f) $\tan 3\theta$, (g) $\sin\frac{\theta}{2}$, (h) $\cos\frac{\theta}{3}$, (i) $\tan\frac{\theta}{3}$.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F03 | V04

Q013 | WRITTEN

C05-K03-5-10-CH

Draw $y = -2|\sin(3x)|$ and find its period.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F04 | V01

Q014 | WRITTEN

C05-K03-5-11-WU

Draw $y = \sin(\theta - \frac{\pi}{6})$ and find its period.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F04 | V02

Q015 | WRITTEN

C05-K03-5-11-TRY

Draw the graphs and find their periods: (1) $y = \sin(\theta - \frac{\pi}{3})$, (2) $y = \cos(\theta + \frac{\pi}{4})$, (3) $y = \tan(\theta - \frac{\pi}{2})$.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F04 | V03

Q016 | WRITTEN

C05-K03-5-11-EX

Draw all given graphs and find their periods: sine group $y = \sin(\theta + \frac{\pi}{4}), \sin(\theta - \frac{\pi}{2}), \sin(\theta + \frac{\pi}{3})$; cosine group $y = \cos(\theta - \frac{\pi}{3}), \cos(\theta - \frac{\pi}{4}), \cos(\theta + \frac{\pi}{6})$; tangent group $y = \tan(\theta + \frac{\pi}{6}), \tan(\theta - \frac{\pi}{3}), \tan(\theta - \frac{\pi}{4})$.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F04 | V04

Q017 | WRITTEN

C05-K03-5-11-CH

Draw $y = 3\cos|x + \frac{\pi}{3}|$ and find its period.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F05 | V01

Q018 | WRITTEN

C05-K03-5-12-WU

Draw the graphs and find their periods: (1) $y = 2\cos(2\theta - \frac{\pi}{2})$, (2) $y = \tan(\frac{\theta}{2} - \frac{\pi}{6})$.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F05 | V02

Q019 | WRITTEN

C05-K03-5-12-TRY

Draw the graphs and find their periods: (a) $y = 3\sin\frac{\theta}{2}$, (b) $y = \tan(2\theta - \frac{\pi}{2})$, (c) $y = 2\cos(2\theta - \frac{\pi}{3})$.

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F05 | V03

Q020 | WRITTEN

C05-K03-5-12-EX

Draw all nine given graphs and find their periods: (a) $2\cos\frac{\theta}{2}$, (b) $3\sin 2\theta$, (c) $2\cos 2\theta$, (d) $2\cos(\theta-\frac{\pi}{4})$, (e) $2\sin(\theta-\frac{\pi}{3})$, (f) $\tan(2\theta-\frac{\pi}{3})$, (g) $3\cos(2\theta-\frac{\pi}{2})$, (h) $3\sin(2\theta-\frac{2\pi}{3})$, (i) $2\cos(\frac{\theta}{2}-\frac{\pi}{4})$.

WORKING AREA

FORMULA BANK

Parent graphs
$y=\sin\theta,\ y=\cos\theta,\ y=\tan\theta$

Periods
$T_{\sin,\cos}=2\pi \quad T_{\tan}=\pi$

Range
$\sin,\cos:\ -1\le y\le 1 \quad \tan:\ y\in\mathbb{R}$

Combined form
$y=af(b\theta-q)=af\left(b\left(\theta-\frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F05 | V04

Q021 | WRITTEN

C05-K03-5-12-CH

Draw $y = 3\sin|2x - \pi|$ and find its period.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F01 | V01

Q022 | MCQ

C05-K03-5-8-GM01

$\sin(\theta + \pi)$ equals:

A $\sin\theta$

B $-\sin\theta$

C $\cos\theta$

D $-\cos\theta$

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F01 | V01

Q023 | MCQ C05-K03-5-8-GM02

$\cos(\theta + \pi)$ equals:

A $\cos\theta$

B $-\cos\theta$

C $\sin\theta$

D $-\sin\theta$

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: -1 \le y \le 1 \quad \tan: y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F01 | V01

Q024 | MCQ

C05-K03-5-8-GM03

$\sin(\frac{\pi}{2} - \theta)$ equals:

A $\sin\theta$

B $-\sin\theta$

C $\cos\theta$

D $-\cos\theta$

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F01 | V01

Q025 | MCQ

C05-K03-5-8-GM04

$\cos(-\theta)$ equals:

A $\cos\theta$

B $-\cos\theta$

C $\sin\theta$

D $-\sin\theta$

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F01 | V01

Q026 | MCQ

C05-K03-5-8-GM05

$\sin(-\theta)$ equals:

A $\sin\theta$

B $-\sin\theta$

C $\cos\theta$

D $-\cos\theta$

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: -1 \le y \le 1 \quad \tan: y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F01 | V01

Q027 | MCQ

C05-K03-5-8-GM06

$\cos(\pi - \theta)$ equals:

A $\cos\theta$

B $-\cos\theta$

C $\sin\theta$

D $-\sin\theta$

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: -1 \le y \le 1 \quad \tan: y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F01 | V01

Q028 | MCQ

C05-K03-5-8-GM07

$\sin(\frac{3\pi}{2} + \theta)$ equals:

A $\sin\theta$

B $-\sin\theta$

C $\cos\theta$

D $-\cos\theta$

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: -1 \le y \le 1 \quad \tan: y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F01 | V01

Q029 | MCQ

C05-K03-5-8-GM08

$\tan(\theta - \frac{\pi}{2})$ equals:

A $\tan\theta$

B $-\tan\theta$

C $\cot\theta$

D $-\cot\theta$

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: -1 \le y \le 1 \quad \tan: y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F02 | V01

Q030 | MCQ

C05-K03-5-9-GM01

The period of $y = \sin\theta$ is:

A $\pi/2$

B π

C 2π

D 4π

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F02 | V01

Q031 | MCQ C05-K03-5-9-GM02

The range of $y = \cos\theta$ is:

A $y \geq 0$

B $-1 \leq y \leq 1$

C $y \in \mathbb{R}$

D y>1

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \leq y \leq 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F02 | V01

Q032 | MCQ

C05-K03-5-9-GM03

The period of $y = \tan\theta$ is:

A $\pi/2$

B π

C 2π

D 4π

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F02 | V01

Q033 | MCQ

C05-K03-5-9-GM04

A vertical asymptote of $y = \tan\theta$ occurs at:

A $\theta = k\pi$

B $\theta = \frac{\pi}{2} + k\pi$

C $\theta = 2k\pi$

D $\theta = \frac{\pi}{4} + k\pi$

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F02 | V01

Q034 | MCQ

C05-K03-5-9-GM05

The maximum value of $\sin\theta$ is:

A -1

B 0

C 1

D π

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: -1 \le y \le 1 \quad \tan: y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F02 | V01

Q035 | MCQ

C05-K03-5-9-GM06

The x-coordinate of the first positive sine maximum is:

A $\pi/4$

B $\pi/2$

C π

D $3\pi/2$

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F02 | V01

Q036 | MCQ

C05-K03-5-9-GM07

At $\theta = 0$, $\cos\theta$ equals:

A -1

B 0

C 1

D undefined

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F02 | V01

Q037 | MCQ

C05-K03-5-9-GM08

At $\theta = 0$, $\tan\theta$ equals:

A -1

B 0

C 1

D undefined

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F03 | V01

Q038 | MCQ

C05-K03-5-10-GM01

The range of $y = 3\sin\theta$ is:

A [-1,1]

B [-3,3]

C [0,3]

D $\mathbb{R}$

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F03 | V01

Q039 | MCQ

C05-K03-5-10-GM02

The period of $y = \sin 4\theta$ is:

A $\pi/4$

B $\pi/2$

C π

D 2π

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F03 | V01

Q040 | MCQ

C05-K03-5-10-GM03

The period of $y = \cos(\theta/3)$ is:

A $2\pi/3$

B 2π

C 3π

D 6π

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F03 | V01

Q041 | MCQ

C05-K03-5-10-GM04

The period of $y = \tan 5\theta$ is:

A $\pi/5$

B π

C 5π

D $2\pi/5$

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F03 | V01

Q042 | MCQ

C05-K03-5-10-GM05

The range of $y = \frac{1}{2}\cos\theta$ is:

A [-2,2]

B [-1,1]

C [-1/2,1/2]

D [0,1/2]

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F03 | V01

Q043 | MCQ

C05-K03-5-10-GM06

The graph of $y = -2\sin\theta$ is the parent sine graph:

A shifted only

B reflected and stretched vertically

C compressed horizontally only

D undefined

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F03 | V01

Q044 | MCQ

C05-K03-5-10-GM07

The period of $y = \tan(\theta/2)$ is:

A $\pi/2$

B π

C 2π

D 4π

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F03 | V01

Q045 | MCQ

C05-K03-5-10-GM08

The period of $y = \sin(3\theta)$ is:

A $\pi/3$

B $2\pi/3$

C 3π

D 6π

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F04 | V01

Q046 | MCQ

C05-K03-5-11-GM01

The graph of $y = \sin(\theta - \pi/4)$ is shifted:

A left by π/4

B right by π/4

C up by π/4

D down by π/4

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F04 | V01

Q047 | MCQ

C05-K03-5-11-GM02

The graph of $y = \cos(\theta + \pi/3)$ is shifted:

A right by π/3

B left by π/3

C up by π/3

D down by π/3

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F04 | V01

Q048 | MCQ

C05-K03-5-11-GM03

A horizontal shift changes the sine period from 2π to:

A π

B 2π

C 4π

D 0

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F04 | V01

Q049 | MCQ

C05-K03-5-11-GM04

A horizontal shift changes the tangent period from π to:

A π/2

B π

C 2π

D 4π

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: -1 \le y \le 1 \quad \tan: y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F04 | V01

Q050 | MCQ

C05-K03-5-11-GM05

The graph of $y = \sin(\theta + \pi/2)$ equals:

A $\sin\theta$

B $-\sin\theta$

C $\cos\theta$

D $-\cos\theta$

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: -1 \le y \le 1 \quad \tan: y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F04 | V01

Q051 | MCQ

C05-K03-5-11-GM06

The graph of $y = \cos(\theta - \pi)$ equals:

A $\cos\theta$

B $-\cos\theta$

C $\sin\theta$

D $-\sin\theta$

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: -1 \le y \le 1 \quad \tan: y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F04 | V01

Q052 | MCQ

C05-K03-5-11-GM07

The graph of $y = \tan(\theta - \pi/2)$ has its central zero at:

A $\theta = 0$

B $\theta = \pi/2$

C $\theta = \pi$

D $\theta = 2\pi$

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F04 | V01

Q053 | MCQ

C05-K03-5-11-GM08

Since cosine is even, $\cos|x|$ equals:

A $\cos x$

B $-\cos x$

C $\sin x$

D $|\cos x|$

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: -1 \le y \le 1 \quad \tan: y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F05 | V01

Q054 | MCQ

C05-K03-5-12-GM01

In $y = a\sin(b\theta - q)$, the horizontal shift is:

A q

B q/b

C b/q

D a/b

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F05 | V01

Q055 | MCQ

C05-K03-5-12-GM02

The period of $y = 2\cos(3\theta - \pi)$ is:

A $\pi/3$

B $2\pi/3$

C π

D 2π

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F05 | V01

Q056 | MCQ

C05-K03-5-12-GM03

The range of $y = 4\sin(2\theta - 1)$ is:

A [-1,1]

B [-2,2]

C [-4,4]

D $\mathbb{R}$

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F05 | V01

Q057 | MCQ C05-K03-5-12-GM04

For $y = \tan(2\theta - \pi/3)$, the shift is:

A left by $\pi/3$

B right by $\pi/6$

C right by $\pi/3$

D left by $\pi/6$

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F05 | V01

Q058 | MCQ

C05-K03-5-12-GM05

The period of $y = 3\sin(\theta/2)$ is:

A π

B 2π

C 3π

D 4π

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F05 | V01

Q059 | MCQ

C05-K03-5-12-GM06

The correct transformation order for $y = af(b\theta - q)$ starts with:

A vertical scale

B horizontal shift

C horizontal scale

D reflection only

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F05 | V01

Q060 | MCQ

C05-K03-5-12-GM07

The period of $y = \tan(4\theta + q)$ is:

A $\pi/4$

B $\pi/2$

C π

D 2π

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: -1 \le y \le 1 \quad \tan: y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F05 | V01

Q061 | MCQ

C05-K03-5-12-GM08

The range of $y = 3\sin|2x - \pi|$ is:

A [-3,3]

B [0,3]

C [-1,1]

D $\mathbb{R}$

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F01 | V01

Q062 | WRITTEN

C05-K03-5-8-GW01

Express $\cos\frac{11\pi}{6}$ as a function of an acute angle.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: -1 \le y \le 1 \quad \tan: y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F01 | V01

Q063 | WRITTEN

C05-K03-5-8-GW02

Simplify $\sin(\theta + \pi) - \cos(\frac{\pi}{2} - \theta)$.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F01 | V01

Q064 | WRITTEN

C05-K03-5-8-GW03

Simplify $\cos(\theta + \pi) + \cos(\frac{\pi}{2} - \theta)$.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F01 | V01

Q065 | WRITTEN

C05-K03-5-8-GW04

Evaluate $\tan(-\frac{3\pi}{4})$ using an acute reference angle.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F02 | V01

Q066 | WRITTEN C05-K03-5-9-GW01

State the period and range of $y = \cos\theta$, then list its key points on one cycle.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F02 | V01

Q067 | WRITTEN

C05-K03-5-9-GW02

State the period and asymptotes of $y = \tan\theta$ on $[-\pi, \pi]$.

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F02 | V01

Q068 | WRITTEN

C05-K03-5-9-GW03

For the parent sine graph, find the x-values where $y = 0$ in $[0, 2\pi]$.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F02 | V01

Q069 | WRITTEN

C05-K03-5-9-GW04

For the parent cosine graph, find the x-values where $y = 0$ in $[0, 2\pi]$.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F03 | V01

Q070 | WRITTEN

C05-K03-5-10-GW01

Find the period and range of $y = 4\cos\theta$.

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F03 | V01

Q071 | WRITTEN

C05-K03-5-10-GW02

Find the period and range of $y = \sin(5\theta)$.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F03 | V01

Q072 | WRITTEN

C05-K03-5-10-GW03

Find the period and range of $y = \tan(\theta/4)$.

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F03 | V01

Q073 | WRITTEN

C05-K03-5-10-GW04

Describe the transformations from $y = \cos\theta$ to $y = -\frac{1}{2}\cos(2\theta)$.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F04 | V01

Q074 | WRITTEN

C05-K03-5-11-GW01

Find the shift and period of $y = \sin(\theta + \frac{\pi}{6})$.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F04 | V01

Q075 | WRITTEN

C05-K03-5-11-GW02

Find the shift and period of $y = \cos(\theta - \frac{\pi}{2})$.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F04 | V01

Q076 | WRITTEN

C05-K03-5-11-GW03

Find the central zero and period of $y = \tan(\theta + \frac{\pi}{4})$.

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F05 | V01

Q077 | WRITTEN

C05-K03-5-12-GW01

For $y = 2\sin(4\theta - \pi)$, state the shift, period and range.

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F05 | V01

Q078 | WRITTEN

C05-K03-5-12-GW02

For $y = \cos(\theta/3 + \pi/6)$, state the shift and period.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F05 | V01

Q079 | WRITTEN

C05-K03-5-12-GW03

For $y = 3\tan(2\theta + \pi)$, state the shift and period.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F05 | V01

Q080 | WRITTEN

C05-K03-5-12-GW04

For $y = 2\cos(\theta/2 - \pi/8)$, state the shift, period and range.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F05 | V01

Quiz M1 | QUIZ MCQ

C05-K03-Q-M01

The period of $y = \sin(2\theta - \frac{\pi}{3})$ is:

A $\pi/2$

B π

C 2π

D 4π

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F01 | V01

Quiz M2 | QUIZ MCQ

C05-K03-Q-M02

$\sin(\theta + \pi)$ equals:

A $\sin\theta$

B $-\sin\theta$

C $\cos\theta$

D $-\cos\theta$

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F03 | V01

Quiz M3 | QUIZ MCQ

C05-K03-Q-M03

The range of $y = 2\cos\theta$ is:

A [-1,1]

B [-2,2]

C [0,2]

D $\mathbb{R}$

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F04 | V01

Quiz M4 | QUIZ MCQ

C05-K03-Q-M04

The graph of $y = \cos(\theta - \frac{\pi}{4})$ is shifted:

A $left by \frac{\pi}{4}$

B $right by \frac{\pi}{4}$

C $up by \frac{\pi}{4}$

D $down by \frac{\pi}{4}$

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F05 | V01

Quiz W1 | QUIZ WRITTEN

C05-K03-Q-W01

For $y = 3\sin(2\theta - \pi)$, state the horizontal shift, period and range.

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F01 | V01

Quiz W2 | QUIZ WRITTEN

C05-K03-Q-W02

Simplify $\sin(\theta + \frac{\pi}{2}) + \sin(\theta + \pi)$.

WORKING AREA

FORMULA BANK

Parent graphs

$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods

$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range

$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form

$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order

shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F04 | V02

Quiz W3 | QUIZ WRITTEN C05-K03-Q-W03

Draw one cycle of $y = \tan(\theta - \frac{\pi}{3})$ and state its period and asymptotes.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

Combined form
$y = af(b\theta - q) = af\left(b\left(\theta - \frac{q}{b}\right)\right)$

Transform order
shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

Concept 3 | Properties and Graphs of Trigonometric Functions

F03 | V04

Quiz W4 | QUIZ WRITTEN C05-K03-Q-W04

For $y = -2|\sin(3x)|$, state its period and range and describe the reflection.

WORKING AREA

FORMULA BANK

Parent graphs
$y = \sin\theta,\ y = \cos\theta,\ y = \tan\theta$

Periods
$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$

Range
$\sin, \cos: \ -1 \le y \le 1 \quad \tan: \ y \in \mathbb{R}$

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shift $\frac{q}{b}$ → horizontal scale $\frac{1}{|b|}$ → vertical scale $|a|$

EGYPTIAN BACCALAUREATE • 2026

MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 05

Trigonometric Functions

1 Concept | 42 questions

B5 Landscape | one question per teaching page

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Chapter 05 | Trigonometric Functions

CLASSROOM ROUTE

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

42 questions

Official lessons: 5-13, 5-14, 5-15, 5-16

Formula Bank changes at each Concept boundary.

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions — **OFFICIAL LESSONS 5-13, 5-14, 5-15, 5-16**

Solving Equations and Inequalities Involving Trigonometric Functions

Equation-first recall | use the same rail beside every question in this Concept

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ **find the range of** t

Start with the family cue, write the first move, then use the working grid.

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F01 | V01

Q001 | WRITTEN C05-K04-5-13-WU

Solve (a) $-2\cos\theta = \sqrt{2}$ and (b) $\tan\theta + \sqrt{3} = 0$, giving the general solution for (b).

WORKING AREA

FORMULA BANK

Single-function form
$$\sin^2\theta + \cos^2\theta = 1$$

Periods
$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check
$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality
solve equality → shade arcs → check endpoints

Shifted argument
$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F01 | V02

Q002 | WRITTEN

C05-K04-5-13-TRY

Solve (a) $2\cos\theta - 1 = 0$ and (b) $\tan\theta - 1 = 0$ for $0 \le \theta \le 2\pi$.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F01 | V03

Q003 | WRITTEN

C05-K04-5-13-EX

Solve all given equations on $0 \le \theta \le 2\pi$: (a) $2\sin\theta + 1 = 0$, (b) $2\sin\theta = \sqrt{3}$, (c) $3\sin\theta + 3 = 0$, (d) $\sqrt{2}\cos\theta + 1 = 0$, (e) $2\cos\theta = \sqrt{3}$, (f) $2\cos\theta - \sqrt{2} = 0$, (g) $\tan\theta + 1 = 0$, (h) $\sqrt{3}\tan\theta = 1$, (i) $\sqrt{3}\tan\theta = 3$, and give general solutions for (j) $2\sin\theta + \sqrt{3} = 0$, (k) $\cos\theta + 1 = 0$, (l) $\sqrt{3}\tan\theta + 3 = 0$.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F01 | V04

Q004 | WRITTEN

C05-K04-5-13-CH

Solve $\tan^2\theta - (2+\sqrt{3})\tan\theta + 2\sqrt{3} = 0$ and give the general solution.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F02 | V01

Q005 | WRITTEN

C05-K04-5-14-WU

Solve for $0 \le \theta < 2\pi$: (a) $2\cos\theta > -\sqrt{3}$, (b) $\tan\theta \le \frac{1}{\sqrt{3}}$.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F02 | V02

Q006 | WRITTEN

C05-K04-5-14-TRY

Solve for $0 \le \theta < 2\pi$: (a) $2\sin\theta \le -1$, (b) $\cos\theta > \frac{1}{2}$, (c) $\tan\theta > 1$.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F02 | V03

Q007 | WRITTEN

C05-K04-5-14-EX

Solve all given inequalities for $0 \le \theta < 2\pi$: (a) $\sin\theta > \frac{\sqrt{3}}{2}$, (b) $\sin\theta - \frac{\sqrt{2}}{2} > 0$, (c) $2\sin\theta + \sqrt{3} \le 0$, (d) $\cos\theta > 0$, (e) $\cos\theta - \frac{1}{2} \le 0$, (f) $2\cos\theta + \sqrt{2} \le 0$, (g) $\tan\theta \le -\frac{1}{\sqrt{3}}$, (h) $\tan\theta + \sqrt{3} > 0$, (i) $\tan\theta + 1 \ge 0$.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F02 | V04

Q008 | WRITTEN

C05-K04-5-14-CH

Solve $2\sin^2\theta - \cos\theta - 1 > 0$ for $0 \leq \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \leq \sin\theta, \cos\theta \leq 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F03 | V01

Q009 | WRITTEN C05-K04-5-15-WU

Solve for $0 \le \theta < 2\pi$: (a) $2\cos^2\theta - 3\sin\theta = 0$, (b) $2\sin^2\theta - 3\cos\theta - 3 \le 0$.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F03 | V02

Q010 | WRITTEN

C05-K04-5-15-TRY

Solve for $0 \le \theta < 2\pi$: (a) $2\sin^2\theta - \sin\theta = 0$, (b) $2\cos^2\theta - \sin\theta = 2$, (c) $2\sin^2\theta - 4 < 5\cos\theta$.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F03 | V03

Q011 | WRITTEN

C05-K04-5-15-EX

Solve all given equations and inequalities for $0 \leq \theta < 2\pi$: (a) $2\sin^2\theta + \sin\theta - 1 = 0$, (b) $2\sin^2\theta + 3\cos\theta = 0$, (c) $2\sin^2\theta - \cos\theta = 2$, (d) $2\cos^2\theta - 5\cos\theta - 3 = 0$, (e) $2\cos^2\theta + \sin\theta - 1 = 0$, (f) $2\cos^2\theta + 3\sin\theta = 3$, (g) $2\cos^2\theta + 3\sin\theta \leq 0$, (h) $2\sin^2\theta + \cos\theta > 1$, (i) $2\cos^2\theta - 4 \leq 5\sin\theta$.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \leq \sin\theta, \cos\theta \leq 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F03 | V04

Q012 | WRITTEN

C05-K04-5-15-CH

Solve $\frac{1-2\sin^2\theta+\sin\theta}{\cos^2\theta} \geq 1$ for $0 \leq \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \leq \sin\theta, \cos\theta \leq 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F04 | V01

Q013 | WRITTEN

C05-K04-5-16-WU

Solve for $0 \le \theta < 2\pi$: (a) $\sin(\theta + \frac{\pi}{3}) = \frac{1}{2}$, (b) $\sin(\theta + \frac{\pi}{6}) > -\frac{1}{2}$.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F04 | V02

Q014 | WRITTEN

C05-K04-5-16-TRY

Solve for $0 \le \theta < 2\pi$: (a) $\sin(\theta + \frac{\pi}{6}) = \frac{1}{2}$, (b) $\tan(\theta + \frac{\pi}{4}) = \sqrt{3}$, (c) $\cos(\theta + \frac{\pi}{4}) < -\frac{\sqrt{2}}{2}$.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ **find the range of** t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F04 | V03

Q015 | WRITTEN

C05-K04-5-16-EX

Solve for $0 \le \theta < 2\pi$: (a) $\cos(\theta + \frac{\pi}{3}) = -\frac{\sqrt{3}}{2}$, (b) $\cos(\theta + \frac{\pi}{6}) = -\frac{1}{2}$, (c) $\sin(\theta + \frac{\pi}{4}) = \frac{\sqrt{3}}{2}$, (d) $\tan(\theta + \frac{\pi}{4}) = -1$, (e) $\tan(\theta + \frac{\pi}{3}) = \frac{1}{\sqrt{3}}$, (f) $\tan(\theta + \frac{\pi}{6}) = 1$, (g) $\sin(\theta + \frac{\pi}{6}) \le \frac{\sqrt{3}}{2}$, (h) $\sin(\theta + \frac{\pi}{4}) \ge \frac{\sqrt{2}}{2}$, (i) $\cos(\theta + \frac{\pi}{3}) > \frac{1}{2}$.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ **find the range of** t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F04 | V04

Q016 | WRITTEN

C05-K04-5-16-CH

Solve $4\sin^2(\theta + \frac{\pi}{6}) \geq 1$ for $0 \leq \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \leq \sin\theta, \cos\theta \leq 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F04 | V04

Q017 | WRITTEN

C05-K04-5-16-REF

A student divides $\tan x \times \cos x = \frac{1}{2}$ by $\cos x$, obtaining $\tan x = \frac{1}{2\cos x}$. Evaluate this strategy and propose a better substitution on $[0°, 360°[$.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ **find the range of** t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F01 | V01

Q018 | MCQ

C05-K04-5-13-GM01

The period used for a general tangent solution is:

A 2π

B π

C $\pi/2$

D 4π

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ **find the range of** t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F01 | V01

Q019 | MCQ

C05-K04-5-13-GM02

The solutions of $2\cos\theta = 1$ on $[0, 2\pi]$ are:

A $\pi/6, 11\pi/6$

B $\pi/3, 5\pi/3$

C $2\pi/3, 4\pi/3$

D $\pi/4, 7\pi/4$

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F01 | V01

Q020 | MCQ

C05-K04-5-13-GM03

Which root is impossible when solving $2\sin^2\theta + 3\sin\theta - 2 = 0$?:

