Elite Mathematics
Pearson Edexcel International GCSE

IGCSE LINEAR · 4MA1

4MA1/1HR June 2025 Worked Solutions

June 2025 paper rebuilt with the worked solution after each question.

26	2020–2026	Single-paper solutions
paper questions	52 past papers	checked by Dr Eslam



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PAST PAPER

4MA1/1HR June 2025

June 2025

26	100	2 h
questions	marks	exam time

Each question is followed by its worked solution and final answer.

4MA1/1HR JUNE 2025

Question 1

2 marks | Prime Factors, HCF & LCM

1 Find the lowest common multiple (LCM) of 45 and 70

(Total for Question 1 is 2 marks)

WORKED SOLUTION

Question 1 · 4MA1/1HR June 2025

1 **Find the LCM**

$$45 = 3^2 \times 5$$

$$70 = 2 \times 5 \times 7$$

2 **Find the LCM**

For the LCM, take the highest power of each prime:

$$\text{LCM} = 2 \times 3^2 \times 5 \times 7 = 630$$

✓ **FINAL ANSWER**

630

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Question 2

2 marks | Rounding, Estimation & Bounds

2 The length of a ship is 142.8 m, correct to 1 decimal place.

(i) Write down the lower bound of the length of the ship.

..... m

(1)

(ii) Write down the upper bound of the length of the ship.

..... m

(1)

(Total for Question 2 is 2 marks)

WORKED SOLUTION

Question 2 · 4MA1/1HR June 2025

1 The length is m correct

The length is 142.8 m correct to 1 decimal place.

2 Half of is

Half of 0.1 is 0.05.

$$142.8 - 0.05 = 142.75$$

$$142.8 + 0.05 = 142.85$$

FINAL ANSWER

(i) 142.75 m, (ii) 142.85 m

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Question 3

3 marks | Algebraic Proof

3 Show that $2\frac{1}{4} \times 1\frac{5}{7} = 3\frac{6}{7}$

(Total for Question 3 is 3 marks)

WORKED SOLUTION

Question 3 · 4MA1/1HR June 2025

1 **Evaluate fraction**

$$2\frac{1}{4} = \frac{9}{4}, \qquad 1\frac{5}{7} = \frac{12}{7}$$

$$2\frac{1}{4} \times 1\frac{5}{7} = \frac{9}{4} \times \frac{12}{7}$$

$$= \frac{108}{28} = \frac{27}{7} = 3\frac{6}{7}$$

✓ **FINAL ANSWER**

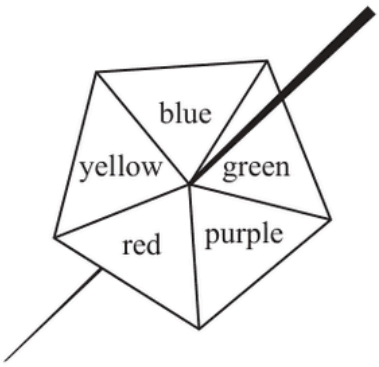
$3\frac{6}{7}$.

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Question 4

5 marks | Probability Toolkit

4 Here is a biased 5-sided spinner.
When the spinner is spun, it can land on blue or on green or on purple or on red or on yellow.



The table gives information about the probability of the spinner landing on each colour.

Colour	blue	green	purple	red	yellow
Probability	0.12	0.20	0.38	$4x$	x

Sophie spins the spinner once.

(a) Work out the probability that the spinner lands on blue or on green or on purple.

.....

(1)

Max spins the spinner 350 times.

(b) Work out an estimate for the number of times the spinner lands on red.

.....

(4)

(Total for Question 4 is 5 marks)

WORKED SOLUTION

Question 4 · 4MA1/1HR June 2025

1 **(a) Blue, green or purple**

$$0.12 + 0.20 + 0.38 = 0.70$$

2 **(b) Find x**

Red and yellow share the rest: $4x + x = 1 - 0.70 = 0.30$, so $5x = 0.30$ and $x = 0.06$.

3 (b) Probability of red

$$4x = 4 \times 0.06 = 0.24$$

4 (b) Estimate for 350 spins

$$350 \times 0.24 = 84$$

FINAL ANSWER

(a) 0.7 (b) 84

Question 5

4 marks | Set Notation & Venn Diagrams

5 $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$

$A = \{2, 4, 6, 8, 10, 12\}$

$B = \{3, 6, 9, 12\}$

$C = \{1, 3, 5, 7, 9, 11\}$

(a) List the members of the set

(i) $A \cup B$

.....

(ii) B'

.....

(2)

$\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$

$A = \{2, 4, 6, 8, 10, 12\}$

$B = \{3, 6, 9, 12\}$

$C = \{1, 3, 5, 7, 9, 11\}$

$\mathscr{E}$	$\cap$	$\cup$	$\varnothing$	$\in$	$\notin$

(b) Write a symbol from the box on each dotted line to make each of the following a true statement.

