Elite Mathematics
Pearson Edexcel International GCSE

IGCSE LINEAR · 4MA1

4MA1/2HR June 2026 Worked Solutions

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

27	2020–2026	Single-paper solutions
paper questions	55 past papers	checked by Dr Eslam



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PAST PAPER

4MA1/2HR June 2026

June 2026

27	100	2 h
questions	marks	exam time

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

4MA1/2HR JUNE 2026

Question 1

3 marks | Right-Angled Triangles - Pythagoras & Trigonometry

1 The diagram shows a right-angled triangle.

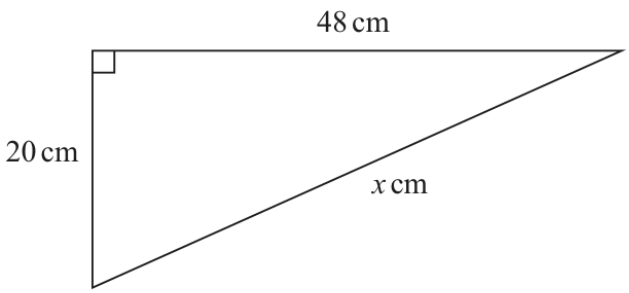


Diagram **NOT** accurately drawn

Work out the value of x

$x =$ .....

(Total for Question 1 is 3 marks)

WORKED SOLUTION

Question 1 · 4MA1/2HR June 2026

1 Solution | Step 1

$$x^2 = 20^2 + 48^2 = 400 + 2304 = 2704.$$

Use Pythagoras because the 20 cm and 48 cm sides meet at the right angle.

2 Solution | Step 2

$$x = \sqrt{2704} = 52.$$

Take the positive square root because x is a length.

FINAL ANSWER

$x = 52$, so the hypotenuse is 52 cm.

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Question 2

2 marks | Sequences

2 Here are the first five terms of an arithmetic sequence.

14 8 2 –4 –10

Find an expression, in terms of n, for the nth term of this sequence.

.....

(Total for Question 2 is 2 marks)

WORKED SOLUTION

Question 2 · 4MA1/2HR June 2026

1 **Solution | Step 1**

The common difference is $8 - 14 = -6$.

Each successive term decreases by 6.

2 **Solution | Step 2**

$$u_n = 14 + (n-1)(-6) = 20 - 6n.$$

Use first term plus (n-1) common differences.

✓ **FINAL ANSWER**

$u_n = 20 - 6n.$

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Question 3

1 marks | Set Notation & Venn Diagrams

3 $\mathscr{E}$ = {integers from 1 to 12}
A = {factors of 12}

List the members of the set A'

.....

(Total for Question 3 is 1 mark)

WORKED SOLUTION

Question 3 · 4MA1/2HR June 2026

1 **Solution | Step 1**

$A = \{1, 2, 3, 4, 6, 12\}$. Remove these factors from the integers 1 to 12.
The complement contains precisely the universal-set elements not in A.

FINAL ANSWER

$A' = \{5, 7, 8, 9, 10, 11\}$.

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Question 4

8 marks | Linear Equations

4 (a) Solve $3(x + 2) = 1 - 5x$
Show clear algebraic working.

$x =$ .....

(3)

$P = c^2 - 5d$

(b) Work out the value of P when $c = -7$ and $d = 3$

$P =$ .....

(2)

(c) Simplify m^0

.....

(1)

(d) Simplify $(4r^2t)^3$

.....

(2)

(Total for Question 4 is 8 marks)

WORKED SOLUTION

Question 4 · 4MA1/2HR June 2026

1 **Part (a) | Step 1**

$$3x + 6 = 1 - 5x.$$

Expand the bracket.

2 **Part (a) | Step 2**

$$8x = -5 \quad \Rightarrow \quad x = -\frac{5}{8}.$$

Add 5x and subtract 6 on both sides, then divide by 8.

3 **Part (b) | Step 1**

$$P = (-7)^2 - 5(3) = 49 - 15 = 34.$$

The square applies to the whole negative number, so (-7) squared is positive.

4 **Part (c) | Step 1**

$m^0 = 1$ for $m \neq 0$.

Any nonzero base to the zero power equals 1.

---

5 **Part (d) | Step 1**

$$(4r^2t)^3 = 4^3(r^2)^3t^3 = 64r^6t^3.$$

Cube each factor and multiply the exponents in the power of a power.

✓ **FINAL ANSWER**

(a) $x = -\frac{5}{8}$. (b) $P = 34$. (c) 1. (d) $64r^6t^3$.

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Question 5

5 marks | Ratio Toolkit

5 Sarah and Dej each give some money to charity **A** and to charity **B**

Sarah shares \$400 between charity **A** and charity **B** in the ratio 2 : 3

Dej shares \$375 between the two charities.
He gives twice as much money to charity **B** as he gives to charity **A**

Dej gives more money to charity **B** than Sarah gives to charity **B**

How much more?

\$.....

(Total for Question 5 is 5 marks)

WORKED SOLUTION

Question 5 · 4MA1/2HR June 2026

1 **Solution | Step 1**

$$\text{Sarah to B} = 400 \times \frac{3}{2+3} = 240 \text{ dollars.}$$

Charity B receives 3 of the 5 equal shares.

2 **Solution | Step 2**

Dej gives to A and B in the ratio $1 : 2$, so

$$\text{Dej to B} = 375 \times \frac{2}{3} = 250 \text{ dollars.}$$

Twice as much to B means that B receives 2 of the 3 shares.

