Elite Mathematics
Pearson Edexcel International GCSE

IGCSE LINEAR · 4MA1

4MA1/2H 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

4MA1/2H June 2025

June 2025

26	100	2 h
questions	marks	exam time

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

4MA1/2H JUNE 2025

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.

		6		10	14

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 · 4MA1/2H June 2025

1 **Calculate statistic**

The range is 10, and the greatest card is 14:

$$14 - \text{smallest} = 10$$

2 **Use Statistics Toolkit tag correct**

So the smallest card is 4.

3 **Calculate statistic**

The median is 7.5. For 6 cards, the median is the mean of the 3rd and 4th cards:

$$\frac{6 + x}{2} = 7.5$$

$$x = 9$$

4 **Calculate statistic**

The mode is 6, so the other missing card must be 6.

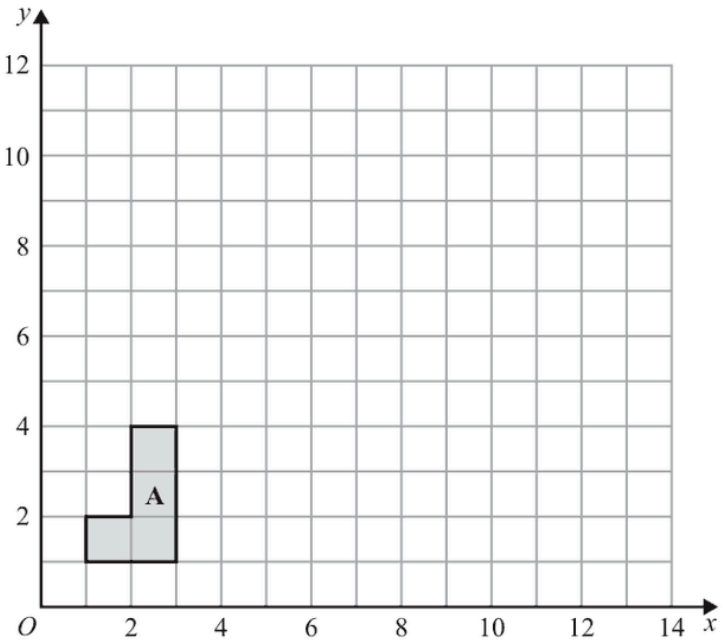
FINAL ANSWER

$4,\ 6,\ 9$.

Question 2

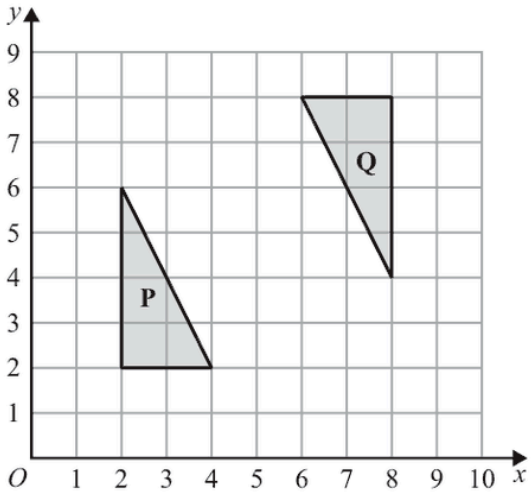
5 marks | Transformations

2



(a) On the grid, enlarge shape **A** with scale factor 3 and centre (0, 1)

(2)



(b) Describe fully the single transformation that maps triangle **P** onto triangle **Q**

.....

.....

(3)

(Total for Question 2 is 5 marks)

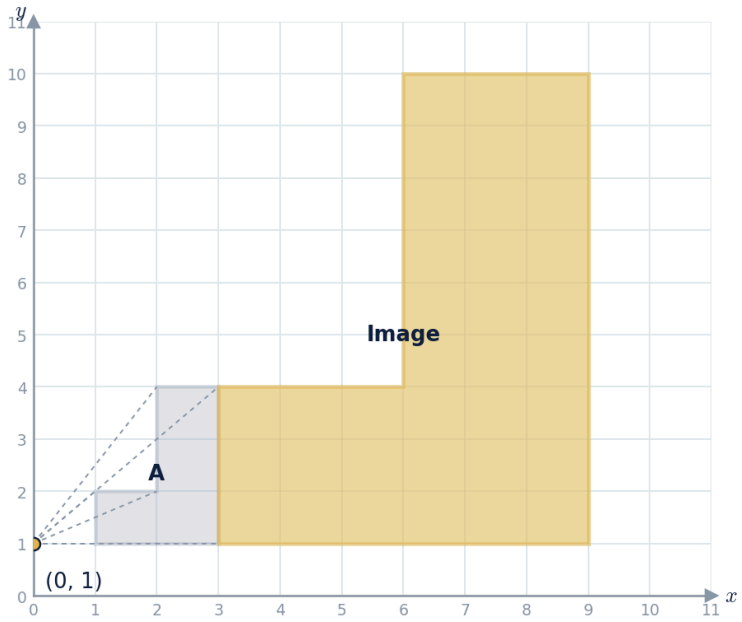
1 **Use Transformations correct**

(a) Enlarge from centre $(0, 1)$ with scale factor 3.

2 **The vertices become**

The vertices become

$$(3, 1),\ (9, 1),\ (9, 10),\ (6, 10),\ (6, 4),\ (3, 4)$$



3 **Use trigonometry**

(b) Triangle P is mapped to triangle Q by a $180°$ rotation about $(5, 5)$.

✓ **FINAL ANSWER**

(a) vertices $(3, 1), (9, 1), (9, 10), (6, 10), (6, 4), (3, 4)$; (b) rotation $180°$ about $(5, 5)$.