A $\sin\theta = 1/2$

B $\sin\theta = -2$

C $\sin\theta = 0$

D $\sin\theta = -1/2$

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F01 | V01

Q021 | MCQ

C05-K04-5-13-GM04

The quadratic challenge factors into roots:

A 1 and $\sqrt{3}$

B 2 and $\sqrt{3}$

C 2 and 3

D $\pi/3$ and 2

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ **find the range of** t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F02 | V01

Q022 | MCQ

C05-K04-5-14-GM01

For $2\cos\theta > -\sqrt{3}$, the excluded arc is:

A $[0, 5\pi/6]$

B $[5\pi/6, 7\pi/6]$

C $[7\pi/6, 2\pi)$

D $(\pi/6, 5\pi/6)$

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F02 | V01

Q023 | MCQ

C05-K04-5-14-GM02

The inequality $\tan\theta > 1$ on $[0, 2\pi)$ holds on:

A $(\pi/4, \pi/2) \cup (5\pi/4, 3\pi/2)$

B $[0, \pi/4]$

C $(\pi/2, \pi)$

D $[\pi, 2\pi)$

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F02 | V01

Q024 | MCQ

C05-K04-5-14-GM03

A closed endpoint in a trig inequality is used when the sign is:

A strictly greater

B strictly less

C greater than or equal to

D never

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ **find the range of** t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F02 | V01

Q025 | MCQ

C05-K04-5-14-GM04

The 5-14 challenge reduces to which cosine condition?:

A $\cos\theta > 1/2$

B $-1 < \cos\theta < 1/2$

C $\cos\theta \leq -1$

D $\cos\theta \geq 1$

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \leq \sin\theta, \cos\theta \leq 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ **find the range of** t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F03 | V01

Q026 | MCQ

C05-K04-5-15-GM01

When a quadratic gives $\sin\theta = -2$, we:

A keep it

B reject it

C square it

D divide by 2

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ **find the range of** t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F03 | V01

Q027 | MCQ

C05-K04-5-15-GM02

The first step for $2\cos^2\theta - 3\sin\theta = 0$ is to use:

A $\sin^2\theta + \cos^2\theta = 1$

B $\tan\theta = \sin\theta$

C $\cos\theta = 1$

D the tangent period

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F03 | V01

Q028 | MCQ

C05-K04-5-15-GM03

The solution of $2\sin^2\theta + \sin\theta - 1 = 0$ includes:

A $\theta = \pi/6$

B $\theta = \pi/4$

C $\theta = \pi/3$

D $\theta = 2\pi/3$

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F03 | V01

Q029 | MCQ

C05-K04-5-15-GM04

In the rational challenge, which angle must be excluded?:

A 0

B $\pi/4$

C $\pi/2$

D π

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F04 | V01

Q030 | MCQ C05-K04-5-16-GM01

After setting $t = \theta + \pi/3$ with $0 \le \theta < 2\pi$, the t-range is:

A $[0, 2\pi)$

B $[\pi/3, 7\pi/3)$

C $[-\pi/3, 5\pi/3)$

D $[\pi, 3\pi)$

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F04 | V01

Q031 | MCQ

C05-K04-5-16-GM02

The solutions of $\tan(\theta + \pi/4) = \sqrt{3}$ include:

A $\pi/12$

B $\pi/6$

C $\pi/3$

D $\pi/2$

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ **find the range of** t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F04 | V01

Q032 | MCQ C05-K04-5-16-GM03

For $\sin(\theta + \pi/4) \geq \sqrt{2}/2$, the θ-solution is:

A $[0, \pi/2]$

B $(0, \pi/2)$

C $[\pi/2, \pi]$

D $[0, 2\pi)$

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \leq \sin\theta, \cos\theta \leq 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F04 | V01

Q033 | MCQ

C05-K04-5-16-GM04

The 5-16 challenge is equivalent to:

A $|\sin t| \geq 1/2$

B $\sin t = 0$

C $\cos t > 1/2$

D $\tan t = 1$

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \leq \sin\theta, \cos\theta \leq 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F04 | V01

Q034 | MCQ

C05-K04-5-16-GM05

In the Reflect problem, $\tan x \cos x$ simplifies to:

A $\cos x$

B $\sin x$

C $\tan^2 x$

D 1

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2 \theta + \cos^2 \theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \leq \sin \theta, \cos \theta \leq 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ **find the range of** t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F01 | V01

Quiz M1 | QUIZ MCQ

C05-K04-Q-M01

The general solution of $\tan\theta = -1$ is:

A $-\pi/4 + 2n\pi$

B $-\pi/4 + n\pi$

C $\pi/4 + 2n\pi$

D $\pi/2 + n\pi$

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F02 | V01

Quiz M2 | QUIZ MCQ

C05-K04-Q-M02

The solution of $\cos\theta > 0$ on $[0, 2\pi)$ is:

A $(\pi/2, 3\pi/2)$

B $[0, \pi/2) \cup (3\pi/2, 2\pi)$

C $[0, \pi)$

D $(\pi, 2\pi)$

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F03 | V01

Quiz M3 | QUIZ MCQ

C05-K04-Q-M03

The valid sine root of $2\sin^2\theta + 3\sin\theta - 2 = 0$ is:

A $\sin\theta = -2$

B $\sin\theta = 1/2$

C $\sin\theta = 2$

D $\sin\theta = -1/2$

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ **find the range of** t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F04 | V01

Quiz M4 | QUIZ MCQ C05-K04-Q-M04

The first operation in a shifted-argument problem is to:

A divide by $\cos\theta$

B set t equal to the whole argument and find its range

C change radians to degrees

D square both sides

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \le \sin\theta, \cos\theta \le 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ **find the range of** t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F01 | V01

Quiz W1 | QUIZ WRITTEN

C05-K04-Q-W01

Solve $2\cos\theta = \sqrt{3}$ for $0 \leq \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \leq \sin\theta, \cos\theta \leq 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ **find the range of** t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F02 | V01

Quiz W2 | QUIZ WRITTEN

C05-K04-Q-W02

Solve $\tan\theta \leq -1$ for $0 \leq \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \leq \sin\theta, \cos\theta \leq 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ **find the range of** t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F03 | V01

Quiz W3 | QUIZ WRITTEN

C05-K04-Q-W03

Solve $2\sin^2\theta + \sin\theta - 1 = 0$ for $0 \leq \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \leq \sin\theta, \cos\theta \leq 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ find the range of t

Concept 4 | Solving Equations and Inequalities Involving Trigonometric Functions

F04 | V01

Quiz W4 | QUIZ WRITTEN

C05-K04-Q-W04

Solve $\cos(\theta + \frac{\pi}{3}) > \frac{1}{2}$ for $0 \leq \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Single-function form

$$\sin^2\theta + \cos^2\theta = 1$$

Periods

$$T_{\sin,\cos} = 2\pi \quad T_{\tan} = \pi$$

Range check

$$-1 \leq \sin\theta, \cos\theta \leq 1$$

Inequality

solve equality → shade arcs → check endpoints

Shifted argument

$t = \theta + \alpha$ **find the range of** t

EGYPTIAN BACCALAUREATE • 2026

MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 05

Trigonometric Functions

1 Concepts | 62 questions

B5 Landscape | one question per teaching page

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01120009622

Chapter 05 | Trigonometric Functions

CLASSROOM ROUTE

Concept 5 | Advanced Theorems and Applications

62 questions

Official lessons: 5-17, 5-18, 5-19, 5-20, 5-21, 5-22, 5-23, 5-24, 5-25

The Formula Bank changes at each Concept boundary.

Concept 5 | Advanced Theorems and Applications — **OFFICIAL LESSONS 5-17, 5-18, 5-19, 5-20, 5-21, 5-22, 5-23, 5-24, 5-25**

Advanced Theorems and Applications

Equation-first recall | use the same rail beside every question in this Concept

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \le \sin\theta, \cos\theta \le 1$$

Start with the family cue, write the first move, then use the working grid.

Concept 5 | Advanced Theorems and Applications

F01 | V01

Q001 | WRITTEN

C05-K05-5-17-WU

Find the maximum and minimum of $y = sin^2\theta + cos\theta + 1$, $0le\theta < 2pi$, and the corresponding θ.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F01 | V02

Q002 | WRITTEN

C05-K05-5-17-TRY

Find the maximum and minimum of $y = cos^2\theta - sin\theta, 0le\theta < 2pi$, and the corresponding θ.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F01 | V03

Q003 | WRITTEN

C05-K05-5-17-EX

Solve the four given maximum/minimum problems on $0 le \theta < 2pi$, including $y = \sin^2\theta + \sin\theta - 1$, $y = \cos^2\theta - \cos\theta + 1$, $y = 2\sin\theta + \cos^2\theta - 1$, and $y = -2\sin^2\theta - 2\cos\theta + 1$. Include the given challenge $y = \cos^2\theta - \sin\theta$.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F02 | V01

Q004 | WRITTEN

C05-K05-5-18-WU

Use addition theorems to find $\sin 75°$ and $\cos(\pi/12)$.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F02 | V02

Q005 | WRITTEN

C05-K05-5-18-TRY

Given $\sin\alpha = \frac{\sqrt{3}}{2}$ in QII and $\cos\beta = -\frac{3}{5}$ in QIII, find $\sin(\alpha+\beta)$ and $\cos(\alpha-\beta)$.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F02 | V03

Q006 | WRITTEN

C05-K05-5-18-EX

Complete the given addition-theorem exercises $exactvalues,\ quadrant-controlled\alpha,\ \beta,\ andthethree-anglechallenge(\sin\alpha=0.6,\ \cos\beta=0.8,\ \tan\gamma=0.75)$.

WORKING AREA

FORMULA BANK

Extrema

$$y=-(t-h)^2+k$$

Addition

$$\sin(\alpha+\beta)=\sin\alpha\cos\beta+\cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha=2\sin\alpha\cos\alpha \qquad \cos 2\alpha=\cos^2\alpha-\sin^2\alpha$$

Harmonic form

$$a\sin\theta+b\cos\theta=r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta=\frac{m_1-m_2}{1+m_1m_2} \qquad -1\le\sin\theta,\cos\theta\le 1$$

Concept 5 | Advanced Theorems and Applications

F03 | V01

Q007 | WRITTEN

C05-K05-5-19-WU

Find $\tan 105°$, then find the angle between $y = 2x + 1$ and $y = -3x + 2$.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F03 | V02

Q008 | WRITTEN

C05-K05-5-19-TRY

Find the angle between each given pair of straight lines, including $y = \frac{1}{3}x$ with $y = 2x$, and $8x + 2y - 3 = 0$ with $-5x + 3y + 1 = 0$.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F03 | V03

Q009 | WRITTEN

C05-K05-5-19-EX

Find the exact angles for all given line pairs and solve the challenge: a line through $P(2, 3)$ makes acute angle $\tan\theta = 3/4$ with $x + 2y - 4 = 0$; give both line equations and the areas of the triangles with the y-axis.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F04 | V01

Q010 | WRITTEN

C05-K05-5-20-WU

Given $\sin\alpha = 1/3$ with α in QII, find $\sin 2\alpha,\ \cos 2\alpha,\ \tan 2\alpha$.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F04 | V02

Q011 | WRITTEN

C05-K05-5-20-TRY

Given $\sin\alpha = -2/3$ with $2\pi < \alpha < 3\pi$, find $\sin 2\alpha,\ \cos 2\alpha,\ \tan 2\alpha$.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F04 | V03

Q012 | WRITTEN C05-K05-5-20-EX

Solve the given double-angle exercises for given sine/cosine values and the challenge $\cos\theta = 0.6,\ \pi < \theta < 2\pi$, evaluating $\cos 3\theta \tan 2\theta$.

WORKING AREA

FORMULA BANK

Extrema
$$y = -(t-h)^2 + k$$

Addition
$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle
$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form
$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range
$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F05 | V01

Q013 | WRITTEN

C05-K05-5-21-WU

Given $\cos\alpha = 3/5, 0 < \alpha < \pi$, find $\sin(\alpha/2)$, $\cos(\alpha/2)$, $\tan(\alpha/2)$, and evaluate $\cos(5\pi/8)$.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F05 | V02

Q014 | WRITTEN

C05-K05-5-21-TRY

Given $\cos\alpha = -1/3$, $0 < \alpha < \pi$, find $\sin(\alpha/2)$, $\cos(\alpha/2)$, $\tan(\alpha/2)$, and evaluate $\sin(3\pi/8)$.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F05 | V03

Q015 | WRITTEN

C05-K05-5-21-EX

Solve the given half-angle exercises for the three quadrant intervals and the challenge with $\tan A = \frac{\sqrt{5}}{2},\ 4\pi < A < 5\pi,\ \cos B = -\frac{\sqrt{5}}{3},\ 5\pi < B < 6\pi.$

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F06 | V01

Q016 | WRITTEN

C05-K05-5-22-WU

Solve on $0 \le \theta < 2\pi$: $a \sin 2\theta + \sin\theta = 0$, $b \cos 2\theta - 7\cos\theta + 4 \ge 0$.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F06 | V02

Q017 | WRITTEN

C05-K05-5-22-TRY

Solve the given equation $\sin 2\theta + \cos\theta = 0$ on $0 \leq \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \leq \sin\theta, \cos\theta \leq 1$$

Concept 5 | Advanced Theorems and Applications

F06 | V03

Q018 | WRITTEN

C05-K05-5-22-EX

Solve all given double-angle equations and inequalities on $0 \le \theta < 2\pi$, including the challenge $\cos 2\theta - 7\cos\theta + 4 \ge 0$.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F07 | V01

Q019 | WRITTEN

C05-K05-5-23-WU

Rewrite $\sin\theta - \sqrt{3}\cos\theta$ as $r\sin(\theta+\alpha)$, $r>0$, $-\pi<\alpha<\pi$.

WORKING AREA

FORMULA BANK

Extrema

$$y=-(t-h)^2+k$$

Addition

$$\sin(\alpha+\beta)=\sin\alpha\cos\beta+\cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha=2\sin\alpha\cos\alpha \quad \cos 2\alpha=\cos^2\alpha-\sin^2\alpha$$

Harmonic form

$$a\sin\theta+b\cos\theta=r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta=\frac{m_1-m_2}{1+m_1m_2} \quad -1\le\sin\theta,\cos\theta\le 1$$

Concept 5 | Advanced Theorems and Applications

F07 | V02

Q020 | WRITTEN

C05-K05-5-23-TRY

Rewrite the given expressions $\sin\theta-\cos\theta$, $\sin\theta+\cos\theta$, $3\sin\theta-\sqrt{3}\cos\theta$, and $3\sin\theta-\cos\theta$ in harmonic-addition form.

WORKING AREA

FORMULA BANK

Extrema

$$y=-(t-h)^2+k$$

Addition

$$\sin(\alpha+\beta)=\sin\alpha\cos\beta+\cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha=2\sin\alpha\cos\alpha \qquad \cos 2\alpha=\cos^2\alpha-\sin^2\alpha$$

Harmonic form

$$a\sin\theta+b\cos\theta=r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta=\frac{m_1-m_2}{1+m_1m_2} \qquad -1\le\sin\theta,\cos\theta\le 1$$

Concept 5 | Advanced Theorems and Applications

F07 | V03

Q021 | WRITTEN

C05-K05-5-23-EX

Rewrite all given harmonic-addition exercises in the form $r\sin(\theta+\alpha)$, including $2\sin\theta+2\cos\theta$ and the challenge $\sin\theta-\sqrt{3}\cos\theta$.

WORKING AREA

FORMULA BANK

Extrema

$$y=-(t-h)^2+k$$

Addition

$$\sin(\alpha+\beta)=\sin\alpha\cos\beta+\cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha=2\sin\alpha\cos\alpha \qquad \cos 2\alpha=\cos^2\alpha-\sin^2\alpha$$

Harmonic form

$$a\sin\theta+b\cos\theta=r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta=\frac{m_1-m_2}{1+m_1m_2} \qquad -1\le\sin\theta,\cos\theta\le 1$$

Concept 5 | Advanced Theorems and Applications

F08 | V01

Q022 | WRITTEN

C05-K05-5-24-WU

Solve on $0 \le \theta < 2\pi$: $a \sin\theta - \cos\theta = 1$, $b \sin\theta + \cos\theta < 3/2$.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F08 | V02

Q023 | WRITTEN

C05-K05-5-24-TRY

Solve $\sin\theta \leq \cos\theta$ on $0 \leq \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \leq \sin\theta, \cos\theta \leq 1$$

Concept 5 | Advanced Theorems and Applications

F08 | V03

Q024 | WRITTEN

C05-K05-5-24-EX

Solve all given harmonic-addition equations and inequalities on $0 \le \theta < 2\pi$, including $\sin\theta + \cos\theta + 1 = 0$ and $\sin\theta - \cos\theta + 3/2 > 0$.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F09 | V01

Q025 | WRITTEN

C05-K05-5-25-WU

Find the maximum and minimum of $y = 2\sin(\theta - \pi/3)$, and of $y = 2\cos 2\theta + 4\cos\theta + 1$, $0 \le \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F09 | V02

Q026 | WRITTEN

C05-K05-5-25-TRY

Find the maximum and minimum of the given functions $y = -\frac{4}{3}\sin^2\theta + \cos\theta$ and $y = \cos 2\theta - 2\cos\theta$.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F09 | V03

Q027 | WRITTEN

C05-K05-5-25-EX

Solve all given maximum/minimum problems in the final lesson, including absolute-value and double-angle forms, and state the corresponding angles where requested.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F01 | C05-K05-F01-VMCQ

Q028 | MCQ

C05-K05-5-17-GM01

The substitution for $\sin^2\theta + \cos\theta + 1$ should be Which of the following is correct?:

A $t = sintheta$

B $t = costheta$

C $t = tantheta$

D $t = theta$

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F01 | C05-K05-F01-VMCQ

Q029 | MCQ

C05-K05-5-17-GM02

The maximum of $\sin^2\theta + \cos\theta + 1$ is:

A 0

B 1

C 9/4

D 4

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F01 | C05-K05-F01-VMCQ

Q030 | MCQ

C05-K05-5-17-GM03

An extremal vertex is valid only if t lies in Which of the following is correct?:

A $[-2, 2]$

B $[-1, 1]$

C $[0,1]$

D all real numbers

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F02 | C05-K05-F02-VMCQ

Q031 | MCQ

C05-K05-5-18-GM04

The identity for sin(a+b) is:

A $sinalphacosbeta + cosalphasinbeta$

B sin alpha sin beta

C cos alpha cos beta

D $tanalpha + tanbeta$

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F02 | C05-K05-F02-VMCQ

Q032 | MCQ

C05-K05-5-18-GM05

sin 75 degrees equals Which of the following is correct?:

A $(sqrt6 - sqrt2)/4$

B $(sqrt6 + sqrt2)/4$

C $1/2$

D $sqrt3/2$

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F02 | C05-K05-F02-VMCQ

Q033 | MCQ

C05-K05-5-18-GM06

A missing trig value is selected using:

A the quadrant

B the denominator

C the period only

D a graph scale

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F03 | C05-K05-F03-VMCQ

Q034 | MCQ

C05-K05-5-19-GM07

The slope of y=mx+k is:

A k

B m

C $1/m$

D $m+k$

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1+m_1m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F03 | C05-K05-F03-VMCQ

Q035 | MCQ

C05-K05-5-19-GM08

The angle formula uses denominator Which of the following is correct?:

A $1 + m1m2$

B $m1 - m2$

C $m1 + m2$

D m1m2

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F03 | C05-K05-F03-VMCQ

Q036 | MCQ

C05-K05-5-19-GM09

For an acute angle, if tan theta1 is negative we use Which of the following is correct?:

A theta1

B $pi - theta1$

C 2theta1

D $-theta1only$

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F04 | C05-K05-F04-VMCQ

Q037 | MCQ

C05-K05-5-20-GM10

sin(2a) equals Which of the following is correct?:

A sin alpha

B 2 sin alpha cos alpha

C cos squared alpha

D tan alpha

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F04 | C05-K05-F04-VMCQ

Q038 | MCQ

C05-K05-5-20-GM11

cos(2a) can be written as Which of the following is correct?:

A *cossquaredalpha – sinsquaredalpha*

B 2sin alpha

C tan alpha

D $1 + sinalpha$

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F04 | C05-K05-F04-VMCQ

Q039 | MCQ

C05-K05-5-20-GM12

For theta in QIV, sin theta is:

A positive

B negative

C zero always

D undefined

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F05 | C05-K05-F05-VMCQ

Q040 | MCQ

C05-K05-5-21-GM13

The half-angle formula for sin(a/2) uses Which of the following is correct?:

A $(1 - cosalpha)/2$

B $(1 + cosalpha)/2$

C tan alpha

D cos 2alpha

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F05 | C05-K05-F05-VMCQ

Q041 | MCQ C05-K05-5-21-GM14

The sign of a half-angle root is chosen from Which of the following is correct?:

A the original quadrant interval

B the coefficient only

C the denominator

D the period of tan

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F05 | C05-K05-F05-VMCQ

Q042 | MCQ

C05-K05-5-21-GM15

If cos a=-1/3 and 0<a<pi, cos(a/2) is:

A negative

B positive

C zero

D undefined

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F06 | C05-K05-F06-VMCQ

Q043 | MCQ C05-K05-5-22-GM16

For double-angle equations, first rewrite in Which of the following is correct?:

A one trig function

B two unrelated angles

C degrees only

D a logarithm

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F06 | C05-K05-F06-VMCQ

Q044 | MCQ

C05-K05-5-22-GM17

The factorisation of sin(2 theta)+sin theta is:

A $sintheta(2costheta + 1)$

B $costheta(2sintheta - 1)$

C $sintheta + costheta$

D 2sin theta

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F06 | C05-K05-F06-VMCQ

Q045 | MCQ

C05-K05-5-22-GM18

A tangent asymptote is always Which of the following is correct?:

A included

B excluded

C a maximum

D an endpoint

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F07 | C05-K05-F07-VMCQ

Q046 | MCQ

C05-K05-5-23-GM19

For a sin theta+b cos theta, r is:

A $a+b$

B $sqrt(a^2+b^2)$

C $a-b$

D ab

WORKING AREA

FORMULA BANK

Extrema

$$y=-(t-h)^2+k$$

Addition

$$\sin(\alpha+\beta)=\sin\alpha\cos\beta+\cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha=2\sin\alpha\cos\alpha \quad \cos 2\alpha=\cos^2\alpha-\sin^2\alpha$$

Harmonic form

$$a\sin\theta+b\cos\theta=r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta=\frac{m_1-m_2}{1+m_1m_2} \quad -1\le\sin\theta,\cos\theta\le 1$$

Concept 5 | Advanced Theorems and Applications

F07 | C05-K05-F07-VMCQ

Q047 | MCQ

C05-K05-5-23-GM20

The harmonic target form is:

A $rsin(theta + alpha)$

B r cos theta

C a tan theta

D sin theta only

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F07 | C05-K05-F07-VMCQ

Q048 | MCQ

C05-K05-5-23-GM21

The angle a is located from point Which of the following is correct?:

A P(a,b)

B P(r,theta)

C the origin only

D the x intercept

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F08 | C05-K05-F08-VMCQ

Q049 | MCQ

C05-K05-5-24-GM22

After synthesis, t is usually Which of the following is correct?:

A $theta + alpha$

B $theta^2$

C tan theta

D cos theta

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F08 | C05-K05-F08-VMCQ

Q050 | MCQ

C05-K05-5-24-GM23

If max(sin theta+cos theta)=sqrt2, then sin theta+cos theta<3/2 is:

A never true

B always true

C true only at pi

D undefined

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F08 | C05-K05-F08-VMCQ

Q051 | MCQ

C05-K05-5-24-GM24

In a strict inequality, equality endpoints are:

A included

B excluded

C doubled

D random

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F09 | C05-K05-F09-VMCQ

Q052 | MCQ

C05-K05-5-25-GM25

The range of 2sin(theta-pi/3) is:

A $[-1, 1]$

B $[-2, 2]$

C $[0,2]$

D $[-3, 3]$

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F09 | C05-K05-F09-VMCQ

Q053 | MCQ

C05-K05-5-25-GM26

For a double-angle maximum problem, use Which of the following is correct?:

A *thedouble angleformulathenaboundedvariable* –

B a logarithm

C only a graph

D no substitution

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F09 | C05-K05-F09-VMCQ

Q054 | MCQ

C05-K05-5-25-GM27

A vertex outside [-1,1] is:

A an allowed extremum

B rejected

C always the maximum

D always the minimum

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F09 | C05-K05-F09-VQUIZ

Quiz M1 | QUIZ MCQ C05-K05-Q-M01

The maximum of $2\sin(\theta - \pi/3)$ is:

A -2

B -1

C 1

D 2

WORKING AREA

FORMULA BANK

Extrema
$$y = -(t-h)^2 + k$$

Addition
$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle
$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form
$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range
$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F02 | C05-K05-F02-VQUIZ

Quiz M2 | QUIZ MCQ

C05-K05-Q-M02

The addition-theorem value $\sin 75°$ is:

A $(\sqrt{6}+\sqrt{2})/4$

B $(\sqrt{6}-\sqrt{2})/4$

C $1/2$

D 1

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F09 | C05-K05-F09-VQUIZ

Quiz M3 | QUIZ MCQ C05-K05-Q-M03

For $y = 2x^2 + 4x + 1$, the vertex x-value is:

A -2

B -1

C 1

D 2

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F03 | C05-K05-F03-VQUIZ

Quiz M4 | QUIZ MCQ C05-K05-Q-M04

The angle between slopes 2 and -3 is:

A $\pi/6$

B $\pi/4$

C $\pi/3$

D $\pi/2$

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F01 | C05-K05-F01-VQUIZ

Quiz W1 | QUIZ WRITTEN C05-K05-Q-W01

Find the maximum and minimum of $y = \sin^2\theta + \cos\theta + 1$ on $0 \le \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Extrema
$$y = -(t-h)^2 + k$$

Addition
$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle
$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form
$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range
$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F04 | C05-K05-F04-VQUIZ

Quiz W2 | QUIZ WRITTEN C05-K05-Q-W02

Find $\sin 2\alpha,\ \cos 2\alpha,\ \tan 2\alpha$ when $\sin\alpha = 1/3$ and α is in QII.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F07 | C05-K05-F07-VQUIZ

Quiz W3 | QUIZ WRITTEN C05-K05-Q-W03

Rewrite $3\sin\theta - \sqrt{3}\cos\theta$ as $r\sin(\theta + \alpha)$.