3 **Solution | Step 3**

$$250 - 240 = 10 \text{ dollars.}$$

Subtract the two donations to charity B.

✓ **FINAL ANSWER**

\$10 more.

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Question 6

4 marks | Statistics Toolkit

6 Mika has six cards.
There is a number on each card.
The cards are arranged with the numbers in order of size.
Three of the numbers are hidden.



The mode of the six numbers is 8
The range of the six numbers is 7
The sum of the six numbers is 31

Work out the median of the six numbers.

.....

(Total for Question 6 is 4 marks)

WORKED SOLUTION

Question 6 · 4MA1/2HR June 2026

1 **Solution | Step 1**

The largest card is 8, so the smallest is $8 - 7 = 1$.

Range is largest minus smallest.

2 **Solution | Step 2**

The fifth card must be 8, since 8 is the mode.

Only the fifth position can supply another 8 in the ordered cards.

3 **Solution | Step 3**

If the third card is z, then

$$1 + 3 + z + 7 + 8 + 8 = 31 \quad \Rightarrow \quad z = 4.$$

Use the total of all six cards.

4 **Solution | Step 4**

The ordered cards are $1, 3, 4, 7, 8, 8$, so

$$\text{median} = \frac{4 + 7}{2} = 5.5.$$

With six values, average the third and fourth.

FINAL ANSWER

Median $= \mathbf{5.5}$.

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Question 7

3 marks | Standard Form

7 (a) Write 4×10^{-5} as an ordinary number.

.....

(1)

(b) Work out $(6 \times 10^{158}) \times (2 \times 10^{72})$
Give your answer in standard form.

.....

(2)

(Total for Question 7 is 3 marks)

WORKED SOLUTION

Question 7 · 4MA1/2HR June 2026

1 Part (a) | Step 1

$$4 \times 10^{-5} = \frac{4}{100000} = 0.00004.$$

Move the decimal point five places left.

2 Part (b) | Step 1

$$(6 \times 10^{158})(2 \times 10^{72}) = 12 \times 10^{230} = 1.2 \times 10^{231}.$$

Multiply the coefficients and add the exponents; normalize the coefficient into [1,10).

FINAL ANSWER

(a) 0.00004. (b) 1.2×10^{231}.

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Question 8

3 marks | Reverse Percentages

8 Lauren's salary increased by 4%
After the increase, her salary was 36 400 euros.

Work out Lauren's salary before the increase.

..... euros

(Total for Question 8 is 3 marks)

WORKED SOLUTION

Question 8 · 4MA1/2HR June 2026

1 Solution | Step 1

Let the old salary be s euros. Then

$$1.04s = 36400.$$

The increased salary is 104% of the original.

2 Solution | Step 2

$$s = \frac{36400}{1.04} = 35000.$$

Divide by the percentage multiplier.

FINAL ANSWER

35000 euros.

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Question 9

3 marks | Standard & Compound Units

9 Change a speed of 198 kilometres per hour to a speed in metres per second.
Show your working clearly.

..... m/s

(Total for Question 9 is 3 marks)

WORKED SOLUTION

Question 9 · 4MA1/2HR June 2026

1 Solution | Step 1

$198\ \text{km} = 198000\ \text{m}$ and $1\ \text{hour} = 3600\ \text{s}$.

Convert both the distance and the time in the rate.

2 Solution | Step 2

$$198\ \text{km/h} = \frac{198000}{3600} = 55\ \text{m/s}.$$

Metres per second means metres divided by seconds.

✓ FINAL ANSWER

$55\ \text{m/s}$.

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Question 10

3 marks | Standard & Compound Units

10 The diagram shows a solid cylinder.

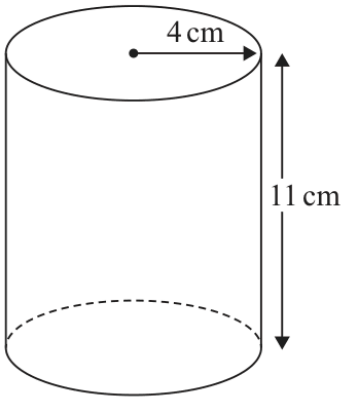


Diagram **NOT** accurately drawn

The cylinder has radius 4 cm and height 11 cm
The cylinder is made from wood with a density of 0.6 g/cm^3

Work out the mass of the cylinder.
Give your answer correct to 3 significant figures.

..... g

(Total for Question 10 is 3 marks)

WORKED SOLUTION

Question 10 · 4MA1/2HR June 2026

1 **Solution | Step 1**

$$V = \pi r^2 h = \pi(4)^2(11) = 176\pi \text{ cm}^3.$$

Use the cylinder volume formula.

2 **Solution | Step 2**

$$m = \rho V = 0.6(176\pi) = 105.6\pi = 331.7521842\ldots \text{ g}.$$

Mass equals density times volume; keep full precision until the end.

3 **Solution | Step 3**

$$m = 332 \text{ g} \quad (3 \text{ significant figures}).$$

Round the final mass as requested.

FINAL ANSWER

332 g (3 significant figures).