4MA1/2H JUNE 2025

Question 3

3 marks | Algebraic Proof

3 Show that $7\frac{1}{3} - 3\frac{4}{7} = 3\frac{16}{21}$

(Total for Question 3 is 3 marks)

WORKED SOLUTION

Question 3 · 4MA1/2H June 2025

1 Evaluate fraction

$$7\frac{1}{3} = \frac{22}{3}, \qquad 5\frac{4}{7} = \frac{39}{7}$$

$$7\frac{1}{3} - 5\frac{4}{7} = \frac{22}{3} - \frac{39}{7}$$

$$= \frac{154}{21} - \frac{117}{21} = \frac{37}{21}$$

$$\frac{37}{21} = 1\frac{16}{21}$$

FINAL ANSWER

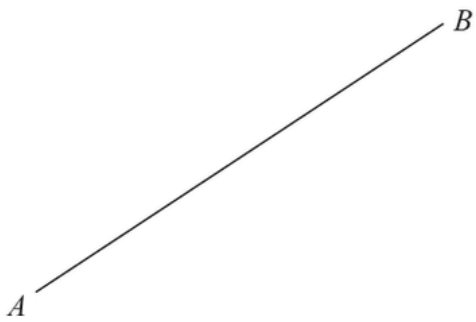
$1\frac{16}{21}$.

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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)

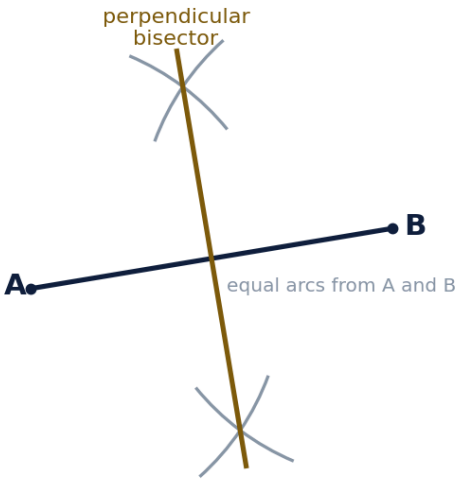
WORKED SOLUTION

Question 4 · 4MA1/2H June 2025

1 **Construction answer**

To construct the perpendicular bisector of AB:

1. Open the compass to more than half the length of AB.
2. Draw equal arcs from A above and below AB.
3. Without changing the compass width, draw equal arcs from B.
4. Join the two arc intersections with a ruler.



FINAL ANSWER

The joined line is the perpendicular bisector of AB.

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Question 5

4 marks | Similar Shapes

5 The diagram shows two similar quadrilaterals, $ABCD$ and $EFGH$

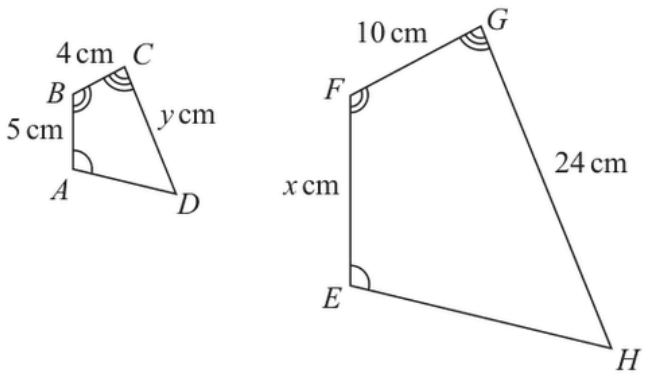


Diagram **NOT** accurately drawn

$AB = 5\,\text{cm}$ $BC = 4\,\text{cm}$ $CD = y\,\text{cm}$

$EF = x\,\text{cm}$ $FG = 10\,\text{cm}$ $GH = 24\,\text{cm}$

(a) Work out the value of x

$x =$ .....

(2)

(b) Work out the value of y

$y =$ .....

(2)

(Total for Question 5 is 4 marks)

WORKED SOLUTION

Question 5 · 4MA1/2H June 2025

1 **Evaluate fraction**

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

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

2 **Calculate value**

Since AB corresponds to EF,

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

3 **Calculate value**

Since CD corresponds to GH,

$$2.5y = 24$$

$$y = 9.6$$

✓ **FINAL ANSWER**

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

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Question 6

4 marks | Ratio Toolkit

6 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 6 is 4 marks)

WORKED SOLUTION

Question 6 · 4MA1/2H June 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 $8 : 7 : 9$.

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Question 7

3 marks | Compound Interest & Depreciation

7 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 7 is 3 marks)

WORKED SOLUTION

Question 7 · 4MA1/2H June 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 8

3 marks | Simultaneous Equations

8 Solve the simultaneous equations

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

Show clear algebraic working.

$x =$ .....

$y =$ .....

(Total for Question 8 is 3 marks)

WORKED SOLUTION

Question 8 · 4MA1/2H June 2025

1 Solve simultaneous equations

$$3x + 5y = 8$$

$$4x + y = -3.5$$

2 Solve simultaneous equations

From the second equation,

$$y = -3.5 - 4x$$

3 Substitute into the first equation

Substitute into the first equation:

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

$$3x - 17.5 - 20x = 8$$

$$-17x = 25.5$$

$$x = -1.5$$

4 **Solve simultaneous equations**

Then

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

✓ **FINAL ANSWER**

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

Question 9

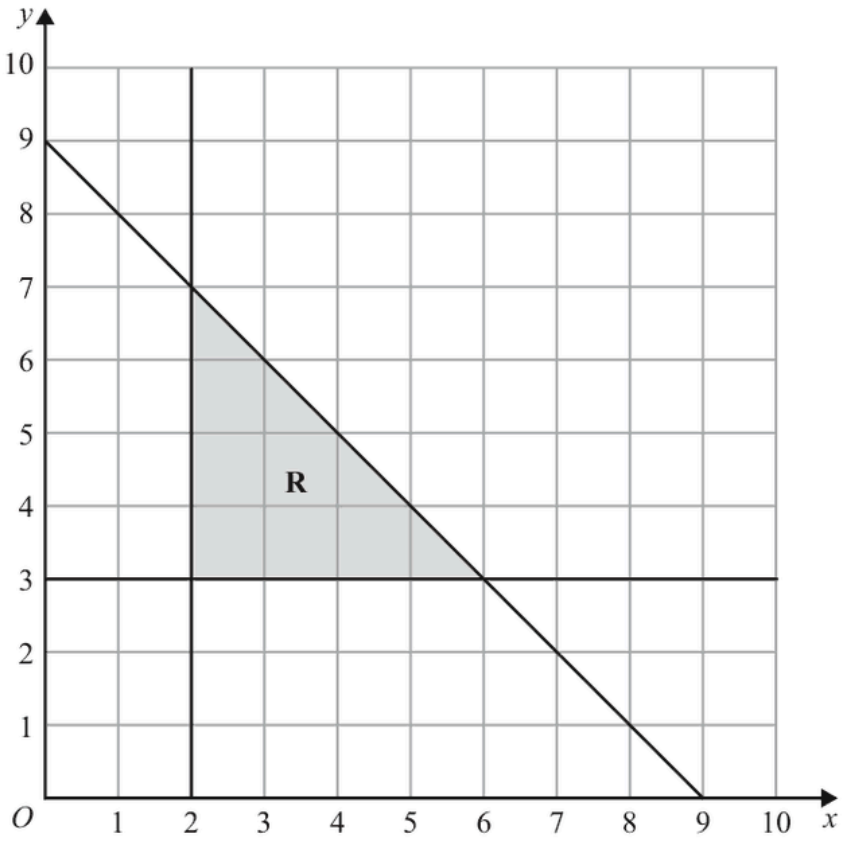
5 marks | Inequalities (Solving & Graphing)

9 (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 9 is 5 marks)

1 Evaluate fraction

For part (a),

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

$$-8 < 5x$$

$$x > -\frac{8}{5}$$

2 Calculate value

For part (b), the boundaries are $x = 2$, $y = 3$, and $x + y = 9$.

3 The shaded region is

The shaded region is

$$x \geq 2$$

$$y \geq 3$$

$$x + y \leq 9$$

FINAL ANSWER

(a) $x > -\frac{8}{5}$. (b) $x \geq 2$, $y \geq 3$, $x + y \leq 9$.

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Question 10

5 marks | Right-Angled Triangles - Pythagoras & Trigonometry

10 ABD and ABC are right-angled triangles.

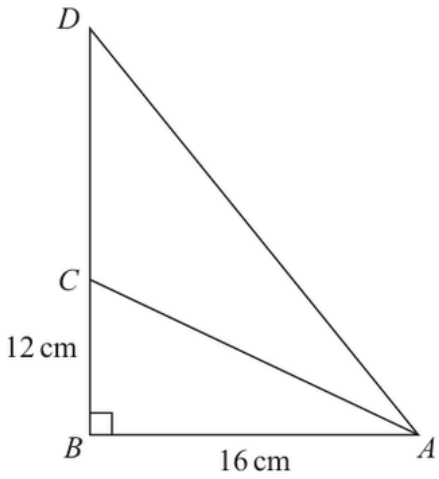


Diagram **NOT** accurately drawn

$AB = 16\,\text{cm}$ $BC = 12\,\text{cm}$ $AD = 1.5 \times AC$

Find the length of CD
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 10 is 5 marks)

WORKED SOLUTION

Question 10 · 4MA1/2H June 2025

1 **Use trigonometry**

In triangle ABC,

$$AC^2 = 16^2 + 12^2 = 400$$

$$AC = 20$$

2 **Use trigonometry**

Given $AD = 1.5AC$,

$$AD = 30$$

3 **Use trigonometry**

In triangle ABD,

$$BD^2 = 30^2 - 16^2 = 644$$

$$BD = 25.377\ldots$$

---

4 **Use trigonometry**

So

$$CD = BD - BC = 25.377\ldots - 12 = 13.377\ldots$$

✓ **FINAL ANSWER**

$13.4\ \text{cm}$.

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Question 11

3 marks | Probability Toolkit

11 Khalid has a box of counters.

17 of the counters are red
28 of the counters are blue
the rest of the counters are orange

Khalid is going to take at random a counter from the box.

The probability that Khalid will take an orange counter is $\frac{4}{9}$

Work out the number of orange counters that are in the box.

(Total for Question 11 is 3 marks)

WORKED SOLUTION

Question 11 · 4MA1/2H June 2025

1 Counters that are not orange

$17 + 28 = 45$ counters are not orange, and $P(\text{not orange}) = 1 - \frac{4}{9} = \frac{5}{9}$.

2 Total number of counters

$$\frac{5}{9} \times T = 45 \Rightarrow T = 81$$

3 Orange counters

$$81 - 45 = 36$$

FINAL ANSWER

36

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Question 12

3 marks | Expanding Brackets

12 Expand and simplify $3x(2x+5)(7x-4)$

(Total for Question 12 is 3 marks)