(i) $A \cap C =$ .....

(ii) 13 ..... $\mathscr{E}$

(2)

(Total for Question 5 is 4 marks)

1 **Calculate value**

$$\mathcal{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$$

$$A = \{2, 4, 6, 8, 10, 12\}$$

$$B = \{3, 6, 9, 12\}$$

$$C = \{1, 3, 5, 7, 9, 11\}$$

2 **Calculate value**

Therefore

$$A \cup B = \{2, 3, 4, 6, 8, 9, 10, 12\}$$

3 **Calculate value**

and

$$B' = \{1, 2, 4, 5, 7, 8, 10, 11\}$$

4 **No number is both even**

No number is both even and odd, so

$$A \cap C = \emptyset$$

5 **Set**

Also $13 \notin \mathcal{E}$ because 13 is not in the universal set.

✓ **FINAL ANSWER**

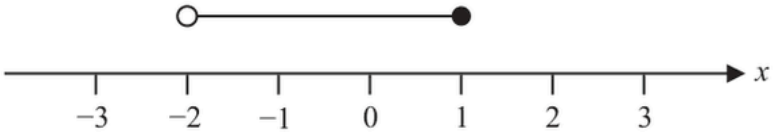
(a)(i) $\{2, 3, 4, 6, 8, 9, 10, 12\}$, (a)(ii) $\{1, 2, 4, 5, 7, 8, 10, 11\}$, (b)(i) $\emptyset$, (b)(ii) $13 \notin \mathcal{E}$

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Question 6

4 marks | Inequalities (Solving & Graphing)

6



(a) Write down the inequality shown on the number line.

.....

(2)

(b) Solve the inequality $7a - 5 \leqslant 3a + 28$
Show clear algebraic working.

.....

(2)

(Total for Question 6 is 4 marks)

WORKED SOLUTION

Question 6 · 4MA1/1HR June 2025

1 **(a) The number line has**

(a) The number line has an open circle at -2, a closed circle at 1, and shading between them.

$$-2 < x \leq 1$$

2 **(b)**

(b)

$$7a - 5 \leq 3a + 28$$

$$4a \leq 33$$

$$a \leq \frac{33}{4}$$

FINAL ANSWER

$-2 < x \leq 1$, and $a \leq \frac{33}{4}$.

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Question 7

3 marks | Standard & Compound Units

7 Change a speed of $50x$ metres per second to a speed in kilometres per hour.

..... km/h

(Total for Question 7 is 3 marks)

WORKED SOLUTION

Question 7 · 4MA1/1HR June 2025

1 **Convert m/s to km/h multiply**

To convert m/s to km/h, multiply by $\mathbf{3.6}$.

$$50x \times 3.6 = 180x$$

FINAL ANSWER

$180x$ km/h.

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Question 8

5 marks | Factorising

8 (a) Simplify $a^6 \times a^{10}$

.....

(1)

(b) Simplify $c^{30} \div c^{12}$

.....

(1)

(c) (i) Factorise $y^2 - 10y + 21$

.....

(2)

(ii) Hence, solve $y^2 - 10y + 21 = 0$

.....

(1)

(Total for Question 8 is 5 marks)

WORKED SOLUTION

Question 8 · 4MA1/1HR June 2025

1 **(a)**

(a) $a^6 \times a^{10} = a^{16}$.

2 **(b)**

(b) $c^{30} \div c^{12} = c^{18}$.

3 **(c)(i)**

(c)(i)

$$y^2 - 10y + 21 = (y - 3)(y - 7)$$

4 **(c)(ii)**

(c)(ii)

$$y = 3 \quad \text{or} \quad y = 7$$

✓ **FINAL ANSWER**

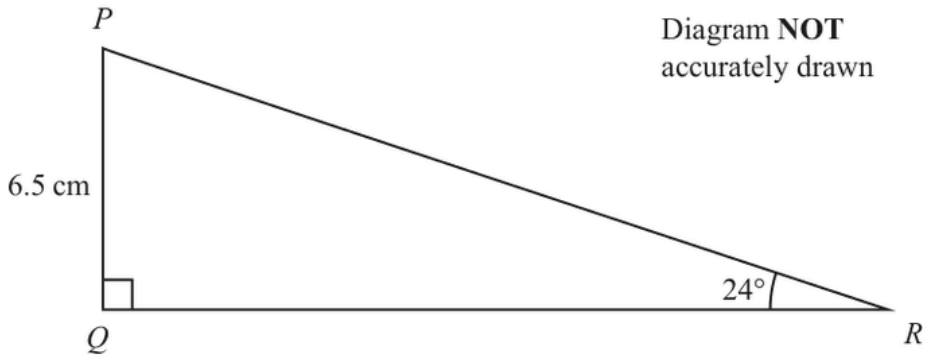
a^{16}, c^{18}, $(y - 3)(y - 7)$, $y = 3$ or $y = 7$

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Question 9

3 marks | Right-Angled Triangles - Pythagoras & Trigonometry

9 The diagram shows triangle PQR



Work out the length of QR
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 9 is 3 marks)

WORKED SOLUTION

Question 9 · 4MA1/1HR June 2025

1 **Use trigonometry**

$$\tan 24^\circ = \frac{6.5}{QR}$$

$$QR = \frac{6.5}{\tan 24^\circ} = 14.599\ldots$$

✓ **FINAL ANSWER**

14.6 cm.