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Question 11

5 marks | Right-Angled Triangles - Pythagoras & Trigonometry

11 The diagram shows a square $ABCD$ and a right-angled triangle EFG

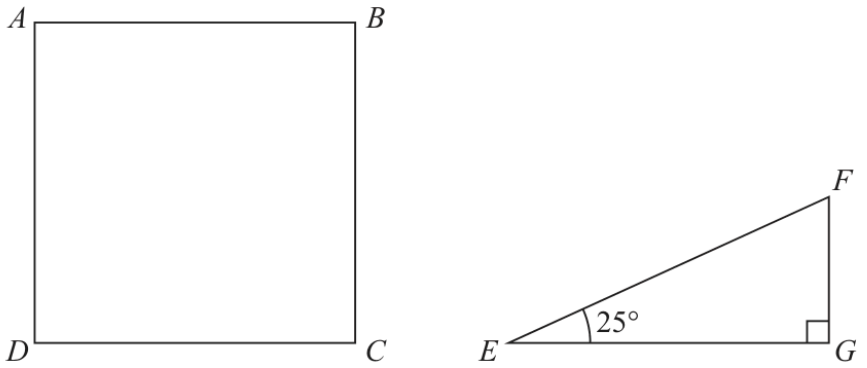


Diagram **NOT** accurately drawn

The area of square $ABCD$ is $36\,\text{cm}^2$
$DC = EG$

Work out the area of triangle EFG
Give your answer correct to one decimal place.
Show your working clearly.

..... cm^2

(Total for Question 11 is 5 marks)

WORKED SOLUTION

Question 11 · 4MA1/2HR June 2026

1 **Solution | Step 1**

$$DC = \sqrt{36} = 6\ \text{cm}, \qquad EG = 6\ \text{cm}.$$

All sides of the square have length equal to the square root of its area, and DC=EG.

2 **Solution | Step 2**

$$\tan 25^\circ = \frac{FG}{EG} \quad \Rightarrow \quad FG = 6\tan 25^\circ = 2.7978459\ldots\ \text{cm}.$$

Relative to angle E, FG is opposite and EG is adjacent.

3 **Solution | Step 3**

$$\text{Area} = \frac{1}{2}(EG)(FG) = \frac{1}{2}(6)(6\tan 25^\circ) = 8.3935378\ldots\ \text{cm}^2.$$

The base EG and height FG are perpendicular.

FINAL ANSWER

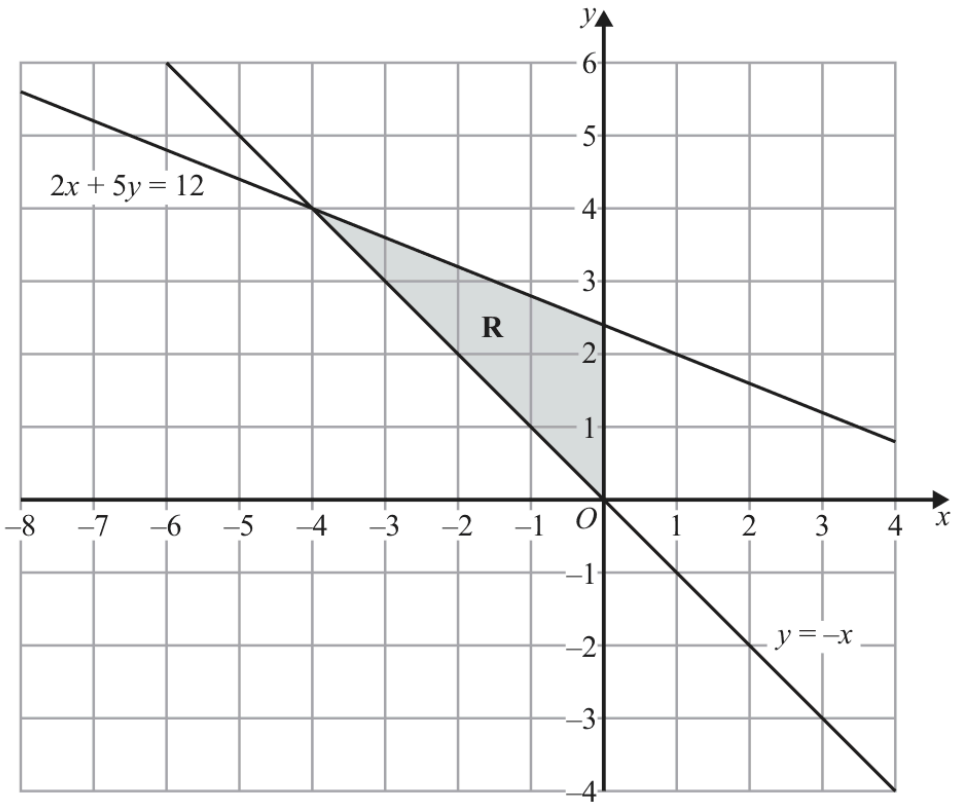
$8.4\ \text{cm}^2$ (1 decimal place).

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Question 12

3 marks | Inequalities (Solving & Graphing)

12



The region **R**, shown shaded in the diagram, is bounded by the y-axis and the straight lines with equations

$$y = -x$$

$$2x + 5y = 12$$

Write down the three inequalities that define **R**

.....

.....

.....

(Total for Question 12 is 3 marks)

WORKED SOLUTION

Question 12 · 4MA1/2HR June 2026

1 **Solution | Step 1**

$x \leq 0$.

R lies to the left of the y-axis.

2 **Solution | Step 2**

$y \geq -x$.

R lies above the line y=-x.

3 **Solution | Step 3**

$2x + 5y \leq 12$.