WORKING AREA

FORMULA BANK

Extrema

$$y = -(t-h)^2 + k$$

Addition

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle

$$\sin 2\alpha = 2\sin\alpha\cos\alpha \qquad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form

$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range

$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \qquad -1 \le \sin\theta, \cos\theta \le 1$$

Concept 5 | Advanced Theorems and Applications

F08 | C05-K05-F08-VQUIZ

Quiz W4 | QUIZ WRITTEN C05-K05-Q-W04

Solve $\sin\theta \leq \cos\theta$ on $0 \leq \theta < 2\pi$.

WORKING AREA

FORMULA BANK

Extrema
$$y = -(t-h)^2 + k$$

Addition
$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

Double angle
$$\sin 2\alpha = 2\sin\alpha\cos\alpha \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

Harmonic form
$$a\sin\theta + b\cos\theta = r\sin(\theta+\alpha)$$

Angle / range
$$\tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} \quad -1 \leq \sin\theta, \cos\theta \leq 1$$

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MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 06

Exponents and Logarithms

1 Concept | 66 questions

B5 Landscape | one question per teaching page

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Chapter 06 | Exponents and Logarithms

CLASSROOM ROUTE

Concept 1 | Laws of Exponents and Roots

66 questions

Official lessons: 6-1, 6-2, 6-3, 6-4

Formula Bank changes at each Concept boundary.

Concept 1 | Laws of Exponents and Roots — **OFFICIAL LESSONS 6-1, 6-2, 6-3, 6-4**

Laws of Exponents and Roots

Equation-first recall | use the same rail beside every question in this Concept

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Start with the family cue, write the first move, then use the working grid.

Concept 1 | Laws of Exponents and Roots

F01 | V01

Q001 | WRITTEN C06-K01-6-1-WU1

Find: (a) 10^0, (b) 2^{-3}, (c) $(0.2)^{-2}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F01 | V02

Q002 | WRITTEN C06-K01-6-1-WU2

Let $a \neq 0,\ b \neq 0$. Simplify: (a) $a^{-5}a^{8}$, (b) $a^{5} \div a^{-3}$, (c) $(a^{-1}b)^{2}$, (d) $(2^{2})^{3} \div 2^{-2} \times 2^{-3}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^{0} = 1 \quad a^{-n} = 1/a^{n}$$

Integer laws

$$a^{m}a^{n} = a^{m+n} \quad a^{m}/a^{n} = a^{m-n}$$

Roots

$$\sqrt[n]{a^{m}} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^{m}}$$

Sign control

$$\sqrt{a^{2}} = |a|$$

Concept 1 | Laws of Exponents and Roots

F01 | V01

Q003 | WRITTEN C06-K01-6-1-TRY1

Find: (a) 5^0, (b) 3^{-2}, (c) $(0.25)^{-2}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F01 | V03

Q004 | WRITTEN

C06-K01-6-1-TRY2

Simplify the eight given expressions: a^5a^4, $a^3 \div a^{-2}$, $(a^{-2}b^4)^{-1}$, $2^3 \times 2^{-7}$, $5^{-4} \div 5^{-6}$, $(a^3b^{-1})^3(a^2b^{-3})^{-2}$, $4^{-5}4^2 \div 4^{-2}$, and $2^4 \div (2^{-1})^3 \times 2^{-2}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F01 | V04

Q005 | WRITTEN

C06-K01-6-1-EX1

Find the nine values: 3^0, 11^0, $(2/3)^0$, 4^{-3}, 5^{-3}, 6^{-2}, $(1/3)^{-3}$, $(3/5)^{-2}$, $(0.04)^{-2}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F01 | V05

Q006 | WRITTEN

C06-K01-6-1-EX2

Simplify the twelve same-base expressions in given Question 2: a^2a^4, $a^{-2}a^5$, $a^{-3}a^{-4}$, $a^3 \div a^5$, $a^8 \div a^{-3}$, $a^{-6} \div a^{-2}$, $(a^{-1})^3$, $(a^3b^4)^{-2}$, $(a^{-3}b^2)^{-3}$, $3^5 3^{-3}$, $4^4 4^{-3}$, $5^5 5^{-5}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F01 | V06

Q007 | WRITTEN

C06-K01-6-1-EX3

Simplify given Question 3: $5^4 \div 5^2$, $3^2 \div 3^{-2}$, $2^{-4} \div 2^{-5}$, $(a^{-2}b)^3(a^2b^{-1})^2$, $(a^{-3}b)^{-3}(a^4b^2)^{-2}$, $(2a^3b^{-1})^3(-3ab^{-2})^{-3}$, $3^2 3^{-1} \div 3^3$, $5^{-4}5^5 \div 5^{-2}$, $2^4 2^{-8} \div 2^{-6}$, $5^3(5^{-2})^2 \div 5^{-4}$, $3^5 \div (3^{-2})^{-3} \times 3$, and $(a/2)^3 a^{-4} \div (2a)^{-2}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F01 | V07

Q008 | WRITTEN

C06-K01-6-1-CH

Simplify completely with positive exponents: $\left(\frac{2a^2}{b^{-3}}\right)^{-2}(4a^{-3}b^2)^3 \div \left(\frac{a}{2b}\right)^{-4} \div (a^{-2}b^2)$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F02 | V01

Q009 | WRITTEN C06-K01-6-2-WU1

Find $\sqrt[3]{64}$ and $\sqrt[3]{1/27}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F02 | V02

Q010 | WRITTEN

C06-K01-6-2-WU2

Perform: $\sqrt[3]{12}\sqrt[3]{18}$, $\sqrt[3]{250}/\sqrt[3]{2}$, $(\sqrt[6]{8})^2$, $\sqrt[3]{\sqrt{729}}$, and $\sqrt[3]{54}-\sqrt[3]{16}+\sqrt[3]{2}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F02 | V01

Q011 | WRITTEN

C06-K01-6-2-TRY1

Find $\sqrt[4]{81}$ and $\sqrt[4]{1/16}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F02 | V03

Q012 | WRITTEN

C06-K01-6-2-TRY2

Perform: $\sqrt[4]{8}\sqrt[4]{32}$, $\sqrt[4]{48}/\sqrt[4]{3}$, $(\sqrt[6]{100})^3$, $\sqrt[3]{\sqrt[3]{64}}$, and $\sqrt[3]{81}-\sqrt[3]{3}+\sqrt[3]{24}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F02 | V04

Q013 | WRITTEN C06-K01-6-2-EX1

Find: $\sqrt[3]{216}$, $\sqrt[4]{625}$, $\sqrt[5]{243}$, $\sqrt[3]{1/64}$, $\sqrt[3]{1/125}$, $\sqrt[4]{1/81}$, $\sqrt[3]{1}$, $\sqrt[5]{100000}$, $\sqrt[4]{0.0001}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F02 | V05

Q014 | WRITTEN

C06-K01-6-2-EX2

Perform the fifteen given calculations involving products, quotients, powers and sums of roots (including $\sqrt[3]{2}\sqrt[3]{4}$, $\sqrt[4]{27}\sqrt[4]{243}$, nested roots and the final three like-radical sums).

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F02 | V06

Q015 | WRITTEN

C06-K01-6-2-CH

Perform $\sqrt[3]{\sqrt[4]{4096}} \div \sqrt{\sqrt[6]{4096}}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V01

Q016 | WRITTEN

C06-K01-6-3-WU1

Express in the form a^r: $\sqrt{5}$, $\sqrt[5]{2^4}$, and $1/\sqrt[5]{3^3}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V02

Q017 | WRITTEN C06-K01-6-3-WU2

Find: $27^{2/3}$, $64^{-3/2}$, $(25/4)^{-3/2}$, and $[(16/9)^{-3/4}]^{2/3}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V03

Q018 | WRITTEN

C06-K01-6-3-TRY1

Express in the form a^r: $\sqrt{a}$, $\sqrt[4]{a^3}$, $\sqrt[6]{a^5}$, $\sqrt[3]{2^2}$, $1/\sqrt{a}$, $1/\sqrt[3]{a^2}$, and $1/\sqrt[4]{5^3}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V04

Q019 | WRITTEN

C06-K01-6-3-TRY2

Find $81^{3/4}$, $16^{-3/2}$, $(25/4)^{-3/2}$, and $[(27/125)^{1/2}]^{-4/3}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V05

Q020 | WRITTEN C06-K01-6-3-EX1

Express the nine given expressions in the form a^r, including roots of a and numerical bases 2, 3, 5.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V06

Q021 | WRITTEN

C06-K01-6-3-EX2

Evaluate the twelve given expressions with rational powers: $25^{3/2}$, $16^{3/4}$, $64^{2/3}$, $9^{-3/2}$, $125^{-2/3}$, $81^{-3/4}$, $(1/8)^{-1/3}$, $(125/8)^{-2/3}$, $(16/81)^{-3/4}$, $[(1/25)^{2/5}]^{-5/4}$, $[(81/100)^{-3/4}]^{2/3}$, $[(64/27)^{-4/3}]^{-1/2}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V07

Q022 | WRITTEN

C06-K01-6-3-CH

Simplify $\left[((1000/27)^{-2/3})^{7/15}\right]^{-15/14}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V08

Q023 | WRITTEN C06-K01-6-4-WU

Perform: (a) $2^{2/3}2^{1/2} \div 2^{7/6}$, (b) $6^{1/2}36^{1/4}$, (c) $\sqrt[3]{6}\sqrt{6}\sqrt[6]{6}$, (d) $\sqrt{2} \div \sqrt[6]{32} \times \sqrt[3]{16}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V09

Q024 | WRITTEN

C06-K01-6-4-TRY1

Perform: $5^{1/2}5^{1/3} \div 5^{-1/6}$, $4^{5/6}2^{4/3}$, $\sqrt{7}\sqrt[3]{7}\sqrt[6]{7}$, and $\sqrt[4]{27}\sqrt{27} \div \sqrt[4]{3}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V10

Q025 | WRITTEN

C06-K01-6-4-TRY2

For $a > 0,\ b > 0$, perform: $\sqrt{a^3} \div \sqrt[3]{a} \div \sqrt[6]{a^5}$ and $\sqrt[3]{a}\sqrt{ab} \div \sqrt[6]{a^2/b^3}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V11

Q026 | WRITTEN C06-K01-6-4-EX1

Perform the twelve numerical calculations in given Question 1, including rational powers of 2, 3 and 5 and mixed radical products/quotients.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V12

Q027 | WRITTEN

C06-K01-6-4-EX2

For $a > 0,\ b > 0$, simplify the six given expressions built from $\sqrt{a}$, $\sqrt[3]{a}$, $\sqrt[4]{a}$, $\sqrt[6]{a}$ and mixed a, b radicals.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F04 | V01

Q028 | WRITTEN C06-K01-6-4-CH

Simplify the ministry expression $\left(\dfrac{(243/32)^{-2/5}(9/4)^{-1}}{(125/64)^{1/3}(0.004)^{-1/2}}\right)^{-3/2}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F04 | V02

Q029 | WRITTEN C06-K01-6-4-REF

Assess the statement $\sqrt{a^2} = a$ for all real a, using positive and negative examples.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F01 | V01

Q030 | MCQ C06-K01-6-1-GM01

The value of 2^{-3} is:

A 8

B 1/8

C -8

D 1/6

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F01 | V01

Q031 | MCQ C06-K01-6-1-GM02

When multiplying equal bases, we:

A subtract exponents

B add exponents

C multiply bases only

D take reciprocals

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F01 | V01

Q032 | MCQ C06-K01-6-1-GM03

The expression $a^5 \div a^{-3}$ simplifies to:

A a^2

B a^8

C a^{-8}

D a^{15}

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F01 | V01

Q033 | MCQ C06-K01-6-1-GM04

A negative exponent means:

A multiply by -1

B take the reciprocal power

C set the base to zero

D add one

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F01 | V01

Q034 | MCQ C06-K01-6-1-GM05

The value of $(0.04)^{-2}$ is:

A 25

B 400

C 625

D 1600

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F01 | V01

Q035 | MCQ C06-K01-6-1-GM06

The exponent of a in $(a^{-2}b)^3(a^2b^{-1})^2$ is:

A -2

B -1

C 2

D 6

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F01 | V01

Q036 | MCQ

C06-K01-6-1-GM07

The positive-exponent form of the 6-1 challenge is:

A a^7b^6

B $1/(a^7b^6)$

C $a^{-7}b^{-6}$

D $1/(a^6b^7)$

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F01 | V01

Q037 | MCQ C06-K01-6-1-GM08

The value of $3^5 \div (3^{-2})^{-3} \times 3$ is:

A 1/3

B 1

C 3

D 9

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F02 | V01

Q038 | MCQ C06-K01-6-2-GM01

$\sqrt[3]{64}$ equals:

A 2

B 4

C 8

D 16

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F02 | V01

Q039 | MCQ C06-K01-6-2-GM02

$\sqrt[3]{12}\sqrt[3]{18}$ equals:

A 4

B 5

C 6

D 9

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F02 | V01

Q040 | MCQ C06-K01-6-2-GM03

The fourth root of 1/16 is:

A 1/2

B 1/4

C 2

D 4

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F02 | V01

Q041 | MCQ C06-K01-6-2-GM04

The result of $\sqrt[3]{54} - \sqrt[3]{16} + \sqrt[3]{2}$ is:

A $\sqrt[3]{2}$

B $2\sqrt[3]{2}$

C $3\sqrt[3]{2}$

D 0

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F02 | V01

Q042 | MCQ

C06-K01-6-2-GM05

$\sqrt[4]{625}$ equals:

A 4

B 5

C 5^2

D 25

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F02 | V01

Q043 | MCQ C06-K01-6-2-GM06

When combining roots with the same index, multiply:

A the indices

B the radicands

C the exponents only

D the signs only

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F02 | V01

Q044 | MCQ C06-K01-6-2-GM07

The roots challenge evaluates to:

A 0

B 1

C 2

D 4

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V01

Q045 | MCQ C06-K01-6-3-GM01

$\sqrt[5]{2^4}$ in rational-index form is:

A $2^{4/5}$

B $2^{5/4}$

C 2^9

D $4^{1/5}$

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V01

Q046 | MCQ C06-K01-6-3-GM02

The value of $27^{2/3}$ is:

A 3

B 6

C 9

D 18

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V01

Q047 | MCQ C06-K01-6-3-GM03

A reciprocal square root is written as:

A $a^{1/2}$

B $a^{-1/2}$

C a^{-2}

D a^{2}

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V01

Q048 | MCQ C06-K01-6-3-GM04

The value of $81^{-3/4}$ is:

A 27

B 1/9

C 1/27

D 1/81

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V01

Q049 | MCQ

C06-K01-6-3-GM05

The exponent of a in $\sqrt[4]{a^3}$ is:

A 3/4

B 4/3

C $-3/4$

D 3

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V01

Q050 | MCQ

C06-K01-6-3-GM06

The value of $[(64/27)^{-4/3}]^{-1/2}$ is:

A 4/9

B 9/4

C 16/9

D 27/64

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V01

Q051 | MCQ C06-K01-6-3-GM07

The 6-3 challenge simplifies to:

A 3/10

B 10/3

C 100/9

D 9/100

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V01

Q052 | MCQ C06-K01-6-4-GM01

$2^{2/3}2^{1/2} \div 2^{7/6}$ equals:

A 1/2

B 1

C 2

D 4

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V01

Q053 | MCQ C06-K01-6-4-GM02

$4^{5/6}2^{4/3}$ equals:

A 4

B 6

C 8

D 16

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V01

Q054 | MCQ

C06-K01-6-4-GM03

$\sqrt{a^3} \div \sqrt[3]{a} \div \sqrt[6]{a^5}$ equals:

A $a^{1/3}$

B $a^{2/3}$

C $a^{5/3}$

D a

WORKING AREA

FORMULA BANK

Zero / negative

$a^0 = 1 \quad a^{-n} = 1/a^n$

Integer laws

$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$

Roots

$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V01

Q055 | MCQ C06-K01-6-4-GM04

The numerical result of $\sqrt[3]{6}\sqrt{6}\sqrt[6]{6}$ is:

A 2

B 3

C 6

D 12

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V01

Q056 | MCQ

C06-K01-6-4-GM05

The given expression $\sqrt{a^3} \div \sqrt[3]{a} \div \sqrt[6]{a^5}$ tests:

A integer powers

B combining rational exponents

C logarithms

D trigonometry

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V01

Q057 | MCQ

C06-K01-6-4-GM06

The printed decimal in the 6-4 challenge is:

A 0.04

B 0.004

C 0.4

D 4

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F04 | V01

Q058 | MCQ C06-K01-6-4-GM07

For real a, $\sqrt{a^2}$ equals:

A a always

B $-a$ always

C $|a|$

D 0

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F01 | V01

Quiz M1 | QUIZ MCQ C06-K01-Q-M01

Which law gives $a^m a^n = a^{m+n}$?:

A same-base multiplication

B power of a power

C reciprocal law

D root product

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F02 | V01

Quiz M2 | QUIZ MCQ

C06-K01-Q-M02

The value of $\sqrt[3]{250}/\sqrt[3]{2}$ is:

A 2

B 5

C 10

D 125

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V01

Quiz M3 | QUIZ MCQ C06-K01-Q-M03

The value of $64^{-3/2}$ is:

A 512

B 1/64

C 1/512

D 64

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F04 | V01

Quiz M4 | QUIZ MCQ

C06-K01-Q-M04

For a negative real a, $\sqrt{a^2}$ is:

A a

B -a

C 0

D a^2

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F01 | V01

Quiz W1 | QUIZ WRITTEN C06-K01-Q-W01

Simplify $a^{-3}a^{7} \div a^{2}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^{0} = 1 \quad a^{-n} = 1/a^{n}$$

Integer laws

$$a^{m}a^{n} = a^{m+n} \quad a^{m}/a^{n} = a^{m-n}$$

Roots

$$\sqrt[n]{a^{m}} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^{m}}$$

Sign control

$$\sqrt{a^{2}} = |a|$$

Concept 1 | Laws of Exponents and Roots

F02 | V01

Quiz W2 | QUIZ WRITTEN C06-K01-Q-W02

Simplify $\sqrt[3]{54} - \sqrt[3]{16} + \sqrt[3]{2}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F03 | V01

Quiz W3 | QUIZ WRITTEN C06-K01-Q-W03

Evaluate $125^{-2/3}$.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m/a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

Concept 1 | Laws of Exponents and Roots

F04 | V01

Quiz W4 | QUIZ WRITTEN C06-K01-Q-W04

Explain why $\sqrt{a^2} = a$ is not true for every real a.

WORKING AREA

FORMULA BANK

Zero / negative

$$a^0 = 1 \quad a^{-n} = 1/a^n$$

Integer laws

$$a^m a^n = a^{m+n} \quad a^m / a^n = a^{m-n}$$

Roots

$$\sqrt[n]{a^m} = a^{m/n} \quad \sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

Rational indices

$$a^{m/n} = \sqrt[n]{a^m}$$

Sign control

$$\sqrt{a^2} = |a|$$

EGYPTIAN BACCALAUREATE • 2026

MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 06

Exponents and Logarithms

1 Concept | 50 questions

B5 Landscape | one question per teaching page

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Chapter 06 | Exponents and Logarithms

CLASSROOM ROUTE

Concept 2 | Exponential Functions and Their Applications

50 questions

Official lessons: 6-5, 6-6, 6-7, 6-8, 6-9

Formula Bank changes at each Concept boundary.

Concept 2 | Exponential Functions and Their Applications — **OFFICIAL LESSONS 6-5, 6-6, 6-7, 6-8, 6-9**

Exponential Functions and Their Applications

Equation-first recall | use the same rail beside every question in this Concept

Graph

$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay

$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude

$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base

$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema

$t = a^x$ t-range from x-domain

Start with the family cue, write the first move, then use the working grid.

Concept 2 | Exponential Functions and Their Applications

F01 | V01

Q001 | WRITTEN C06-K02-6-5-WU

Draw the graphs of $y = 3^x$ and $y = (1/3)^x$, using the points $x = -1,\ 0,\ 1$.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 :\ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F01 | V02

Q002 | WRITTEN

C06-K02-6-5-TRY

Draw $y = 2^x$ and $y = (1/2)^x$.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F01 | V03

Q003 | WRITTEN

C06-K02-6-5-EX

Draw the six given graphs $y = 4^x$, $y = 10^x$, $y = (2/3)^x$, $y = (1/4)^x$, $y = (1/10)^x$, $y = (3/2)^x$.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F01 | V04

Q004 | WRITTEN C06-K02-6-5-CH

Draw $y = \pi^x$ for $-1 \le x \le 2$, marking the key points.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F02 | V01

Q005 | WRITTEN C06-K02-6-6-WU

Order the given sets 0.7^{-3}, 0.7^{-1}, 0.7^{2} and 5/8, 5/64, 6/16 using inequality signs.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F02 | V02

Q006 | WRITTEN

C06-K02-6-6-TRY

Order the three displayed Try sets: $5^0,\ 5^{-4},\ 5^{3/2}$; $(1/3)^7,\ (1/3)^2,\ (1/3)^{-5}$; and $3^0,\ 3^2,\ 3^{-2}$.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 :\ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F02 | V03

Q007 | WRITTEN C06-K02-6-6-EX1

Order the given sets with bases 3, 2, 3/2, 7, 0.9, and 0.1, including the radical/fraction forms shown in the lesson.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

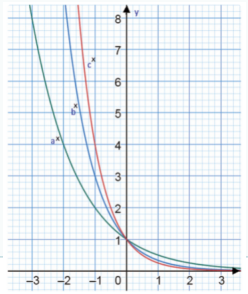
Concept 2 | Exponential Functions and Their Applications

F02 | V04

Q008 | WRITTEN

C06-K02-6-6-CH

Order $(\sqrt{2})^5$, $(\sqrt[3]{4})^3$, $(\sqrt[4]{8})^2$, then use the opposite graph to compare the labelled values a, b, c.



WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F03 | V01

Q009 | WRITTEN C06-K02-6-7-WU

Solve the six Warm Up items: $4^{x-1} = 8^{x+3}$, $3^x = 81$, $7^x = 7$, $2^{2x-1} \geq 1/2$, $(1/27)^x < (1/3)^{x+4}$, and $8 \geq 2^{2x-1}$.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F03 | V02

Q010 | WRITTEN

C06-K02-6-7-TRY

Solve the eight Try equations/inequalities displayed in lesson 6-7, including $9^x = 243$, $3^{2x+1} = 125$, $2^{3x} \leq 9^{x+1}$, and the reciprocal-base inequalities.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F03 | V03

Q011 | WRITTEN C06-K02-6-7-EX

Solve all 24 given equations and inequalities in Exercise (a)–(x), including the 2, 3, 4, 5, 8, 9, 25, 27, 32, 64, 81, 125 common-base forms.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F03 | V04

Q012 | WRITTEN C06-K02-6-7-CH

A food-safety model requires $4^{x^2-x} > 16$. Find when the batch becomes unsafe.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F03 | V05

Q013 | WRITTEN

C06-K02-6-8-WU

Solve $4^x - 3 \cdot 2^x - 16 = 0$ and $8 \cdot 3^{-2x+1} - 3^{-x} \leq 0$ by substitution.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F03 | V06

Q014 | WRITTEN C06-K02-6-8-TRY

Solve the four Try items in lesson 6-8: two quadratic equations and two inequalities in powers of 2 and 3.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F03 | V07

Q015 | WRITTEN C06-K02-6-8-EX

Solve the twelve given items (a)–(l), each reducible to a quadratic in 2^x or 3^x.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F03 | V08

Q016 | WRITTEN

C06-K02-6-8-CH

Solve completely for real x: $(1/4)^{x^2-2x} - 5(1/2)^{x^2-2x} + 4 \leq 0$.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F04 | V01

Q017 | WRITTEN C06-K02-6-9-WU

For $-1 \leq x \leq 3$, find the maximum and minimum of $y = 2^{2x} - 4 \cdot 2^{x}$, with the corresponding x-values.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F04 | V02

Q018 | WRITTEN C06-K02-6-9-TRY

For $-1 \leq x \leq 2$, find the maximum and minimum of $y = -9 + 2 \cdot 3^x + 3^{2x}$, with the corresponding x-values.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F04 | V03

Q019 | WRITTEN C06-K02-6-9-EX

Solve the three given extrema models: $-3 \le x \le 2,\ y = 2\cdot 9^x - 12\cdot 3^x + 7; -1 \le x \le 3,\ y = -4 + 2^{2x} - 3^{x+2}$; and the third displayed interval/model.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 :\ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F04 | V04

Q020 | WRITTEN C06-K02-6-9-CH

For $-1 \le x \le 2$, optimise $y = 2 \cdot 4^x - 2^{x+2} + 11$.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F04 | V05

Q021 | WRITTEN C06-K02-6-9-REF

For $f(x) = a^x$, $g(x) = (1/a)^x$ with $a > 1$, analyse $h(x) = f(x) + g(x)$.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F01 | V01

Q022 | MCQ C06-K02-6-5-GM01

Which base gives a strictly decreasing exponential graph?:

A 2

B 3

C 1/2

D π

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F01 | V01

Q023 | MCQ

C06-K02-6-5-GM02

The horizontal asymptote of $y = a^x$ is:

A $x = 0$

B $y = 0$

C $y = 1$

D $x = 1$

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F01 | V01

Q024 | MCQ C06-K02-6-5-GM03

The range of $y = 5^x$ is:

A $\mathbb{R}$

B $[0, \infty)$

C $(0, \infty)$

D $(-\infty, 0)$

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F01 | V01

Q025 | MCQ C06-K02-6-5-GM04

For $y = \pi^x$ on $[-1,\ 2]$, which point is on the graph?:

A $(0, \pi)$

B $(1, \pi)$

C $(2, \pi)$

D $(-1, \pi)$

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 :\ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F02 | V01