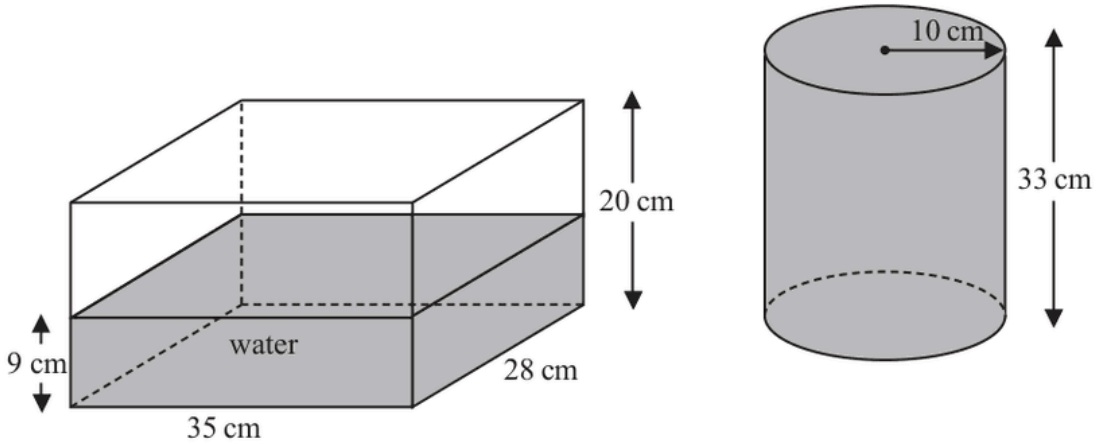
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Question 10

3 marks | Volume & Surface Area

10 The diagram shows two water containers.
One is a cuboid and one is a cylinder.

Diagram **NOT** accurately drawn



The cuboid measures 35 cm by 28 cm by 20 cm
The surface of the water in the cuboid is 9 cm above the base of the cuboid.

The cylinder has a radius of 10 cm and a height of 33 cm
The cylinder is completely full of water.

Izzy is going to pour all the water from the cylinder into the cuboid.

Show that the cuboid will not be completely full of water.

(Total for Question 10 is 3 marks)

WORKED SOLUTION

Question 10 · 4MA1/1HR June 2025

1 Capacity of the cuboid

Capacity of the cuboid:

$$35 \times 28 \times 20 = 19600 \text{ cm}^3$$

2 Water already in the cuboid

Water already in the cuboid:

$$35 \times 28 \times 9 = 8820 \text{ cm}^3$$

3 **Volume of the full cylinder**

Volume of the full cylinder:

$$\pi(10)^2(33) = 10367.255\ldots \text{ cm}^3$$

4 **Total water after pouring**

Total water after pouring:

$$8820 + 10367.255\ldots = 19187.255\ldots$$

5 **Calculate area**

Since

$$19187.255\ldots < 19600$$

6 **the cuboid will not be**

the cuboid will not be completely full.

✓ **FINAL ANSWER**

The cuboid will not be completely full.

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Question 11

5 marks | Compound Interest & Depreciation

11 Zhou invests some money for 2 years.
He invests \$2500 with Bank A and \$3000 with Bank B.

Bank A
Invests \$2500
amount of money invested : total amount of interest after 2 years = 20 : 3

Bank B
Invests \$3000
4% per year compound interest for 2 years

Zhou receives more **interest** from Bank A than from Bank B.

How much more?

\$ .....