R lies below the other line. All three boundaries are solid, so equality is included.

✓ **FINAL ANSWER**

$x \leq 0, \quad y \geq -x, \quad 2x + 5y \leq 12$.

Question 13

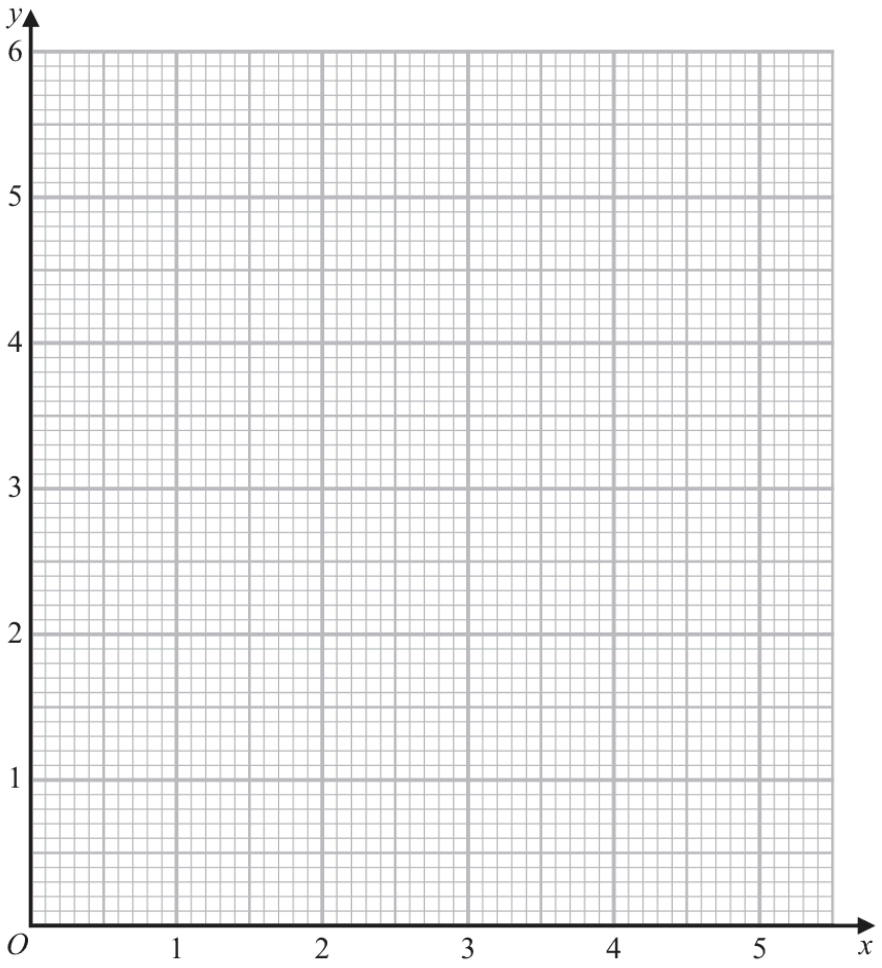
4 marks | Graphs of Functions

13 (a) Complete the table of values for $y = x + \frac{1}{x}$

x	0.25	0.5	1	2	3	4	5
y	4.25			2.5	3.33		

(2)

(b) On the grid, draw the graph of $y = x + \frac{1}{x}$ for $0.25 \leqslant x \leqslant 5$



(2)

(Total for Question 13 is 4 marks)

1

Part (a) | Step 1

Use $y = x + 1/x$:

$$y(0.5) = 0.5 + 2 = 2.5, \quad y(1) = 1 + 1 = 2, \quad y(4) = 4 + 0.25 = 4.25, \quad y(5) = 5 + 0.2 = 5.2.$$

Substitute each required x-value into the formula.

2

Part (b) | Step 1

Plot

$$(0.25, 4.25),\ (0.5, 2.5),\ (1, 2),\ (2, 2.5),\ (3, 10/3),\ (4, 4.25),\ (5, 5.2).$$

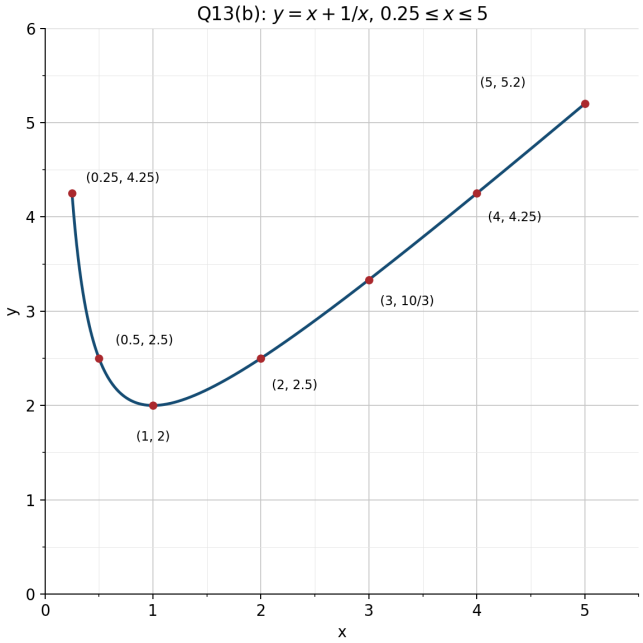
Use x horizontally and y vertically on the supplied grid; 10/3 is approximately 3.33.

