Elite Mathematics
Pearson Edexcel International GCSE

IGCSE LINEAR · 4MA1

4WM1/01 May 2026 Worked Solutions

May 2026 paper rebuilt with the worked solution after each question.

24	2020–2026	Single-paper solutions
paper questions	55 past papers	checked by Dr Eslam



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PAST PAPER

4WM1/01 May 2026

May 2026

24	100	2 h
questions	marks	exam time

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

4WM1/01 MAY 2026

Question 1

3 marks | Fractions

1 Show that $4\frac{1}{7} - 2\frac{3}{5} = 1\frac{19}{35}$

(Total for Question 1 is 3 marks)

WORKED SOLUTION

Question 1 · 4WM1/01 May 2026

1 **Improper fractions**

$$4\tfrac{1}{7} = \frac{29}{7}, \qquad 2\tfrac{3}{5} = \frac{13}{5}$$

2 **Common denominator 35**

$$\frac{29}{7} - \frac{13}{5} = \frac{145}{35} - \frac{91}{35} = \frac{54}{35}$$

3 **Back to a mixed number**

$$\frac{54}{35} = 1\tfrac{19}{35} \quad \text{as required.}$$

✓ **FINAL ANSWER**

$\frac{54}{35} = 1\frac{19}{35}$ (shown)

4WM1/01 MAY 2026

Question 2

3 marks | Right-Angled Triangles - Pythagoras & Trigonometry

2

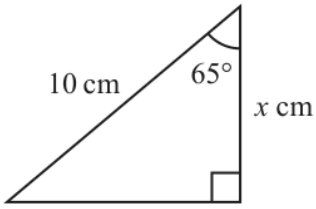


Diagram **NOT** accurately drawn

Work out the value of x
Give your answer correct to 3 significant figures.

$x =$ .....

(Total for Question 2 is 3 marks)

WORKED SOLUTION

Question 2 · 4WM1/01 May 2026

1 Choose the ratio

x is next to the $65°$ angle and 10 cm is the hypotenuse, so use cosine.

2 Calculate

$$x = 10\cos 65° = 4.2261\ldots$$

FINAL ANSWER

$x = 4.23$

Question 3

5 marks | Powers & Roots

3 $20^{70} \times 20^{8} = 20^{n}$

(a) Find the value of n

$n =$ .....

(1)

$36^{80} \div 36^{5} = 36^{m}$

(b) Find the value of m

$m =$ .....

(1)

$\left(52^{4}\right)^{16} = 52^{p}$

(c) Find the value of p

$p =$ .....

(1)

In a race, Dani ran a distance of 100 metres, correct to the nearest metre.

(d) Write down the lower bound for the distance.

..... metres

(1)

Dani ran this race in a time of 16.3 seconds, correct to one decimal place.

(e) Write down the upper bound for the time.

..... seconds

(1)

(Total for Question 3 is 5 marks)

1 **(a) Multiply: add powers**

$$20^{70} \times 20^{8} = 20^{78} \Rightarrow n = 78$$

2 **(b) Divide: subtract powers**

$$36^{80} \div 36^{5} = 36^{75} \Rightarrow m = 75$$

3 **(c) Power of a power: multiply**

$$(52^{4})^{16} = 52^{64} \Rightarrow p = 64$$

4 **(d) Lower bound**

Nearest metre means ± 0.5 m: lower bound $= 99.5$ m.

5 **(e) Upper bound**

One decimal place means ± 0.05 s: upper bound $= 16.35$ s.

✓ **FINAL ANSWER**

(a) 78 (b) 75 (c) 64 (d) 99.5 m (e) 16.35 s

Question 4

5 marks | Perimeter & Area

4 The diagram shows a shaded shape $ABCD$ made from a right-angled triangle ABD and a semicircle BCD

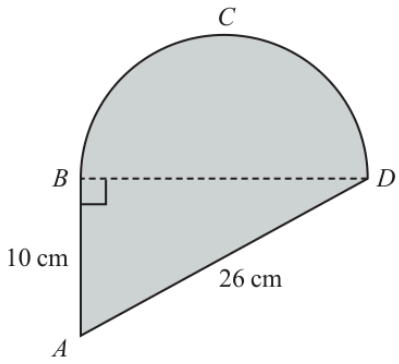


Diagram **NOT** accurately drawn

$AB = 10$ cm $AD = 26$ cm angle $ABD = 90°$

Work out the perimeter of the shaded shape.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 4 is 5 marks)