Q026 | MCQ

C06-K02-6-6-GM01

For $0 < a < 1$ and $r < s$, which is true?:

A $a^r < a^s$

B $a^r > a^s$

C $a^r = a^s$

D Cannot compare

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F02 | V01

Q027 | MCQ C06-K02-6-6-GM02

The first step when bases differ is to:

A add exponents

B make the bases equal

C take logarithms immediately

D ignore the base

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F02 | V01

Q028 | MCQ

C06-K02-6-6-GM03

Which is largest? 3^{-2}, 3^{0}, 3^{2}:

A 3^{-2}

B 3^{0}

C 3^{2}

D They are equal

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F02 | V01

Q029 | MCQ

C06-K02-6-6-GM04

The challenge term $(\sqrt[3]{4})^3$ equals:

A $2^{3/2}$

B 2^2

C 2^3

D 4^3

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F03 | V01

Q030 | MCQ C06-K02-6-7-GM01

Solving $4^{x-1} = 8^{x+3}$ gives:

A $x = -11$

B $x = -3$

C $x = 3$

D $x = 11$

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F03 | V01

Q031 | MCQ C06-K02-6-7-GM02

For $0 < a < 1$, an exponential inequality requires:

A the same exponent order

B a reversed exponent order

C no base conversion

D squaring both sides

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F03 | V01

Q032 | MCQ

C06-K02-6-7-GM03

The solution of $3^x = 81$ is:

A 2

B 3

C 4

D 5

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F03 | V01

Q033 | MCQ

C06-K02-6-7-GM04

The food-safety condition $4^{x^2-x} > 16$ is unsafe for physical time when:

A $0 \le x \le 2$

B $x > 2$

C $x < -1$

D $x < 2$

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F03 | V01

Q034 | MCQ

C06-K02-6-8-GM05

In substitution methods, $t = a^x$ must satisfy:

A $t < 0$

B $t = 0$

C $t > 0$

D $t \in \mathbb{R}$

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F03 | V01

Q035 | MCQ

C06-K02-6-8-GM06

The positive root of $t^2 - 3t - 16 = 0$ is:

A $(3 - \sqrt{73})/2$

B $(3 + \sqrt{73})/2$

C 8

D 16

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F03 | V01

Q036 | MCQ C06-K02-6-8-GM07

The challenge quadratic in t is:

A $t^2 + 5t + 4$

B $t^2 - 5t + 4$

C $t^2 - 4t + 5$

D $t^2 + 4t - 5$

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F03 | V01

Q037 | MCQ

C06-K02-6-8-GM08

After solving an exponential quadratic, reject roots with:

A $t > 1$

B $t = 1$

C $t \leq 0$

D $t < 4$

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F04 | V01

Q038 | MCQ

C06-K02-6-9-GM01

For extrema, the first required range is the range of:

A x

B $t = a^x$

C a

D y only

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F04 | V01

Q039 | MCQ

C06-K02-6-9-GM02

The minimum of $y = t^2 - 4t$ at $t = 2$ is:

A -8

B -4

C 0

D 4

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F04 | V01

Q040 | MCQ

C06-K02-6-9-GM03

The C06-K02 challenge has minimum value:

A 9 at $x = 0$

B 9 at $x = 2$

C 27 at $x = 0$

D 27 at $x = 2$

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F04 | V01

Q041 | MCQ C06-K02-6-9-GM04

The global minimum of $a^x + a^{-x}$ for $a > 1$ is:

A 0

B 1

C 2

D It has no minimum

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F04 | V01

Q042 | MCQ

C06-K02-6-9-GM05

At which value of x does $a^x + a^{-x}$ attain its minimum?:

A $x = -1$

B $x = 0$

C $x = 1$

D It has no stationary point

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F01 | V01

Quiz M1 | QUIZ MCQ C06-K02-Q-M01

Which statement about $y = a^x$ is always true for $a > 0,\ a \neq 1$?:

A range $(0, \infty)$

B range all reals

C vertical asymptote

D decreasing for every a

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 :\ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F02 | V01

Quiz M2 | QUIZ MCQ C06-K02-Q-M02

For base 0.5, increasing the exponent makes the value:

A larger

B smaller

C unchanged

D zero

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F03 | V01

Quiz M3 | QUIZ MCQ

C06-K02-Q-M03

The positive-substitution condition is:

A t<0

B t=0

C t>0

D t can be any real

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 :\ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F04 | V01

Quiz M4 | QUIZ MCQ C06-K02-Q-M04

For $y = 2(t-1)^2 + 9$, the minimum is:

A 0

B 1

C 9

D 11

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F01 | V01

Quiz W1 | QUIZ WRITTEN C06-K02-Q-W01

Sketch $y = (1/4)^x$ and state its domain, range, and asymptote.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F02 | V01

Quiz W2 | QUIZ WRITTEN C06-K02-Q-W02

Order $2^{-3},\ 2^{0},\ 2^{5/2}$.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 :\ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F03 | V01

Quiz W3 | QUIZ WRITTEN C06-K02-Q-W03

Solve $4^x - 5 \cdot 2^x + 4 = 0$.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

Concept 2 | Exponential Functions and Their Applications

F04 | V01

Quiz W4 | QUIZ WRITTEN C06-K02-Q-W04

Find the minimum of $a^x + a^{-x}$ for $a > 1$.

WORKING AREA

FORMULA BANK

Graph
$y = a^x \quad a > 0,\ a \neq 1$

Growth / decay
$a > 1 \Rightarrow \nearrow \quad 0 < a < 1 \Rightarrow \searrow$

Magnitude
$a > 1 : \ r < s \Rightarrow a^r < a^s$

Common base
$a^u = a^v \Rightarrow u = v \quad t = a^x > 0$

Extrema
$t = a^x$ t-range from x-domain

EGYPTIAN BACCALAUREATE • 2026

MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 06

Exponents and Logarithms

1 Concept | 74 questions

B5 Landscape | one question per teaching page

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Chapter 06 | Exponents and Logarithms

CLASSROOM ROUTE

Concept 3 | Introduction to Logarithms and Their Properties

74 questions

Official lessons: 6-10, 6-11, 6-12, 6-13, 6-14, 6-15, 6-16, 6-17

Formula Bank changes at each Concept boundary.

Concept 3 | Introduction to Logarithms and Their Properties OFFICIAL LESSONS 6-10, 6-11, 6-12, 6-13, 6-14, 6-15, 6-16, 6-17

Introduction to Logarithms and Their Properties

Equation-first recall | use the same rail beside every question in this Concept

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Start with the family cue, write the first move, then use the working grid.

Concept 3 | Introduction to Logarithms and Their Properties

F01 | V01

Q001 | WRITTEN

C06-K03-6-10-WU

Convert the given forms $2^5 = 32$ and $\log_3 9 = 2$ to the opposite notation.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F01 | V02

Q002 | WRITTEN

C06-K03-6-10-TRY

Convert $2^6 = 64$, $4^{-2} = 1/16$, and the two remaining Try expressions into logarithmic or exponential form.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F01 | V03

Q003 | WRITTEN

C06-K03-6-10-EX

Convert all Exercise items (a)+(l): the first six exponential statements to logarithms and the last six logarithmic statements to exponentials.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F01 | V04

Q004 | WRITTEN

C06-K03-6-10-CH

If $\log_5 25 = x$, evaluate $\log_{1/2} x$ without a calculator.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F01 | V05

Q005 | WRITTEN

C06-K03-6-11-WU

Find the six direct logarithmic values shown in Warm Up, including $\log_{10} 1$, $\log_5 5$, $\log_2 8$, $\log_2 16$, $\log_5(1/5)$, $\log_7(49^{3/2})$.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F01 | V06

Q006 | WRITTEN

C06-K03-6-11-TRY

Find the six Try values $\log_5 1,\ \log_3 3,\ \log_4 4,\ \log_3 27,\ \log_2(1/4),\ \log_5(1/125)$.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F01 | V07

Q007 | WRITTEN C06-K03-6-11-EX

Find all 18 Exercise values (a)+(r), including reciprocal arguments and fractional powers.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F01 | V08

Q008 | WRITTEN

C06-K03-6-11-CH

Put the printed logarithmic product $\log_{a^3}(a^2)$ into simplest form.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F02 | V01

Q009 | WRITTEN

C06-K03-6-12-WU

Perform $\log_6 2 + \log_6 3$ and $\log_2 30 - \log_2 3 - \log_2 5$.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F02 | V02

Q010 | WRITTEN

C06-K03-6-12-TRY

Perform the six Try calculations using product, quotient, and power laws, including $4\log_5 3 - 2\log_5 15 - \log_5 45$.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F02 | V03

Q011 | WRITTEN C06-K03-6-12-EX

Perform all 18 given expressions (a)+(r), combining same-base logarithms exactly.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F02 | V04

Q012 | WRITTEN

C06-K03-6-12-CH

Simplify the fractional expression $\log_5 75 + 3\log_5 \sqrt{2} - 2\log_5 \sqrt{6}$ to one reduced fraction.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F02 | V05

Q013 | WRITTEN

C06-K03-6-15-WU

Given $\log_{10} 2 = a$ and $\log_{10} 3 = b$, express $\log_{10} 24$, $\log_{10}(27/4)$, $\log_{10} 45$, $\log_{10}(24/75)$ in terms of a, b.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F02 | V06

Q014 | WRITTEN

C06-K03-6-15-TRY

Given $\log_{10} 2 = a$, $\log_{10} 3 = b$, express the four Try arguments 72, $3^8/10$, 15, 12 in terms of a, b.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F02 | V07

Q015 | WRITTEN

C06-K03-6-15-EX

Express all 12 Exercise logarithms in terms of $a = \log_{10} 2$ and $b = \log_{10} 3$, including fractions and reciprocal arguments.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F02 | V08

Q016 | WRITTEN

C06-K03-6-15-CH

If $\log_c 3 = x$, $\log_c 2 = y$, write $\log_c 12$, $\log_c(3/8)$, $\log_c \sqrt{6}$, $\log_2 3$, $\log_{3^b}(2^b c)$ in terms of x, y.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0$ $\log_a a = 1$ $\log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N$ $\log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1$:↗ $0 < a < 1$:↘ $x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V01

Q017 | WRITTEN

C06-K03-6-13-WU

Find $\log_{16} 64$ and $\log_5(1/125)$ by changing to bases 2 and 5.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V02

Q018 | WRITTEN

C06-K03-6-13-TRY

Evaluate the five Try logarithms using a suitable common base.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V03

Q019 | WRITTEN

C06-K03-6-13-EX

Find all 15 Exercise values using change of base, including the mixed-base and fractional-argument items.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V04

Q020 | WRITTEN

C06-K03-6-13-CH

Find $\log_9(\sqrt{3}/4\sqrt{2})$ exactly.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V05

Q021 | WRITTEN

C06-K03-6-14-WU

Solve the three warm-up expressions using a common base, including $\log_4 16 \cdot \log_9 3$.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V06

Q022 | WRITTEN

C06-K03-6-14-TRY

Solve the four Try products of logarithms after making the bases the same.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V07

Q023 | WRITTEN C06-K03-6-14-EX

Simplify all 15 Exercise products and sums of logarithms by common-base conversion.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V08

Q024 | WRITTEN

C06-K03-6-14-CH

Simplify $\log_x(\sqrt{y})\ \log_{y^2}(z^3)\ \log_{\sqrt{z}}(x^4)$ for $x > 1$.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V09

Q025 | WRITTEN

C06-K03-6-14-REF

Compare $f(x) = \log_4(x^2)$ and $g(x) = 2\log_4 x$ across the real line.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F04 | V01

Q026 | WRITTEN C06-K03-6-16-WU

Draw $y = \log_4 x$, state its positional relationship with $y = 4^x$, and draw $y = \log_{1/4} x$.

WORKING AREA

FORMULA BANK

Definition
$a^p = M \iff \log_a M = p$

Values
$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws
$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base
$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs
$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F04 | V02

Q027 | WRITTEN

C06-K03-6-16-TRY

State graph relationships and draw the three Try logarithmic functions with bases 2, 5, and 1/3.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F04 | V03

Q028 | WRITTEN C06-K03-6-16-EX

Complete both Exercise groups: state positional relationships and draw the six requested logarithmic graphs.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F04 | V04

Q029 | WRITTEN

C06-K03-6-16-CH

For $f(x) = \log_5(x-2) + 1$ and $g(x) = 5^{x-1} + 2$, state their exact geometric relationship and line of symmetry.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F04 | V05

Q030 | WRITTEN

C06-K03-6-17-WU

Order the displayed logarithmic sets, including $\log_2 3$, $\log_2 5$, $2\log_2(1/2)$, $\log_{1/2} 3$, $\log_{1/2} 5$.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F04 | V06

Q031 | WRITTEN C06-K03-6-17-TRY

Order the four Try sets of logarithms using monotonicity and change of base.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F04 | V07

Q032 | WRITTEN C06-K03-6-17-EX

Order all 12 Exercise sets (a)+(l), including negative coefficients and reciprocal bases.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F04 | V08

Q033 | WRITTEN

C06-K03-6-17-CH

If $\log_c(3^2/2) = x$ and $\log_c(9) = y$, write the relation between x and y for $0 < c < 1$ and $c > 1$.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F01 | V01

Q034 | MCQ

C06-K03-6-10-GM01

$\log_2 32$ equals:

A 2

B 4

C 5

D 32

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F01 | V01

Q035 | MCQ

C06-K03-6-10-GM02

$\log_{1/2} 2$ equals:

A -2

B -1

C 1

D 2

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F01 | V01

Q036 | MCQ

C06-K03-6-11-GM03

$\log_5(1/125)$ equals:

A -3

B -2

C 2

D 3

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F01 | V01

Q037 | MCQ

C06-K03-6-11-GM04

$\log_7 49^{3/2}$ equals:

A 1

B 2

C 3/2

D 7/2

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F02 | V01

Q038 | MCQ

C06-K03-6-12-GM01

$\log_a M + \log_a N$ equals:

A $\log_a(M+N)$

B $\log_a(MN)$

C $\log_a(M/N)$

D $\log_a(M-N)$

WORKING AREA

FORMULA BANK

Definition

$a^p = M \iff \log_a M = p$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F02 | V01

Q039 | MCQ

C06-K03-6-12-GM02

The coefficient $3\log_5 2$ becomes:

A $\log_5(2+3)$

B $\log_5 2^3$

C $\log_5(3^2)$

D $3^2 \log_5 2$

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F02 | V01

Q040 | MCQ

C06-K03-6-15-GM03

If $a = \log_{10} 2$ and $b = \log_{10} 3$, $\log_{10} 24$ is:

A $a + b$

B $2a + 3b$

C $3a + b$

D $3a + 2b$

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F02 | V01

Q041 | MCQ

C06-K03-6-15-GM04

$\log_c \sqrt{6}$ in terms of $x = \log_c 3$, $y = \log_c 2$ is:

A $x + y$

B $(x + y)/2$

C $2x + y$

D $x + 2y$

WORKING AREA

FORMULA BANK

Definition

$a^p = M \iff \log_a M = p$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V01

Q042 | MCQ

C06-K03-6-13-GM01

$\log_{16} 64$ equals:

A 1/2

B 3/2

C 2

D 4

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V01

Q043 | MCQ

C06-K03-6-13-GM02

Change of base gives $\log_a b =$:

A $\log_c a / \log_c b$

B $\log_c b / \log_c a$

C $\log_a b / \log_c b$

D $\log_c a \log_c b$

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V01

Q044 | MCQ

C06-K03-6-14-GM03

$\log_4 16 \cdot \log_9 3$ equals:

A 1/2

B 1

C 2

D 4

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V01

Q045 | MCQ

C06-K03-6-14-GM04

The challenge product of three logarithms equals:

A 6

B 8

C 12

D 24

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F04 | V01

Q046 | MCQ

C06-K03-6-16-GM01

The domain of $y = \log_a x$ is:

A all real x

B $x \geq 0$

C $x > 0$

D $x \neq 0$

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F04 | V01

Q047 | MCQ

C06-K03-6-16-GM02

The graph of $y = \log_a x$ is symmetric with $y = a^x$ about:

A $x = 0$

B $y = 0$

C $y = x$

D $y = -x$

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F04 | V01

Q048 | MCQ

C06-K03-6-17-GM03

For $a > 1$ and $M < N$, which is true?:

A $\log_a M > \log_a N$

B $\log_a M < \log_a N$

C They are equal

D Cannot compare

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F04 | V01

Q049 | MCQ

C06-K03-6-17-GM04

For $0 < a < 1$ and $M < N$, which is true?:

A $\log_a M > \log_a N$

B $\log_a M < \log_a N$

C They are equal

D Both are positive

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F04 | V01

Q050 | MCQ

C06-K03-6-16-GM05

The vertical asymptote of $y = \log_a x$ is:

A $x = 0$

B $y = 0$

C $x = 1$

D $y = 1$

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F04 | V01

Q051 | MCQ

C06-K03-6-17-GM06

A negative coefficient $-2\log_a M$ can be written as:

A $\log_a M^{-2}$

B $\log_a(-2M)$

C $\log_a(M-2)$

D $2\log_a M$

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F01 | V01

Q052 | MCQ

C06-K03-6-10-GM05

The base of $\log_a M$ is:

A M

B a

C p

D $1/a$

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F01 | V01

Q053 | MCQ

C06-K03-6-10-GM06

The argument of $\log_a M$ is:

A a

B M

C p

D 0

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F01 | V01

Q054 | MCQ

C06-K03-6-11-GM07

$\log_2(1/8)$ equals:

A -3

B -2

C 2

D 3

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F01 | V01

Q055 | MCQ

C06-K03-6-11-GM08

$\log_4 4$ equals:

A 0

B 1

C 2

D 4

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F01 | V01

Q056 | MCQ

C06-K03-6-11-GM09

$\log_3 1$ equals:

A -1

B 0

C 1

D 3

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F02 | V01

Q057 | MCQ

C06-K03-6-12-GM05

$\log_a M - \log_a N$ equals:

A $\log_a(MN)$

B $\log_a(M/N)$

C $\log_a(M-N)$

D $\log_a(N/M)$

WORKING AREA

FORMULA BANK

Definition

$a^p = M \iff \log_a M = p$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F02 | V01

Q058 | MCQ

C06-K03-6-12-GM06

$2\log_3 5$ equals:

A $\log_3 10$

B $\log_3 25$

C $\log_3 7$

D $\log_3(5/2)$

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F02 | V01

Q059 | MCQ

C06-K03-6-15-GM07

If $a = \log_{10} 2,\ b = \log_{10} 3$, $\log_{10} 12$ is:

A $a + b$

B $2a + b$

C $a + 2b$

D $2a + 2b$

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F02 | V01

Q060 | MCQ

C06-K03-6-15-GM08

$\log_{10} 5$ in terms of $a = \log_{10} 2$ is:

A a

B $1 - a$

C $1 + a$

D $-a$

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V01

Q061 | MCQ

C06-K03-6-13-GM05

$\log_8 32$ equals:

A 2/3

B 3/2

C 5/3

D 3

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V01

Q062 | MCQ

C06-K03-6-13-GM06

$\log_{25} 125$ equals:

A 1/2

B 3/2

C 2

D 5/2

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V01

Q063 | MCQ

C06-K03-6-14-GM05

$\log_a b \cdot \log_b a$ equals:

A 0

B 1

C 2

D $\log_a b$

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V01

Q064 | MCQ C06-K03-6-14-GM06

$\log_2 8 \cdot \log_8 2$ equals:

A 1/3

B 1

C 3

D 8

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V01

Q065 | MCQ

C06-K03-6-14-GM07

The best common base for 16 and 64 is:

A 2

B 4

C 8

D 10

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F04 | V01

Q066 | MCQ

C06-K03-6-16-GM07

The range of $y = \log_a x$ is:

A $x > 0$

B $\mathbb{R}$

C $[0, \infty)$

D $y > 0$

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F01 | V01

Quiz M1 | QUIZ MCQ C06-K03-Q-M01

The logarithmic equivalent of $a^p = M$ is:

A $\log_a M = p$

B $\log_p M = a$

C $\log_M a = p$

D $\log_a p = M$

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0$ $\log_a a = 1$ $\log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N$ $\log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow$ $0 < a < 1 : \searrow$ $x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F02 | V01

Quiz M2 | QUIZ MCQ C06-K03-Q-M02

$\log_2 8 + \log_2 4$ equals:

A 2

B 3

C 5

D 12

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V01

Quiz M3 | QUIZ MCQ

C06-K03-Q-M03

$\log_{16} 64$ equals:

A 1/2

B 3/2

C 2

D 4

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F04 | V01

Quiz M4 | QUIZ MCQ

C06-K03-Q-M04

For $a > 1$, $M < N$ implies:

A $\log_a M > \log_a N$

B $\log_a M < \log_a N$

C equality

D no relation

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F01 | V01

Quiz W1 | QUIZ WRITTEN C06-K03-Q-W01

Find $\log_3(1/27)$.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$$

Laws

$$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F02 | V01

Quiz W2 | QUIZ WRITTEN C06-K03-Q-W02

Simplify $\log_5 25 + \log_5 5$.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F03 | V01

Quiz W3 | QUIZ WRITTEN C06-K03-Q-W03

Find $\log_{16} 64$ using change of base.

WORKING AREA

FORMULA BANK

Definition

$$a^p = M \iff \log_a M = p$$

Values

$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws

$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs

$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

Concept 3 | Introduction to Logarithms and Their Properties

F04 | V01

Quiz W4 | QUIZ WRITTEN C06-K03-Q-W04

State the domain and range of $y = \log_a x$.

WORKING AREA

FORMULA BANK

Definition
$a^p = M \iff \log_a M = p$

Values
$\log_a 1 = 0 \quad \log_a a = 1 \quad \log_a(a^p) = p$

Laws
$\log_a(MN) = \log_a M + \log_a N \quad \log_a(M/N) = \log_a M - \log_a N$

Change base
$$\log_a b = \frac{\log_c b}{\log_c a}$$

Graphs
$a > 1 : \nearrow \quad 0 < a < 1 : \searrow \quad x = 0$

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MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 06

Exponents and Logarithms

1 Concepts | 48 questions

B5 Landscape | one question per teaching page

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Chapter 06 | Exponents and Logarithms

CLASSROOM ROUTE

Concept 4 | Applications of Logarithms

48 questions

Official lessons: 6-18, 6-19, 6-20, 6-21, 6-22

The Formula Bank changes at each Concept boundary.

Concept 4 | Applications of Logarithms — **OFFICIAL LESSONS 6-18, 6-19, 6-20, 6-21, 6-22**

Applications of Logarithms

Equation-first recall | use the same rail beside every question in this Concept

Log equations

$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities

$a > 1 : \ M < N \qquad 0 < a < 1 : \ M > N$

Substitution

$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema

$t = \log_a x$ t**-range from the** x**-domain**

Common log

$n - 1 < \log_{10} N < n \Rightarrow n$ **digits**

Start with the family cue, write the first move, then use the working grid.