3

Part (b) | Step 2

Join the points with one smooth curve for $0.25 \le x \le 5$, descending to its minimum $(1, 2)$ and then ascending.

The graph is curved, not a set of straight segments, and includes both endpoints.



✓ **FINAL ANSWER**

(a) Table entries, in order: $2.5, 2, 4.25, 5.2$. (b) The smooth curve $y = x + 1/x$ through the stated coordinates on $[0.25, 5]$.

Question 14

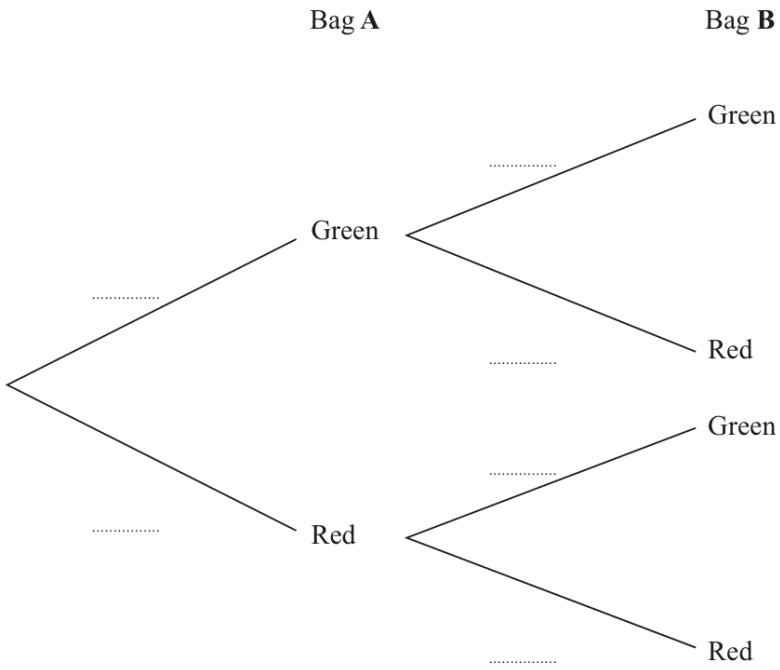
8 marks | Tree Diagrams & Conditional Probability

14 Pras has 2 bags of counters, bag **A** and bag **B**

In bag **A**, there are 4 green counters and 3 red counters.
In bag **B**, there are 5 green counters and 1 red counter.

Pras is going to take at random a counter from bag **A** and a counter from bag **B**

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that Pras will take two green counters.

.....

(2)

Pras also has a third bag of counters, bag **C**
In bag **C**, there are only green counters and red counters.
All the original counters are back in bag **A** and bag **B**

Pras is going to take at random a counter from bag **A**, a counter from bag **B** and a counter from bag **C**

The probability that Pras will take three red counters is $\frac{3}{70}$

(c) Work out the probability that Pras will take 1 green counter and 2 red counters.

.....

(4)

(Total for Question 14 is 8 marks)

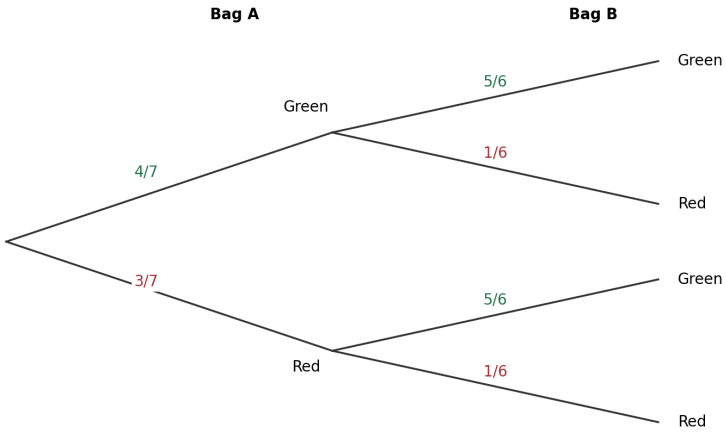
1 **Part (a) | Step 1**

From the start, label the Bag A branches $P(G_A) = 4/7$ and $P(R_A) = 3/7$.
Bag A has 7 counters in total.

2 **Part (a) | Step 2**

From each Bag A outcome, label the Bag B green branch $5/6$ and red branch $1/6$.
Bag B has 6 counters and is unaffected by the result from bag A.

Q14(a): Completed probability tree



3 **Part (b) | Step 1**

$$P(G_A G_B) = \frac{4}{7} \times \frac{5}{6} = \frac{20}{42} = \frac{10}{21}.$$

Both events must occur, so multiply along the green-green path.

4 **Part (c) | Step 1**

Let $r = P(R_C)$. Then

$$\frac{3}{7} \times \frac{1}{6} \times r = \frac{3}{70} \quad \Rightarrow \quad r = \frac{3}{5}, \qquad P(G_C) = \frac{2}{5}.$$

Use the given probability of three reds to find the bag C probabilities.

5 **Part (c) | Step 2**

Exactly one green means the disjoint outcomes $G_A R_B R_C$, $R_A G_B R_C$, or $R_A R_B G_C$.
The single green counter can come from A, B or C.

6 **Part (c) | Step 3**

$$P = \frac{4}{7}\frac{1}{6}\frac{3}{5} + \frac{3}{7}\frac{5}{6}\frac{3}{5} + \frac{3}{7}\frac{1}{6}\frac{2}{5} = \frac{2}{35} + \frac{3}{14} + \frac{1}{35} = \frac{3}{10}.$$

Multiply within each outcome and add the three mutually exclusive probabilities.

