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Elite Mathematics
Pearson Edexcel International GCSE

IGCSE LINEAR · 4MA1

4WM2/01 May 2025 Worked Solutions

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

27	2020–2026	Single-paper solutions
paper questions	52 past papers	checked by Dr Eslam



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PAST PAPER

4WM2/01 May 2025

May 2025

27	100	2 h
questions	marks	exam time

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

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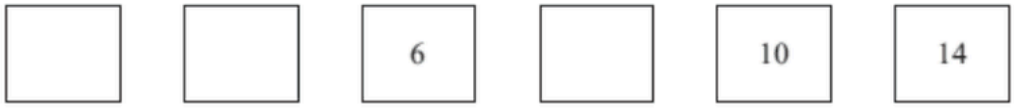
Question 1

3 marks | Statistics Toolkit

1 Rio has six cards.
He writes a number on each card so that

the range of the numbers is 10
the median of the numbers is 7.5
the mode of the numbers is 6

Rio arranges the cards so that the numbers are in order of size.



Three of the numbers are hidden.
Complete the cards above to show the three numbers that are hidden.

(Total for Question 1 is 3 marks)

WORKED SOLUTION

Question 1 · 4WM2/01 May 2025

1 **Calculate statistic**

The range is 10, so the first number is

$$14 - 10 = 4$$

2 **Calculate statistic**

For six numbers, the median is the mean of the third and fourth values.

$$\frac{6 + \text{fourth value}}{2} = 7.5$$

3 **Calculate statistic**

So the fourth value is 9. To make 6 the mode, the second value must also be 6.

✓ **FINAL ANSWER**

the hidden numbers are $4, 6, 9$.

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Question 2

3 marks | Volume & Surface Area

2 The diagram shows a solid prism with a cross section in the shape of a trapezium.

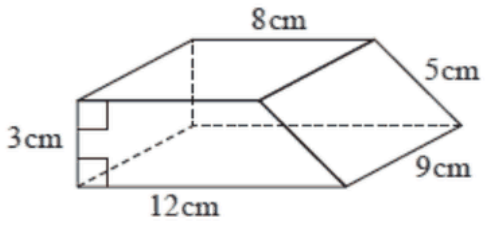


Diagram **NOT** accurately drawn

Work out the total surface area of the prism.

..... cm^2

(Total for Question 2 is 3 marks)

WORKED SOLUTION

Question 2 · 4WM2/01 May 2025

1 Area of one trapezium

Area of one trapezium:

$$\frac{1}{2}(8+12)\times 3 = 30$$

2 Perimeter of the trapezium

Perimeter of the trapezium:

$$8+12+3+5 = 28$$

3 Rectangular faces

Rectangular faces:

$$28 \times 9 = 252$$

4 Total surface area

Total surface area:

$$252 + 2(30) = 312$$

FINAL ANSWER

$312\ \text{cm}^2$.

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Question 3

3 marks | Reverse Percentages

3 Bernice bought a car for $8000
She sold the car for $5600

Work out Bernice's percentage loss when she sold the car.

.....%

(Total for Question 3 is 3 marks)

WORKED SOLUTION

Question 3 · 4WM2/01 May 2025

1 Convert standard form

$$\text{loss} = 8000 - 5600 = 2400$$

$$\text{percentage loss} = \frac{2400}{8000} \times 100 = 30\%$$

FINAL ANSWER

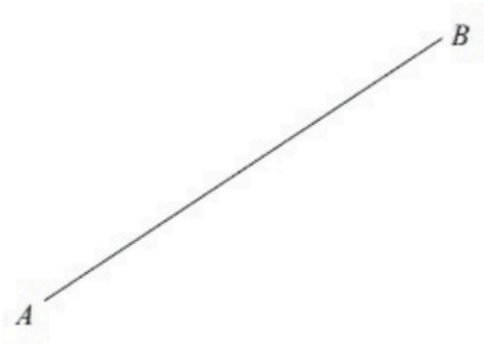
30%.

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Question 4

2 marks | Constructions & Loci

4 Using ruler and compasses only, construct the perpendicular bisector of the line AB
Show all your construction lines.



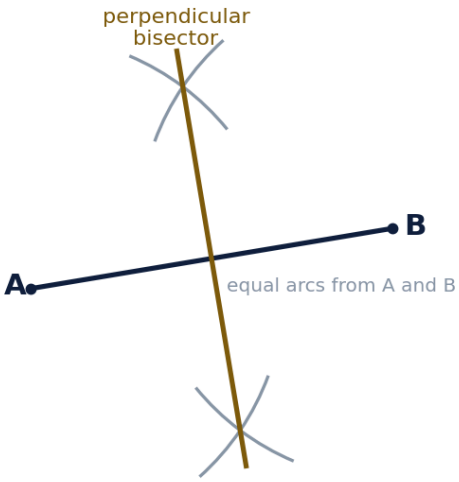
(Total for Question 4 is 2 marks)

WORKED SOLUTION

Question 4 · 4WM2/01 May 2025

1 **Use a compass radius greater**

Use a compass radius greater than half of AB. Draw matching arcs from A above and below the line, then draw matching arcs from B with the same radius. Join the two arc-intersection points.