1 **Find BD with Pythagoras**

$$BD = \sqrt{26^2 - 10^2} = \sqrt{576} = 24 \text{ cm}$$

2 **Semicircle arc**

Diameter $BD = 24$, so the arc is

$$\tfrac{1}{2}\pi \times 24 = 12\pi = 37.699\ldots \text{ cm}$$

3 **Perimeter (BD is inside, not counted)**

$$10 + 26 + 12\pi = 73.699\ldots$$

✓ **FINAL ANSWER**

73.7 cm

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Question 5

4 marks | Set Notation & Venn Diagrams

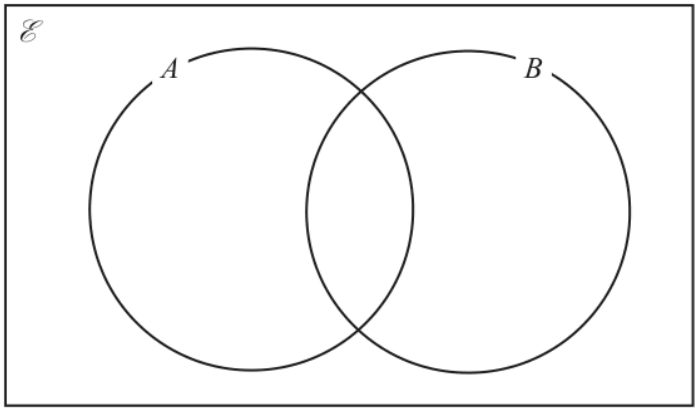
5 $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$

$A = \{2, 3, 5, 7, 11\}$

$A \cap B = \{2, 5\}$

$B' = \{3, 4, 6, 7, 9, 11\}$

(a) Complete the Venn diagram for this information.



(3)

A number is chosen at random from the universal set $\mathscr{E}$

(b) Write down the probability that this number is in the set $(A \cup B)'$

.....

(1)

(Total for Question 5 is 4 marks)

WORKED SOLUTION

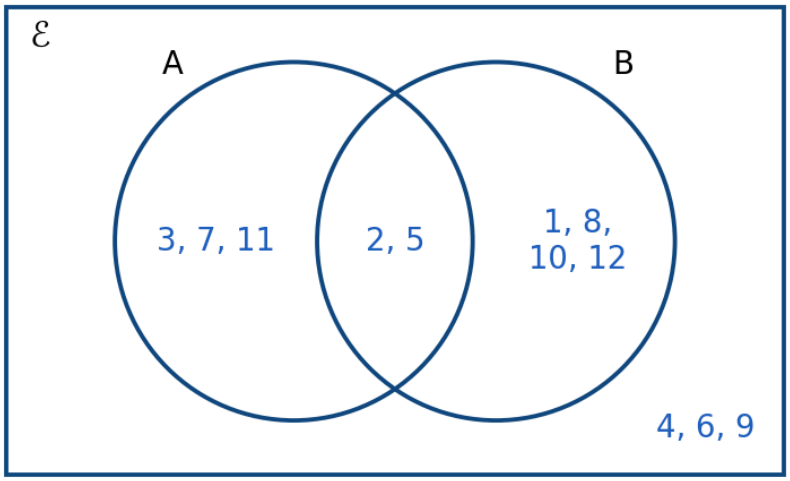
Question 5 · 4WM1/01 May 2026

1 **Find set B**

$B' = \{3, 4, 6, 7, 9, 11\}$, so $B = \{1, 2, 5, 8, 10, 12\}$.

2 **Fill each region**

$A \cap B = \{2, 5\}$; A only $= \{3, 7, 11\}$; B only $= \{1, 8, 10, 12\}$; outside both $= \{4, 6, 9\}$.



3 **(b) Outside both circles**

$$P\big((A \cup B)'\big) = \frac{3}{12} = \frac{1}{4}$$

FINAL ANSWER

(a) see diagram (b) $\frac{3}{12} = \frac{1}{4}$

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Question 6

2 marks | Algebraic Roots & Indices

6 Simplify $\left(4x^5y^6\right)^3$

.....

(Total for Question 6 is 2 marks)

WORKED SOLUTION

Question 6 · 4WM1/01 May 2026

1 Cube every part

$$(4x^5y^6)^3 = 4^3x^{15}y^{18} = 64x^{15}y^{18}$$

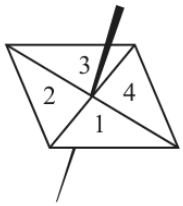
✓ **FINAL ANSWER**

$64x^{15}y^{18}$

Question 7

4 marks | Probability Toolkit

7 Here is a biased 4-sided spinner.



The table gives information about the probability that, when the spinner is spun once, it will land on each number.

Number	1	2	3	4
Probability	0.12	x	$2x$	0.16

Nevan spins the spinner 500 times.

Work out the expected number of times that the spinner lands on an even number.

.....