WORKED SOLUTION

Question 12 · 4MA1/2H June 2025

1 Expand brackets

$$3x(2x+5)(7x-4) = 3x(14x^2+27x-20)$$

$$= 42x^3+81x^2-60x$$

FINAL ANSWER

$42x^3+81x^2-60x$

Question 13

6 marks | Cumulative Frequency Diagrams

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

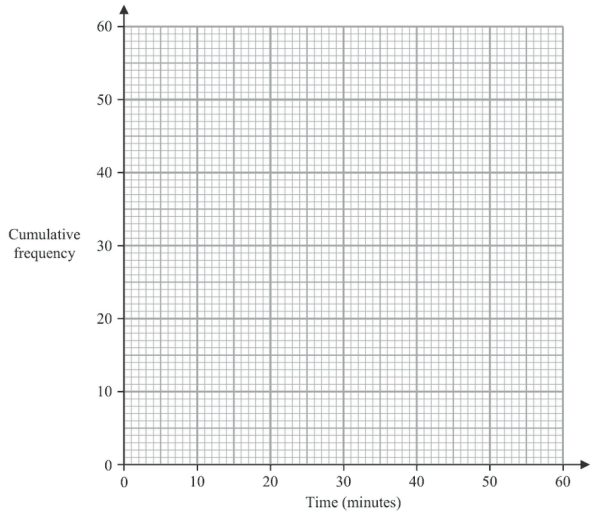
Time (t minutes)	Frequency
$0 < t \leqslant 10$	8
$10 < t \leqslant 20$	13
$20 < t \leqslant 30$	12
$30 < t \leqslant 40$	17
$40 < t \leqslant 50$	7
$50 < t \leqslant 60$	3

(a) Complete the cumulative frequency table.

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

(1)

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



(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 13 is 6 marks)

1

(a) Running totals

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

2

(b) Plot at the upper class boundaries

Plot $(10, 8), (20, 21), (30, 33), (40, 50), (50, 57), (60, 60)$, start at $(0, 0)$, and join with a smooth curve.

3

(c) Median

Read across from $\frac{60}{2} = 30$: about 27.5 minutes.

4

(d) More than 45 minutes

At 45 minutes the curve reads about 54, so about $60 - 54 = 6$ people. (Answers from about 5 to 8 are accepted, depending on the curve.)

✓ **FINAL ANSWER**

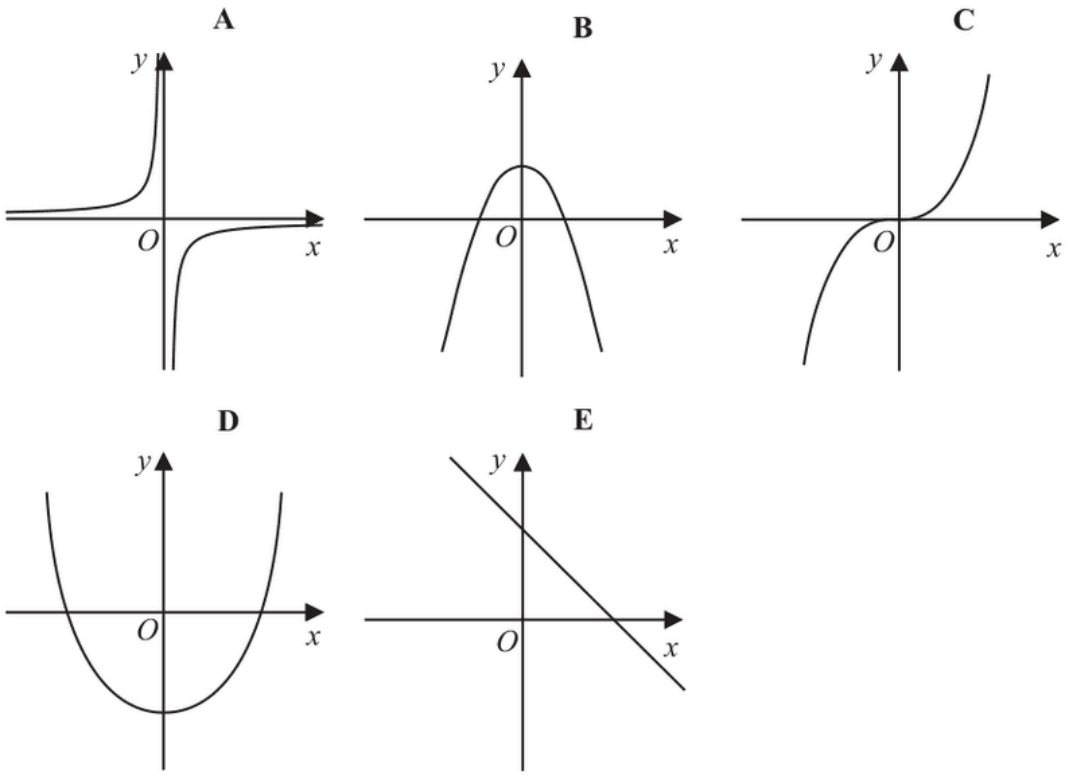
(a) $8, 21, 33, 50, 57, 60$ (c) about 27.5 minutes (d) about 6

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Question 14

2 marks | Graphs of Functions

14 Here are five graphs.



(a) Write down the letter of the graph that could have the equation $y = 5 - x^2$

.....

(1)

(b) Write down the letter of the graph that could have the equation $y = 2x^3$

.....

(1)

(Total for Question 14 is 2 marks)

WORKED SOLUTION

Question 14 · 4MA1/2H June 2025

1 **(a)**

(a)

$$y = 5 - x^2$$

2 **This is a quadratic graph**

This is a quadratic graph with a negative coefficient of x^2, so it is a downward-opening parabola.

3 **That is graph B**

That is graph **B**.

4 **(b)**

(b)

$$y = 2x^3$$

5 **This is an increasing cubic**

This is an increasing cubic graph passing through the origin.

6 **That is graph C**

That is graph **C**.

✓ **FINAL ANSWER**

(a) B, (b) C.