✓ **FINAL ANSWER**

the joined line is the perpendicular bisector of AB.

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Question 5

3 marks | Sequences

5 Here are the first five terms of a number sequence.

11 15 19 23 27

(a) Find an expression in terms of n for the nth term of this sequence.

.....

(2)

The nth term of another number sequence is $5n + 4$

Salim says no term in this sequence is a prime number.

(b) Find a term in this sequence that shows Salim is wrong.

.....

(1)

(Total for Question 5 is 3 marks)

WORKED SOLUTION

Question 5 · 4WM2/01 May 2025

1 Find the nth term

The sequence increases by 4, so

$$u_n = 4n + 7$$

2 Find the nth term

For the sequence $5n + 4$, take $n = 3$:

$$5(3) + 4 = 19$$

3 Check prime condition

and 19 is prime.

FINAL ANSWER

$4n + 7$; a suitable counterexample is 19.

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Question 6

4 marks | Similar Shapes

6 The diagram shows two similar quadrilaterals, *ABCD* and *EFGH*

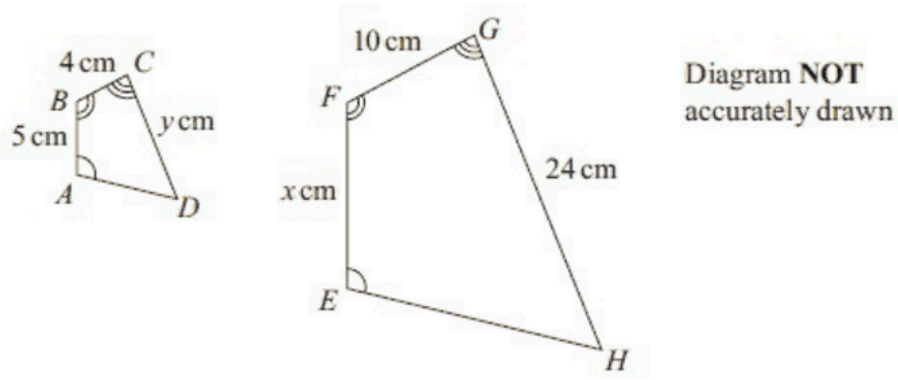


Diagram **NOT** accurately drawn

$AB = 5$ cm $\quad BC = 4$ cm $\quad CD = y$ cm

$EF = x$ cm $\quad FG = 10$ cm $\quad GH = 24$ cm

(a) Work out the value of x

$x =$ .....

(2)

(b) Work out the value of y

$y =$ .....

(2)

(Total for Question 6 is 4 marks)

WORKED SOLUTION

Question 6 · 4WM2/01 May 2025

1 Evaluate fraction

The scale factor from $ABCD$ to $EFGH$ is

$$\frac{FG}{BC} = \frac{10}{4} = 2.5$$

2 Calculate value

So

$$x = EF = 5 \times 2.5 = 12.5$$

3 **Evaluate fraction**

and

$$y = CD = \frac{24}{2.5} = 9.6$$

✓ **FINAL ANSWER**

$x = 12.5$, $y = 9.6$.

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Question 7

4 marks | Ratio Toolkit

7 Pau, Sam and Tia share £240 in the ratios $3 : 4 : 5$

Sam and Tia each give £10 of their share to Pau.

Work out the ratios of the amounts of money that Pau, Sam and Tia now have.
Give your answer in its simplest form.

..... : ..... : .....

(Total for Question 7 is 4 marks)

WORKED SOLUTION

Question 7 · 4WM2/01 May 2025

1 The original ratio is

The original ratio is

$$\text{Pau} : \text{Sam} : \text{Tia} = 3 : 4 : 5$$

2 There are

There are

$$3 + 4 + 5 = 12 \text{ parts}$$

3 Each part is

Each part is

$$240 \div 12 = 20$$

4 Split the ratio

So the original amounts are

$$60,\ 80,\ 100$$

5 Sam gives 10 to Pau

Sam gives 10 to Pau and Tia gives 10 to Pau, so the new amounts are

$$80,\ 70,\ 90$$

6 Divide by 10

Divide by 10:

$$80 : 70 : 90 = 8 : 7 : 9$$

FINAL ANSWER

The new ratio is $8 : 7 : 9$.

Question 8

4 marks | Averages from Frequency Tables

8 The table gives information about the lengths of time, in minutes, that some people were in a coffee shop.

Length of time (m minutes)	Frequency
$0 < m \leqslant 10$	x
$10 < m \leqslant 20$	3
$20 < m \leqslant 30$	2
$30 < m \leqslant 40$	4
$40 < m \leqslant 50$	2

The information in the table is used to calculate an estimate for the mean length of time these people were in the coffee shop.

The estimate for the mean length of time is 20

Work out the value of x

x = ...