(Total for Question 7 is 4 marks)

1 **Probabilities add to 1**

$$0.12 + x + 2x + 0.16 = 1 \Rightarrow 3x = 0.72 \Rightarrow x = 0.24$$

2 **Even numbers are 2 and 4**

$$P(\text{even}) = 0.24 + 0.16 = 0.40$$

3 **Expected number**

$$500 \times 0.40 = 200$$

✓ **FINAL ANSWER**

200

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Question 8

3 marks | Standard & Compound Units

8 A block of wood has a mass of 480 kg
The wood has a density of 640 kg/m^3

Work out the volume of the block of wood.

..... m^3

(Total for Question 8 is 3 marks)

WORKED SOLUTION

Question 8 · 4WM1/01 May 2026

1 **Volume = mass ÷ density**

$$V = \frac{480}{640} = 0.75 \text{ m}^3$$

FINAL ANSWER

0.75 m^3

Question 9

5 marks | Factorising

9 (a) Factorise $15g^4h - 20gh^3$

.....

(2)

(b) (i) Factorise $x^2 + 3x - 28$

.....

(2)

(ii) Hence, solve $x^2 + 3x - 28 = 0$

.....

(1)

(Total for Question 9 is 5 marks)

1 **(a) Take out the HCF**

HCF of $15g^4h$ and $20gh^3$ is $5gh$:

$$15g^4h - 20gh^3 = 5gh(3g^3 - 4h^2)$$

2 **(b)(i) Two numbers: product −28, sum 3**

7 and -4:

$$x^2 + 3x - 28 = (x + 7)(x - 4)$$

3 **(b)(ii) Each bracket = 0**

$$x = -7 \quad \text{or} \quad x = 4$$

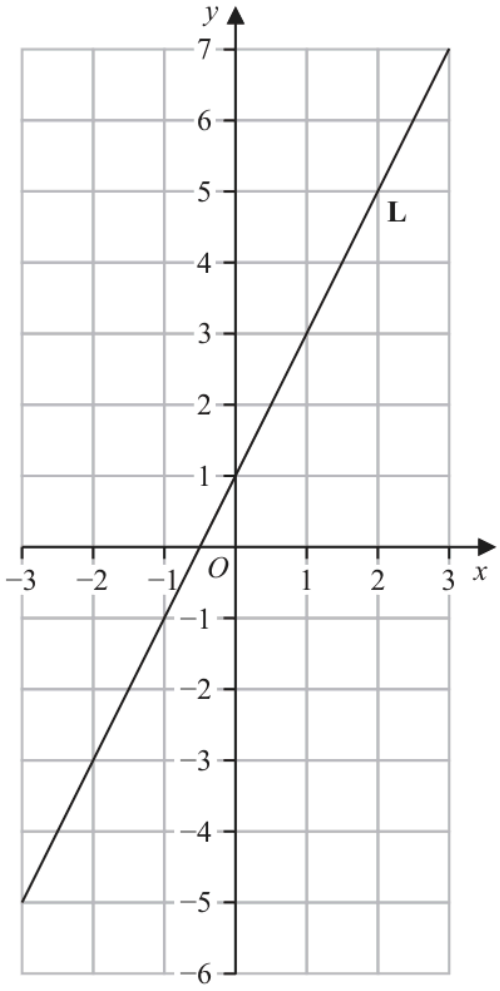
FINAL ANSWER

(a) $5gh(3g^3 - 4h^2)$ (b)(i) $(x + 7)(x - 4)$ (ii) $x = -7,\ 4$

Question 10

3 marks | Linear Graphs

10 The line **L** is drawn on a grid.



Find an equation for **L**

.....

(Total for Question 10 is 3 marks)

1 **Read two points**

The line passes through $(0, 1)$ and $(2, 5)$.

2 **Gradient and intercept**

$$m = \frac{5 - 1}{2 - 0} = 2, \qquad c = 1$$

3 **Equation**

$$y = 2x + 1$$

✓ **FINAL ANSWER**

$y = 2x + 1$

Question 11

3 marks | Probability Toolkit

11 There are 40 counters in a bag.

25 of the counters are green
7 of the counters are blue
8 of the counters are red

Ben puts some extra blue counters and some extra red counters into the bag.
The number of blue counters added to the bag is twice as many as the number of red counters added to the bag.

Ben takes at random a counter from the bag.

The probability that he takes a green counter is $\frac{5}{11}$

How many of the extra counters that Ben put into the bag were blue?

.....

(Total for Question 11 is 3 marks)

1 **Let r red be added**

Then $2r$ blue are added and the total is $40 + 3r$.