FINAL ANSWER

(a) Branch labels from top to bottom: $4/7, 3/7$ for A; $5/6, 1/6$ for B after either A result. (b) $\frac{10}{21}$. (c) $\frac{3}{10}$.

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Question 15

2 marks | Statistics Toolkit

15 Mina recorded the times taken, in minutes, by 11 people to complete a puzzle.
Here are her results.

2 2 3 6 7 9 9 12 13 17 20

Find the interquartile range of these times.

..... minutes

(Total for Question 15 is 2 marks)

WORKED SOLUTION

Question 15 · 4MA1/2HR June 2026

1 Solution | Step 1

The overall median is the sixth value, 9. The lower five values are $2, 2, 3, 6, 7$, and the upper five are $9, 12, 13, 17, 20$.

Exclude the overall median when forming the two halves.

2 Solution | Step 2

$$Q_1 = 3, \quad Q_3 = 13, \quad \text{IQR} = 13 - 3 = 10 \text{ minutes.}$$

Take each half-median, then subtract the lower quartile from the upper.

✓ FINAL ANSWER

10 minutes.

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Question 16

2 marks | Algebraic Roots & Indices

16 $\left(\frac{1}{\sqrt{a}}\right)^6 = a^n$

Work out the value of n

$n =$ .....

(Total for Question 16 is 2 marks)

WORKED SOLUTION

Question 16 · 4MA1/2HR June 2026

1 Solution | Step 1

$$\frac{1}{\sqrt{a}} = a^{-1/2}, \qquad \left(a^{-1/2}\right)^6 = a^{-3}.$$

A reciprocal changes the sign of the exponent and an outer power multiplies exponents.

FINAL ANSWER

$n = -3$.

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Question 17

2 marks | Fractions

17 Use algebra to show that $0.\dot{8}1\dot{4} = \frac{22}{27}$

(Total for Question 17 is 2 marks)

WORKED SOLUTION

Question 17 · 4MA1/2HR June 2026

1 **Solution | Step 1**

Let $z = 0.\overline{814} = 0.814814814\ldots$. Then $1000z = 814.814814\ldots$.

Multiplication by 1000 aligns the repeating three-digit tails.

2 **Solution | Step 2**

$$1000z - z = 814 \quad \Rightarrow \quad 999z = 814 \quad \Rightarrow \quad z = \frac{814}{999} = \frac{22}{27}.$$

Subtract to cancel the recurring tails, then cancel the common factor 37.

✓ **FINAL ANSWER**

$0.\overline{814} = \frac{22}{27}$.

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Question 18

2 marks | Vectors

18 Here are two vectors.

$$\overrightarrow{AB} = \begin{pmatrix} 4 \\ 5 \end{pmatrix} \qquad \overrightarrow{CB} = \begin{pmatrix} -2 \\ 8 \end{pmatrix}$$

Find $\overrightarrow{AC}$ as a column vector.

$$\overrightarrow{AC} = \begin{pmatrix} \ldots\ldots\ldots \\ \ldots\ldots\ldots \end{pmatrix}$$

(Total for Question 18 is 2 marks)

WORKED SOLUTION

Question 18 · 4MA1/2HR June 2026

1 Solution | Step 1

$$\overrightarrow{AC} = \overrightarrow{AB} + \overrightarrow{BC} = \overrightarrow{AB} - \overrightarrow{CB}.$$

Reverse CB to travel from B to C.

2 Solution | Step 2

$$\overrightarrow{AC} = \begin{pmatrix} 4 \\ 5 \end{pmatrix} - \begin{pmatrix} -2 \\ 8 \end{pmatrix} = \begin{pmatrix} 6 \\ -3 \end{pmatrix}.$$

Subtract corresponding components.