Concept 4 | Applications of Logarithms

F01 | V01

Q001 | WRITTEN

C06-K04-6-18-WU

Solve $\log_2 x = 4$.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F01 | V02

Q002 | WRITTEN

C06-K04-6-18-TRY

Solve $\log_2(2x-1) = \log_2 3$.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F01 | V03

Q003 | WRITTEN C06-K04-6-18-EX

Solve all 12 given logarithmic equations, including same-base, product, quotient, and shifted-argument forms.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F01 | V04

Q004 | WRITTEN

C06-K04-6-18-CH

Solve $\log_3(x+2) - \log_9((x-2)^2) = 1$ completely.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F02 | V01

Q005 | WRITTEN

C06-K04-6-19-WU

Solve $\log_3 x < \log_3 81$ and $\log_{1/2}(x+2) + \log_{1/2}(x-5) > -3$.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F02 | V02

Q006 | WRITTEN

C06-K04-6-19-TRY

Solve the six given logarithmic inequalities using base monotonicity and argument conditions.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F02 | V03

Q007 | WRITTEN

C06-K04-6-19-EX

Solve all 24 given logarithmic inequalities, including shifted arguments, coefficients, and rational arguments.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F02 | V04

Q008 | WRITTEN

C06-K04-6-19-CH

Solve the given challenge inequality involving a reciprocal-base logarithmic sum and state the complete interval.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F03 | V01

Q009 | WRITTEN

C06-K04-6-20-WU

Solve $5(\log_2 x)^2 - 16\log_2 x + 3 < 0$.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F03 | V02

Q010 | WRITTEN

C06-K04-6-20-TRY

Solve the three given substitution problems: two quadratic logarithmic inequalities/equations and one exponential-log value.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F03 | V03

Q011 | WRITTEN C06-K04-6-20-EX

Solve the given groups: three equations, three inequalities, and three exact logarithmic values.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F03 | V04

Q012 | WRITTEN

C06-K04-6-20-CH

Solve $(\log_3 x)^2 - \log_3 x - 6 < 0$ for the positive wave-intensity multiplier x.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F04 | V01

Q013 | WRITTEN

C06-K04-6-21-WU

For $y = -(\log_3 x)^2 + 4\log_3 x + 3$, $1 \le x \le 27$, find maximum/minimum values and the corresponding x.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F04 | V02

Q014 | WRITTEN

C06-K04-6-21-TRY

Find the maximum and minimum of the given logarithmic quadratic on its stated interval, with the corresponding values of x.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F04 | V03

Q015 | WRITTEN C06-K04-6-21-EX

Solve the three given extrema problems, each with a different base and interval.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F04 | V04

Q016 | WRITTEN

C06-K04-6-21-CH

For $y = -(\log_2 x)^2 + 2\log_2 x + 4$, $1 \le x \le 8$, find the maximum and minimum health ratings and their concentrations.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F04 | V05

Q017 | WRITTEN

C06-K04-6-22-WU

Using $\log_{10} 2 = 0.3010$ and $\log_{10} 3 = 0.4771$, determine the digits of 6^{30} and the first non-zero decimal place of $(2/3)^{50}$.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F04 | V06

Q018 | WRITTEN

C06-K04-6-22-EX

Complete the given digit-count and first-non-zero-decimal-place sets for the displayed powers and fractions.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F04 | V07

Q019 | WRITTEN

C06-K04-6-22-CH

Using the printed common logs, determine the number of digits and the leading digit of 12^{50}.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F04 | V08

Q020 | WRITTEN

C06-K04-6-22-REF

Solve $\log_x(x+2) \leq \log_x(4-x)$ for all real x.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F01 | C06-K04-F01-VMCQ

Q021 | MCQ

C06-K04-6-18-GM01

The argument condition for $\log_3(x-5)$ is:

A x<5

B $x \geq 5$

C x>5

D all real x

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F01 | C06-K04-F01-VMCQ

Q022 | MCQ

C06-K04-6-18-GM02

If $\log_2(2x-1) = \log_2 3$, then $x =$:

A 1

B 2

C 3

D 4

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F01 | C06-K04-F01-VMCQ

Q023 | MCQ C06-K04-6-18-GM03

The valid solution of the challenge equation is:

A 1

B 2

C 4

D 8

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F01 | C06-K04-F01-VMCQ

Q024 | MCQ

C06-K04-6-18-GM04

For same-base logarithms, equality of logs gives:

A arguments equal

B bases equal

C arguments add

D no result

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F02 | C06-K04-F02-VMCQ

Q025 | MCQ

C06-K04-6-19-GM05

For base $a > 1$, $\log_a M < \log_a N$ means:

A M>N

B M<N

C M=N

D MN<0

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F02 | C06-K04-F02-VMCQ

Q026 | MCQ

C06-K04-6-19-GM06

For base $0 < a < 1$, the inequality direction is:

A preserved

B reversed

C removed

D squared

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F02 | C06-K04-F02-VMCQ

Q027 | MCQ

C06-K04-6-19-GM07

The domain of $\log_{1/2}(x-5)$ requires:

A x<5

B $x \leq 5$

C x>5

D $x \neq 5$

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1: \ M < N \qquad 0 < a < 1: \ M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F02 | C06-K04-F02-VMCQ

Q028 | MCQ

C06-K04-6-19-GM08

The warm-up intersection is:

A 0<x<5

B 5<x<6

C x>6

D -3<x<6

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F03 | C06-K04-F03-VMCQ

Q029 | MCQ

C06-K04-6-20-GM09

The best substitution for a quadratic logarithmic equation is:

A $t = x^2$

B $t = \log_a x$

C $t = a^x$

D t=1/x

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F03 | C06-K04-F03-VMCQ

Q030 | MCQ

C06-K04-6-20-GM10

The inequality $5t^2 - 16t + 3 < 0$ gives:

A t<1/5

B 1/5<t<3

C t>3

D 0<t<1

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F03 | C06-K04-F03-VMCQ

Q031 | MCQ

C06-K04-6-20-GM11

The substitution variable must satisfy:

A t>0

B $t \in \mathbb{R}$

C t<0

D t=1

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F03 | C06-K04-F03-VMCQ

Q032 | MCQ

C06-K04-6-20-GM12

The challenge interval for $(\log_3 x)^2 - \log_3 x - 6 < 0$ is:

A x<1/9

B 1/9<x<27

C x>27

D 0<x<3

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F04 | C06-K04-F04-VMCQ

Q033 | MCQ

C06-K04-6-21-GM13

For $y = -(t-2)^2 + 7$, the maximum occurs at:

A t=0

B t=1

C t=2

D t=3

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F04 | C06-K04-F04-VMCQ

Q034 | MCQ

C06-K04-6-21-GM14

The correct first step for extrema is:

A differentiate in x

B $sett = \log_a x$

C ignore the interval

D take x=0

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F04 | C06-K04-F04-VMCQ

Q035 | MCQ

C06-K04-6-21-GM15

For $1 \leq x \leq 27$, $t = \log_3 x$ lies in:

A [-1,3]

B [0,3]

C [1,27]

D all real

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F04 | C06-K04-F04-VMCQ

Q036 | MCQ

C06-K04-6-21-GM16

The water-tank challenge maximum health rating is:

A 3

B 4

C 5

D 8

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F04 | C06-K04-F04-VMCQ

Q037 | MCQ

C06-K04-6-22-GM17

The number of digits of N is determined by:

A $\log_{10} N$

B $[\log_{10} N] + 1$

C N+1

D 10^N

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F04 | C06-K04-F04-VMCQ

Q038 | MCQ

C06-K04-6-22-GM18

If $-9 < \log_{10} N < -8$, the first non-zero digit is at:

A 8th

B 9th

C 10th

D 11th

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F04 | C06-K04-F04-VMCQ

Q039 | MCQ

C06-K04-6-22-GM19

The common logarithm base is:

A 2

B e

C 10

D any base

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F04 | C06-K04-F04-VMCQ

Q040 | MCQ

C06-K04-6-22-GM20

The solution set of $\log_x(x+2) \leq \log_x(4-x)$ is:

A (0,1)

B (1,4)

C (0,4)

D empty

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F01 | C06-K04-F01-VQUIZ

Quiz M1 | QUIZ MCQ C06-K04-Q-M01

Solve $\log_5(x-1)=2$:

A x=26

B 0

C 1

D cannot be determined

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F02 | C06-K04-F02-VQUIZ

Quiz M2 | QUIZ MCQ

C06-K04-Q-M02

For $0 < a < 1$ and $M < N$, compare $\log_a M$ and $\log_a N$:

A $\log_a M > \log_a N$

B 0

C 1

D cannot be determined

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F03 | C06-K04-F03-VQUIZ

Quiz M3 | QUIZ MCQ

C06-K04-Q-M03

Solve $4(\log_2 x)^2 - 5\log_2 x + 1 = 0$:

A $x = 2, \sqrt{2}$

B 0

C 1

D cannot be determined

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F04 | C06-K04-F04-VQUIZ

Quiz M4 | QUIZ MCQ C06-K04-Q-M04

Find the maximum of $y = -(\log_3 x)^2 + 2\log_3 x + 4$ on $1 \le x \le 27$:

A 5 at x=3

B 0

C 1

D cannot be determined

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F01 | C06-K04-F01-VQUIZ

Quiz W1 | QUIZ WRITTEN C06-K04-Q-W01

Solve $\log_3(x+1) = 2$.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F02 | C06-K04-F02-VQUIZ

Quiz W2 | QUIZ WRITTEN C06-K04-Q-W02

Solve $\log_2 x \geq 3$.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F03 | C06-K04-F03-VQUIZ

Quiz W3 | QUIZ WRITTEN C06-K04-Q-W03

Solve $(\log_5 x)^2 - 4 < 0$.

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

Concept 4 | Applications of Logarithms

F04 | C06-K04-F04-VQUIZ

Quiz W4 | QUIZ WRITTEN C06-K04-Q-W04

How many digits does 6^{20} have using $\log_{10} 2 = 0.3010,\ \log_{10} 3 = 0.4771$?

WORKING AREA

FORMULA BANK

Log equations
$\log_a M = \log_a N \Rightarrow M = N \quad (M, N > 0)$

Log inequalities
$a > 1 : M < N \qquad 0 < a < 1 : M > N$

Substitution
$t = \log_a x \quad t \in \mathbb{R} \quad x = a^t$

Extrema
$t = \log_a x$ t-range from the x-domain

Common log
$n - 1 < \log_{10} N < n \Rightarrow n$ digits

EGYPTIAN BACCALAUREATE • 2026

MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 07

Differentiation and Integration

1 Concepts | 42 questions

B5 Landscape | one question per teaching page

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Chapter 07 | Differentiation and Integration

CLASSROOM ROUTE

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

42 questions

Official lessons: 7-1, 7-2, 7-3, 7-4

The Formula Bank changes at each Concept boundary.

Concept 1 | Fundamentals of Calculus (Limits and Derivatives) OFFICIAL LESSONS 7-1, 7-2, 7-3, 7-4

Fundamentals of Calculus (Limits and Derivatives)

Equation-first recall | use the same rail beside every question in this Concept

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Start with the family cue, write the first move, then use the working grid.

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F01 | V01

Q001 | WRITTEN C07-K01-7-1-WU

For $f(x) = x^2 + 2x$, find the average rate of change from -1 to 3, and from 3 to $3 + h$.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b) - f(a)}{b - a}$$

Limit

$$\lim_{x \to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F01 | V02

Q002 | WRITTEN

C07-K01-7-1-TRY

Find the average rate of change for the three given Try functions on their stated intervals.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F01 | V03

Q003 | WRITTEN C07-K01-7-1-EX

Find the average rate of change for all nine given Exercise functions, including fixed and h-form intervals.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F01 | V04

Q004 | WRITTEN C07-K01-7-1-CH

Find the average rate of change of a circle's area as its diameter changes from 10 cm to 18 cm.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F02 | V01

Q005 | WRITTEN

C07-K01-7-2-WU

Find the given limits by direct substitution and by simplifying the indeterminate fraction before substitution.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F02 | V02

Q006 | WRITTEN

C07-K01-7-2-TRY

Find the three given Try limits, including polynomial and h-quotient forms.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F02 | V03

Q007 | WRITTEN

C07-K01-7-2-EX

Find all nine given Exercise limits, including x-limits and h-limits.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F02 | V04

Q008 | WRITTEN

C07-K01-7-2-CH

If $\lim_{x\to 3}(x^2-5x+k)/(x-3)=L$ is finite, find Lk.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x)=\alpha$$

Coefficient

$$f'(a)=\lim_{h\to 0}\frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A=\frac{3\sqrt{3}}{2}x^2 \quad A'=3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F03 | V01

Q009 | WRITTEN

C07-K01-7-3-WU

Find the differential coefficient of $f(x) = 3x^2$ at $x = -2$ using the definition.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b) - f(a)}{b - a}$$

Limit

$$\lim_{x \to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F03 | V02

Q010 | WRITTEN

C07-K01-7-3-TRY

Find the differential coefficients at the given values for the two given Try functions using the definition.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F03 | V03

Q011 | WRITTEN C07-K01-7-3-EX

Find the differential coefficients for all six given Exercise functions at their stated values.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F03 | V04

Q012 | WRITTEN

C07-K01-7-3-CH

A dropped stone has displacement $s(t) = 4.9t^2$ metres. Find its instantaneous velocity at $t = 10$ seconds using the definition.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b) - f(a)}{b - a}$$

Limit

$$\lim_{x \to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F04 | V01

Q013 | WRITTEN C07-K01-7-4-WU

Differentiate $f(x) = x^2 + 3x$ using the definition of the derivative.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b) - f(a)}{b - a}$$

Limit

$$\lim_{x \to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F04 | V02

Q014 | WRITTEN

C07-K01-7-4-TRY

Differentiate the three given Try functions using the definition.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F04 | V03

Q015 | WRITTEN C07-K01-7-4-EX

Differentiate all nine given Exercise functions using the definition.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F04 | V04

Q016 | WRITTEN C07-K01-7-4-CH

A regular hexagon has side length x. Write its area and differentiate it using the definition.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F04 | V05

Q017 | WRITTEN

C07-K01-7-4-REF

If $f(x) = 5$ for every x except that it is undefined at x=2, does $\lim_{x \to 2} f(x)$ exist?

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b) - f(a)}{b - a}$$

Limit

$$\lim_{x \to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F01 | C07-K01-F01-VMCQ

Q018 | MCQ C07-K01-7-1-GM01

The average rate of change from a to b is:

A [f(a)+f(b)]/(b-a)

B [f(b)-f(a)]/(b-a)

C f'(a)

D b-a

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F01 | C07-K01-F01-VMCQ

Q019 | MCQ C07-K01-7-1-GM02

For $f(x) = x^2 + 2x$ from -1 to 3, the average rate is:

A 2

B 3

C 4

D 8

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b) - f(a)}{b - a}$$

Limit

$$\lim_{x \to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F01 | C07-K01-F01-VMCQ

Q020 | MCQ C07-K01-7-1-GM03

The average area-rate for diameter 10 to 18 is:

A 7π

B 14π

C 28π

D 56π

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F01 | C07-K01-F01-VMCQ

Q021 | MCQ C07-K01-7-1-GM04

The h-form average rate is found by Which of the following is correct?:

A setting h=1

B cancelling the common h

C differentiating first

D squaring h

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F02 | C07-K01-F02-VMCQ

Q022 | MCQ C07-K01-7-2-GM05

A direct-substitution limit is valid when Which of the following is correct?:

A the expression is defined

B the denominator is zero

C the numerator is infinite

D h is negative

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F02 | C07-K01-F02-VMCQ

Q023 | MCQ C07-K01-7-2-GM06

The 0/0 form requires Which of the following is correct?:

A factor/cancel first

B differentiate twice

C ignore the denominator

D change the base

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F02 | C07-K01-F02-VMCQ

Q024 | MCQ C07-K01-7-2-GM07

In the finite-limit challenge, k equals Which of the following is correct?:

A 3

B 5

C 6

D 9

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F02 | C07-K01-F02-VMCQ

Q025 | MCQ C07-K01-7-2-GM08

For a polynomial, the limit equals Which of the following is correct?:

A its value at the point

B zero

C infinity

D the slope

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F03 | C07-K01-F03-VMCQ

Q026 | MCQ

C07-K01-7-3-GM09

The definition of the differential coefficient at a is:

A lim [f(a+h)-f(a)]/h

B f(a+h)+f(a)

C [f(a)-f(0)]/a

D h/f(a)

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F03 | C07-K01-F03-VMCQ

Q027 | MCQ C07-K01-7-3-GM10

For $f(x) = 3x^2$, $f'(-2)$ is:

A -12

B -6

C 6

D 12

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b) - f(a)}{b - a}$$

Limit

$$\lim_{x \to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F03 | C07-K01-F03-VMCQ

Q028 | MCQ C07-K01-7-3-GM11

The stone's velocity at 10 s is:

A 49

B 98

C 196

D 4.9

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F03 | C07-K01-F03-VMCQ

Q029 | MCQ C07-K01-7-3-GM12

After cancelling h, take the limit as Which of the following is correct?:

A $h \to 0$

B $h \to 1$

C $x \to 0$

D $a \to \infty$

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x \to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h \to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h \to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F04 | C07-K01-F04-VMCQ

Q030 | MCQ

C07-K01-7-4-GM13

The derivative function is:

A the coefficient at one point

B the differential coefficient for every x

C the average rate only

D the original function

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F04 | C07-K01-F04-VMCQ

Q031 | MCQ

C07-K01-7-4-GM14

The derivative of $x^2 + 3x$ from the definition is:

A x+3

B 2x+3

C 2x

D x^2

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b) - f(a)}{b - a}$$

Limit

$$\lim_{x \to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F04 | C07-K01-F04-VMCQ

Q032 | MCQ

C07-K01-7-4-GM15

The area of a regular hexagon of side x is:

A $3\sqrt{3}x$

B $(3\sqrt{3}/2)x^2$

C $6x^2$

D $\sqrt{3}x$

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F04 | C07-K01-F04-VMCQ

Q033 | MCQ C07-K01-7-4-GM16

A function need not be defined at a for its limit to Which of the following is correct?:

A exist

B be infinite only

C equal zero only

D fail

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F04 | C07-K01-F04-VMCQ

Q034 | MCQ C07-K01-7-4-GM17

The derivative of a constant function is:

A 0

B 1

C x

D the constant

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F01 | C07-K01-F01-VQUIZ

Quiz M1 | QUIZ MCQ C07-K01-Q-M01

Find the average rate of change of x^2 from 1 to 3:

A 4

B 1

C 2

D 3

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F02 | C07-K01-F02-VQUIZ

Quiz M2 | QUIZ MCQ C07-K01-Q-M02

Find $\lim_{x\to 2}(x^2+1)$:

A 0

B 5

C 2

D 3

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F03 | C07-K01-F03-VQUIZ

Quiz M3 | QUIZ MCQ C07-K01-Q-M03

Find $f'(x)$ for $f(x) = x^2$ using the definition:

A 0

B 1

C 2x

D 3

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b) - f(a)}{b - a}$$

Limit

$$\lim_{x \to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F03 | C07-K01-F03-VQUIZ

Quiz M4 | QUIZ MCQ C07-K01-Q-M04

If $s(t) = 4.9t^2$, find the velocity at t=5:

A 0

B 1

C 2

D 49

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b) - f(a)}{b - a}$$

Limit

$$\lim_{x \to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F01 | C07-K01-F01-VQUIZ

Quiz W1 | QUIZ WRITTEN C07-K01-Q-W01

Find the average rate of change of $3x + 1$ from 2 to 7.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b) - f(a)}{b - a}$$

Limit

$$\lim_{x \to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F02 | C07-K01-F02-VQUIZ

Quiz W2 | QUIZ WRITTEN C07-K01-Q-W02

Evaluate $\lim_{h\to 0}(6+2h)$.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F03 | C07-K01-F03-VQUIZ

Quiz W3 | QUIZ WRITTEN C07-K01-Q-W03

Find the differential coefficient of $2x^2$ at x=3 from the definition.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

Concept 1 | Fundamentals of Calculus (Limits and Derivatives)

F04 | C07-K01-F04-VQUIZ

Quiz W4 | QUIZ WRITTEN C07-K01-Q-W04

State $\lim_{x\to 2} f(x)$ when f(x)=5 for all x except x=2 where it is undefined.

WORKING AREA

FORMULA BANK

Average rate

$$\frac{f(b)-f(a)}{b-a}$$

Limit

$$\lim_{x\to a} f(x) = \alpha$$

Coefficient

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Derivative

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Hexagon area

$$A = \frac{3\sqrt{3}}{2}x^2 \quad A' = 3\sqrt{3}x$$

EGYPTIAN BACCALAUREATE • 2026

MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 07

Differentiation and Integration

1 Concepts | 40 questions

B5 Landscape | one question per teaching page

Eng Eslam Ahmed

Assistant Lecturer • Faculty of Engineering • Cairo University

01120009622

Chapter 07 | Differentiation and Integration

CLASSROOM ROUTE

Concept 2 | Differentiation and Tangent Lines

40 questions

Official lessons: 7-5, 7-6, 7-7, 7-8

The Formula Bank changes at each Concept boundary.

Concept 2 | Differentiation and Tangent Lines — **OFFICIAL LESSONS 7-5, 7-6, 7-7, 7-8**

Differentiation and Tangent Lines

Equation-first recall | use the same rail beside every question in this Concept

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Start with the family cue, write the first move, then use the working grid.

Concept 2 | Differentiation and Tangent Lines

F01 | V01

Q001 | WRITTEN C07-K02-7-5-WU

Differentiate the four Warm Up demands: $y = x^2 - 3x + 2$, $y = (2x + 1)^3$, $V = \pi r^2 h$ with respect to (r), and find $f'(-1)$ for $f(x) = x^3 - 3x + 1$.

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F01 | V02

Q002 | WRITTEN

C07-K02-7-5-TRY

Differentiate the six printed Try functions, the two variable-labelled functions $S = \pi r^2$ and $h = vt - \frac{1}{2}gt^2$, and evaluate $f'(2),\ f'(-3)$ for $f(x) = 4x^3 - 3x^2 + 2$.

WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F01 | V03

Q003 | WRITTEN C07-K02-7-5-EX

Differentiate every given Exercise function 18*polynomial/product forms*, the six functions with variables indicated in brackets, and evaluate the two values in each of Exercises 3–5.

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F01 | V04

Q004 | WRITTEN

C07-K02-7-5-CH

For $f(x) = \sqrt[3]{x^5} + \frac{1}{x^2}$, find $f'(1) + f'(-1)$.

WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F02 | V01

Q005 | WRITTEN C07-K02-7-6-WU

Find the quadratic $f(x) = ax^2 + bx + c$ satisfying $f'(0) = -2,\ f'(2) = 2,\ f(1) = 2$.

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F02 | V02

Q006 | WRITTEN

C07-K02-7-6-TRY

Find the quadratic satisfying $f'(0) = 2,\ f'(1) = 4,\ f(2) = 6$.

WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F02 | V03

Q007 | WRITTEN C07-K02-7-6-EX

Find the four quadratics satisfying the four given triples of derivative and function conditions.

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F02 | V04

Q008 | WRITTEN

C07-K02-7-6-CH

Find the quadratic (f(x)) satisfying $f'(2) + f'(4) = 0,\ f(3) = 0,\ f(1) = 12.$

WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F03 | V01

Q009 | WRITTEN C07-K02-7-7-WU

Find the tangent line to $y = x^2 - 4x + 1$ at $(3,\ -2)$.

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F03 | V02

Q010 | WRITTEN

C07-K02-7-7-TRY

Find the tangent line for the three given functions at their stated points: $y = x^2 + 3$ at $(-2,\ 7)$, $y = x^2 - 3x + 2$ at $((1,\ 0))$, and $y = -x^3 + 2x + 4$ at $(-2,\ 8)$.

WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F03 | V03

Q011 | WRITTEN C07-K02-7-7-EX

Find the tangent line for all nine given Exercise functions at their given points.

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

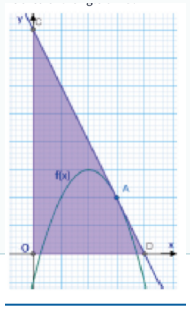
Concept 2 | Differentiation and Tangent Lines

F03 | V04

Q012 | WRITTEN

C07-K02-7-7-CH

For $f(x) = -x^2 + 4x - 1$, the tangent at x-coordinate 3 meets the axes at (D, C). Find the area of triangle (ODC).



WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F04 | V01

Q013 | WRITTEN C07-K02-7-8-WU

Solve the two given Warm Up demands: tangents from (C(0, 2)) to $y = x^2 - 3x + 6$, and tangents to $y = x^3 + 4x^2 - 3$ with gradient 3.

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F04 | V02

Q014 | WRITTEN

C07-K02-7-8-TRY

Solve the two given Try demands: tangents from $C(1,\ -1)$ to $y = x^2 - x + 3$, and tangents to $y = x^3 + 2x - 3$ with gradient 5.

WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F04 | V03

Q015 | WRITTEN C07-K02-7-8-EX

Solve all six given Exercise demands involving external points or prescribed gradients.

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

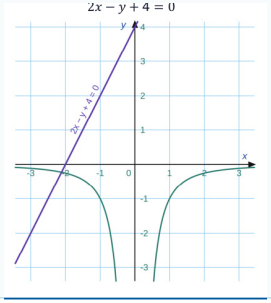
Concept 2 | Differentiation and Tangent Lines

F04 | V04

Q016 | WRITTEN

C07-K02-7-8-CH

For $f(x) = -1/x^2$, find the tangent line parallel to $2x - y + 4 = 0$.



WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F01 | C07-K02-F01-VMCQ

Q017 | MCQ C07-K02-7-5-GM01

The derivative of x^n is:

A x^{n-1}

B nx^{n-1}

C $n + x$

D x^n

WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F01 | C07-K02-F01-VMCQ

Q018 | MCQ C07-K02-7-5-GM02

The derivative of $V = \pi r^2 h$ with respect to r is:

A πh

B $2\pi rh$

C $2\pi r$

D πr^2

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F01 | C07-K02-F01-VMCQ

Q019 | MCQ C07-K02-7-5-GM03

For $f(x) = x^3 - 3x + 1$, $f'(-1)$ is:

A -6

B -3

C 0

D 3

WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F01 | C07-K02-F01-VMCQ

Q020 | MCQ C07-K02-7-5-GM04

The challenge function can be written as Which of the following is correct?:

A $x^{5/3} + x^{-2}$

B $x^5 + x^2$

C $x^{3/5} + x^2$

D $x^{5/3} + x^2$

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F02 | C07-K02-F02-VMCQ

Q021 | MCQ C07-K02-7-6-GM01

For $f(x) = ax^2 + bx + c$, (f'(x)) is:

A $ax + b$

B $2ax + b$

C $2a + b + c$

D $ax^2 + b$

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F02 | C07-K02-F02-VMCQ

Q022 | MCQ

C07-K02-7-6-GM02

The condition $f'(0) = -2$ gives Which of the following is correct?:

A $a = -2$

B $b = -2$

C $c = -2$

D $2a = -2$

WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F02 | C07-K02-F02-VMCQ

Q023 | MCQ C07-K02-7-6-GM03

The warm-up quadratic is:

A $x^2 - 2x + 3$

B $x^2 + 2x + 3$

C $2x^2 - x + 3$

D $x^2 - 2x - 3$

WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F02 | C07-K02-F02-VMCQ

Q024 | MCQ

C07-K02-7-6-GM04

The challenge coefficient a is:

A 1

B 2

C 3

D 6

WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F03 | C07-K02-F03-VMCQ

Q025 | MCQ C07-K02-7-7-GM01

The tangent gradient at x=a is:

A (f(a))

B (a)

C (f'(a))

D $1/f'(a)$

WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F03 | C07-K02-F03-VMCQ

Q026 | MCQ C07-K02-7-7-GM02

The tangent to $y = x^2 - 4x + 1$ at $(3, -2)$ is:

A $y = x - 5$

B $y = 2x - 8$

C $y = -2x + 4$

D $y = 3x - 11$

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F03 | C07-K02-F03-VMCQ

Q027 | MCQ C07-K02-7-7-GM03

In the triangle challenge, the x-intercept of the tangent is:

A 2

B 3

C 4

D 8

WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F03 | C07-K02-F03-VMCQ

Q028 | MCQ C07-K02-7-7-GM04

The area of triangle (ODC) in the challenge is:

A 8

B 12

C 16

D 32

WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F04 | C07-K02-F04-VMCQ

Q029 | MCQ C07-K02-7-8-GM01

When the contact point is not given, set it to Which of the following is correct?:

A ((0,0))

B ((a,f(a)))

C ((f(a),a))

D ((1,f'(a)))

WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F04 | C07-K02-F04-VMCQ

Q030 | MCQ C07-K02-7-8-GM02

The gradient of $2x - y + 4 = 0$ is:

A -2

B -1

C 1

D 2

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F04 | C07-K02-F04-VMCQ

Q031 | MCQ C07-K02-7-8-GM03

For $f(x) = -1/x^2$, (f'(x)) is:

A $-2/x^3$

B $2/x^3$

C $1/x^2$

D $-1/x^3$

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F04 | C07-K02-F04-VMCQ

Q032 | MCQ C07-K02-7-8-GM04

The parallel tangent in the challenge is:

A $y = 2x + 3$

B $y = 2x - 3$

C $y = -2x - 3$

D $y = x - 2$

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F01 | C07-K02-F01-VQUIZ

Quiz W1 | QUIZ WRITTEN C07-K02-Q-M01

Differentiate $3x^3 - 2x$.