(Total for Question 8 is 4 marks)

1 Use class midpoints

Use class midpoints $5, 15, 25, 35, 45$.

$$\frac{5x + 15(3) + 25(2) + 35(4) + 45(2)}{x + 3 + 2 + 4 + 2} = 20$$

$$\frac{5x + 325}{x + 11} = 20$$

$$5x + 325 = 20x + 220$$

$$105 = 15x$$

$$x = 7$$

FINAL ANSWER

$x = 7$.

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Question 9

3 marks | Compound Interest & Depreciation

9 Tim buys a bracelet for 4000 Swiss francs.
The value of the bracelet increases by 7% each year.

Work out the value of the bracelet at the end of 3 years.
Give your answer correct to the nearest Swiss franc.

..... Swiss francs

(Total for Question 9 is 3 marks)

WORKED SOLUTION

Question 9 · 4WM2/01 May 2025

1 The multiplier for a increase

The multiplier for a 7% increase is

$$1.07$$

2 Use compound interest

After 3 years,

$$4000(1.07)^3 = 4900.172$$

3 Correct to the nearest Swiss

Correct to the nearest Swiss franc,

$$4900.172 \approx 4900$$

FINAL ANSWER

4900 Swiss francs

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Question 10

3 marks | Simultaneous Equations

10 Solve the simultaneous equations

$$3x + 5y = 8$$
$$4x + y = -3.5$$

Show clear algebraic working.

$x =$ .....

$y =$ .....

(Total for Question 10 is 3 marks)

WORKED SOLUTION

Question 10 · 4WM2/01 May 2025

1 Calculate value

From

$$4x + y = -3.5$$

$$y = -3.5 - 4x$$

2 Substitute into equation

Substitute into $3x + 5y = 8$:

$$3x + 5(-3.5 - 4x) = 8$$

$$-17x = 25.5$$

$$x = -1.5$$

3 Calculate value

Then

$$y = -3.5 - 4(-1.5) = 2.5$$

✓ **FINAL ANSWER**

$x = -1.5$, $y = 2.5$.

Question 11

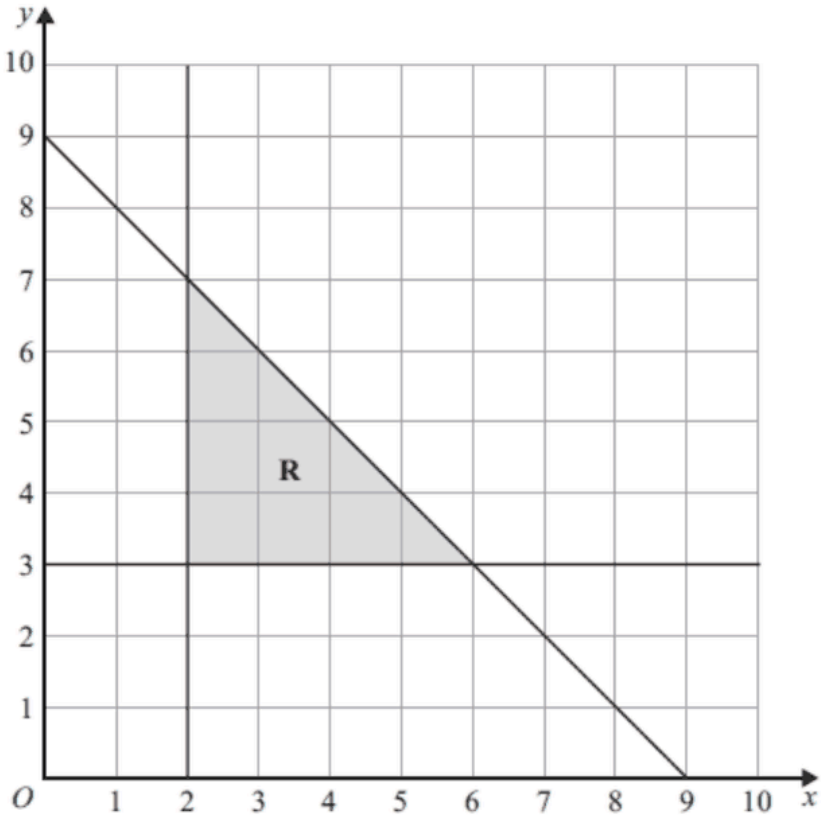
5 marks | Inequalities (Solving & Graphing)

11 (a) Solve the inequality $7 - 3t < 2t + 15$

.....

(2)

The region **R**, shown shaded in the diagram, is bounded by three straight lines.



(b) Write down three inequalities that define the region **R**

.....

.....

.....

(3)

(Total for Question 11 is 5 marks)

1 **(a)**

(a)

$$7 - 3t < 2t + 15$$

$$-8 < 5t$$

$$t > -1.6$$

2 **(b) The three boundary lines**

(b) The three boundary lines are $x = 2$, $y = 3$, and $x + y = 9$. The shaded side gives

$$x \geq 2, \qquad y \geq 3, \qquad x + y \leq 9$$

✓ **FINAL ANSWER**

$t > -1.6$; $x \geq 2$, $y \geq 3$, $x + y \leq 9$.