FINAL ANSWER

$$\overrightarrow{AC} = \begin{pmatrix} 6 \\ -3 \end{pmatrix}.$$

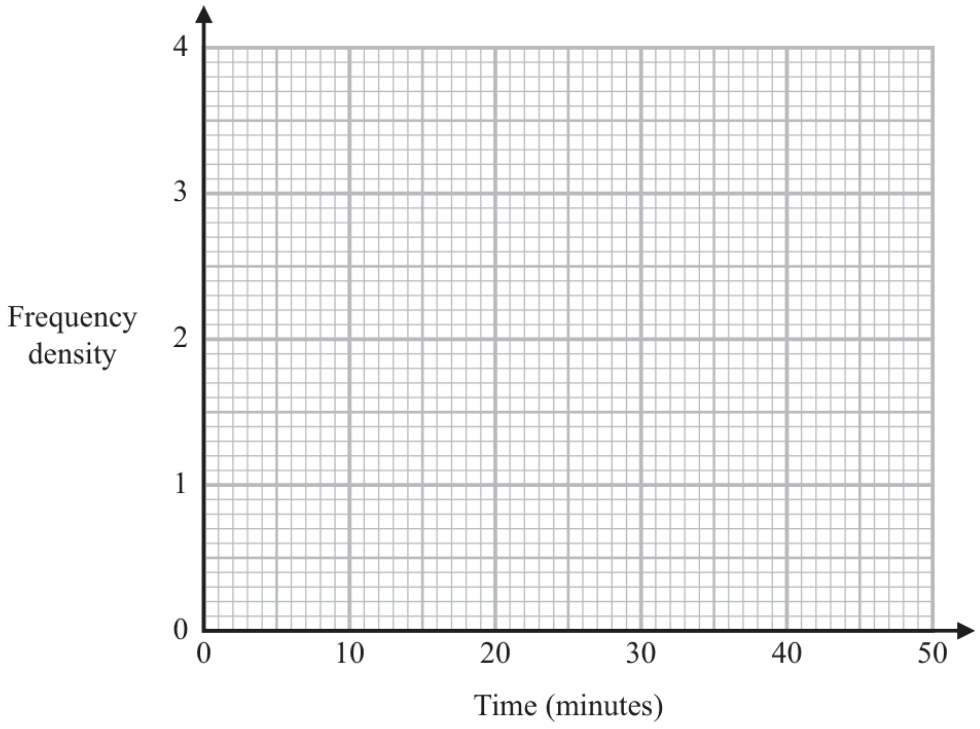
Question 19

3 marks | Histograms

19 The table gives information about the times, in minutes, some people spent waiting to go on a rollercoaster.

Time (t minutes)	Frequency
$0 < t \leqslant 20$	14
$20 < t \leqslant 25$	12
$25 < t \leqslant 35$	32
$35 < t \leqslant 50$	30

On the grid, draw a histogram for this information.



(Total for Question 19 is 3 marks)

1 Solution | Step 1

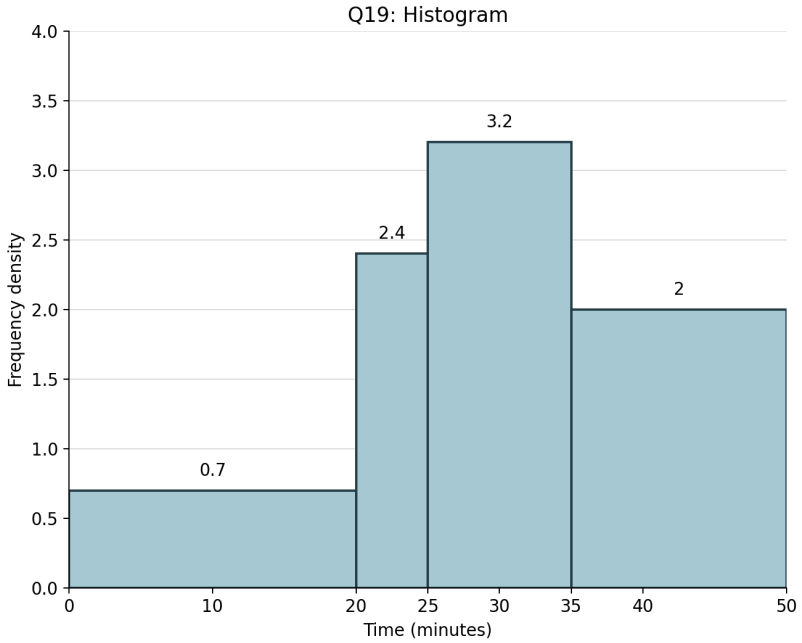
Use $\textbf{frequency density} = \textbf{frequency}/\textbf{class width}$:

$$14/20 = 0.7, \quad 12/5 = 2.4, \quad 32/10 = 3.2, \quad 30/15 = 2.$$

Histogram areas, rather than heights alone, represent frequencies.

2 Solution | Step 2

Draw four adjoining rectangles on the supplied time and frequency-density axes: $[0, 20]$ at height 0.7, $[20, 25]$ at height 2.4, $[25, 35]$ at height 3.2, and $[35, 50]$ at height 2.
Each rectangle starts at density 0 and has the stated class boundaries as its vertical edges; leave no gaps between classes.



FINAL ANSWER

Bar intervals/heights: $[0, 20] : 0.7;\ [20, 25] : 2.4;\ [25, 35] : 3.2;\ [35, 50] : 2$.

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Question 20

3 marks | Rearranging Formulae

20 Make x the subject of $y = \dfrac{3x+5}{4-2x}$

.....

(Total for Question 20 is 3 marks)

WORKED SOLUTION

Question 20 · 4MA1/2HR June 2026

1 Solution | Step 1

$$y(4-2x) = 3x+5 \quad \Rightarrow \quad 4y-2xy = 3x+5.$$

Multiply by the denominator, which is nonzero in the original expression.

2 Solution | Step 2

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

Collect both x-terms together and factor out x.

3 Solution | Step 3

$$x = \frac{4y-5}{2y+3}.$$

Divide by 2y+3. The inverse formula requires y not equal to -3/2; the original requires x not equal to 2.

FINAL ANSWER

$x = \frac{4y-5}{2y+3}$.

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Question 21

3 marks | Rounding, Estimation & Bounds

21 $p = \dfrac{d-e}{f}$

$d = 6.6$ correct to 1 decimal place
$e = 2.8$ correct to 1 decimal place
$f = 0.47$ correct to 2 decimal places

Calculate the lower bound for the value of p
Give your answer correct to 3 significant figures.
Show your working clearly.

.....

(Total for Question 21 is 3 marks)

WORKED SOLUTION

Question 21 · 4MA1/2HR June 2026

1 Solution | Step 1

$$6.55 \le d < 6.65, \quad 2.75 \le e < 2.85, \quad 0.465 \le f < 0.475.$$

Use half of each rounding unit to obtain the bounds.