(Total for Question 11 is 5 marks)

WORKED SOLUTION

Question 11 · 4MA1/1HR June 2025

1 **Use compound interest**

For Bank A,

$$\text{amount invested} : \text{interest} = 20 : 3$$

2 **Use compound interest**

So the interest from Bank A is

$$2500 \times \frac{3}{20} = 375$$

3 Use compound interest

For Bank B, the compound interest after 2 years is

$$3000(1.04)^2 - 3000$$

$$= 3000(1.0816) - 3000 = 244.80$$

4 Difference

Difference:

$$375 - 244.80 = 130.20$$

FINAL ANSWER

$130.20

Question 12

6 marks | Cumulative Frequency Diagrams

12 The table gives information about the ages of 80 people in a cinema.

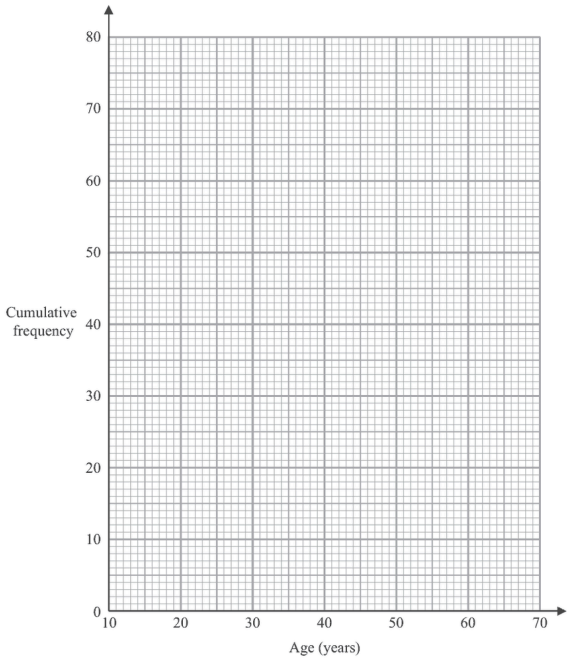
Age (n years)	Frequency
$10 < n \leqslant 20$	12
$20 < n \leqslant 30$	15
$30 < n \leqslant 40$	20
$40 < n \leqslant 50$	18
$50 < n \leqslant 60$	9
$60 < n \leqslant 70$	6

(a) Complete the cumulative frequency table.

Age (n years)	Cumulative frequency
$10 < n \leqslant 20$	
$10 < n \leqslant 30$	
$10 < n \leqslant 40$	
$10 < n \leqslant 50$	
$10 < n \leqslant 60$	
$10 < n \leqslant 70$	

(1)

(b) On the grid below, draw a cumulative frequency graph for your table.



(2)

(c) Use your graph to find an estimate for the percentage of the 80 people who are more than 46 years of age.
Give your answer correct to the nearest whole number.

.....%

(3)

(Total for Question 12 is 6 marks)

1 **(a) Running totals**

$$12,\ 27,\ 47,\ 65,\ 74,\ 80$$

2 **(b) Plot at the upper class boundaries**

Plot $(20, 12), (30, 27), (40, 47), (50, 65), (60, 74), (70, 80)$, start at $(10, 0)$, and join with a smooth curve.

3 **(c) People aged 46 or under**

Read up from 46: about 58 people.

4 **(c) Percentage older than 46**

$80 - 58 = 22$ people.

$$\frac{22}{80} \times 100 \approx 28\%$$

(About 26% to 30% is accepted, depending on the curve.)

✓ **FINAL ANSWER**

(a) $12, 27, 47, 65, 74, 80$ (c) about 28%

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Question 13

2 marks | Statistics Toolkit

13 Here are the numbers of eggs laid by some hens on each of 11 days in June.

9 10 12 15 17 18 19 19 20 25 26

Work out the interquartile range of the numbers of eggs.

(Total for Question 13 is 2 marks)

WORKED SOLUTION

Question 13 · 4MA1/1HR June 2025

1 Put the numbers in order

Put the numbers in order:

$$9,\ 10,\ 12,\ 15,\ 17,\ 18,\ 19,\ 19,\ 20,\ 25,\ 26$$

$$Q_1 = 12, \qquad Q_3 = 20$$

$$\text{IQR} = 20 - 12 = 8$$

FINAL ANSWER

8.

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Question 14

2 marks | Standard Form

14 Work out $6.7 \times 10^{135} + 3 \times 10^{134}$

Give your answer in standard form.

(Total for Question 14 is 2 marks)

WORKED SOLUTION

Question 14 · 4MA1/1HR June 2025

1 Convert standard form

$$6.7 \times 10^{135} + 3 \times 10^{134}$$

2 Write both terms using

Write both terms using 10^{135}:

$$3 \times 10^{134} = 0.3 \times 10^{135}$$

3 Convert standard form

So

$$6.7 \times 10^{135} + 0.3 \times 10^{135} = 7.0 \times 10^{135}$$

$$= 7 \times 10^{135}$$

FINAL ANSWER

7×10^{135}

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Question 15

6 marks | Linear Equations

15 (a) Solve $\frac{5a+8}{3} - \frac{2a+5}{4} = 23$

Show clear algebraic working.

$a =$ .....

(4)

(b) Express $\left(\frac{\sqrt{y}}{3}\right)^{-1}$ in the form cy^n where c and n are numbers to be found.

.....