2 **Use P(green)**

$$\frac{25}{40+3r} = \frac{5}{11} \Rightarrow 275 = 200 + 15r \Rightarrow r = 5$$

3 **Blue added**

$$2r = 10$$

✓ **FINAL ANSWER**

10

Question 12

6 marks | Algebraic Roots & Indices

12 $\dfrac{2^{\frac{x}{3}}}{8^x} = 64$

(a) Find the value of x
Show clear algebraic working.

$x =$ .....

(3)

(b) Expand and simplify $4t(t + 5)(2t - 3)$

.....

(3)

(Total for Question 12 is 6 marks)

1 **(a) Write everything as powers of 2**

$$8^x = 2^{3x}, \quad 64 = 2^6 \Rightarrow \frac{2^{x/3}}{2^{3x}} = 2^6$$

2 **Compare powers**

$$\frac{x}{3} - 3x = 6 \Rightarrow -\frac{8x}{3} = 6 \Rightarrow x = -\frac{9}{4}$$

3 **(b) Expand two brackets first**

$$(t+5)(2t-3) = 2t^2 + 7t - 15$$

4 **Multiply by 4t**

$$4t(2t^2 + 7t - 15) = 8t^3 + 28t^2 - 60t$$

✓ **FINAL ANSWER**

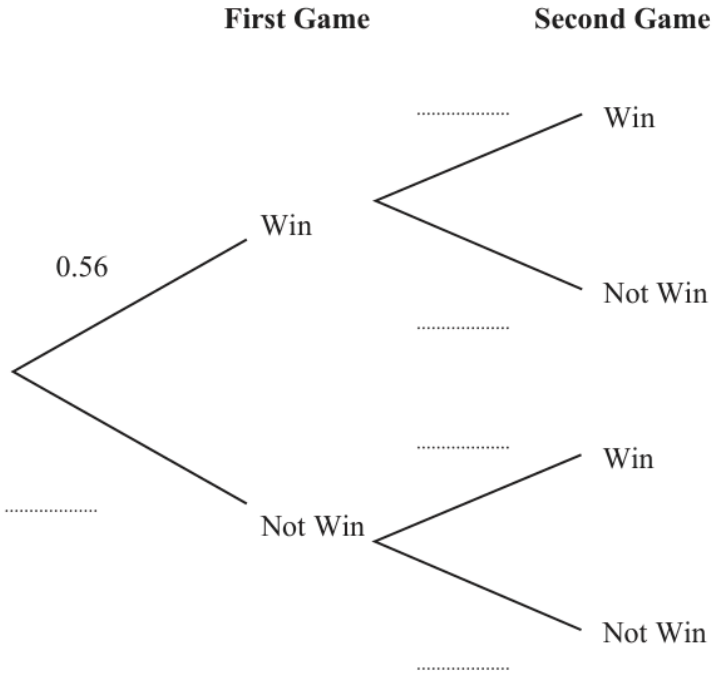
(a) $x = -\frac{9}{4}$ (b) $8t^3 + 28t^2 - 60t$

Question 13

4 marks | Tree Diagrams & Conditional Probability

13 A team plays two games of football.
For each game, the probability that the team wins is 0.56

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that the team wins both games.

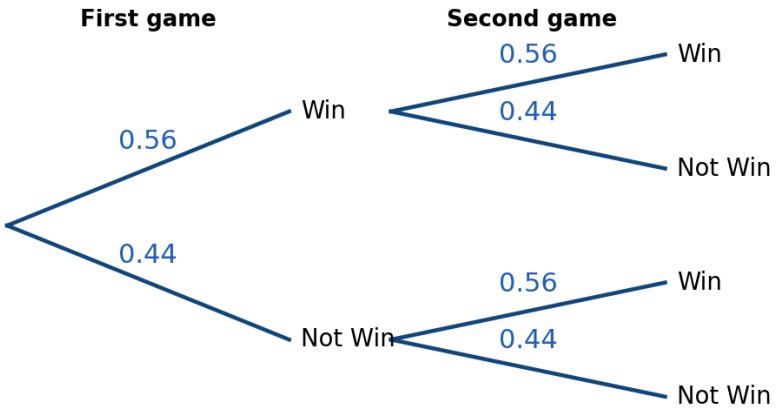
.....

(2)

(Total for Question 13 is 4 marks)

1 (a) Branches add to 1

Not win $= 1 - 0.56 = 0.44$ on every pair of branches.