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Question 15

3 marks | Algebraic Roots & Indices

15 Simplify fully $\left(\frac{2a^3}{10a^7c^2}\right)^{-3}$

(Total for Question 15 is 3 marks)

WORKED SOLUTION

Question 15 · 4MA1/2H June 2025

1 **Use index laws**

$$\left(\frac{2a^3}{10a^7c^2}\right)^{-3}$$

2 **Use index laws**

First simplify inside the bracket:

$$\frac{2a^3}{10a^7c^2} = \frac{1}{5a^4c^2}$$

3 **A negative power means take**

A negative power means take the reciprocal:

$$\left(\frac{1}{5a^4c^2}\right)^{-3} = (5a^4c^2)^3$$

$$= 125a^{12}c^6$$

✓ **FINAL ANSWER**

$125a^{12}c^6$.

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Question 16

4 marks | Rearranging Formulae

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

(Total for Question 16 is 4 marks)

WORKED SOLUTION

Question 16 · 4MA1/2H June 2025

1 Rearrange formula

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

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

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

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

FINAL ANSWER

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

Question 17

6 marks | Differentiation & Turning Points

17 $y = 4x^3 + 5x^2 + 2x$

(a) Find $\frac{dy}{dx}$

$\frac{dy}{dx} =$ .....

(2)

(b) Find the coordinates of the turning points on the graph with equation $y = 4x^3 + 5x^2 + 2x$
Show clear algebraic working.

.....

(4)

(Total for Question 17 is 6 marks)

1 **Differentiate**

$$y = 4x^3 + 5x^2 + 2x$$

$$\frac{dy}{dx} = 12x^2 + 10x + 2$$

2 **Differentiate**

At a turning point,

$$12x^2 + 10x + 2 = 0$$

$$2(6x^2 + 5x + 1) = 0$$

$$(3x + 1)(2x + 1) = 0$$

$$x = -\frac{1}{3} \quad \text{or} \quad x = -\frac{1}{2}$$

3 **Differentiate**

When $x = -\frac{1}{3}$,

$$y = -\frac{7}{27}$$

4 **Differentiate**

When $x = -\frac{1}{2}$,

$$y = -\frac{1}{4}$$

FINAL ANSWER

$\left(-\frac{1}{2}, -\frac{1}{4}\right)$ and $\left(-\frac{1}{3}, -\frac{7}{27}\right)$.

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Question 18

2 marks | Algebraic Proof

18 Use algebra to show that $0.\dot{7}0\dot{2} = \frac{26}{37}$

(Total for Question 18 is 2 marks)

WORKED SOLUTION

Question 18 · 4MA1/2H June 2025

1 Let

Let

$$x = 0.\dot{7}0\dot{2}$$

2 Calculate value

Then

$$1000x = 702.\dot{7}0\dot{2}$$

3 Subtract

Subtract:

$$999x = 702$$

$$x = \frac{702}{999} = \frac{26}{37}$$

FINAL ANSWER

$0.\dot{7}0\dot{2} = \frac{26}{37}$.

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Question 19

3 marks | Inequalities (Solving & Graphing)

19 Solve the inequality $4x^2 + 4x - 15 < 0$
Show clear algebraic working.

(Total for Question 19 is 3 marks)

WORKED SOLUTION

Question 19 · 4MA1/2H June 2025

1 Solve inequality

$$4x^2 + 4x - 15 < 0$$

2 Factorise

Factorise:

$$(2x + 5)(2x - 3) < 0$$

3 The roots are

The roots are

$$x = -\frac{5}{2}, \qquad x = \frac{3}{2}$$

4 The quadratic is negative between

The quadratic is negative between the roots.

✓ FINAL ANSWER

$-\frac{5}{2} < x < \frac{3}{2}$.

Question 20

6 marks | Set Notation & Venn Diagrams

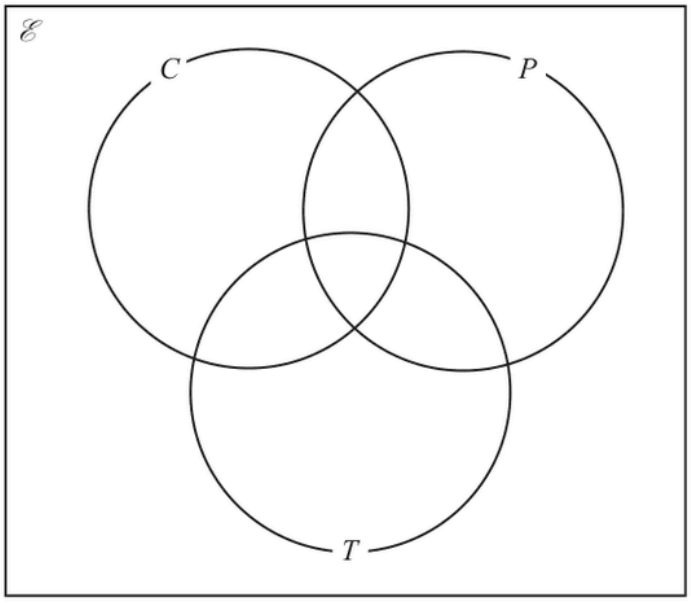
20 120 gardeners were asked if they grow carrots (C) or potatoes (P) or tomatoes (T)

Of these gardeners

43 grow carrots
12 grow carrots and potatoes and tomatoes
18 grow carrots and potatoes
27 grow carrots and tomatoes
32 grow potatoes and tomatoes
29 do not grow carrots or potatoes or tomatoes

The number of these gardeners who grow only potatoes is equal to the number of these gardeners who grow only tomatoes.

(a) Complete the Venn diagram to show this information.



(3)

(b) Find $n(T' \cap C)$

.....

(1)

One of the gardeners who grows carrots is chosen at random.

(c) Calculate the probability that this gardener also grows potatoes.

.....