(2)

(Total for Question 15 is 6 marks)

WORKED SOLUTION

Question 15 · 4MA1/1HR June 2025

1 Solve equation

For part (a),

$$\frac{5a+8}{3} - \frac{2a+5}{4} = 23$$

2 Multiply by

Multiply by 12:

$$4(5a+8) - 3(2a+5) = 276$$

$$20a + 32 - 6a - 15 = 276$$

$$14a + 17 = 276$$

$$14a = 259$$

$$a = \frac{259}{14} = \frac{37}{2}$$

3 **Solve equation**

For part (b),

$$\left(\frac{\sqrt{y}}{3}\right)^{-1} = \frac{3}{\sqrt{y}}$$

$$= 3y^{-1/2}$$

✓ **FINAL ANSWER**

(a) $a = \frac{37}{2}$, (b) $3y^{-1/2}$

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Question 16

2 marks | Recurring Decimals

16 Use algebra to show that the recurring decimal $0.6\dot{1}\dot{2} = \frac{101}{165}$

(Total for Question 16 is 2 marks)

WORKED SOLUTION

Question 16 · 4MA1/1HR June 2025

1 Let

Let

$$x = 0.6121212\ldots$$

2 Calculate value

Then

$$10x = 6.121212\ldots$$

3 Calculate value

and

$$1000x = 612.121212\ldots$$

4 Subtract

Subtract:

$$1000x - 10x = 612.121212\ldots - 6.121212\ldots$$

$$990x = 606$$

$$x = \frac{606}{990} = \frac{101}{165}$$

FINAL ANSWER

$0.6121212\ldots = \frac{101}{165}$.

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Question 17

3 marks | Algebraic Proof

17 Prove that, for any three numbers which are consecutive multiples of 4, the difference between the square of the largest number and the square of the smallest number is always a multiple of 64

Show clear algebraic working.

(Total for Question 17 is 3 marks)

WORKED SOLUTION

Question 17 · 4MA1/1HR June 2025

1 Let the three consecutive multiples

Let the three consecutive multiples of 4 be

$$4n, \quad 4n+4, \quad 4n+8$$

2 The difference between the square

The difference between the square of the largest and the square of the smallest is

$$(4n+8)^2 - (4n)^2$$

$$= 16n^2 + 64n + 64 - 16n^2$$

$$= 64n + 64 = 64(n+1)$$

3 This is always a multiple

This is always a multiple of 64.

FINAL ANSWER

The difference is always a multiple of 64.

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Question 18

5 marks | Direct & Inverse Proportion

18 F is inversely proportional to the cube of r

$F = 6$ when $r = 2$

(a) Find a formula for F in terms of r

.....

(3)

(b) Find the value of r when $F = 3072$

$r =$ .....

(2)

(Total for Question 18 is 5 marks)

WORKED SOLUTION

Question 18 · 4MA1/1HR June 2025

1 Find inverse function

F is inversely proportional to r^3, so

$$F = \frac{k}{r^3}$$

2 Use when

Use $F = 6$ when $r = 2$:

$$6 = \frac{k}{2^3}$$

$$k = 48$$

3 Find inverse function

So

$$F = \frac{48}{r^3}$$

4 **Find inverse function**

When $F = 3072$,

$$3072 = \frac{48}{r^3}$$

$$r^3 = \frac{48}{3072} = \frac{1}{64}$$

$$r = \frac{1}{4}$$

✓ **FINAL ANSWER**

$F = \frac{48}{r^3}$, and $r = \frac{1}{4}$.

4MA1/1HR JUNE 2025

Question 19

3 marks | Probability Toolkit

19 Kannika has 9 counters.
There is a number on each counter.



Kannika puts the 9 counters in a bag.
She takes at random a counter from the bag and does not replace the counter.
She then takes at random a second counter from the bag.

Work out the probability that the sum of the numbers on the two counters is less than 5

(Total for Question 19 is 3 marks)

WORKED SOLUTION

Question 19 · 4MA1/1HR June 2025

1 Pairs with a sum less than 5

The counters are $1, 1, 2, 3, 3, 3, 5, 6, 6$. The only possible sums under 5 are $1+1$, $1+2$ and $1+3$.

2 First counter, then second (no replacement)

$$P(1,1) = \frac{2}{9} \times \frac{1}{8} = \frac{2}{72}$$

$$P(1 \text{ and } 2) = 2 \times \frac{2}{9} \times \frac{1}{8} = \frac{4}{72}, \qquad P(1 \text{ and } 3) = 2 \times \frac{2}{9} \times \frac{3}{8} = \frac{12}{72}$$