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F02 | C07-K02-F02-VQUIZ

Quiz W2 | QUIZ WRITTEN C07-K02-Q-M02

Find the quadratic with $f'(0) = 1,\ f'(1) = 3,\ f(1) = 2$.

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F03 | C07-K02-F03-VQUIZ

Quiz W3 | QUIZ WRITTEN C07-K02-Q-M03

Find the tangent to $y = x^2$ at $((2, 4))$.

WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F04 | C07-K02-F04-VQUIZ

Quiz W4 | QUIZ WRITTEN C07-K02-Q-M04

For $f(x) = -1/x$, find the tangent parallel to $y = x + 2$.

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F01 | C07-K02-F01-VQUIZ

Quiz M1 | QUIZ MCQ C07-K02-Q-M05

The derivative of a constant is:

A 0

B 1

C x

D the constant

WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F02 | C07-K02-F02-VQUIZ

Quiz M2 | QUIZ MCQ C07-K02-Q-M06

For $f(x) = ax^2 + bx + c$, the coefficient equations come from:

A three function values

B two derivatives and one function value

C one derivative only

D the tangent gradient only

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F03 | C07-K02-F03-VQUIZ

Quiz M3 | QUIZ MCQ C07-K02-Q-M07

The tangent equation in point-slope form is:

A $y - y_1 = m(x - x_1)$

B $y = mx + c$

C $y + y_1 = m(x + x_1)$

D $x - x_1 = m(y - y_1)$

WORKING AREA

FORMULA BANK

Power rule
$$(x^n)' = nx^{n-1}$$

Quadratic
$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent
$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact
$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines
$$m_1 = m_2$$

Concept 2 | Differentiation and Tangent Lines

F04 | C07-K02-F04-VQUIZ

Quiz M4 | QUIZ MCQ C07-K02-Q-M08

A tangent parallel to $y = 3x - 1$ has gradient Which of the following is correct?:

A -3

B 1/3

C 3

D 1

WORKING AREA

FORMULA BANK

Power rule

$$(x^n)' = nx^{n-1}$$

Quadratic

$f(x) = ax^2 + bx + c \quad f'(x) = 2ax + b$

Tangent

$y - y_1 = m(x - x_1) \quad m = f'(a)$

Unknown contact

$(a, f(a)) \quad y - f(a) = f'(a)(x - a)$

Parallel lines

$$m_1 = m_2$$

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MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 07

Differentiation and Integration

1 Concepts | 76 questions

B5 Landscape | one question per teaching page

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Chapter 07 | Differentiation and Integration

CLASSROOM ROUTE

Concept 3 | Applications of Differentiation: Polynomial Functions

76 questions

Official lessons: 7-9, 7-10, 7-11, 7-12, 7-13, 7-14, 7-15, 7-16, 7-17

The Formula Bank changes at each Concept boundary.

Concept 3 | Applications of Differentiation: Polynomial Functions OFFICIAL LESSONS 7-9, 7-10, 7-11, 7-12, 7-13, 7-14, 7-15, 7-16, 7-17

Applications of Differentiation: Polynomial Functions

Equation-first recall | use the same rail beside every question in this Concept

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ **x-axis intersections**

Quartic

$$f'(x) = 0$$

Start with the family cue, write the first move, then use the working grid.

Concept 3 | Applications of Differentiation: Polynomial Functions

F01 | V01

Q001 | WRITTEN C07-K03-7-9-WU

Find the extreme values and sketch the graphs of the three cubic functions printed in the Warm Up.

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F01 | V02

Q002 | WRITTEN

C07-K03-7-9-TRY

Find the extreme values and sketch the three given Try cubics.

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F01 | V03

Q003 | WRITTEN

C07-K03-7-9-EX

Find the extreme values and draw the graphs for all nine given cubic functions in Exercise.

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F01 | V04

Q004 | WRITTEN C07-K03-7-9-CH

For $P(x) = x^3 - 3ax^2 + (3a^2 - 3)x + 4$, $a > 0$, find the flow rates giving the maximum and minimum peak efficiency.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F02 | V01

Q005 | WRITTEN C07-K03-7-10-WU

On $[-3,\ 4]$, find the maximum and minimum values of $y = -x^3 + 12x + 5$.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F02 | V02

Q006 | WRITTEN

C07-K03-7-10-TRY

Find the maximum and minimum values of the two given Try cubics on their stated closed intervals.

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F02 | V03

Q007 | WRITTEN

C07-K03-7-10-EX

Find the maximum and minimum values of all six given cubics on their given closed intervals.

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F02 | V04

Q008 | WRITTEN C07-K03-7-10-CH

For $f(x) = x^3 - 6x$ on $[-3,\ 3]$, find the absolute deepest dive and highest ascent.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F03 | V01

Q009 | WRITTEN

C07-K03-7-11-WU

If $f(x) = -x^3 + ax + b$ has a local maximum of 9 at $x = 2$, find a, b, and the local minimum.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F03 | V02

Q010 | WRITTEN

C07-K03-7-11-TRY

Solve the two given Try problems: determine the coefficients from a local minimum/maximum and another stationary point.

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F03 | V03

Q011 | WRITTEN C07-K03-7-11-EX

Solve all six given Exercise problems asking for cubic coefficients from extrema.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F03 | V04

Q012 | WRITTEN

C07-K03-7-11-CH

For $f(x) = x^3 + ax^2 + bx + c$, the graph has a local peak 178 at $x = -2$ and a local trough at $x = 4$. Find $a,\ b,\ c$.

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F04 | V01

Q013 | WRITTEN C07-K03-7-12-WU

If $f(x) = x^3 - 3kx^2 + kx + 2$ has no extreme values, find the range of k.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F04 | V02

Q014 | WRITTEN

C07-K03-7-12-TRY

Determine the parameter ranges in the given Try problems for a cubic to have no extreme values or to have both extremes.

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F04 | V03

Q015 | WRITTEN C07-K03-7-12-EX

Determine the parameter ranges for all six given Exercise cubics according to whether they have extreme values.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F04 | V04

Q016 | WRITTEN C07-K03-7-12-CH

For $f(x) = x^3 + 3kx^2 + 12kx + 10$, find the exact k-range that guarantees both a local maximum and minimum.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F05 | V01

Q017 | WRITTEN

C07-K03-7-13-WU

If $f(x) = x^3 - 3kx^2 + (k^2 + 5)x + 3$ is always monotonically increasing, find the range of k.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F05 | V02

Q018 | WRITTEN

C07-K03-7-13-TRY

Find the parameter ranges in the two given Try problems for the cubic to be monotonically increasing.

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F05 | V03

Q019 | WRITTEN C07-K03-7-13-EX

Find the parameter ranges in all six given Exercise problems for monotonic increase.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F05 | V04

Q020 | WRITTEN

C07-K03-7-13-CH

For $f(x) = \frac{1}{3}x^3 - kx^2 + (k+6)x + 10$, find the k-range for monotonic increase on $x \in [1, \infty)$.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | V01

Q021 | WRITTEN C07-K03-7-14-WU

Find the number of distinct real roots of $x^3 - 6x^2 + 9x - 3 = 0$.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | V02

Q022 | WRITTEN

C07-K03-7-14-TRY

Find the number of distinct real roots for the three given Try equations.

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | V03

Q023 | WRITTEN C07-K03-7-14-EX

Find the number of distinct real roots for all nine given cubic equations.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | V04

Q024 | WRITTEN

C07-K03-7-14-CH

Find the number of distinct real roots of $-h^3 + 12h^2 - 36h + 40 = 0$.

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | V05

Q025 | WRITTEN C07-K03-7-15-WU

If $-x^3 + 3x^2 + 9x + a = 0$ has three distinct real roots, find the range of a.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | V06

Q026 | WRITTEN

C07-K03-7-15-TRY

Solve the two given Try parameter problems for three or two distinct real roots.

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | V07

Q027 | WRITTEN C07-K03-7-15-EX

Solve all four given Exercise parameter problems for the required number of distinct roots.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | V08

Q028 | WRITTEN C07-K03-7-15-CH

For $f(x) = x^3 - 6x^2 + 9x - 2a^2 + 7a$, find all real a such that $f(x) = 2$ has exactly three distinct real roots.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | V09

Q029 | WRITTEN C07-K03-7-16-WU

Prove the given inequalities using an auxiliary cubic and a derivative sign table.

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | V10

Q030 | WRITTEN C07-K03-7-16-EX

Prove all three given cubic inequalities on their stated domains.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | V11

Q031 | WRITTEN

C07-K03-7-16-CH

Find the largest k such that $x^3 - 3x^2 - 3x + k + 3 \leq 0$ for every $x \in [-1,\ 3]$.

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | V12

Q032 | WRITTEN

C07-K03-7-17-WU

Find the extreme values and sketch the two given quartic functions.

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | V13

Q033 | WRITTEN

C07-K03-7-17-EX

Find the extreme values and graphs for all six given quartic functions.

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | V14

Q034 | WRITTEN

C07-K03-7-17-REF

For $f(x) = x^4 - 4x^3 + k$, find the exact k-range for exactly two distinct real roots.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F01 | C07-K03-F01-VMCQ

Q035 | MCQ C07-K03-7-9-GM01

At a local maximum, the sign of f' changes Which of the following is correct?:

A $- \rightarrow +$

B $+ \rightarrow -$

C $+ \rightarrow +$

D $- \rightarrow -$

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F01 | C07-K03-F01-VMCQ

Q036 | MCQ C07-K03-7-9-GM02

For $P'(x) = 3[(x-a)^2 - 1]$, the local maximum occurs at Which of the following is correct?:

A $a-1$

B a

C $a+1$

D $1-a$

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F02 | C07-K03-F02-VMCQ

Q037 | MCQ C07-K03-7-10-GM03

Absolute extrema on a closed interval require comparing Which of the following is correct?:

A stationary points only

B endpoints only

C stationary points and endpoints

D the y-intercept

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F02 | C07-K03-F02-VMCQ

Q038 | MCQ C07-K03-7-10-GM04

The absolute maximum of $x^3 - 6x$ on $[-3, 3]$ is:

A $4\sqrt{2}$

B 9

C 6

D 0

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F03 | C07-K03-F03-VMCQ

Q039 | MCQ

C07-K03-7-11-GM05

If $f(x) = -x^3 + ax + b$ has a stationary point at 2, then a is:

A 2

B 6

C 12

D -12

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F03 | C07-K03-F03-VMCQ

Q040 | MCQ

C07-K03-7-11-GM06

The derivative roots in the challenge are:

A $-4, 2$

B $-2, 4$

C $2, 4$

D $-3, 3$

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F04 | C07-K03-F04-VMCQ

Q041 | MCQ

C07-K03-7-12-GM07

No two distinct extrema for a cubic means the derivative discriminant is:

A $D > 0$

B $D = 1$

C $D \leq 0$

D $D < 0$ only

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F04 | C07-K03-F04-VMCQ

Q042 | MCQ

C07-K03-7-12-GM08

The challenge range for both extrema is:

A $0 < k < 4$

B $k < 0$ or $k > 4$

C $-4 < k < 0$

D $k \leq 4$

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F05 | C07-K03-F05-VMCQ

Q043 | MCQ C07-K03-7-13-GM09

For a positive-leading cubic to be monotone increasing, its derivative must be Which of the following is correct?:

A negative everywhere

B non-negative everywhere

C zero everywhere

D linear

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F05 | C07-K03-F05-VMCQ

Q044 | MCQ

C07-K03-7-13-GM10

The challenge domain in 7-13 is:

A $(-\infty, \infty)$

B $[1, \infty)$

C $[-1, 1]$

D $(0, 1)$

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | C07-K03-F06-VMCQ

Q045 | MCQ C07-K03-7-14-GM11

Three distinct roots occur when the x-axis lies Which of the following is correct?:

A above both extrema

B between the local maximum and minimum

C at an endpoint only

D at the local maximum only

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | C07-K03-F06-VMCQ

Q046 | MCQ C07-K03-7-14-GM12

The 7-14 challenge has how many distinct real roots? Which of the following is correct?:

A 0

B 1

C 2

D 3

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | C07-K03-F06-VMCQ

Q047 | MCQ

C07-K03-7-15-GM13

Three intersections with $y = a$ require the level to lie Which of the following is correct?:

A strictly between the extrema

B above the maximum

C below the minimum

D at an extremum

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | C07-K03-F06-VMCQ

Q048 | MCQ

C07-K03-7-15-GM14

The 7-15 warm-up range is:

A $-27 < a < 5$

B $-5 < a < 27$

C $a \leq -27$

D $a \geq 5$

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | C07-K03-F06-VMCQ

Q049 | MCQ

C07-K03-7-16-GM15

To prove LHS $\geq$ RHS, define Which of the following is correct?:

A $f = \text{LHS} + \text{RHS}$

B $f = \text{LHS} - \text{RHS}$

C $f = \text{RHS} - 1$

D $f = f'$

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | C07-K03-F06-VMCQ

Q050 | MCQ

C07-K03-7-16-GM16

The largest k in the challenge is:

A $2-4\sqrt{2}$

B $4\sqrt{2}-2$

C $2+4\sqrt{2}$

D $-2-4\sqrt{2}$

WORKING AREA

FORMULA BANK

First derivative

$$f'(x)>0 \Rightarrow \nearrow$$

Stationary point

$$f'(a)=0$$

Discriminant

$$D=b^2-4ac$$

Cubic roots

$f(x)=0 \iff$ x-axis intersections

Quartic

$$f'(x)=0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | C07-K03-F06-VMCQ

Q051 | MCQ C07-K03-7-17-GM17

A repeated root of a derivative may be Which of the following is correct?:

A always a local maximum

B always a local minimum

C stationary but not an extreme

D impossible

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | C07-K03-F06-VMCQ

Q052 | MCQ

C07-K03-7-17-GM18

Exactly two distinct roots for $x^4 - 4x^3 + k = 0$ require Which of the following is correct?:

A $k = 27$

B $k < 27$

C $k > 27$

D $k \leq 0$ only

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F01 | C07-K03-F01-VMCQ

Q053 | MCQ

C07-K03-7-9-GM19

A local minimum is identified by the change Which of the following is correct?:

A $+ \rightarrow -$

B $- \rightarrow +$

C $+ \rightarrow +$

D $- \rightarrow -$

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F01 | C07-K03-F01-VMCQ

Q054 | MCQ C07-K03-7-9-GM20

For $y = x^3 - 6x^2 + 16$, the critical x-values are:

A $0, 4$

B $1, 3$

C $-2, 2$

D $2, 4$

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F01 | C07-K03-F01-VMCQ

Q055 | MCQ

C07-K03-7-9-GM21

The derivative sign table is used to determine:

A only the y-intercept

B increase/decrease and extrema

C the constant term

D the domain

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F02 | C07-K03-F02-VMCQ

Q056 | MCQ C07-K03-7-10-GM22

On a closed interval, an endpoint can be Which of the following is correct?:

A ignored

B an absolute extreme

C a derivative root only

D never a minimum

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F02 | C07-K03-F02-VMCQ

Q057 | MCQ

C07-K03-7-10-GM23

For $y = -x^3 + 12x + 5$, the stationary x-values are:

A $-2, 2$

B $-1, 1$

C $0, 4$

D $2, 4$

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F02 | C07-K03-F02-VMCQ

Q058 | MCQ

C07-K03-7-10-GM24

The absolute minimum of $x^3 - 6x$ on $[-3, 3]$ is at Which of the following is correct?:

A $x = -3$

B $x = -\sqrt{2}$

C $x = \sqrt{2}$

D $x = 3$

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F03 | C07-K03-F03-VMCQ

Q059 | MCQ

C07-K03-7-11-GM25

To determine a cubic from an extreme value, use both $f(a) = M$ and:

A $f(a) = 0$

B $f'(a) = 0$

C $f''(a) = 0$

D $a = 0$

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F03 | C07-K03-F03-VMCQ

Q060 | MCQ

C07-K03-7-11-GM26

In the warm-up $f(x) = -x^3 + 12x - 7$, the local minimum occurs at Which of the following is correct?:

A $x = -2$

B $x = 0$

C $x = 2$

D $x = 7$

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F04 | C07-K03-F04-VMCQ

Q061 | MCQ

C07-K03-7-12-GM27

For $f(x) = x^3 - 3kx^2 + kx + 2$, no two distinct stationary roots requires Which of the following is correct?:

A $0 \leq k \leq 1/3$

B $k > 1/3$

C $k < 0$

D $k \geq 1/3$

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F04 | C07-K03-F04-VMCQ

Q062 | MCQ

C07-K03-7-12-GM28

Two distinct stationary points occur when the derivative discriminant is:

A $D < 0$

B $D = 0$

C $D > 0$

D $D = 1$

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F05 | C07-K03-F05-VMCQ

Q063 | MCQ

C07-K03-7-13-GM29

For a positive-leading quadratic derivative, $D \leq 0$ implies it is:

A non-negative for all x

B negative for all x

C linear

D undefined

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F05 | C07-K03-F05-VMCQ

Q064 | MCQ

C07-K03-7-13-GM30

In the 7-13 challenge, monotonicity is required on Which of the following is correct?:

A $[1, \infty)$

B $[-1, 1]$

C $(-infty, 0)$

D $[0, 1]$

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | C07-K03-F06-VMCQ

Q065 | MCQ C07-K03-7-14-GM31

A cubic with both stationary values above the x-axis has Which of the following is correct?:

A three roots

B one distinct real root

C no real roots

D two repeated roots

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | C07-K03-F06-VMCQ

Q066 | MCQ C07-K03-7-14-GM32

To count cubic roots, compare the extrema with Which of the following is correct?:

A the y-axis

B the x-axis

C the derivative axis

D the domain only

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | C07-K03-F06-VMCQ

Q067 | MCQ

C07-K03-7-15-GM33

At an extremal parameter level, a cubic and a horizontal line have Which of the following is correct?:

A one distinct intersection

B two distinct intersections

C three distinct intersections

D no intersection

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | C07-K03-F06-VMCQ

Q068 | MCQ C07-K03-7-17-GM34

For $x^4 - 4x^3 + k$, the global minimum occurs at Which of the following is correct?:

A $x = 0$

B $x = 1$

C $x = 3$

D $x = 4$

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F01 | C07-K03-F01-VQUIZ

Quiz W1 | QUIZ WRITTEN C07-K03-Q-W01

Find the local maximum and minimum of $x^3 - 3x^2 + 1$.

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F03 | C07-K03-F03-VQUIZ

Quiz W2 | QUIZ WRITTEN C07-K03-Q-W02

Find $a,\ b$ if $f(x) = -x^3 + ax + b$ has a local maximum 4 at x=1.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F04 | C07-K03-F04-VQUIZ

Quiz W3 | QUIZ WRITTEN C07-K03-Q-W03

Find the k-range for $x^3 - 3kx^2 + kx$ to have no two distinct stationary points.

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | C07-K03-F06-VQUIZ

Quiz W4 | QUIZ WRITTEN C07-K03-Q-W04

Find the largest k such that $x^3 - 3x^2 - 3x + k + 3 \leq 0$ on $[-1,\ 3]$.

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F01 | C07-K03-F01-VQUIZ

Quiz M1 | QUIZ MCQ

C07-K03-Q-M05

At a local minimum, f' changes Which of the following is correct?:

A $+ \to -$

B $- \to +$

C $+ \to +$

D $- \to -$

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F05 | C07-K03-F05-VQUIZ

Quiz M2 | QUIZ MCQ C07-K03-Q-M06

A cubic with a positive-leading derivative and $D < 0$ is:

A always increasing

B always decreasing

C constant

D undefined

WORKING AREA

FORMULA BANK

First derivative
$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point
$$f'(a) = 0$$

Discriminant
$$D = b^2 - 4ac$$

Cubic roots
$f(x) = 0 \iff$ x-axis intersections

Quartic
$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | C07-K03-F06-VQUIZ

Quiz M3 | QUIZ MCQ C07-K03-Q-M07

The 7-15 challenge requires the level to satisfy Which of the following is correct?:

A $t < 0$

B $0 < t < 4$

C $t > 4$

D $t = 4$

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

Concept 3 | Applications of Differentiation: Polynomial Functions

F06 | C07-K03-F06-VQUIZ

Quiz M4 | QUIZ MCQ

C07-K03-Q-M08

The global minimum of $x^4 - 4x^3 + k$ is:

A $k - 27$

B $k + 27$

C $k - 3$

D $27 - k$

WORKING AREA

FORMULA BANK

First derivative

$$f'(x) > 0 \Rightarrow \nearrow$$

Stationary point

$$f'(a) = 0$$

Discriminant

$$D = b^2 - 4ac$$

Cubic roots

$f(x) = 0 \iff$ x-axis intersections

Quartic

$$f'(x) = 0$$

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MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 07

Differentiation and Integration

1 Concepts | 58 questions

B5 Landscape | one question per teaching page

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Chapter 07 | Differentiation and Integration

CLASSROOM ROUTE

Concept 4 | Integration: Definite Integrals and Applications

58 questions

Official lessons: 7-18, 7-19, 7-20, 7-21, 7-22, 7-23, 7-24

The Formula Bank changes at each Concept boundary.

Concept 4 | Integration: Definite Integrals and Applications — **OFFICIAL LESSONS 7-18, 7-19, 7-20, 7-21, 7-22, 7-23, 7-24**

Integration: Definite Integrals and Applications

Equation-first recall | use the same rail beside every question in this Concept

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Start with the family cue, write the first move, then use the working grid.

Concept 4 | Integration: Definite Integrals and Applications

F01 | V01

Q001 | WRITTEN C07-K04-7-18-WU

Find the two indefinite integrals in the Warm Up.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F01 | V02

Q002 | WRITTEN C07-K04-7-18-TRY

Find the six indefinite integrals in the given Try section, expanding a squared bracket first when needed.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F01 | V03

Q003 | WRITTEN C07-K04-7-18-EX-A

Solve the first ten given indefinite-integral exercises (constants, linear and quadratic polynomials).

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F01 | V04

Q004 | WRITTEN C07-K04-7-18-EX-B

Solve the remaining eight given integrals, including products and squared brackets.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F02 | V01

Q005 | WRITTEN

C07-K04-7-19-WU

Find $F(x)$ when $F'(x) = 3x^2 + 8x - 1$ and $F(1) = 7$.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F02 | V02

Q006 | WRITTEN C07-K04-7-19-TRY

Find the two given Try functions from their derivatives and one given value of F.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F02 | V03

Q007 | WRITTEN C07-K04-7-19-EX

Find $F(x)$ for all six given Exercise conditions.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F03 | V01

Q008 | WRITTEN C07-K04-7-20-WU

Find the curve $y = f(x)$ through $(3,\ 2)$ whose tangent gradient is $3x^2 - 2x + 1$.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\,dx = a\int f\,dx + b\int g\,dx$$

FTC

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx}\int_a^x f(t)\,dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F03 | V02

Q009 | WRITTEN C07-K04-7-20-TRY

Solve the given Try tangent-gradient problem through (1, 1).