(2)

(Total for Question 20 is 6 marks)

1 **Calculate value**

There are 120 gardeners in total and 29 are outside all three sets, so

$$n(C \cup P \cup T) = 120 - 29 = 91$$

2 **The triple intersection is**

The triple intersection is

$$n(C \cap P \cap T) = 12$$

3 **Calculate value**

So the pair-only regions are:

$$C \cap P \text{ only} = 18 - 12 = 6$$

$$C \cap T \text{ only} = 27 - 12 = 15$$

$$P \cap T \text{ only} = 32 - 12 = 20$$

4 **Calculate value**

Since 43 grow carrots,

$$C \text{ only} = 43 - 6 - 15 - 12 = 10$$

5 **Let the number who grow**

Let the number who grow only potatoes be y. The number who grow only tomatoes is also y.

6 **Add the regions union**

Now add the regions in the union:

$$10 + y + y + 6 + 15 + 20 + 12 = 91$$

$$63 + 2y = 91$$

$$2y = 28$$

$$y = 14$$

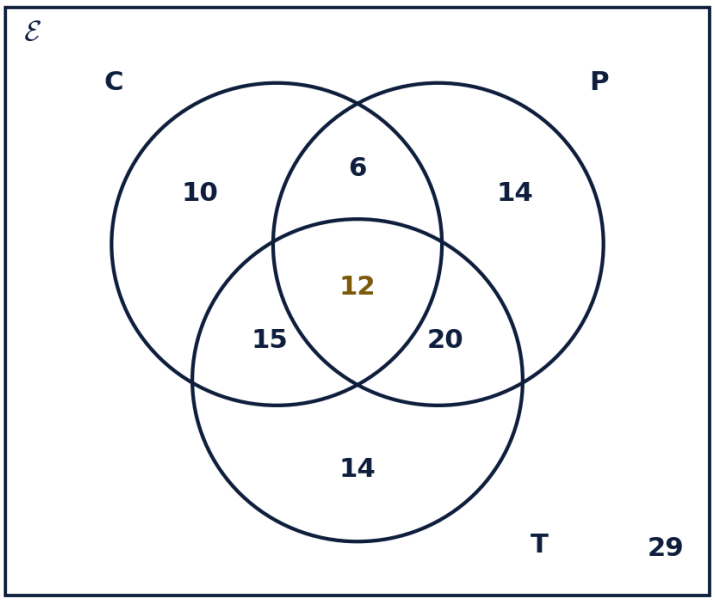
7 **Calculate value**

So the Venn regions are:

$$C \text{ only} = 10, \quad P \text{ only} = 14, \quad T \text{ only} = 14$$

$$C \cap P \text{ only} = 6, \quad C \cap T \text{ only} = 15, \quad P \cap T \text{ only} = 20$$

$$C \cap P \cap T = 12, \quad \text{outside} = 29$$



8 **Calculate value**

For part (b),

$$n(T' \cap C) = C \text{ only} + C \cap P \text{ only}$$

$$= 10 + 6 = 16$$

9 **Evaluate fraction**

For part (c), one gardener who grows carrots is chosen.

$$P(\text{also grows potatoes}) = \frac{n(C \cap P)}{n(C)}$$

$$= \frac{18}{43}$$

✓ **FINAL ANSWER**

(b) 16, (c) $\frac{18}{43}$

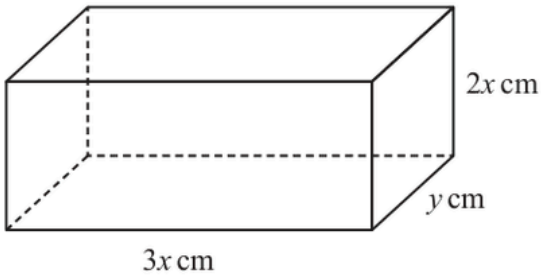
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Question 21

3 marks | Volume & Surface Area

21 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 $1014\,\text{cm}^3$
The total surface area of the cuboid is $A\,\text{cm}^2$

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

You must show all the stages of your working.

(Total for Question 21 is 3 marks)

WORKED SOLUTION

Question 21 · 4MA1/2H June 2025

1 **The cuboid has dimensions**

The cuboid has dimensions

$$3x, \quad 2x, \quad y$$

2 **Calculate volume**

Its volume is $1014\ \text{cm}^3$, so

$$(3x)(2x)(y) = 1014$$

$$6x^2y = 1014$$

$$y = \frac{1014}{6x^2}$$

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

3 **The total surface area is**

The total surface area is

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

$$A = 2(6x^2 + 5xy)$$

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

4 **Substitute**

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

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

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

✓ **FINAL ANSWER**

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

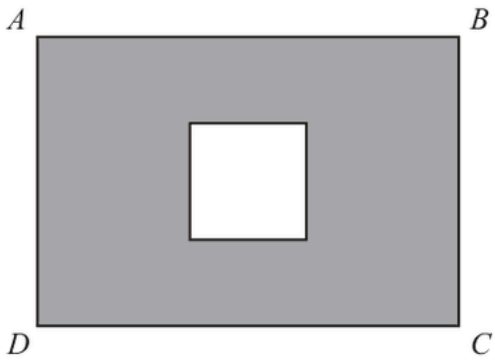
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Question 22

4 marks | Rounding, Estimation & Bounds

22 The diagram shows a square inside rectangle $ABCD$

Diagram **NOT** accurately drawn



The total area of the region shown shaded in the diagram is $X\text{cm}^2$

$AB = 11.5$ cm correct to the nearest 0.5 cm
$BC = 9.2$ cm correct to 2 significant figures
side of square $= 4.1$ cm correct to 2 significant figures

By considering bounds, work out the value of X to a suitable degree of accuracy.
Show your working clearly.

$X =$ .....