2 (b) Win and win

$$0.56 \times 0.56 = 0.3136$$

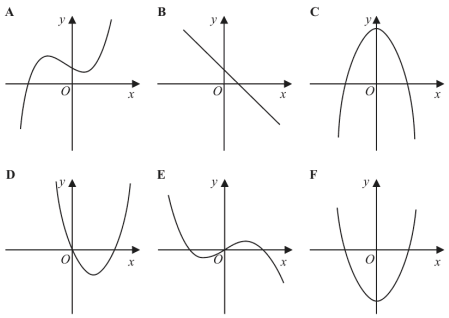
FINAL ANSWER

(a) see diagram (b) 0.3136

Question 14

6 marks | Graphs of Functions

14 Here are six graphs.



(a) Write down the letter of the graph that could have the equation

(i) $y = x^2 - 3x$

.....

(1)

(ii) $y = -x^3 + 9x$

.....

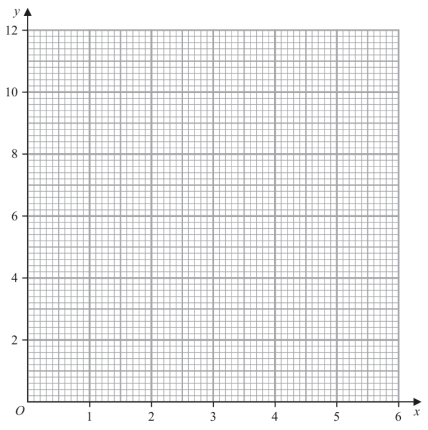
(1)

(b) Complete the table of values for $y = \frac{12}{x^2}$

x	1	1.5	2	3	4	5	6
y		5.33		1.33			0.33

(2)

(c) On the grid, draw the graph of $y = \frac{12}{x^2}$ for $1 \leqslant x \leqslant 6$



(2)

(Total for Question 14 is 6 marks)

1 **(a)(i) Positive quadratic**

$y = x^2 - 3x = x(x-3)$: U-shape through O and $x = 3$ → graph D.

2 **(a)(ii) Negative cubic**

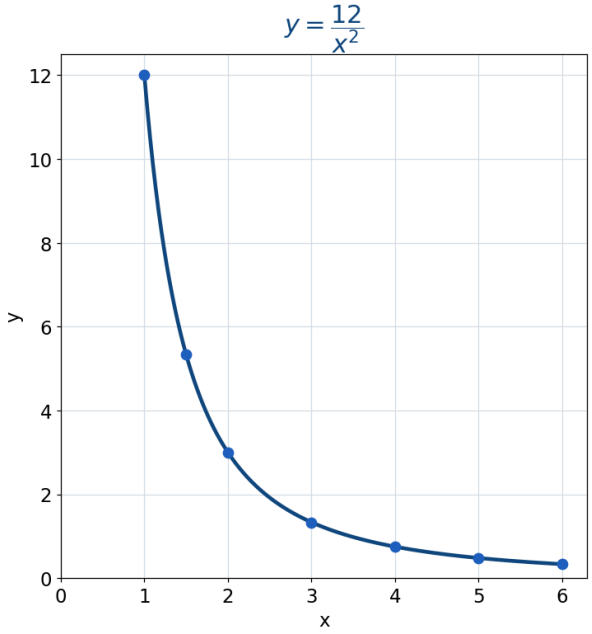
$y = -x^3 + 9x$: negative cubic through the origin → graph E.

3 **(b) Substitute**

$$x = 1 :\ 12, \quad x = 2 :\ 3, \quad x = 4 :\ 0.75, \quad x = 5 :\ 0.48$$

4 **(c) Plot and join with a smooth curve**

Plot all 7 points and draw a smooth curve (no straight segments).



✓ **FINAL ANSWER**

(a)(i) D (ii) E (b) $12,\ 3,\ 0.75,\ 0.48$ (c) smooth curve through the points

Question 15

5 marks | Sine & Cosine Rules

15 The diagram shows triangle ABC

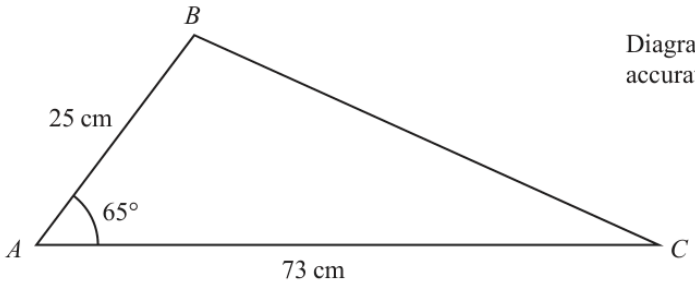


Diagram **NOT** accurately drawn

$AB = 25$ cm $\quad AC = 73$ cm $\quad$ angle $BAC = 65°$

(a) Work out the length of BC
Give your answer correct to 3 significant figures.

..... cm

(3)

(b) Work out the area of the triangle.
Give your answer correct to 3 significant figures.