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Question 12

3 marks | Standard Form

12 (a) Write 8.6×10^{-5} as an ordinary number.

.....

(1)

(b) Work out $(3 \times 10^{143}) \div (6 \times 10^{137})$

Give your answer in standard form.

.....

(2)

(Total for Question 12 is 3 marks)

WORKED SOLUTION

Question 12 · 4WM2/01 May 2025

1 **(a)**

(a)

$$8.6 \times 10^{-5} = 0.000086$$

2 **(b)**

(b)

$$(3 \times 10^{43}) \div (6 \times 10^{37})$$

$$= 0.5 \times 10^{6} = 5 \times 10^{5}$$

✓ **FINAL ANSWER**

0.000086, 5×10^{5}.

Question 13

4 marks | Circle Theorems

13 The diagram shows a circle, centre O

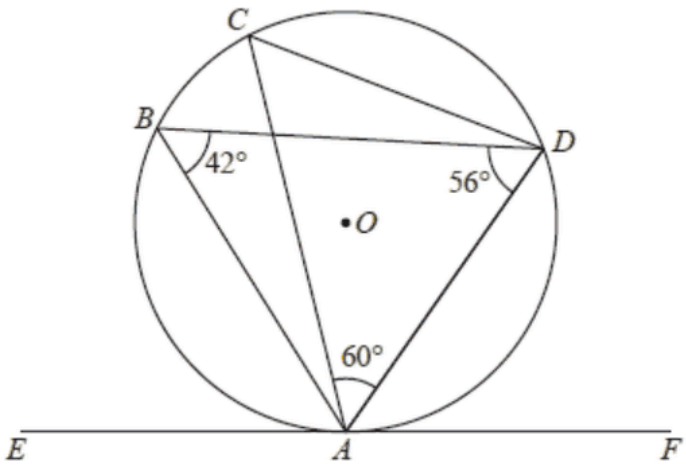


Diagram **NOT** accurately drawn

A, B, C and D are points on the circle.
EAF is the tangent to the circle at A

angle ABD = 42° **angle BDA = 56°** **angle CAD = 60°**

(a) (i) Find the size of angle EAB

..... °

(1)

(ii) Give a reason for your answer to (a) (i)

.....

.....

(1)

(b) Work out the size of angle CDB

..... °

(2)

(Total for Question 13 is 4 marks)

1 **Use trigonometry**

By the alternate segment theorem,

$$\angle EAB = \angle ADB = 56^\circ$$

2 **Use trigonometry**

In triangle ABD,

$$\angle BAD = 180^\circ - 42^\circ - 56^\circ = 82^\circ$$

3 **Use trigonometry**

So

$$\angle BAC = 82^\circ - 60^\circ = 22^\circ$$

4 **Angles subtended by the same**

Angles subtended by the same chord CB are equal, so

$$\angle CDB = 22^\circ$$

✓ **FINAL ANSWER**

56°, alternate segment theorem, 22°.

Question 14

6 marks | Cumulative Frequency Diagrams

14 The frequency table gives information about the times, in minutes, that 60 people took to complete a puzzle.

Time (t minutes)	Frequency
$0 < t \leqslant 10$	8
$10 < t \leqslant 20$	13
$20 < t \leqslant 30$	12
$30 < t \leqslant 40$	17
$40 < t \leqslant 50$	7
$50 < t \leqslant 60$	3

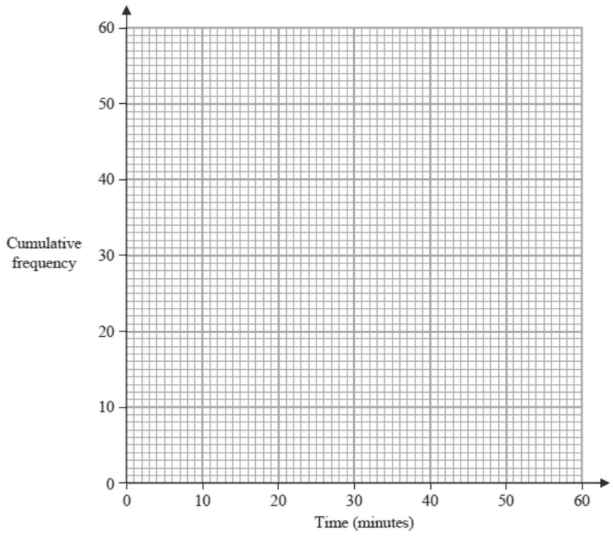
(a) Complete the cumulative frequency table.

Time (t minutes)	Cumulative frequency
$0 < t \leqslant 10$	
$10 < t \leqslant 20$	
$20 < t \leqslant 30$	
$30 < t \leqslant 40$	
$40 < t \leqslant 50$	
$50 < t \leqslant 60$	

(1)

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

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(2)

(c) Use your graph to find an estimate for the median time.

..... minutes

(1)

(d) Use your graph to find an estimate for the number of these people who took more than 45 minutes to complete the puzzle.