3 Add the cases

$$\frac{2+4+12}{72} = \frac{18}{72} = \frac{1}{4}$$

✓ **FINAL ANSWER**

$$\frac{1}{4}$$

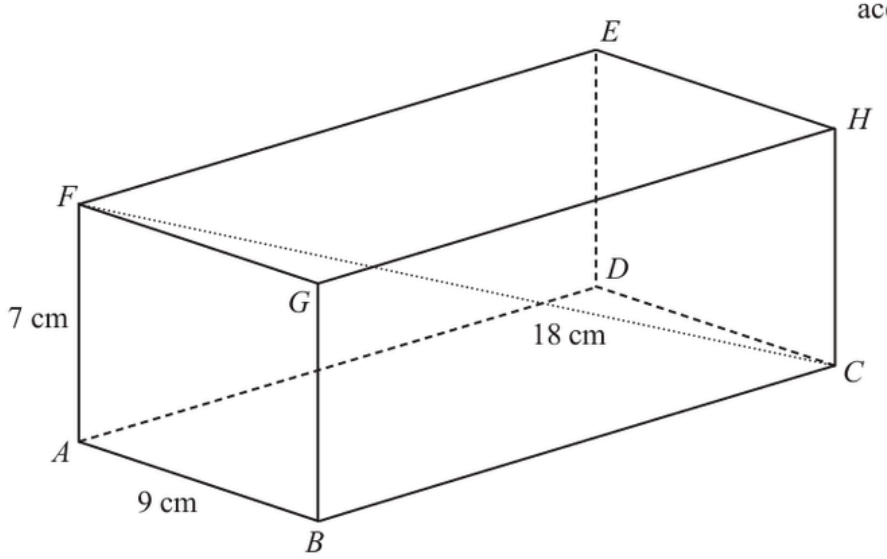
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Question 20

3 marks | 3D Pythagoras & Trigonometry

20 The diagram shows cuboid $ABCDEFGH$

Diagram **NOT** accurately drawn



$AB = 9\,\text{cm}$ $AF = 7\,\text{cm}$ $FC = 18\,\text{cm}$

Calculate the length of BC
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 20 is 3 marks)

WORKED SOLUTION

Question 20 · 4MA1/1HR June 2025

1 **Use trigonometry**

In the rectangle $ABCF$, use Pythagoras with the diagonal FC:

$$AC^2 = FC^2 - AF^2$$

$$AC^2 = 18^2 - 7^2 = 324 - 49 = 275$$

2 **Use trigonometry**

Now use Pythagoras in triangle ABC:

$$BC^2 = AC^2 - AB^2$$

$$BC^2 = 275 - 9^2 = 275 - 81 = 194$$

$$BC = \sqrt{194} = 13.928\ldots$$

✓ **FINAL ANSWER**

$\mathbf{13.9\ cm}$ to 3 significant figures

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Question 21

3 marks | Transformations of Graphs

21 The curve with equation $y = f(x)$ has one turning point.
The coordinates of this turning point are $(-6, 9)$

(a) Write down the coordinates of the turning point on the curve with equation $y = f(3x)$

(..... , ...)

(1)

The curve **C** with equation $y = g(x)$ is transformed to give the curve **S** with equation $y = g(x + a) + b$

The point $(4, -5)$ on **C** is mapped to the point $(1, -16)$ on **S**

(b) Write down the value of a and the value of b

$a =$ .....

$b =$ .....

(2)

(Total for Question 21 is 3 marks)

WORKED SOLUTION

Question 21 · 4MA1/1HR June 2025

1 The turning point of is

The turning point of $y = f(x)$ is $(-6, 9)$.

2 Calculate value

For

$$y = f(3x)$$

3 the coordinate is divided by

the x-coordinate is divided by 3:

$$(-6, 9) \to (-2, 9)$$

4 Calculate value

For part (b), a point $(4, -5)$ on $y = g(x)$ maps to $(1, -16)$ on

$$y = g(x + a) + b$$

5 **Calculate value**

For the x-coordinate:

$$1 + a = 4$$

$$a = 3$$

---

6 **Calculate value**

For the y-coordinate:

$$-5 + b = -16$$

$$b = -11$$

✓ **FINAL ANSWER**

$(-2, 9)$, $a = 3$, $b = -11$

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Question 22

5 marks | Simultaneous Equations

22 Solve the simultaneous equations

$$x^2 + y^2 = 41$$
$$2x + y = 3$$

Show clear algebraic working.