..... cm^2

(2)

(Total for Question 15 is 5 marks)

1 **(a) Cosine rule**

$$BC^2 = 25^2 + 73^2 - 2(25)(73)\cos 65° = 4411.4\ldots$$

2 **Square root**

$$BC = 66.418\ldots$$

3 **(b) Area formula**

$$\tfrac{1}{2}(25)(73)\sin 65° = 827.005\ldots$$

✓ **FINAL ANSWER**

(a) 66.4 cm (b) 827 cm^2

Question 16

6 marks | Surds

16 (a) Solve $x^2 - \left(2\sqrt{3}\right)x - 13 = 0$

Give your solutions in the form $\sqrt{a} \pm b$ where a and b are integers.
Show your working clearly.

(3)

(b) Show that $\dfrac{\sqrt{20}}{\sqrt{5}+2}$ can be written in the form $c - \sqrt{d}$ where c and d are integers.

(3)

(Total for Question 16 is 6 marks)

1 **(a) Quadratic formula**

$$x = \frac{2\sqrt{3} \pm \sqrt{(2\sqrt{3})^2 + 4(13)}}{2} = \frac{2\sqrt{3} \pm \sqrt{64}}{2}$$

2 **Simplify**

$$x = \frac{2\sqrt{3} \pm 8}{2} = \sqrt{3} \pm 4$$

3 **(b) Rationalise**

$$\frac{\sqrt{20}}{\sqrt{5}+2} \times \frac{\sqrt{5}-2}{\sqrt{5}-2} = \frac{2\sqrt{5}(\sqrt{5}-2)}{5-4}$$

4 **Simplify**

$$= 10 - 4\sqrt{5} = 10 - \sqrt{80} \quad (c = 10,\ d = 80)$$

✓ **FINAL ANSWER**

(a) $\sqrt{3} \pm 4$ (b) $10 - \sqrt{80}$

Question 17

4 marks | Linear Graphs

17 The line **L** is perpendicular to the line with equation $y = 7 + 4x$

L passes through the point A with coordinates $\left(0, \frac{19}{2}\right)$

L crosses the x-axis at the point B

Find the area of triangle AOB where O is the origin.
Show your working clearly.

.....

(Total for Question 17 is 4 marks)

1 **Perpendicular gradient**

$y = 7 + 4x$ has gradient 4, so $\mathbf{L}$ has gradient $-\frac{1}{4}$.

2 **Equation of L**

$$y = -\tfrac{1}{4}x + \tfrac{19}{2}$$

3 **Point B (y = 0)**

$$0 = -\tfrac{1}{4}x + \tfrac{19}{2} \Rightarrow x = 38,\ B = (38, 0)$$

4 **Area of triangle AOB**

$$\tfrac{1}{2} \times 38 \times \tfrac{19}{2} = 180.5$$

✓ **FINAL ANSWER**

180.5

Question 18

5 marks | Rounding, Estimation & Bounds

18 The final velocity, v m/s, of an object is given by

$$v = 2\left(\frac{s}{t}\right) - u$$

where

$s = 100$ correct to the nearest integer
$t = 1.68$ correct to 2 decimal places
$u = 0.5$ correct to 1 decimal place

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

.....

(Total for Question 18 is 5 marks)

1 **Bounds**

$99.5 \leq s < 100.5$, $1.675 \leq t < 1.685$, $0.45 \leq u < 0.55$

2 **Upper bound of v**

Big s, small t, small u:

$$v_{\max} = 2\left(\frac{100.5}{1.675}\right) - 0.45 = 119.55$$

3 **Lower bound of v**

Small s, big t, big u:

$$v_{\min} = 2\left(\frac{99.5}{1.685}\right) - 0.55 = 117.55\ldots$$

4 **Suitable accuracy**

Both bounds round to 120 to 2 s.f. (they differ to 3 s.f.), so $v = 120$.

✓ **FINAL ANSWER**

$v = 120$ m/s (2 s.f.)

Question 19

3 marks | 3D Pythagoras & Trigonometry

19 The diagram shows cuboid $PQRSTUVW$

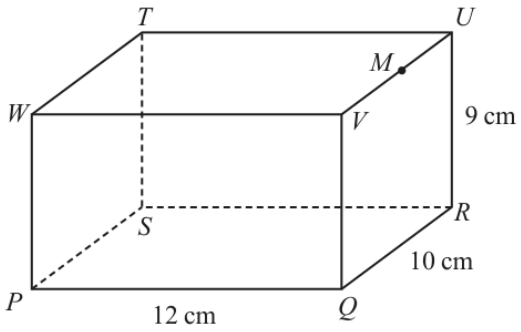


Diagram **NOT** accurately drawn

$PQ = 12$ cm $\quad QR = 10$ cm $\quad RU = 9$ cm

M is the midpoint of VU

Work out the size of the angle between line MP and plane $PQRS$
Give your answer correct to one decimal place.