.....

(2)

(Total for Question 14 is 6 marks)

1 Cumulative frequencies

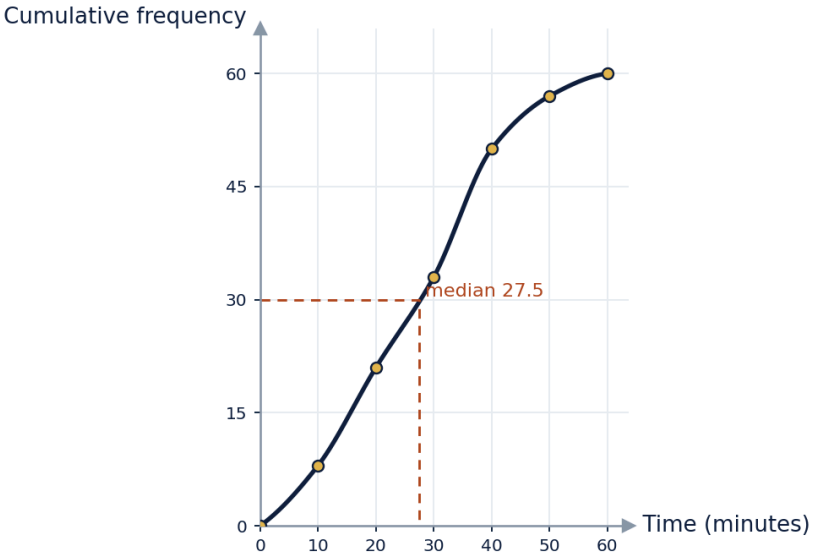
Cumulative frequencies:

$$8,\ 21,\ 33,\ 50,\ 57,\ 60$$

2 Plot the points

Plot the points

$$(10, 8), (20, 21), (30, 33), (40, 50), (50, 57), (60, 60)$$



3 The median is the th

The median is the 30th value. Interpolating in the 20 to 30 interval gives about 27.5 minutes.

4 Estimate the value

For more than 45 minutes, the estimate is about 7 people.

FINAL ANSWER

cumulative frequencies $8, 21, 33, 50, 57, 60$; median about 27.5 minutes; more than 45 minutes about 7 people.

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Question 15

3 marks | Compound Interest & Depreciation

15 Fred buys a painting.

The value of the painting increases by 12% during the first year.
The value of the painting then decreases by 15% during the second year.

Work out the overall percentage decrease in the value of the painting during this two-year period.

.....%

(Total for Question 15 is 3 marks)

WORKED SOLUTION

Question 15 · 4WM2/01 May 2025

1 Use multipliers

Use multipliers:

$$1.12 \times 0.85 = 0.952$$

2 Calculate percentage

So the final value is 95.2% of the original.

$$100 - 95.2 = 4.8$$

FINAL ANSWER

4.8% decrease.

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Question 16

2 marks | Statistics Toolkit

16 Here are the numbers of goals scored by a netball team in its 11 games this season.

7 8 10 11 13 14 16 17 19 21 24

Work out the interquartile range for the number of goals.

.....

(Total for Question 16 is 2 marks)

WORKED SOLUTION

Question 16 · 4WM2/01 May 2025

1 There are values. Excluding the

There are 11 values. Excluding the median 14:

2 Calculate value

Lower half: $7, 8, 10, 11, 13$, so $Q_1 = 10$.

3 Calculate value

Upper half: $16, 17, 19, 21, 24$, so $Q_3 = 19$.

$$\text{IQR} = 19 - 10 = 9$$

✓ **FINAL ANSWER**

9.

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Question 17

4 marks | Prime Factors, HCF & LCM

17 $A = 3^2 \times 5^4$ $B = 2^5 \times 3^2$ $C = 2^3 \times 5^6$

(a) Work out the value of $(ABC)^3$

Give your answer as a product of powers of its prime factors.

.....

(2)

(b) Work out $(5\times10^{150})\times(3\times10^{140})$

Give your answer as a product of powers of its prime factors.

.....

(2)

(Total for Question 17 is 4 marks)

WORKED SOLUTION

Question 17 · 4WM2/01 May 2025

1 **(a)**

(a)

$$ABC = (3^2 \times 5^4)(2^5 \times 3^2)(2^3 \times 5^6)$$

$$= 2^8 \times 3^4 \times 5^{10}$$

$$(ABC)^3 = 2^{24} \times 3^{12} \times 5^{30}$$

2 **(b)**

(b)

$$(5 \times 10^{150})(3 \times 10^{140}) = 15 \times 10^{290}$$

$$= 3 \times 5 \times (2 \times 5)^{290}$$

$$= 2^{290} \times 3 \times 5^{291}$$

FINAL ANSWER

$2^{24} \times 3^{12} \times 5^{30}$; $2^{290} \times 3 \times 5^{291}$.

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Question 18

3 marks | Direct & Inverse Proportion

18 W is inversely proportional to y^2

$W = 50$ when $y = 4$

Find a formula for W in terms of y

.....