(Total for Question 22 is 5 marks)

WORKED SOLUTION

Question 22 · 4MA1/1HR June 2025

1 **Calculate value**

$$x^2 + y^2 = 41$$

$$2x + y = 3$$

2 **Calculate value**

So

$$y = 3 - 2x$$

3 **Substitute**

Substitute:

$$x^2 + (3 - 2x)^2 = 41$$

$$x^2 + 9 - 12x + 4x^2 = 41$$

$$5x^2 - 12x - 32 = 0$$

$$(5x + 8)(x - 4) = 0$$

4 **Evaluate fraction**

So

$$x = -\frac{8}{5} \quad \text{or} \quad x = 4$$

5 **Find**

Find y:

$$x = -\frac{8}{5} \Rightarrow y = \frac{31}{5}$$

$$x = 4 \Rightarrow y = -5$$

✓ **FINAL ANSWER**

$(x, y) = \left(-\frac{8}{5}, \frac{31}{5}\right)$ or $(4, -5)$

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Question 23

5 marks | Circle Theorems

23

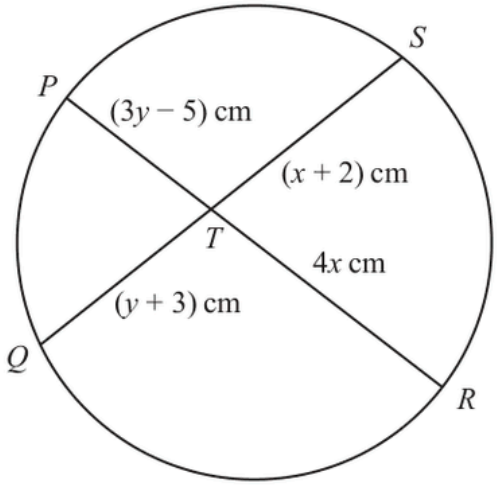


Diagram **NOT** accurately drawn

PTR and QTS are chords of a circle.

$PT = (3y - 5)\,\text{cm}$ $QT = (y + 3)\,\text{cm}$ $RT = 4x\,\text{cm}$ $ST = (x + 2)\,\text{cm}$

Find an expression for y in terms of x

$y =$ .....

Total for Question 23 is 5 marks)

WORKED SOLUTION

Question 23 · 4MA1/1HR June 2025

1 Use chord theorem

For two intersecting chords in a circle,

$$PT \times TR = QT \times TS$$

2 Substitute the given lengths

Substitute the given lengths:

$$(3y - 5)(4x) = (y + 3)(x + 2)$$

3 Expand

Expand:

$$12xy - 20x = xy + 2y + 3x + 6$$

4 **Collect the terms on one**

Collect the y terms on one side:

$$12xy - xy - 2y = 20x + 3x + 6$$

$$11xy - 2y = 23x + 6$$

---

5 **Factorise**

Factorise:

$$y(11x - 2) = 23x + 6$$

$$y = \frac{23x + 6}{11x - 2}$$

✓ **FINAL ANSWER**

$$\boxed{y = \frac{23x + 6}{11x - 2}}$$

4MA1/1HR JUNE 2025

Question 24

6 marks | Sequences

24 The first 3 terms of an arithmetic series are

$$(2x + 5) \qquad (3y - 4) \qquad (4x - 2)$$

where x and y are constants.

The sum of the first 9 terms of the series is 216

Find the value of x and the value of y
Show clear algebraic working.

$x =$ .....

$y =$ .....

(Total for Question 24 is 6 marks)

WORKED SOLUTION

Question 24 · 4MA1/1HR June 2025

1 **The first 3 terms are**

The first 3 terms are

$$2x + 5, \quad 3y - 4, \quad 4x - 2$$

2 **Equal differences give**

Equal differences give

$$(3y - 4) - (2x + 5) = (4x - 2) - (3y - 4)$$

$$6y - 6x = 11$$

3 **Use series formula**

For an arithmetic series,

$$S_9 = 9(a + 4d)$$

4 **Here**

Here

$$a = 2x + 5$$

$$d = (3y - 4) - (2x + 5) = 3y - 2x - 9$$

5 **Given**

Given $S_9 = 216$:

$$9[(2x + 5) + 4(3y - 2x - 9)] = 216$$

$$12y - 6x = 55$$

6 **Solve**

Now solve

$$6y - 6x = 11$$

$$12y - 6x = 55$$

7 **Subtracting gives**

Subtracting gives

$$6y = 44$$

$$y = \frac{22}{3}$$

8 **Evaluate fraction**

Then

$$6\left(\frac{22}{3}\right) - 6x = 11$$

$$x = \frac{11}{2}$$

✓ **FINAL ANSWER**

$$x = \frac{11}{2},\ y = \frac{22}{3}$$

4MA1/1HR JUNE 2025

Question 25

6 marks | Circles, Arcs & Sectors

25

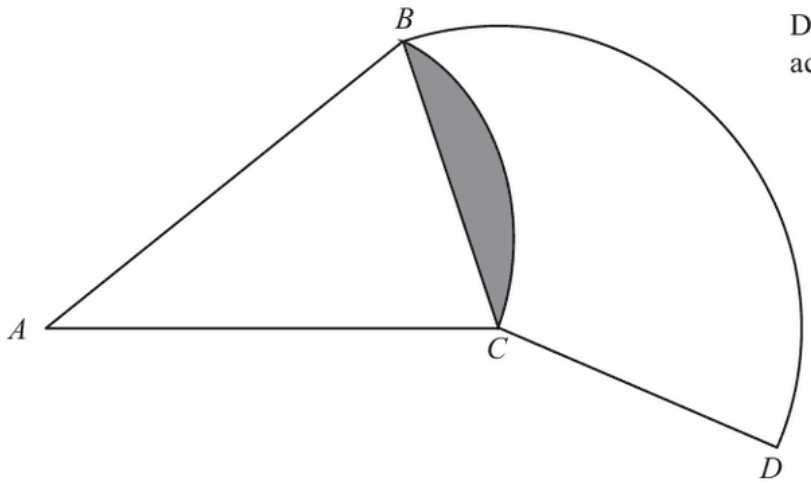


Diagram **NOT** accurately drawn

BAC is a sector of a circle, centre *A*

BCD is a sector of a circle, centre *C*

Angle *BAC* = 40°
Angle *BCD* = 130°
Area of shaded segment = 28 cm^2

Find the length of the arc *BD*
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 25 is 6 marks)

WORKED SOLUTION

Question 25 · 4MA1/1HR June 2025

1 Let the radius of sector

Let the radius of sector BAC be R.

2 The shaded segment is the

The shaded segment is the segment cut off by chord BC in the sector with centre A.

3 **Its area is**

Its area is

$$\text{sector area} - \text{triangle area}$$

$$28 = \frac{40}{360}\pi R^2 - \frac{1}{2}R^2 \sin 40°$$

$$28 = R^2\left(\frac{\pi}{9} - \frac{1}{2}\sin 40°\right)$$

$$R = 31.8096\ldots$$

---

4 **Use trigonometry**

Now find the chord BC:

$$BC = 2R\sin 20°$$

$$BC = 2(31.8096\ldots)\sin 20° = 21.7591\ldots$$

---

5 **Calculate value**

In sector BCD, the centre is C, so the radius is

$$CB = CD = 21.7591\ldots$$

---

6 **Use trigonometry**

The arc BD has angle $130°$, so

$$\text{arc } BD = \frac{130}{360} \times 2\pi(21.7591\ldots)$$

$$= 49.3697\ldots$$

✓ **FINAL ANSWER**

$\boxed{49.4 \text{ cm}}$

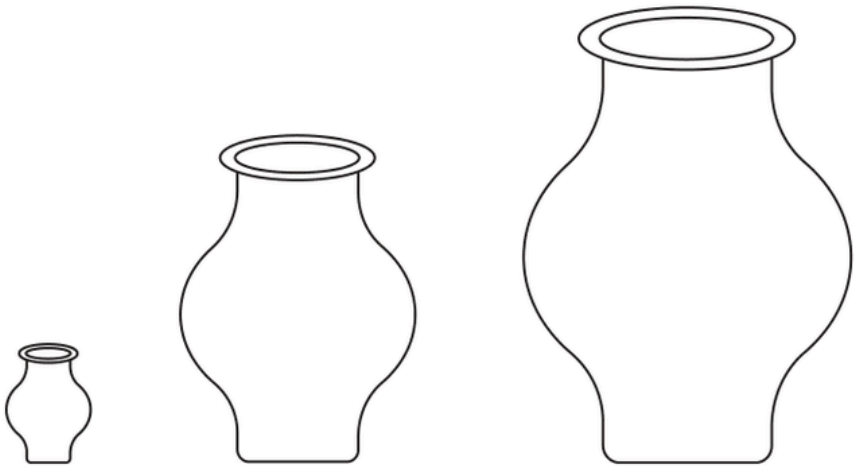
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Question 26

4 marks | Area & Volume of Similar Shapes

26 **R**, **S** and **T** are three similar vases.

Diagram **NOT** accurately drawn



The volume of vase **S** is 72.8% more than the volume of vase **R**

The height of vase **R** is h cm
The height of vase **T** is $6h$ cm

The surface area of vase **S** is A cm^2
The surface area of vase **T** is kA cm^2

Work out the value of k

$k =$ .....

(Total for Question 26 is 4 marks)

WORKED SOLUTION

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1 **The volume of vase is**

The volume of vase S is 72.8% more than vase R, so

$$\frac{V_S}{V_R} = 1.728$$

2 **Calculate area**

For similar solids, volume scale factor is the cube of the linear scale factor:

$$\text{linear scale factor from } R \text{ to } S = \sqrt[3]{1.728} = 1.2$$

3 **The height of vase is**

The height of vase T is $6h$, so the linear scale factor from R to T is 6.

4 **Calculate area**

Therefore the linear scale factor from S to T is

$$\frac{6}{1.2} = 5$$

5 **Surface area scale factor is**

Surface area scale factor is the square of the linear scale factor:

$k = 5^2 = 25$

✓ **FINAL ANSWER**

$k = 25$