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F03 | V03

Q010 | WRITTEN C07-K04-7-20-EX

Solve the three given tangent-gradient exercises, finding each function from its point and gradient.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F04 | V01

Q011 | WRITTEN C07-K04-7-21-WU

Evaluate the three definite integrals in the Warm Up using the Fundamental Theorem of Calculus.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F04 | V02

Q012 | WRITTEN

C07-K04-7-21-TRY

Evaluate the six given Try definite integrals, simplifying the integrand before applying the limits.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F04 | V03

Q013 | WRITTEN C07-K04-7-21-EX-A

Evaluate the first twelve given Exercise definite integrals, including reversed and equal limits.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F04 | V04

Q014 | WRITTEN C07-K04-7-21-EX-B

Evaluate the remaining twelve given Exercise integrals, including sums, differences and products.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F05 | V01

Q015 | WRITTEN C07-K04-7-22-WU

Use the four properties of definite integrals to simplify the three Warm Up expressions.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F05 | V02

Q016 | WRITTEN

C07-K04-7-22-TRY

Solve the four given Try definite-integral transformations.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\,dx = a\int f\,dx + b\int g\,dx$$

FTC

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx}\int_a^x f(t)\,dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F05 | V03

Q017 | WRITTEN C07-K04-7-22-EX-A

Solve the first six given Exercise questions using interval splitting and reversal.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F05 | V04

Q018 | WRITTEN C07-K04-7-22-EX-B

Solve the final six given Exercise questions using the factorized definite-integral identity.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F06 | V01

Q019 | WRITTEN C07-K04-7-23-WU

Find $f(x)$ from the given equation $f(x) = x^2 + \int_0^1 f(t)\ dt$.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\,dx = a\int f\,dx + b\int g\,dx$$

FTC

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx}\int_a^x f(t)\,dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F06 | V02

Q020 | WRITTEN C07-K04-7-23-TRY

Solve the two given Try integral equations for $f(x)$.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F06 | V03

Q021 | WRITTEN C07-K04-7-23-EX

Find $f(x)$ for all five given integral equations.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F07 | V01

Q022 | WRITTEN

C07-K04-7-24-WU

Differentiate $\int_3^x (2t^2 + 3t - 5)\ dt$ with respect to x.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\,dx = a\int f\,dx + b\int g\,dx$$

FTC

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx}\int_a^x f(t)\,dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F07 | V02

Q023 | WRITTEN C07-K04-7-24-TRY

Solve the two given Try problems involving differentiation of a variable-limit integral and an unknown lower limit.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\,dx = a\int f\,dx + b\int g\,dx$$

FTC

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx}\int_a^x f(t)\,dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F07 | V03

Q024 | WRITTEN C07-K04-7-24-EX-A

Differentiate the three given expressions with respect to x.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F07 | V04

Q025 | WRITTEN C07-K04-7-24-EX-B

Find $f(x)$ and a for the three given equations with a variable upper limit.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\,dx = a\int f\,dx + b\int g\,dx$$

FTC

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx}\int_a^x f(t)\,dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F01 | C07-K04-F01-VMCQ

Q026 | MCQ C07-K04-7-18-GM01

The constant of integration is required because Which of the following is correct?:

A every primitive is unique

B primitives differ by a constant

C the integrand is constant

D the limits are equal

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\,dx = a\int f\,dx + b\int g\,dx$$

FTC

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx}\int_a^x f(t)\,dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F01 | C07-K04-F01-VMCQ

Q027 | MCQ

C07-K04-7-18-GM02

The integral of x^n for $n \neq -1$ is:

A $nx^{n-1} + C$

B $x^{n+1}/(n+1) + C$

C $x^n/n + C$

D $x^{n-1}/(n-1) + C$

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F01 | C07-K04-F01-VMCQ

Q028 | MCQ

C07-K04-7-18-GM03

Before integrating $(x-1)^2$, first Which of the following is correct?:

A differentiate it

B expand it

C set $x = 0$

D add limits

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F01 | C07-K04-F01-VMCQ

Q029 | MCQ

C07-K04-7-18-GM04

The integral of $3x^2 - 2x + 1$ is:

A $x^3 - x^2 + x + C$

B $3x^3 - 2x^2 + x + C$

C $x^3 - 2x + 1 + C$

D $6x - 2 + C$

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F02 | C07-K04-F02-VMCQ

Q030 | MCQ

C07-K04-7-19-GM05

To find $F(x)$ from $F'(x)$, you should first:

A differentiate again

B integrate $F'(x)$

C set $F = 0$

D ignore the initial value

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F02 | C07-K04-F02-VMCQ

Q031 | MCQ

C07-K04-7-19-GM06

The condition $F(1) = 7$ determines Which of the following is correct?:

A the derivative

B the domain

C the constant C

D the leading coefficient

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F02 | C07-K04-F02-VMCQ

Q032 | MCQ

C07-K04-7-19-GM07

If $F'(x) = 6x - 2$ and $F(0) = 1$, then $F(x)$ is:

A $3x^2 - 2x + 1$

B $6x^2 - 2x + 1$

C $3x^2 - 2x$

D $6x - 2 + 1$

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F03 | C07-K04-F03-VMCQ

Q033 | MCQ

C07-K04-7-20-GM08

The gradient of the tangent at (x, y) is:

A $f(x)$

B $f'(x)$

C $f''(x)$

D $x + y$

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F03 | C07-K04-F03-VMCQ

Q034 | MCQ

C07-K04-7-20-GM09

A point (x_0, y_0) on $y = f(x)$ gives Which of the following is correct?:

A $f'(x_0) = y_0$

B $f(x_0) = y_0$

C $f(0) = x_0$

D $C = 0$

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F03 | C07-K04-F03-VMCQ

Q035 | MCQ

C07-K04-7-20-GM10

If $f'(x) = 3x^2 - 2x + 1$, an antiderivative is:

A $3x^3 - 2x^2 + x$

B $x^3 - x^2 + x + C$

C $6x - 2$

D $x^3 - 2x + 1$

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F04 | C07-K04-F04-VMCQ

Q036 | MCQ

C07-K04-7-21-GM11

The Fundamental Theorem gives $\int_a^b f(x)dx =$ Which of the following is correct?:

A $F(a) - F(b)$

B $F(b) - F(a)$

C $F(a) + F(b)$

D 0 always

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F04 | C07-K04-F04-VMCQ

Q037 | MCQ

C07-K04-7-21-GM12

When the limits are equal, $\int_a^a f(x)dx$ equals Which of the following is correct?:

A 1

B a

C 0

D $f(a)$

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\,dx = a\int f\,dx + b\int g\,dx$$

FTC

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx}\int_a^x f(t)\,dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F04 | C07-K04-F04-VMCQ

Q038 | MCQ

C07-K04-7-21-GM13

A reversed definite integral satisfies Which of the following is correct?:

A $\int_a^b f = \int_b^a f$

B $\int_a^b f = -\int_b^a f$

C both are zero

D only if $f = 0$

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F04 | C07-K04-F04-VMCQ

Q039 | MCQ C07-K04-7-21-GM14

To evaluate a definite integral of a product, first:

A integrate each factor separately

B expand the product

C differentiate the product

D change the limits

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F05 | C07-K04-F05-VMCQ

Q040 | MCQ

C07-K04-7-22-GM15

Adjacent integrals with the same integrand can be Which of the following is correct?:

A multiplied

B combined over the joined interval

C set equal to zero

D reversed only

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F05 | C07-K04-F05-VMCQ

Q041 | MCQ C07-K04-7-22-GM16

To use $\int_{\alpha}^{\beta}(x-\alpha)(x-\beta)dx$, the factors must have Which of the following is correct?:

A different roots

B the displayed roots (a,b)

C zero coefficients

D equal limits

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\,dx = a\int f\,dx + b\int g\,dx$$

FTC

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx}\int_a^x f(t)\,dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F05 | C07-K04-F05-VMCQ

Q042 | MCQ

C07-K04-7-22-GM17

The identity for the factored integral is:

A $(\beta-\alpha)^2/6$

B $-(\beta-\alpha)^3/6$

C $(\beta+\alpha)^3/6$

D 0

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n\,dx=\frac{x^{n+1}}{n+1}+C$$

Linearity

$$\int(af+bg)\,dx=a\int f\,dx+b\int g\,dx$$

FTC

$$\int_a^b f(x)\,dx=F(b)-F(a)$$

Limit rules

$$\int_a^b f=-\int_b^a f$$

Variable limit

$$\frac{d}{dx}\int_a^x f(t)\,dt=f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F05 | C07-K04-F05-VMCQ

Q043 | MCQ C07-K04-7-22-GM18

A minus sign before an integral can be removed by Which of the following is correct?:

A squaring the integrand

B reversing its limits

C adding C

D differentiating

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F06 | C07-K04-F06-VMCQ

Q044 | MCQ

C07-K04-7-23-GM19

In $f(x) = p(x) + \int_a^b f(t)dt$, the definite integral is:

A a function of x

B a constant

C always zero

D a derivative

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F06 | C07-K04-F06-VMCQ

Q045 | MCQ C07-K04-7-23-GM20

The best first step for an integral equation is to let Which of the following is correct?:

A $A = f(x)$

B $A = \int_a^b f(t)dt$

C $A = x$

D $A = C$ only

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F06 | C07-K04-F06-VMCQ

Q046 | MCQ

C07-K04-7-23-GM21

For the warm-up $f(x) = x^2 + \int_0^1 f(t)dt$, the constant integral is:

A $1/3$

B $-1/3$

C 0

D 1

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F07 | C07-K04-F07-VMCQ

Q047 | MCQ

C07-K04-7-24-GM22

$\frac{d}{dx}\int_a^x f(t)dt$ equals Which of the following is correct?:

A $f(a)$

B $f(x)$

C $F(x)$

D 0

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\,dx = a\int f\,dx + b\int g\,dx$$

FTC

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx}\int_a^x f(t)\,dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F07 | C07-K04-F07-VMCQ

Q048 | MCQ

C07-K04-7-24-GM23

When differentiating an integral, the dummy variable t is replaced by Which of the following is correct?:

A the lower limit

B the upper-limit variable

C C

D zero

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F07 | C07-K04-F07-VMCQ

Q049 | MCQ

C07-K04-7-24-GM24

If $\int_a^a f(t)dt = 0$, this can determine:

A the derivative

B the unknown lower limit a

C the integrand degree

D the upper limit

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F07 | C07-K04-F07-VMCQ

Q050 | MCQ

C07-K04-7-24-GM25

For $\int_3^x (2t^2 + 3t - 5)dt$, the derivative is:

A $2x^2 + 3x - 5$

B $2x^3 + 3x^2 - 5x$

C $3x^2 + 3x - 5$

D 0

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F01 | C07-K04-F01-VQUIZ

Quiz W1 | QUIZ WRITTEN C07-K04-Q-W01

Find $int(4x^3 - 6x + 2)dx$.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F02 | C07-K04-F02-VQUIZ

Quiz W2 | QUIZ WRITTEN C07-K04-Q-W02

Find $F(x)$ if $F'(x) = 2x - 5$ and $F(2) = 1$.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F04 | C07-K04-F04-VQUIZ

Quiz W3 | QUIZ WRITTEN

C07-K04-Q-W03

Evaluate $\int_{-1}^{2}(3x^2-4x+1)dx$.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n\,dx=\frac{x^{n+1}}{n+1}+C$$

Linearity

$$\int(af+bg)\,dx=a\int f\,dx+b\int g\,dx$$

FTC

$$\int_a^b f(x)\,dx=F(b)-F(a)$$

Limit rules

$$\int_a^b f=-\int_b^a f$$

Variable limit

$$\frac{d}{dx}\int_a^x f(t)\,dt=f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F06 | C07-K04-F06-VQUIZ

Quiz W4 | QUIZ WRITTEN C07-K04-Q-W04

Find $f(x)$ if $f(x) = x^2 + \int_0^1 f(t)dt$.

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F07 | C07-K04-F07-VQUIZ

Quiz M1 | QUIZ MCQ C07-K04-Q-M05

The derivative of $\int_0^x (3t^2+1)dt$ is:

A $3x^2+1$

B x^3+x

C $6x$

D 0

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af+bg)\,dx = a\int f\,dx + b\int g\,dx$$

FTC

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx}\int_a^x f(t)\,dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F01 | C07-K04-F01-VQUIZ

Quiz M2 | QUIZ MCQ C07-K04-Q-M06

A primitive of $5x^4$ is:

A $x^5 + C$

B $5x^5 + C$

C $20x^3 + C$

D $x^4/5 + C$

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F02 | C07-K04-F02-VQUIZ

Quiz M3 | QUIZ MCQ

C07-K04-Q-M07

For $F'(x) = 4x + 2$ and $F(0) = 3$, $F(x)$ is:

A $2x^2 + 2x + 3$

B $4x^2 + 2x + 3$

C $2x^2 + 2$

D $4x + 5$

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\, dx = a \int f \, dx + b \int g \, dx$$

FTC

$$\int_a^b f(x)\, dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$$

Concept 4 | Integration: Definite Integrals and Applications

F05 | C07-K04-F05-VQUIZ

Quiz M4 | QUIZ MCQ C07-K04-Q-M08

$\int_1^3 f(x)dx + \int_3^5 f(x)dx$ equals Which of the following is correct?:

A $\int_1^5 f(x)dx$

B $\int_1^3 f(x)dx$

C $\int_3^5 f(x)dx$

D 0

WORKING AREA

FORMULA BANK

Power rule

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$$

Linearity

$$\int (af + bg)\,dx = a\int f\,dx + b\int g\,dx$$

FTC

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

Limit rules

$$\int_a^b f = -\int_b^a f$$

Variable limit

$$\frac{d}{dx}\int_a^x f(t)\,dt = f(x)$$

EGYPTIAN BACCALAUREATE • 2026

MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 07

Differentiation and Integration

1 Concepts | 46 questions

B5 Landscape | one question per teaching page

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Chapter 07 | Differentiation and Integration

CLASSROOM ROUTE

Concept 5 | Applications of Integration to Geometry

46 questions

Official lessons: 7-25, 7-26, 7-27, 7-28, 7-29, 7-30

The Formula Bank changes at each Concept boundary.

Concept 5 | Applications of Integration to Geometry — **OFFICIAL LESSONS 7-25, 7-26, 7-27, 7-28, 7-29, 7-30**

Applications of Integration to Geometry

Equation-first recall | use the same rail beside every question in this Concept

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b \left(f(x) - g(x)\right)dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Start with the family cue, write the first move, then use the working grid.

Concept 5 | Applications of Integration to Geometry

F01 | V01

Q001 | WRITTEN

C07-K05-7-25-WU-A

Find the area bounded by $y = 2x^2 + 1$, the x-axis, $x = -2$, and $x = 1$.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F01 | V02

Q002 | WRITTEN

C07-K05-7-25-WU-B

Find the area bounded by $y = x^2 + x - 6$, the x-axis, $x = -2$, and $x = 1$.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F01 | V03

Q003 | WRITTEN

C07-K05-7-25-WU-C

Find the area bounded by $y = -x^2 + 4$ and the x-axis.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F01 | V04

Q004 | WRITTEN

C07-K05-7-25-CH

Find the area under $y = -x^2 - 2x + 3$ and above the x-axis.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F02 | V01

Q005 | WRITTEN

C07-K05-7-26-WU-A

Find the area between $y = x^2 - 2$ and $y = -2x + 1$.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F02 | V02

Q006 | WRITTEN

C07-K05-7-26-WU-B

Find the area between $y = x^2 + 2x - 4$ and $y = -x^2 + 2x + 4$.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F02 | V03

Q007 | WRITTEN

C07-K05-7-26-WU-C

Find the area between $y = -x^2 + 4x$ and $y = x$.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F02 | V04

Q008 | WRITTEN

C07-K05-7-26-CH

Find the area between $y = -x^2 + 8$ and $y = 2x$ for $-2 \leq x \leq 3$.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F03 | V01

Q009 | WRITTEN

C07-K05-7-27-WU

Find the area bounded by $y = x^3 - 5x^2 + 6x$ and the x-axis.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F03 | V02

Q010 | WRITTEN

C07-K05-7-27-CH

Find the area bounded by $y = -x^3 + 4x$ and the x-axis.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F03 | V03

Q011 | WRITTEN C07-K05-7-27-EX

Solve the given cubic area exercises by finding every x-intercept and adding the absolute signed pieces.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F04 | V01

Q012 | WRITTEN

C07-K05-7-28-WU-A

Evaluate $\int_{-2}^{1} |x+1| \, dx$.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F04 | V02

Q013 | WRITTEN

C07-K05-7-28-WU-B

Evaluate $\int_0^3 |x^2 - 4| \, dx$.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F04 | V03

Q014 | WRITTEN

C07-K05-7-28-CH

Evaluate $\int_0^2 |x^2 + 3x - 4| \ dx$.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F05 | V01

Q015 | WRITTEN

C07-K05-7-29-WU-A

Find the area bounded by $y = x^2 - x$ and its tangents at $(0,\ 0)$ and $(2,\ 2)$.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F05 | V02

Q016 | WRITTEN

C07-K05-7-29-WU-B

Find the area bounded by $y = x^3 + x^2 - 3x + 6$ and its tangent at $(1,\ 5)$.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F05 | V03

Q017 | WRITTEN

C07-K05-7-29-CH

For $y = x^2$, tangents through $(3,\ 8)$ touch at $x = 2,\ 4$. Find the enclosed area.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F06 | V01

Q018 | WRITTEN

C07-K05-7-30-WU

If $y = kx$ bisects the area under $y = 2x - x^2$ and above the x-axis, find k.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F06 | V02

Q019 | WRITTEN

C07-K05-7-30-EX

Solve the given bisection exercises for the given parabolas and lines, using the required area ratio.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F01 | C07-K05-F01-VMCQ

Q020 | MCQ

C07-K05-7-25-GM01

When the graph is below the x-axis, area is:

A the signed integral

B the negative of the integral

C always zero

D undefined

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F01 | C07-K05-F01-VMCQ

Q021 | MCQ C07-K05-7-25-GM02

A bounded area under a curve is found by first checking Which of the following is correct?:

A the graph and sign

B $onlythey - intercept$

C the font size

D the derivative only

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F01 | C07-K05-F01-VMCQ

Q022 | MCQ C07-K05-7-25-GM03

The area under $y = -x^2 + 4$ between its roots is:

A 8/3

B 16/3

C 32/3

D 64/3

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F02 | C07-K05-F02-VMCQ

Q023 | MCQ

C07-K05-7-26-GM04

Between two curves, the integrand is:

A *lower − upper*

B *upper − lower*

C product

D derivative

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F02 | C07-K05-F02-VMCQ

Q024 | MCQ C07-K05-7-26-GM05

If curves cross inside the interval, area must be Which of the following is correct?:

A split at the crossing

B ignored

C doubled always

D negative

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F02 | C07-K05-F02-VMCQ

Q025 | MCQ

C07-K05-7-26-GM06

The area between $y = x^2 - 2$ and $y = -2x + 1$ is:

A 16/3

B 32/3

C 64/3

D 9/2

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F03 | C07-K05-F03-VMCQ

Q026 | MCQ

C07-K05-7-27-GM07

For cubic area, the sign changes at Which of the following is correct?:

A every turning point

B $eachx - intercept$

C $they - interceptonly$

D the midpoint

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F03 | C07-K05-F03-VMCQ

Q027 | MCQ

C07-K05-7-27-GM08

The area for $y = -x^3 + 4x$ is:

A 4

B 6

C 8

D 12

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F03 | C07-K05-F03-VMCQ

Q028 | MCQ C07-K05-7-27-GM09

A negative lobe contributes Which of the following is correct?:

A negative area

B positive absolute area

C no area

D a derivative

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F04 | C07-K05-F04-VMCQ

Q029 | MCQ

C07-K05-7-28-GM10

For an absolute-value integral, first locate:

A the roots

B the vertex only

C $they-axis$

D the tangent

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F04 | C07-K05-F04-VMCQ

Q030 | MCQ

C07-K05-7-28-GM11

The value of $\int_0^2 |x^2+3x-4| dx$ is:

A 3

B 4

C 5

D 6

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F04 | C07-K05-F04-VMCQ

Q031 | MCQ C07-K05-7-28-GM12

If f changes sign at c, split the integral Which of the following is correct?:

A at c

B at 0 only

C never

D after doubling

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F05 | C07-K05-F05-VMCQ

Q032 | MCQ

C07-K05-7-29-GM13

A tangent line at x=a has slope Which of the following is correct?:

A f(a)

B f'(a)

C a^2

D the area

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F05 | C07-K05-F05-VMCQ

Q033 | MCQ

C07-K05-7-29-GM14

For two tangent lines, split at their Which of the following is correct?:

A $intersectionx - coordinate$

B $y - interceptonly$

C vertex only

D origin

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F05 | C07-K05-F05-VMCQ

Q034 | MCQ

C07-K05-7-29-GM15

The area in the given parabola-tangent Warm Up is:

A 1/2

B 1

C 3/2

D 3

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F06 | C07-K05-F06-VMCQ

Q035 | MCQ C07-K05-7-30-GM16

Bisection means each part has Which of the following is correct?:

A the same area

B the same slope

C the same root

D zero area

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F06 | C07-K05-F06-VMCQ

Q036 | MCQ

C07-K05-7-30-GM17

For $y=2x-x^2$, the total area above the x-axis is:

A 1

B 2

C 3

D 4

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F06 | C07-K05-F06-VMCQ

Q037 | MCQ

C07-K05-7-30-GM18

The line y=kx must satisfy the stated Which of the following is correct?:

A area ratio

B font ratio

C root count

D period

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F06 | C07-K05-F06-VMCQ

Q038 | MCQ

C07-K05-7-30-GM19

In a bisection problem, the cut-off area is:

A the total area

B half the total area

C twice the total area

D zero

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F01 | C07-K05-F01-VQUIZ

Quiz M1 | QUIZ MCQ C07-K05-Q-M01

The area under $y = -x^2 + 4$ and above the x-axis is:

A 16/3

B 8

C 32/3

D 64/3

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F02 | C07-K05-F02-VQUIZ

Quiz M2 | QUIZ MCQ C07-K05-Q-M02

The area between $y = x^2 - 2$ and $y = -2x + 1$ is:

A 16/3

B 32/3

C 64/3

D 9/2

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F04 | C07-K05-F04-VQUIZ

Quiz M3 | QUIZ MCQ

C07-K05-Q-M03

Evaluate $\int_{-2}^{1} |x+1|\,dx$:

A 2

B 5/2

C 3

D 7/2

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F05 | C07-K05-F05-VQUIZ

Quiz M4 | QUIZ MCQ C07-K05-Q-M04

The area enclosed by $y = x^2$ and tangents through $(3, 8)$ is:

A 1/3

B 1/2

C 2/3

D 4/3

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F03 | C07-K05-F03-VQUIZ

Quiz W1 | QUIZ WRITTEN C07-K05-Q-W01

Find the area bounded by $y = x^3 - 5x^2 + 6x$ and the x-axis.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F04 | C07-K05-F04-VQUIZ

Quiz W2 | QUIZ WRITTEN C07-K05-Q-W02

Evaluate $\int_0^2 |x^2 + 3x - 4| \ dx$.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F05 | C07-K05-F05-VQUIZ

Quiz W3 | QUIZ WRITTEN C07-K05-Q-W03

Find the area bounded by $y = x^2 - x$ and its tangents at $(0,\ 0)$ and $(2,\ 2)$.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

Concept 5 | Applications of Integration to Geometry

F06 | C07-K05-F06-VQUIZ

Quiz W4 | QUIZ WRITTEN C07-K05-Q-W04

If $y = kx$ bisects the area under $y = 2x - x^2$, find k.

WORKING AREA

FORMULA BANK

Area under a curve

$$S = \int_a^b f(x)\,dx$$

Area between curves

$$S = \int_a^b (f(x) - g(x))\,dx$$

Absolute value

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) < 0 \end{cases}$$

Tangent line

$$y - y_1 = f'(x_1)(x - x_1)$$

Bisection of area

$$\int_a^k f(x)\,dx = \frac{1}{2}\int_a^b f(x)\,dx$$

EGYPTIAN BACCALAUREATE • 2026

MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 08

Statistical Inference

1 Concepts | 50 questions

B5 Landscape | one question per teaching page

Eng Eslam Ahmed

Assistant Lecturer • Faculty of Engineering • Cairo University

01120009622

Chapter 08 | Statistical Inference

CLASSROOM ROUTE

Concept 1 | Fundamentals of Random Variables

50 questions

Official lessons: 8-1, 8-2, 8-3, 8-4, 8-5, 8-6, 8-7

The Formula Bank changes at each Concept boundary.

Concept 1 | Fundamentals of Random Variables — **OFFICIAL LESSONS 8-1, 8-2, 8-3, 8-4, 8-5, 8-6, 8-7**

Fundamentals of Random Variables

Equation-first recall | use the same rail beside every question in this Concept

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Start with the family cue, write the first move, then use the working grid.

Concept 1 | Fundamentals of Random Variables

F01 | V01

Q001 | WRITTEN

C08-K01-8-1-WU

For the sum of two dice, construct the probability distribution and find P5 <= X <= 8.

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F01 | V02

Q002 | WRITTEN

C08-K01-8-1-TRY

Find the probability distributions for the absolute difference of two dice and the number of white balls drawn from the stated bag; evaluate the requested interval probabilities.

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F01 | V03

Q003 | WRITTEN C08-K01-8-1-EX

Construct both given probability tables (four coins; three balls from 4 red and 2 blue) and evaluate the given ranges.

WORKING AREA

FORMULA BANK

Distribution
$$\sum P(X = x) = 1$$

Mean
$$E(X) = \sum xP(X = x)$$

Variance
$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation
$$\sigma(X) = \sqrt{V(X)}$$

Transformation
$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F02 | V01

Q004 | WRITTEN

C08-K01-8-2-WU

Find EX for tails in four coins and for red balls in a draw of three from a bag with 4 red and 5 white.

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F02 | V02

Q005 | WRITTEN

C08-K01-8-2-TRY

Find expected values for tails in three coins, the absolute difference of two dice, and white balls in the stated bag.

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F02 | V03

Q006 | WRITTEN C08-K01-8-2-EX

Find EX for all six given random-variable experiments (cards, dice, balls, tickets, coins and repeated die rolls).

WORKING AREA

FORMULA BANK

Distribution
$$\sum P(X = x) = 1$$

Mean
$$E(X) = \sum xP(X = x)$$

Variance
$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation
$$\sigma(X) = \sqrt{V(X)}$$

Transformation
$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F03 | V01

Q007 | WRITTEN

C08-K01-8-3-WU

For tails in four fair coins, find E(3X+2), E(-4X+1), and EX^2.

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$$

Concept 1 | Fundamentals of Random Variables

F03 | V02

Q008 | WRITTEN

C08-K01-8-3-TRY

For white balls drawn from 4 red and 3 white, find the four requested transformed expected values.

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$$

Concept 1 | Fundamentals of Random Variables

F03 | V03

Q009 | WRITTEN C08-K01-8-3-EX

Solve both given Exercise groups of transformed expectations for coins and for balls.

WORKING AREA

FORMULA BANK

Distribution
$$\sum P(X = x) = 1$$

Mean
$$E(X) = \sum xP(X = x)$$

Variance
$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation
$$\sigma(X) = \sqrt{V(X)}$$

Transformation
$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F04 | V01

Q010 | WRITTEN

C08-K01-8-4-WU

For black balls drawn from the stated box, find EX and VX.

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F04 | V02

Q011 | WRITTEN

C08-K01-8-4-TRY

Find the mean and variance for the two given Try random variables (a numbered card and winning tickets).

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F04 | V03

Q012 | WRITTEN

C08-K01-8-4-EX

Find EX and VX for all five given Exercise random variables.

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F05 | V01

Q013 | WRITTEN C08-K01-8-5-WU

Find the standard deviation of tails when two biased coins have P(head)=4/7 and P(tail)=3/7.

WORKING AREA

FORMULA BANK

Distribution
$$\sum P(X = x) = 1$$

Mean
$$E(X) = \sum xP(X = x)$$

Variance
$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation
$$\sigma(X) = \sqrt{V(X)}$$

Transformation
$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F05 | V02

Q014 | WRITTEN

C08-K01-8-5-TRY

Find the standard deviation from each given probability table and for white balls drawn from 4 red and 3 white.

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F05 | V03

Q015 | WRITTEN C08-K01-8-5-EX

Find the standard deviation for both given probability-table exercises.

WORKING AREA

FORMULA BANK

Distribution
$$\sum P(X = x) = 1$$

Mean
$$E(X) = \sum xP(X = x)$$

Variance
$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation
$$\sigma(X) = \sqrt{V(X)}$$

Transformation
$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F06 | V01

Q016 | WRITTEN

C08-K01-8-6-WU

For the number of winning tickets in the given draw, find VY and sigma$Y$ for Y=2X+1 and Y=-3X-2.

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F06 | V02

Q017 | WRITTEN

C08-K01-8-6-TRY

For red balls drawn from the stated bag, find variance and standard deviation for the three linear transformations of X.

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F06 | V03

Q018 | WRITTEN

C08-K01-8-6-EX

For a single die, find VY and sigma$Y$ for Y=X+2, Y=3X+1 and Y=-2X+4.

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F07 | V01

Q019 | WRITTEN

C08-K01-8-7-WU

Solve the two given transformation problems: a net prize after an entry fee, and finding a, b from E(aX+b)=7/3 and sigma(aX+b)=3.