(Total for Question 18 is 3 marks)

WORKED SOLUTION

Question 18 · 4WM2/01 May 2025

1 Find inverse function

Since W is inversely proportional to y^2,

$$W = \frac{k}{y^2}$$

2 Evaluate fraction

Using $W = 50$ when $y = 4$:

$$50 = \frac{k}{16}$$

$$k = 800$$

FINAL ANSWER

$$W = \frac{800}{y^2}.$$

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Question 19

4 marks | Rearranging Formulae

19 Make t the subject of the formula $c = \frac{t^2 + 3}{7 - 8t^2}$

.....

(Total for Question 19 is 4 marks)

WORKED SOLUTION

Question 19 · 4WM2/01 May 2025

1 Evaluate fraction

$$c = \frac{t^2 + 3}{7 - 8t^2}$$

$$c(7 - 8t^2) = t^2 + 3$$

$$7c - 3 = t^2(8c + 1)$$

$$t^2 = \frac{7c - 3}{8c + 1}$$

FINAL ANSWER

$$t = \pm\sqrt{\frac{7c - 3}{8c + 1}}.$$

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Question 20

3 marks | Algebraic Proof

20 a, b and c are three consecutive even numbers where $a < b < c$

Prove algebraically that $b^2 = ac + 4$

(Total for Question 20 is 3 marks)

WORKED SOLUTION

Question 20 · 4WM2/01 May 2025

1 Let

Let

$$a = 2n, \qquad b = 2n + 2, \qquad c = 2n + 4$$

2 Calculate value

Then

$$ac + 4 = (2n)(2n + 4) + 4$$

$$= 4n^2 + 8n + 4$$

$$= (2n + 2)^2 = b^2$$

3 Calculate value

So $b^2 = ac + 4$.

FINAL ANSWER

So $b^2 = ac + 4$.

4WM2/01 MAY 2025

Question 21

7 marks | Functions

21 The function g is defined as

$$g(x) = \frac{7x + 20}{2x} \qquad x \neq 0$$

(a) Solve $gg(x) = 6$
Show clear algebraic working.

$x =$ .....

(3)

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The function h is defined as

$$h(x) = 5x^2 + 30x - 7 \qquad x \geqslant -3$$

(b) Express the inverse function h^{-1} in the form $h^{-1}(x) = \ldots$

$h^{-1}(x) =$ .....

(4)

(Total for Question 21 is 7 marks)

WORKED SOLUTION

Question 21 · 4WM2/01 May 2025

1 **Evaluate fraction**

(a) If $g(g(x)) = 6$, then

$$\frac{7g(x) + 20}{2g(x)} = 6$$

$$7g(x) + 20 = 12g(x)$$

$$g(x) = 4$$

2 **Evaluate fraction**

So

$$\frac{7x+20}{2x}=4$$

$$7x+20=8x$$

$$x=20$$

---

3 **(b)**

(b)

$$h(x)=5x^2+30x-7=5(x+3)^2-52$$

---

4 **Simplify surd**

Let $y=5(x+3)^2-52$. Since $x\geq -3$, use the positive square root:

$$x+3=\sqrt{\frac{y+52}{5}}$$

$$h^{-1}(x)=\sqrt{\frac{x+52}{5}}-3$$

✓ **FINAL ANSWER**

$x=20$; $h^{-1}(x)=\sqrt{\frac{x+52}{5}}-3$.

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Question 22

4 marks | Differentiation & Turning Points

22 Work out the range of values of x for which the graph of $y = x^3 + \frac{2}{}x^2 - 10x + 5$ has a positive gradient.
Show clear algebraic working.

.....

(Total for Question 22 is 4 marks)

WORKED SOLUTION

Question 22 · 4WM2/01 May 2025

1 Evaluate fraction

$$\frac{dy}{dx} = 3x^2 + 2x - 10$$

2 Find the gradient

For a positive gradient,

$$3x^2 + 2x - 10 > 0$$

3 The roots are

The roots are

$$x = \frac{-1 \pm \sqrt{31}}{3}$$

4 Solve quadratic equation

Since the quadratic opens upwards,

$$x < \frac{-1 - \sqrt{31}}{3} \quad \text{or} \quad x > \frac{-1 + \sqrt{31}}{3}$$

FINAL ANSWER

$x < \frac{-1 - \sqrt{31}}{3}$ or $x > \frac{-1 + \sqrt{31}}{3}$.

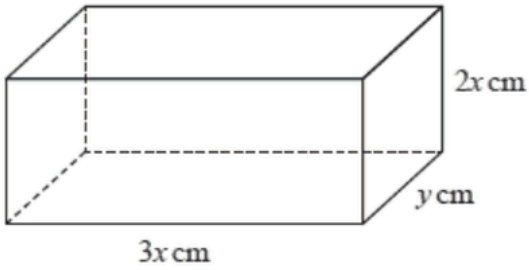
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Question 23

3 marks | Volume & Surface Area

23 The diagram shows a cuboid.

Diagram **NOT** accurately drawn



The cuboid measures $3x$ cm by $2x$ cm by y cm

The volume of the cuboid is 1014 cm^3
The total surface area of the cuboid is A cm^2

Show that $A = 12x^2 + \dfrac{1690}{x}$

You must show all the stages of your working.