(Total for Question 22 is 4 marks)

WORKED SOLUTION

Question 22 · 4MA1/2H June 2025

1 The shaded area is

The shaded area is

$$X = \text{area of rectangle} - \text{area of square}$$

2 Bounds

Bounds:

$$11.25 \leq AB < 11.75$$

$$9.15 \leq BC < 9.25$$

$$4.05 \leq \text{square side} < 4.15$$

3 **Lower bound**

Lower bound:

$$11.25(9.15) - 4.15^2 = 85.715$$

4 **Upper bound**

Upper bound:

$$11.75(9.25) - 4.05^2 = 92.285$$

5 **Estimate the value**

So

$$85.715 < X < 92.285$$

6 **Estimate the value**

Both bounds round to 90 to the nearest 10.

✓ **FINAL ANSWER**

$X = 90\ \text{cm}^2$ to a suitable degree of accuracy

4MA1/2H JUNE 2025

Question 23

4 marks | Algebraic Fractions

23 $\dfrac{4x^2-4x-120}{5x^2-180} \div \dfrac{x^2+5x}{10x^2+60x} = p$ where p is an integer.

Find the value of p

Show clear algebraic working.

$p =$ .....

(Total for Question 23 is 4 marks)

WORKED SOLUTION

Question 23 · 4MA1/2H June 2025

1 **Split the ratio**

$$\frac{4x^2-4x-120}{5x^2-180} \div \frac{x^2+5x}{10x^2+60x}$$

2 **Factorise**

Factorise:

$$4x^2-4x-120 = 4(x-6)(x+5)$$

$$5x^2-180 = 5(x-6)(x+6)$$

$$x^2+5x = x(x+5)$$

$$10x^2+60x = 10x(x+6)$$

3 **Split the ratio**

So

$$\frac{4(x-6)(x+5)}{5(x-6)(x+6)} \div \frac{x(x+5)}{10x(x+6)}$$

$$= \frac{4(x+5)}{5(x+6)} \times \frac{10(x+6)}{x+5} = 8$$

FINAL ANSWER

$p = 8$

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Question 24

4 marks | 3D Pythagoras & Trigonometry

24 The diagram shows a square-based pyramid $ABCDE$

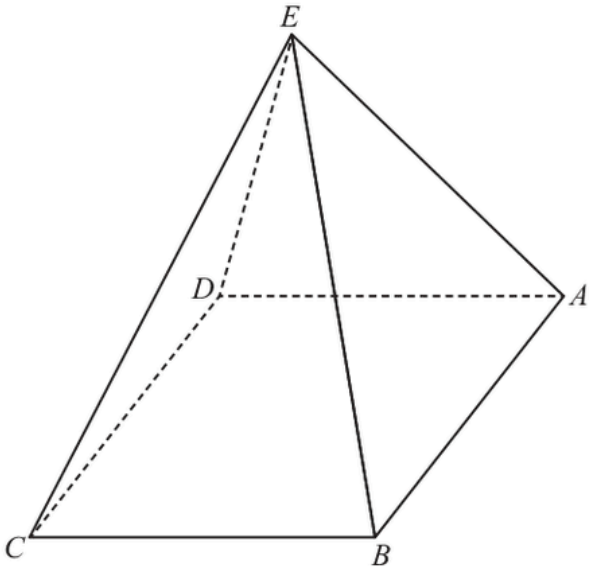


Diagram **NOT** accurately drawn

$EA = EB = EC = ED$

M is the centre of the horizontal square base $ABCD$
Q is the midpoint of AB
Angle $EQM = 80°$

$EA : AB = n : 1$

Find the value of n
Give your answer correct to 3 significant figures.

$n =$ .....

(Total for Question 24 is 4 marks)

WORKED SOLUTION

Question 24 · 4MA1/2H June 2025

1 **Let**

Let

$$AB = s$$

2 **Find the midpoint**

Since M is the centre of the square base and Q is the midpoint of AB,

$$QM = \frac{s}{2}$$

3 **Use trigonometry**

Since $EA = EB = EC = ED$, the point E is vertically above M.

4 **Use trigonometry**

In right triangle EQM,

$$\tan 80° = \frac{EM}{QM}$$

$$EM = \frac{s}{2}\tan 80°$$

5 **The distance from the centre**

The distance from the centre of a square to a vertex is half the diagonal:

$$AM = \frac{s\sqrt{2}}{2}$$

6 **Use trigonometry**

In right triangle EMA,

$$EA^2 = EM^2 + AM^2$$

$$EA^2 = \left(\frac{s}{2}\tan 80°\right)^2 + \left(\frac{s\sqrt{2}}{2}\right)^2$$