.....°

(Total for Question 19 is 3 marks)

1 **Drop M to the base**

M is above the midpoint N of QR, so $QN = 5$ and $MN = 9$.

2 **Length PN**

$$PN = \sqrt{12^2 + 5^2} = 13$$

3 **Angle**

$$\tan\theta = \frac{9}{13} \Rightarrow \theta = 34.69\ldots^\circ$$

✓ **FINAL ANSWER**

34.7°

Question 20

4 marks | Algebraic Fractions

20 Express $\left(\frac{5}{4x-7}-\frac{3}{3x-5}\right)\div\frac{9x^2-16}{6x^2-7x-5}$ as a single fraction in its simplest form.

Show clear algebraic working.

.....

(Total for Question 20 is 4 marks)

1 **Subtract the fractions**

$$\frac{5(3x-5)-3(4x-7)}{(4x-7)(3x-5)} = \frac{3x-4}{(4x-7)(3x-5)}$$

2 **Factorise the second fraction**

$$9x^2-16=(3x-4)(3x+4), \qquad 6x^2-7x-5=(3x-5)(2x+1)$$

3 **Divide = multiply by the reciprocal**

$$\frac{3x-4}{(4x-7)(3x-5)} \times \frac{(3x-5)(2x+1)}{(3x-4)(3x+4)}$$

4 **Cancel**

$$= \frac{2x+1}{(4x-7)(3x+4)}$$

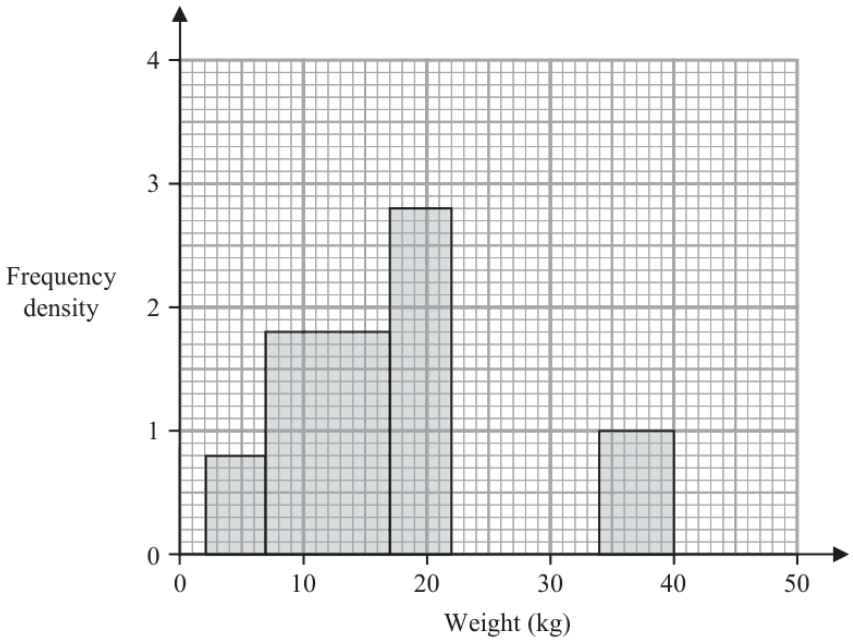
✓ **FINAL ANSWER**

$$\frac{2x+1}{(4x-7)(3x+4)}$$

Question 21

3 marks | Histograms

21 The incomplete histogram shows information about the weights, in kg, of some parcels.



No parcels weigh less than 2 kg
No parcels weigh more than 40 kg
Half of the parcels weigh between 22 kg and 34 kg

Complete the histogram by drawing a bar to represent the parcels that weigh between 22 kg and 34 kg

(Total for Question 21 is 3 marks)