(Total for Question 23 is 3 marks)

WORKED SOLUTION

Question 23 · 4WM2/01 May 2025

1 **Evaluate fraction**

$$3x \times 2x \times y = 1014$$

$$6x^2y = 1014$$

$$y = \frac{169}{x^2}$$

2 Surface area

Surface area:

$$A = 2(3x \cdot 2x + 3x \cdot y + 2x \cdot y)$$

$$= 12x^2 + 10xy$$

$$= 12x^2 + 10x\left(\frac{169}{x^2}\right)$$

$$= 12x^2 + \frac{1690}{x}$$

FINAL ANSWER

$A = 12x^2 + \dfrac{1690}{x}$.

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Question 24

4 marks | Sequences

24 The 21st term of an arithmetic series is 109
The sum of the first 52 terms of the series is 4381

Work out the 5th term of the series.
Show clear algebraic working.

.....

(Total for Question 24 is 4 marks)

WORKED SOLUTION

Question 24 · 4WM2/01 May 2025

1 Use series formula

For an arithmetic series,

$$a + 20d = 109$$

2 Evaluate fraction

and

$$\frac{52}{2}(2a + 51d) = 4381$$

$$26(2a + 51d) = 4381$$

3 Solving gives

Solving gives

$$d = -4.5, \qquad a = 199$$

4 The fifth term is

The fifth term is

$$a + 4d = 199 + 4(-4.5) = 181$$

✓ **FINAL ANSWER**

181.

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Question 25

4 marks | Area & Volume of Similar Shapes

25 **A** and **B** are two similar solids.

The height of solid **A** is 31 cm
The height of solid **B** is 18.6 cm

Given that

volume of solid **A** − volume of solid **B** = 735 cm³

find the volume of solid **A**

..... cm³

(Total for Question 25 is 4 marks)

WORKED SOLUTION

Question 25 · 4WM2/01 May 2025

1 Linear scale factor from solid

Linear scale factor from solid A to solid B:

$$\frac{18.6}{31} = 0.6$$

2 Calculate volume

So the volume scale factor is

$$0.6^3 = 0.216$$

3 Let the volume of be

Let the volume of A be V. Then

$$V - 0.216V = 735$$

$$0.784V = 735$$

$$V = 937.5$$

FINAL ANSWER

$937.5\ \text{cm}^3$.

Question 26

5 marks | Vectors

26

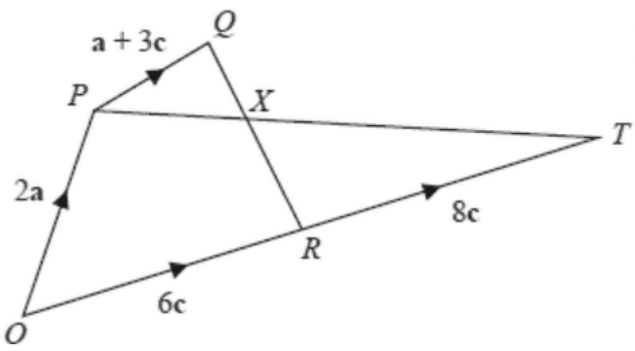


Diagram **NOT** accurately drawn

The diagram shows a quadrilateral $OPQR$ in which

$\overrightarrow{OP} = 2\mathbf{a}$ $\overrightarrow{OR} = 6\mathbf{c}$ $\overrightarrow{PQ} = \mathbf{a} + 3\mathbf{c}$

(a) Find in terms of **a** and **c**

$\overrightarrow{QR}$ = ...

(1)

The point T is such that $\overrightarrow{RT} = 8\mathbf{c}$
The point X lies on QR such that PXT is a straight line.

(b) Using a vector method, find the ratio $QX : XR$
Give your answer in the form $m : n$ where m and n are integers.
Show your working clearly.

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$QX : XR$ = ...

(4)

(Total for Question 26 is 5 marks)

1 **(a)**

(a)

$$\overrightarrow{QR} = \overrightarrow{OR} - \overrightarrow{OQ}$$

$$\overrightarrow{OQ} = 2a + (a + 3c) = 3a + 3c$$

$$\overrightarrow{QR} = 6c - (3a + 3c) = 3c - 3a$$

2 **(b) Let divide so that**

(b) Let X divide QR so that

$$\overrightarrow{QX} = \lambda\overrightarrow{QR}$$

3 **Calculate value**

Then

$$\overrightarrow{OX} = 3a + 3c + \lambda(3c - 3a)$$

4 **Calculate value**

Also X lies on PT, where $\overrightarrow{OT} = 14c$, so

$$\overrightarrow{OX} = 2a + \mu(14c - 2a)$$

5 **Equating coefficients gives . Therefore**

Equating coefficients gives $\lambda = \frac{5}{9}$. Therefore

$$QX : XR = \frac{5}{9} : \frac{4}{9} = 5 : 4$$

✓ **FINAL ANSWER**

$\overrightarrow{QR} = 3c - 3a$; $QX : XR = 5 : 4$.