$$EA = s\sqrt{\frac{\tan^2 80°}{4} + \frac{1}{2}}$$

7 **Use trigonometry**

So

$$\frac{EA}{AB} = \sqrt{\frac{\tan^2 80°}{4} + \frac{1}{2}}$$

$$n = 2.92$$

FINAL ANSWER

$n = 2.92$

Question 25

6 marks | Completing the Square

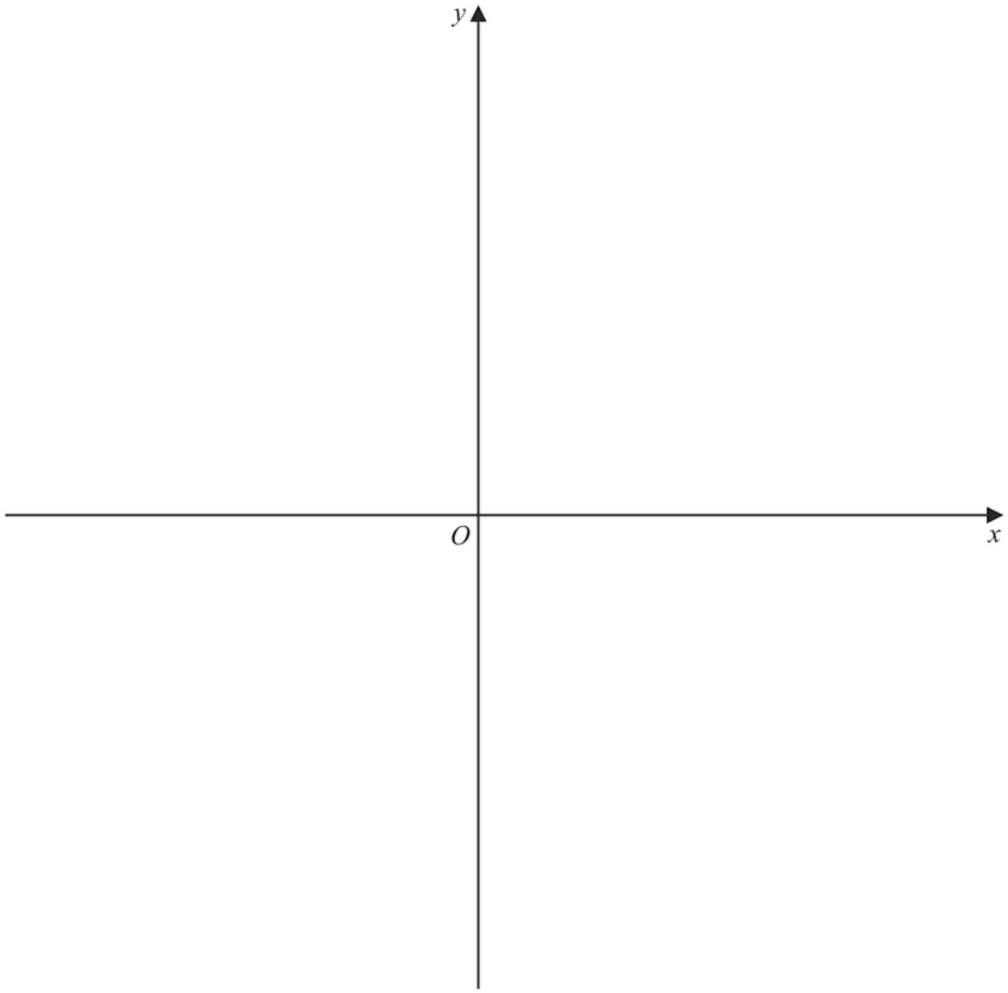
25 (a) Write $28+24x-6x^2$ in the form $a-b(x-c)^2$ where a, b and c are integers.

.....

(3)

(b) On the axes below, sketch the graph of $y=28+24x-6x^2$

Show clearly the coordinates of the turning point and the coordinates of the point of intersection of the graph with the y-axis.



(3)

(Total for Question 25 is 6 marks)

1 **(a)**

(a)

$$28 + 24x - 6x^2 = -6x^2 + 24x + 28$$

$$= -6(x^2 - 4x) + 28$$

$$= -6\left((x-2)^2 - 4\right) + 28$$

$$= 52 - 6(x-2)^2$$

2 **(b)**

(b)

$$y = 52 - 6(x-2)^2$$

3 **The graph is a downward**

The graph is a downward-opening parabola.

4 **The turning point is**

The turning point is

$$(2, 52)$$

5 **Calculate value**

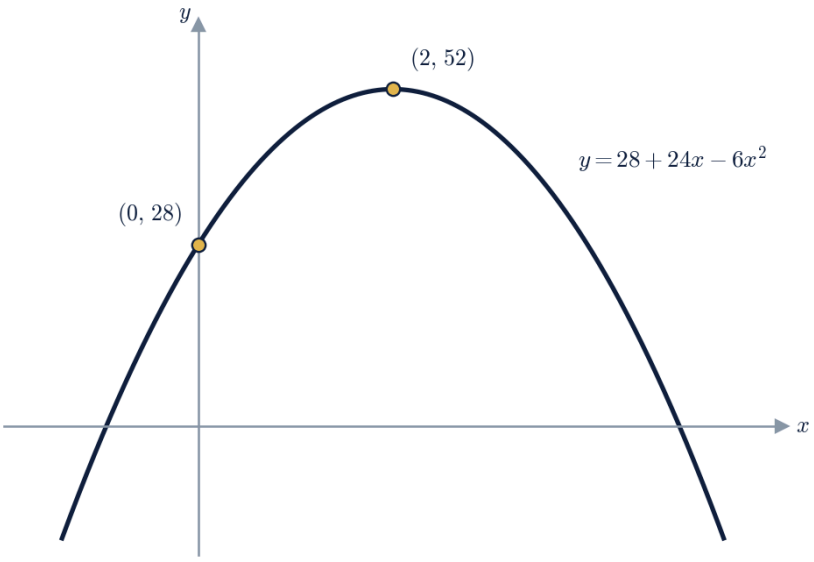
The point of intersection with the y-axis is found by putting $x = 0$:

$$y = 28$$

6 **Find intercepts**

So the y-intercept is

$$(0, 28)$$



FINAL ANSWER

(a) $52 - 6(x - 2)^2$. For the sketch, show a downward parabola with turning point $(2, 52)$ and y-intercept $(0, 28)$.

4MA1/2H JUNE 2025

Question 26

4 marks | Area & Volume of Similar Shapes

26 **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 26 is 4 marks)

WORKED SOLUTION

Question 26 · 4MA1/2H June 2025

1 **The heights of solids A**

The heights of solids A and B are 31 cm and 18.6 cm.

$$31 : 18.6 = 5 : 3$$

2 **Split the ratio**

So the volumes are in the ratio

$$5^3 : 3^3 = 125 : 27$$

3 **The difference in volume is**

The difference in volume is

$$125 - 27 = 98$$

4 **parts**

parts.

5 **Evaluate fraction**

This difference is $735\ \text{cm}^3$, so one part is

$$\frac{735}{98} = 7.5$$

6 Volume of solid A

Volume of solid A:

$$125 \times 7.5 = 937.5$$

FINAL ANSWER

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