1 **Frequency = width × height**

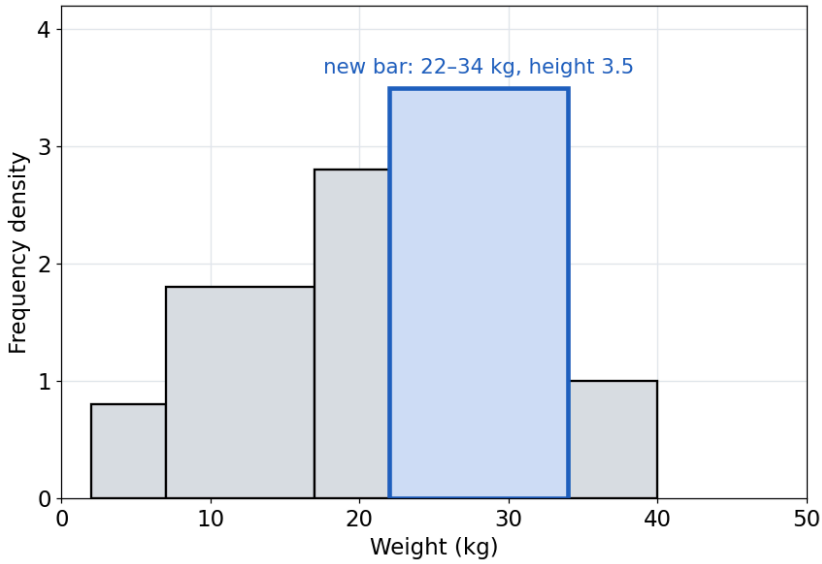
$$5(0.8) + 10(1.8) + 5(2.8) + 6(1) = 4 + 18 + 14 + 6 = 42$$

2 **Half are in 22–34**

So the other half is also 42 parcels.

3 **Height of the new bar**

$$\text{f.d.} = \frac{42}{34 - 22} = 3.5$$



FINAL ANSWER

Bar from 22 to 34 kg, height 3.5

Question 22

5 marks | Tree Diagrams & Conditional Probability

22 A bag contains x marbles.
12 of the marbles are pink and the rest are yellow.

Greta takes at random 2 marbles from the bag.

The probability that Greta takes a pink marble and a yellow marble is $\frac{18}{47}$

Work out the value of x
Show clear algebraic working.

$x =$ .....

(Total for Question 22 is 5 marks)

1 **Pink then yellow, or yellow then pink**

$$2 \times \frac{12}{x} \times \frac{x-12}{x-1} = \frac{18}{47}$$

2 **Cross-multiply**

$$1128(x-12) = 18x(x-1) \Rightarrow 18x^2 - 1146x + 13536 = 0$$

3 **Simplify (÷6) and solve**

$$3x^2 - 191x + 2256 = 0 \Rightarrow (x-48)(3x-47) = 0$$

4 **x must be a whole number**

$$x = 48$$

✓ **FINAL ANSWER**

$x = 48$

Question 23

6 marks | Circles, Arcs & Sectors

23 OPQ and OAB are sectors of a circle, centre O

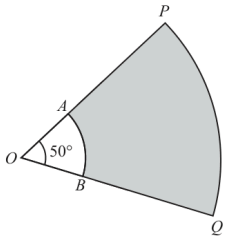


Diagram **NOT** accurately drawn

Angle $POQ = 50°$

A is the point on OP such that $OA = \frac{1}{4}OP$

The area of the shaded region is $\frac{243}{16}\pi\ \text{cm}^2$

Work out the perimeter of the shaded region.
Give your answer in the form $a\pi + b$ where a and b are constants.
Show your working clearly.

.....cm

(Total for Question 23 is 6 marks)

1 **Let OP = r**

Then $OA = \frac{r}{4}$. Shaded area:

$$\frac{50}{360}\pi\left(r^2 - \frac{r^2}{16}\right) = \frac{243}{16}\pi$$

2 **Solve for r**

$$\frac{75}{576}r^2 = \frac{243}{16} \Rightarrow r^2 = 116.64 \Rightarrow r = 10.8,\ OA = 2.7$$

3 **Arcs**

$$\text{arc } PQ = \frac{50}{360} \times 2\pi(10.8) = 3\pi, \qquad \text{arc } AB = \frac{50}{360} \times 2\pi(2.7) = \tfrac{3}{4}\pi$$

4 **Straight edges and total**

$AP = BQ = 10.8 - 2.7 = 8.1$:

$$3\pi + \tfrac{3}{4}\pi + 2(8.1) = \tfrac{15}{4}\pi + 16.2$$

FINAL ANSWER

$\frac{15}{4}\pi + 16.2$ cm

4WM1/01 MAY 2026

Question 24

3 marks | Completing the Square

24 Express $22 - 3x^2 + 30x$ in the form $a - b(x - c)^2$ where a, b and c are integers.

.....

(Total for Question 24 is 3 marks)

WORKED SOLUTION

Question 24 · 4WM1/01 May 2026

1 Factor out −3 from the x terms

$$22 - 3x^2 + 30x = 22 - 3(x^2 - 10x)$$

2 Complete the square

$$x^2 - 10x = (x - 5)^2 - 25$$

3 Simplify

$$22 - 3\big((x - 5)^2 - 25\big) = 97 - 3(x - 5)^2$$

FINAL ANSWER

$$97 - 3(x - 5)^2$$