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$$

Concept 1 | Fundamentals of Random Variables

F07 | V02

Q020 | WRITTEN

C08-K01-8-7-TRY

Solve the two given Try problems involving net winnings and determining a, b for a die transformation.

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F07 | V03

Q021 | WRITTEN C08-K01-8-7-EX

Solve all four given transformation exercises, including the number-line coin walk, games, and the calibrated die model.

WORKING AREA

FORMULA BANK

Distribution
$$\sum P(X = x) = 1$$

Mean
$$E(X) = \sum xP(X = x)$$

Variance
$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation
$$\sigma(X) = \sqrt{V(X)}$$

Transformation
$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F01 | C08-K01-F01-VMCQ

Q022 | MCQ C08-K01-8-1-GM01

A probability distribution must have probabilities that sum to Which of the following is correct?:

A 0

B 1

C the number of outcomes

D the mean

WORKING AREA

FORMULA BANK

Distribution
$$\sum P(X = x) = 1$$

Mean
$$E(X) = \sum xP(X = x)$$

Variance
$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation
$$\sigma(X) = \sqrt{V(X)}$$

Transformation
$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F01 | C08-K01-F01-VMCQ

Q023 | MCQ C08-K01-8-1-GM02

For two fair dice, $PX = 2$ is:

A 1/6

B 1/36

C 2/36

D 0

WORKING AREA

FORMULA BANK

Distribution
$$\sum P(X = x) = 1$$

Mean
$$E(X) = \sum xP(X = x)$$

Variance
$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation
$$\sigma(X) = \sqrt{V(X)}$$

Transformation
$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F01 | C08-K01-F01-VMCQ

Q024 | MCQ C08-K01-8-1-GM03

The number of heads in three coins can be Which of the following is correct?:

A 1,2,3

B 0,1,2,3

C 0,3 only

D any integer

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F02 | C08-K01-F02-VMCQ

Q025 | MCQ C08-K01-8-2-GM04

The expected value is calculated as:

A sum P$X = x$

B sum xP$X = x$

C largest x

D variance squared

WORKING AREA

FORMULA BANK

Distribution
$$\sum P(X = x) = 1$$

Mean
$$E(X) = \sum xP(X = x)$$

Variance
$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation
$$\sigma(X) = \sqrt{V(X)}$$

Transformation
$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F02 | C08-K01-F02-VMCQ

Q026 | MCQ C08-K01-8-2-GM05

The mean number of tails in four fair coins is:

A 1

B 2

C 3

D 4

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F02 | C08-K01-F02-VMCQ

Q027 | MCQ C08-K01-8-2-GM06

For a fair die, EX is:

A 3

B 3.5

C 4

D 6

WORKING AREA

FORMULA BANK

Distribution
$$\sum P(X = x) = 1$$

Mean
$$E(X) = \sum xP(X = x)$$

Variance
$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation
$$\sigma(X) = \sqrt{V(X)}$$

Transformation
$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F03 | C08-K01-F03-VMCQ

Q028 | MCQ C08-K01-8-3-GM07

E(aX+b) equals Which of the following is correct?:

A aEX

B aEX+b

C EX+b only

D a+b

WORKING AREA

FORMULA BANK

Distribution
$$\sum P(X = x) = 1$$

Mean
$$E(X) = \sum xP(X = x)$$

Variance
$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation
$$\sigma(X) = \sqrt{V(X)}$$

Transformation
$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F03 | C08-K01-F03-VMCQ

Q029 | MCQ

C08-K01-8-3-GM08

In general, EX^2 is:

A $E[X]^2$

B equal to EX

C a weighted square sum

D always zero

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F03 | C08-K01-F03-VMCQ

Q030 | MCQ

C08-K01-8-3-GM09

If EX=2, then E(3X+2) is:

A 6

B 8

C 10

D 12

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$$

Concept 1 | Fundamentals of Random Variables

F04 | C08-K01-F04-VMCQ

Q031 | MCQ

C08-K01-8-4-GM10

The variance identity is:

A $E[X] - E[X^2]$

B $E[X^2] - E[X]^2$

C $E[X]^2$

D sqrt V

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F04 | C08-K01-F04-VMCQ

Q032 | MCQ C08-K01-8-4-GM11

Variance can never be Which of the following is correct?:

A positive

B zero

C negative

D fractional

WORKING AREA

FORMULA BANK

Distribution
$$\sum P(X = x) = 1$$

Mean
$$E(X) = \sum xP(X = x)$$

Variance
$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation
$$\sigma(X) = \sqrt{V(X)}$$

Transformation
$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F04 | C08-K01-F04-VMCQ

Q033 | MCQ C08-K01-8-4-GM12

The first step in a variance problem is to Which of the following is correct?:

A draw the distribution

B take a square root

C ignore probabilities

D add the values

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F05 | C08-K01-F05-VMCQ

Q034 | MCQ

C08-K01-8-5-GM13

Standard deviation is:

A VX

B sqrt$V(X)$

C VX squared

D EX

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F05 | C08-K01-F05-VMCQ

Q035 | MCQ C08-K01-8-5-GM14

Standard deviation has units Which of the following is correct?:

A squared units

B the same units as X

C no units

D units cubed

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F06 | C08-K01-F06-VMCQ

Q036 | MCQ

C08-K01-8-6-GM15

V(aX+b) equals Which of the following is correct?:

A aVX+b

B a squared times VX

C |a|VX

D VX+b

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F06 | C08-K01-F06-VMCQ

Q037 | MCQ C08-K01-8-6-GM16

sigma(aX+b) equals Which of the following is correct?:

A a sigma$X$

B |a| sigma$X$

C a squared sigma$X$

D sigma$X$+b

WORKING AREA

FORMULA BANK

Distribution
$$\sum P(X = x) = 1$$

Mean
$$E(X) = \sum xP(X = x)$$

Variance
$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation
$$\sigma(X) = \sqrt{V(X)}$$

Transformation
$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F06 | C08-K01-F06-VMCQ

Q038 | MCQ

C08-K01-8-6-GM17

For Y=X+3, the variance is:

A $\mathrm{V}X+3$

B $\mathrm{V}X$

C $3\mathrm{V}X$

D $9\mathrm{V}X$

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F07 | C08-K01-F07-VMCQ

Q039 | MCQ C08-K01-8-7-GM18

A net prize after a fixed fee is modeled as Which of the following is correct?:

A Y=X+b

B Y=aX+b

C $Y = X^2$

D Y=a+b only

WORKING AREA

FORMULA BANK

Distribution
$$\sum P(X = x) = 1$$

Mean
$$E(X) = \sum xP(X = x)$$

Variance
$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation
$$\sigma(X) = \sqrt{V(X)}$$

Transformation
$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F07 | C08-K01-F07-VMCQ

Q040 | MCQ

C08-K01-8-7-GM19

If a>0 and sigma(aX+b)=3, then a is:

A 3 sigma$X$

B 3/sigma$X$

C sigma$X$/3

D 3+b

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F07 | C08-K01-F07-VMCQ

Q041 | MCQ C08-K01-8-7-GM20

Changing b in aX+b changes Which of the following is correct?:

A variance only

B standard deviation only

C the mean only

D nothing

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$$

Concept 1 | Fundamentals of Random Variables

F04 | C08-K01-F04-VMCQ

Q042 | MCQ

C08-K01-8-4-GM21

If $EX=2$ and $EX^2=7$, then VX is:

A 3

B 5

C 7

D 9

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X=x)=1$$

Mean

$$E(X)=\sum xP(X=x)$$

Variance

$$V(X)=E(X^2)-[E(X)]^2$$

Standard deviation

$$\sigma(X)=\sqrt{V(X)}$$

Transformation

$$E(aX+b)=aE(X)+b \quad V(aX+b)=a^2V(X)$$

Concept 1 | Fundamentals of Random Variables

F02 | C08-K01-F02-VQUIZ

Quiz W1 | QUIZ WRITTEN C08-K01-Q-W01

Find EX and VX for the number of heads in three fair coins.

WORKING AREA

FORMULA BANK

Distribution
$$\sum P(X = x) = 1$$

Mean
$$E(X) = \sum xP(X = x)$$

Variance
$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation
$$\sigma(X) = \sqrt{V(X)}$$

Transformation
$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F06 | C08-K01-F06-VQUIZ

Quiz W2 | QUIZ WRITTEN C08-K01-Q-W02

For Y=4X-1 with VX=2, find VY and sigma$Y$.

WORKING AREA

FORMULA BANK

Distribution
$$\sum P(X = x) = 1$$

Mean
$$E(X) = \sum xP(X = x)$$

Variance
$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation
$$\sigma(X) = \sqrt{V(X)}$$

Transformation
$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F03 | C08-K01-F03-VQUIZ

Quiz W3 | QUIZ WRITTEN C08-K01-Q-W03

For a fair die, find E(2X+5).

WORKING AREA

FORMULA BANK

Distribution
$$\sum P(X = x) = 1$$

Mean
$$E(X) = \sum xP(X = x)$$

Variance
$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation
$$\sigma(X) = \sqrt{V(X)}$$

Transformation
$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F07 | C08-K01-F07-VQUIZ

Quiz W4 | QUIZ WRITTEN C08-K01-Q-W04

If sigma$X$=2 and EX=3, find sigma(-5X+7).

WORKING AREA

FORMULA BANK

Distribution
$$\sum P(X = x) = 1$$

Mean
$$E(X) = \sum xP(X = x)$$

Variance
$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation
$$\sigma(X) = \sqrt{V(X)}$$

Transformation
$$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$$

Concept 1 | Fundamentals of Random Variables

F06 | C08-K01-F06-VQUIZ

Quiz M1 | QUIZ MCQ C08-K01-Q-M05

If VX=5, V(3X+1) is:

A 5

B 8

C 15

D 45

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F02 | C08-K01-F02-VQUIZ

Quiz M2 | QUIZ MCQ C08-K01-Q-M06

For a fair die EX is:

A 2.5

B 3

C 3.5

D 4

WORKING AREA

FORMULA BANK

Distribution
$$\sum P(X = x) = 1$$

Mean
$$E(X) = \sum xP(X = x)$$

Variance
$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation
$$\sigma(X) = \sqrt{V(X)}$$

Transformation
$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F01 | C08-K01-F01-VQUIZ

Quiz M3 | QUIZ MCQ C08-K01-Q-M07

A probability table total must be Which of the following is correct?:

A 0

B 1

C 2

D the mean

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$

Concept 1 | Fundamentals of Random Variables

F07 | C08-K01-F07-VQUIZ

Quiz M4 | QUIZ MCQ

C08-K01-Q-M08

If sigma$X$=4, sigma(X-9) is:

A 0

B 4

C 13

D 16

WORKING AREA

FORMULA BANK

Distribution

$$\sum P(X = x) = 1$$

Mean

$$E(X) = \sum xP(X = x)$$

Variance

$$V(X) = E(X^2) - [E(X)]^2$$

Standard deviation

$$\sigma(X) = \sqrt{V(X)}$$

Transformation

$$E(aX + b) = aE(X) + b \quad V(aX + b) = a^2V(X)$$

EGYPTIAN BACCALAUREATE • 2026

MATHEMATICS

CLASSROOM WORKING EDITION

Chapter 08

Statistical Inference

1 Concepts | 58 questions

B5 Landscape | one question per teaching page

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Chapter 08 | Statistical Inference CLASSROOM ROUTE

Concept 2 | Expected Value and Variance of Multiple Variables — 58 questions

Official lessons: 8-8, 8-9, 8-10, 8-11, 8-12

The Formula Bank changes at each Concept boundary.

Concept 2 | Expected Value and Variance of Multiple Variables OFFICIAL LESSONS 8-8, 8-9, 8-10, 8-11, 8-12

Expected Value and Variance of Multiple Variables

Equation-first recall | use the same rail beside every question in this Concept

Sum

$$E(X+Y)=E(X)+E(Y)$$

Linear combination

$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product

$$E(XY)=E(X)E(Y)$$

Variance of a sum

$$V(X+Y)=V(X)+V(Y)$$

Three variables

$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Start with the family cue, write the first move, then use the working grid.

Concept 2 | Expected Value and Variance of Multiple Variables

F01 | V01

Q001 | WRITTEN C08-K02-8-8-WU

Given the probability distributions of X and Y in the given tables, find E(X+Y).

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$$E(XYZ)=E(X)E(Y)E(Z) \quad V(X+Y+Z)=V(X)+V(Y)+V(Z)$$

Concept 2 | Expected Value and Variance of Multiple Variables

F01 | V02

Q002 | WRITTEN C08-K02-8-8-COIN

Three coins are tossed once; let X, Y and Z be the head indicators. Find E(X+Y+Z).

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F01 | V03

Q003 | WRITTEN

C08-K02-8-8-TRY

For the two given tables with X=1, 2, 3 and Y=4, 5, 6, find E(X+Y).

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F01 | V04

Q004 | WRITTEN

C08-K02-8-8-EX

For the two bags in the given exercise, find the expected total number of red balls drawn.

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$$E(XYZ)=E(X)E(Y)E(Z) \quad V(X+Y+Z)=V(X)+V(Y)+V(Z)$$

Concept 2 | Expected Value and Variance of Multiple Variables

F01 | V05

Q005 | WRITTEN

C08-K02-8-8-CH

Three independent subsystems each receive two signals with success probability 0.5. Find E(X+Y+Z).

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F02 | V01

Q006 | WRITTEN C08-K02-8-9-WU

Two 500-point coins and three 100-point coins are tossed. Find the expected total score Z.

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$$E(XYZ)=E(X)E(Y)E(Z) \quad V(X+Y+Z)=V(X)+V(Y)+V(Z)$$

Concept 2 | Expected Value and Variance of Multiple Variables

F02 | V02

Q007 | WRITTEN

C08-K02-8-9-TRY

Two 500-point coins and two 100-point coins are tossed. Find EZ.

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F02 | V03

Q008 | WRITTEN

C08-K02-8-9-DICE

A die is thrown twice and the score is Z=3X+5Y. Find EZ.

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F02 | V04

Q009 | WRITTEN C08-K02-8-9-EX

For three 100-point coins and one 50-point coin, find the expected score from heads.

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F02 | V05

Q010 | WRITTEN C08-K02-8-9-CH

In two independent raffles, buy two tickets from a 2/10 winner raffle and two from a 1/6 winner raffle. Find the expected prizes.

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F03 | V01

Q011 | WRITTEN

C08-K02-8-10-WU

Three coins are tossed and a die is rolled; X is heads and Y is the die score. Find E(XY).

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F03 | V02

Q012 | WRITTEN

C08-K02-8-10-TRY

For independent X with probabilities 2/5, 2/5, 1/5 at 1, 2, 3 and Y uniform on 2, 4, 6, find E(XY).

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F03 | V03

Q013 | WRITTEN

C08-K02-8-10-EX

Ahmed tosses three coins and Mohamed tosses two coins. Let X and Y be their head counts. Find E(XY).

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F03 | V04

Q014 | WRITTEN

C08-K02-8-10-CH

A card numbered 1 to 4 is replaced and a second card is drawn. Find E(XY).

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F03 | V05

Q015 | WRITTEN

C08-K02-8-10-EX2

For independent X and Y with EX=1 and EY=2/7, find E(XY).

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F04 | V01

Q016 | WRITTEN

C08-K02-8-11-WU

A card X is drawn from 1, 2, 3 and three-coin heads Y is independent. Find V(X+Y) and sigma(X+Y).

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F04 | V02

Q017 | WRITTEN

C08-K02-8-11-DICE

Two independent dice are thrown. Find the variance and standard deviation of their sum.

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F04 | V03

Q018 | WRITTEN

C08-K02-8-11-EX1

An independent coin head count X and die score Y are combined. Find V(X+Y) and sigma(X+Y).

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$$E(XYZ)=E(X)E(Y)E(Z) \quad V(X+Y+Z)=V(X)+V(Y)+V(Z)$$

Concept 2 | Expected Value and Variance of Multiple Variables

F04 | V04

Q019 | WRITTEN

C08-K02-8-11-EX2

Ahmed tosses two coins and Mohamed tosses three coins. Find the variance of the total head count.

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F04 | V05

Q020 | WRITTEN

C08-K02-8-11-CH

Independent X is uniform on 1 to 4 and Y on 1 to 6. Find V(X+Y) and sigma(X+Y).

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F05 | V01

Q021 | WRITTEN C08-K02-8-12-WU

Three independent special dice take values 2, 4, 6 equally. Find E(XYZ) and V(X+Y+Z).

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F05 | V02

Q022 | WRITTEN

C08-K02-8-12-TRY

Three independent dice take values 1, 3, 5 equally. Find E(XYZ) and V(X+Y+Z).

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F05 | V03

Q023 | WRITTEN C08-K02-8-12-EX

Three ordinary dice are thrown. Find the expected product and the variance of their sum.

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F05 | V04

Q024 | WRITTEN

C08-K02-8-12-CH

Three friends have 5, 4 and 3 independent rolls to score a six. Find E(XYZ) and V(X+Y+Z).

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F05 | V05

Q025 | WRITTEN

C08-K02-8-12-EX2

If X, Y and Z are independent head counts from 4, 3 and 2 fair coins, find E(XYZ).

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$$E(XYZ)=E(X)E(Y)E(Z) \quad V(X+Y+Z)=V(X)+V(Y)+V(Z)$$

Concept 2 | Expected Value and Variance of Multiple Variables

F01 | C08-K02-F01-VMCQ

Q026 | MCQ

C08-K02-8-8-GM01

E(X+Y) equals Which of the following is correct?:

A EX-EY

B EX+EY

C $EXEY$

D EX/EY

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F01 | C08-K02-F01-VMCQ

Q027 | MCQ C08-K02-8-8-GM02

For three variables, E(X+Y+Z) equals Which of the following is correct?:

A $EXEYEZ$

B $EX+EY+EZ$

C $EX-EY-EZ$

D 0

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F01 | C08-K02-F01-VMCQ

Q028 | MCQ C08-K02-8-8-GM03

The expected heads in one fair coin toss is:

A 0

B 1/2

C 1

D 2

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F01 | C08-K02-F01-VMCQ

Q029 | MCQ C08-K02-8-8-GM04

For two signals with p=0.5, EX is:

A 0.5

B 1

C 2

D 4

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F01 | C08-K02-F01-VMCQ

Q030 | MCQ

C08-K02-8-8-GM05

If $EX=2$ and $EY=5$, E(X+Y) is:

A 3

B 7

C 10

D 25

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F02 | C08-K02-F02-VMCQ

Q031 | MCQ

C08-K02-8-9-GM06

E(aX+bY) equals Which of the following is correct?:

A aEX+bEY

B abE(XY)

C EX+EY

D $a+b$

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F02 | C08-K02-F02-VMCQ

Q032 | MCQ C08-K02-8-9-GM07

The expected score of one fair 100-point coin is:

A 25

B 50

C 100

D 200

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F02 | C08-K02-F02-VMCQ

Q033 | MCQ C08-K02-8-9-GM08

For a fair die, E(3X+5Y) with two rolls is:

A 14

B 21

C 28

D 35

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F02 | C08-K02-F02-VMCQ

Q034 | MCQ

C08-K02-8-9-GM09

A fixed entry fee changes Which of the following is correct?:

A variance only

B the mean only

C neither mean nor variance

D standard deviation only

WORKING AREA

FORMULA BANK

Sum

$$E(X+Y)=E(X)+E(Y)$$

Linear combination

$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product

$$E(XY)=E(X)E(Y)$$

Variance of a sum

$$V(X+Y)=V(X)+V(Y)$$

Three variables

$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F02 | C08-K02-F02-VMCQ

Q035 | MCQ C08-K02-8-9-GM10

The expected number of winners in 2 of 10 tickets with 2 winners is:

A 1/5

B 2/5

C 1/2

D 4/5

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F03 | C08-K02-F03-VMCQ

Q036 | MCQ

C08-K02-8-10-GM11

E(XY)=E*X*E*Y* requires Which of the following is correct?:

A $X = Y$

B independence

C zero means

D equal variances

WORKING AREA

FORMULA BANK

Sum
$$E(X + Y) = E(X) + E(Y)$$

Linear combination
$$E(aX + bY) = aE(X) + bE(Y)$$

Independent product
$$E(XY) = E(X)E(Y)$$

Variance of a sum
$$V(X + Y) = V(X) + V(Y)$$

Three variables
$$E(XYZ) = E(X)E(Y)E(Z) \quad V(X + Y + Z) = V(X) + V(Y) + V(Z)$$

Concept 2 | Expected Value and Variance of Multiple Variables

F03 | C08-K02-F03-VMCQ

Q037 | MCQ

C08-K02-8-10-GM12

For three fair coins, EX is:

A 1/2

B 1

C 3/2

D 3

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F03 | C08-K02-F03-VMCQ

Q038 | MCQ

C08-K02-8-10-GM13

For a fair die, EY is:

A 2.5

B 3

C 3.5

D 6

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F03 | C08-K02-F03-VMCQ

Q039 | MCQ C08-K02-8-10-GM14

With replacement, two card draws are:

A dependent

B independent

C identical outcomes

D impossible

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F03 | C08-K02-F03-VMCQ

Q040 | MCQ

C08-K02-8-10-GM15

If $EX=2$ and $EY=3$ for independent variables, E(XY) is:

A 5

B 6

C 1

D 9

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F04 | C08-K02-F04-VMCQ

Q041 | MCQ

C08-K02-8-11-GM16

For independent X,Y, V(X+Y) equals Which of the following is correct?:

A VX-VY

B VX+VY

C $VXVY$

D 0

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F04 | C08-K02-F04-VMCQ

Q042 | MCQ

C08-K02-8-11-GM17

The variance of a fair die is:

A 7/2

B 35/12

C 35/6

D 1/4

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F04 | C08-K02-F04-VMCQ

Q043 | MCQ

C08-K02-8-11-GM18

Sigma(X+Y) is:

A $V(X+Y)$

B sqrt$V(X+Y)$

C $VX+VY$

D $E(X+Y)$

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F04 | C08-K02-F04-VMCQ

Q044 | MCQ

C08-K02-8-11-GM19

The variance of the sum of two independent fair dice is:

A 35/12

B 35/6

C 70/6

D 49/4

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F04 | C08-K02-F04-VMCQ

Q045 | MCQ C08-K02-8-11-GM20

For independent sums, a constant shift changes Which of the following is correct?:

A variance

B standard deviation

C neither spread measure

D both spread measures

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F05 | C08-K02-F05-VMCQ

Q046 | MCQ

C08-K02-8-12-GM21

For independent X,Y,Z, E(XYZ) equals Which of the following is correct?:

A $EX+EY+EZ$

B $EXEYEZ$

C 0

D $E(XY)+EZ$

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F05 | C08-K02-F05-VMCQ

Q047 | MCQ C08-K02-8-12-GM22

For independent X,Y,Z, V(X+Y+Z) equals Which of the following is correct?:

A $VXVYVZ$

B $VX+VY+VZ$

C $VX-VY-VZ$

D 0

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F05 | C08-K02-F05-VMCQ

Q048 | MCQ C08-K02-8-12-GM23

For a binomial count with n=5 and p=1/6, EX is:

A 1/6

B 5/6

C 5/36

D 6

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F05 | C08-K02-F05-VMCQ

Q049 | MCQ

C08-K02-8-12-GM24

For three values 2,4,6 equally likely, EX is:

A 2

B 3

C 4

D 6

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F05 | C08-K02-F05-VMCQ

Q050 | MCQ

C08-K02-8-12-GM25

For three independent fair dice, V(sum) is:

A 35/12

B 35/6

C 35/4

D 343/8

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F01 | C08-K02-F01-VQUIZ

Quiz W1 | QUIZ WRITTEN C08-K02-Q-W01

If EX=4 and EY=7, find E(3X-2Y).

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F03 | C08-K02-F03-VQUIZ

Quiz W2 | QUIZ WRITTEN C08-K02-Q-W02

For independent variables with $EX=2$ and $EY=5$, find $E(XY)$.

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F04 | C08-K02-F04-VQUIZ

Quiz W3 | QUIZ WRITTEN C08-K02-Q-W03

Two independent fair dice are thrown. Find V(X+Y) and sigma(X+Y).

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$$E(XYZ)=E(X)E(Y)E(Z) \quad V(X+Y+Z)=V(X)+V(Y)+V(Z)$$

Concept 2 | Expected Value and Variance of Multiple Variables

F05 | C08-K02-F05-VQUIZ

Quiz W4 | QUIZ WRITTEN C08-K02-Q-W04

Three independent Binomial counts have (n, p)=(2, 1/2), (3, 1/2), (4, 1/2). Find V(X+Y+Z).

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F02 | C08-K02-F02-VQUIZ

Quiz M1 | QUIZ MCQ C08-K02-Q-M05

If EX=3 and EY=4, E(2X+Y) is:

A 7

B 10

C 14

D 24

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F03 | C08-K02-F03-VQUIZ

Quiz M2 | QUIZ MCQ C08-K02-Q-M06

For independent variables $EX=2$, $EY=5$, $E(XY)$ is:

A 7

B 10

C 25

D 1/2

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F04 | C08-K02-F04-VQUIZ

Quiz M3 | QUIZ MCQ C08-K02-Q-M07

For two independent die rolls, V(X+Y) is:

A 35/12

B 35/6

C 35/4

D 7/2

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$E(XYZ)=E(X)E(Y)E(Z)$ $V(X+Y+Z)=V(X)+V(Y)+V(Z)$

Concept 2 | Expected Value and Variance of Multiple Variables

F05 | C08-K02-F05-VQUIZ

Quiz M4 | QUIZ MCQ C08-K02-Q-M08

For three independent variables, V(X+Y+Z) is:

A the product of variances

B the sum of variances

C the sum of means

D always zero

WORKING AREA

FORMULA BANK

Sum
$$E(X+Y)=E(X)+E(Y)$$

Linear combination
$$E(aX+bY)=aE(X)+bE(Y)$$

Independent product
$$E(XY)=E(X)E(Y)$$

Variance of a sum
$$V(X+Y)=V(X)+V(Y)$$

Three variables
$$E(XYZ)=E(X)E(Y)E(Z) \quad V(X+Y+Z)=V(X)+V(Y)+V(Z)$$