Question 27

4 marks | Transformations of Graphs

27 A curve has equation $y = f(x)$

There is one maximum point on this curve.
The coordinates of this maximum point are $(6, -5)$

(a) Write down the coordinates of the maximum point on the curve with equation

(i) $y = f(x - 4)$

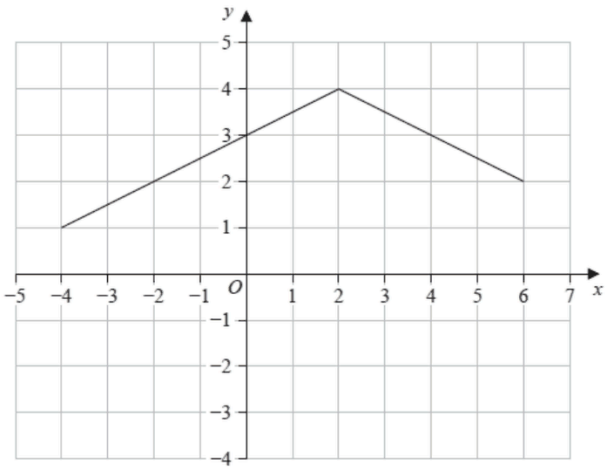
(.....)
(1)

(ii) $y = f(3x)$

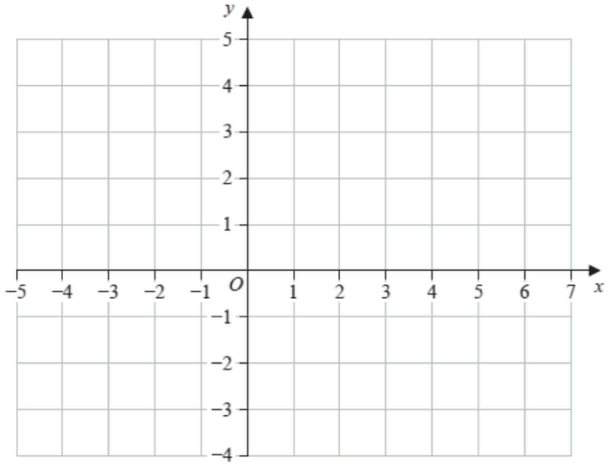
(.....)
(1)

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Here is the graph of $y = g(x)$



(b) On the grid below, draw the graph of $y = g(2x) - 3$



(2)

(Total for Question 27 is 4 marks)

1 **(a)**

(a)

2 **Read the graph**

For $y = f(x - 4)$, move the graph 4 units right:

$$(6, -5) \to (10, -5)$$

3 **Divide the -coordinate**

For $y = f(3x)$, divide the x-coordinate by 3:

$$(6, -5) \to (2, -5)$$

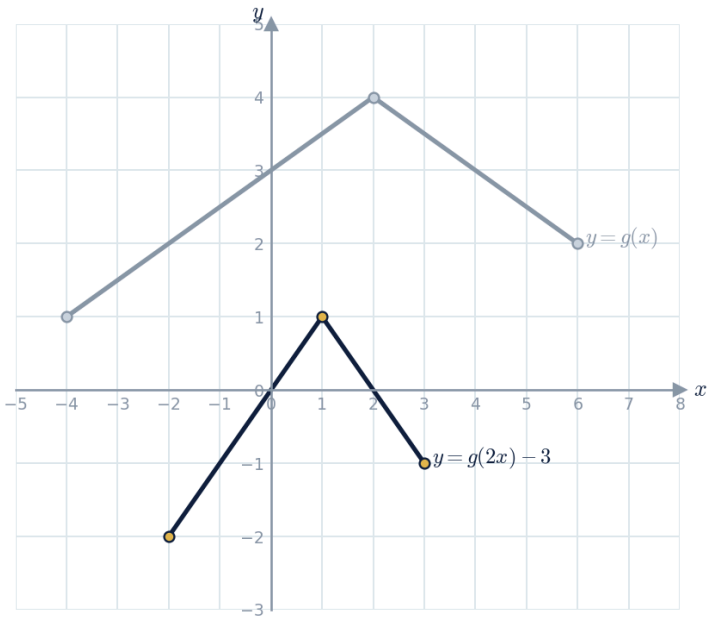
4 **Subtract from each -coordinate**

(b) For $y = g(2x) - 3$, halve each x-coordinate and subtract 3 from each y-coordinate.

5 **Useful transformed points are**

Useful transformed points are

$$(-4, 1) \to (-2, -2), \quad (2, 4) \to (1, 1), \quad (6, 2) \to (3, -1)$$



6 **Join these points with straight**

Join these points with straight line segments.

✓ **FINAL ANSWER**

$(10, -5)$, $(2, -5)$, graph through $(-2, -2), (1, 1), (3, -1)$.