2 Solution | Step 2

$$p_{\text{lower}} = \frac{6.55 - 2.85}{0.475} = \frac{3.70}{0.475} = 7.789473684\ldots.$$

Minimize the positive numerator by using the lower bound of d and upper bound of e; maximize the positive denominator.

3 Solution | Step 3

$$p_{\text{lower}} = 7.79 \quad \text{(3 significant figures)}.$$

Round the boundary value to the requested accuracy.

✓ **FINAL ANSWER**

Lower bound $= 7.79$ (3 significant figures).

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Question 22

5 marks | Simultaneous Equations

22 Solve the simultaneous equations

$$y^2 = x^2 + 7$$
$$y = 3x - 5$$

Show clear algebraic working.

.....

(Total for Question 22 is 5 marks)

WORKED SOLUTION

Question 22 · 4MA1/2HR June 2026

1 Solution | Step 1

$$(3x - 5)^2 = x^2 + 7 \quad \Rightarrow \quad 9x^2 - 30x + 25 = x^2 + 7.$$

Substitute the linear expression for y into the nonlinear equation.

2 Solution | Step 2

$$8x^2 - 30x + 18 = 0 \quad \Rightarrow \quad 4x^2 - 15x + 9 = 0.$$

Collect all terms on one side and divide by 2.

3 Solution | Step 3

$$(4x - 3)(x - 3) = 0 \quad \Rightarrow \quad x = \frac{3}{4} \text{ or } x = 3.$$

Factorize the quadratic and set each factor to zero.

4 Solution | Step 4

For $x = \frac{3}{4}$, $y = 3(\frac{3}{4}) - 5 = -\frac{11}{4}$. For $x = 3$, $y = 9 - 5 = 4$.

Find the corresponding y-value for each x, preserving the pairs.

FINAL ANSWER

$(x, y) = (\frac{3}{4}, -\frac{11}{4})$ or $(3, 4)$.

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Question 23

5 marks | Area & Volume of Similar Shapes

23 **K**, **L** and **M** are three similar solids.

volume of **K** : volume of **L** = 125 : 216

surface area of **K** : surface area of **M** = 4 : 9

The height of **M** is y% greater than the height of **L**

Work out the value of y
Show your working clearly.

$y =$ .....

(Total for Question 23 is 5 marks)

WORKED SOLUTION

Question 23 · 4MA1/2HR June 2026

1 Solution | Step 1

$$h_K : h_L = \sqrt[3]{125} : \sqrt[3]{216} = 5 : 6.$$

Corresponding lengths have the cube-root ratio of volumes.

2 Solution | Step 2

$$h_K : h_M = \sqrt{4} : \sqrt{9} = 2 : 3.$$

Corresponding lengths have the square-root ratio of surface areas.

3 Solution | Step 3

Take $h_K = 10$ units. Then $h_L = 12$ and $h_M = 15$, so

$$y = \frac{15 - 12}{12} \times 100 = 25.$$

Align the shared K-length and compare the increase relative to L.

FINAL ANSWER

$y = 25$, so the height is 25% greater.

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Question 24

4 marks | Angles in Polygons & Parallel Lines

24

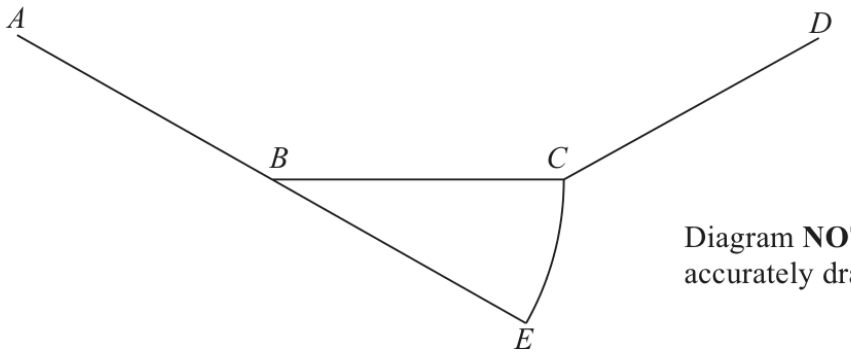


Diagram **NOT** accurately drawn

AB, BC and CD are three sides of a regular polygon.
ABE is a straight line.

BCE is a sector of a circle with centre B and radius 4.5 cm

The length of arc CE is $\frac{3}{10}\pi$ cm

Work out the sum of the interior angles of the regular polygon.

.....°

(Total for Question 24 is 4 marks)

WORKED SOLUTION

Question 24 · 4MA1/2HR June 2026

1 **Solution | Step 1**

Let $\theta = \angle CBE$. Then

$$\frac{\theta}{360}\,2\pi(4.5) = \frac{3}{10}\pi \quad \Rightarrow \quad \theta = 12°.$$

The arc is theta/360 of a full circumference.

2 **Solution | Step 2**

$\angle ABC = 180° - 12° = 168°$, so the regular polygon has exterior angle $12°$.
A, B and E are collinear, so the sector angle is supplementary to the interior angle.

3 Solution | Step 3

$$n = \frac{360}{12} = 30, \qquad \text{sum} = (30-2)180^\circ = 5040^\circ.$$

Exterior angles sum to 360 degrees, and an n-gon has interior-angle sum (n-2) times 180 degrees.

FINAL ANSWER

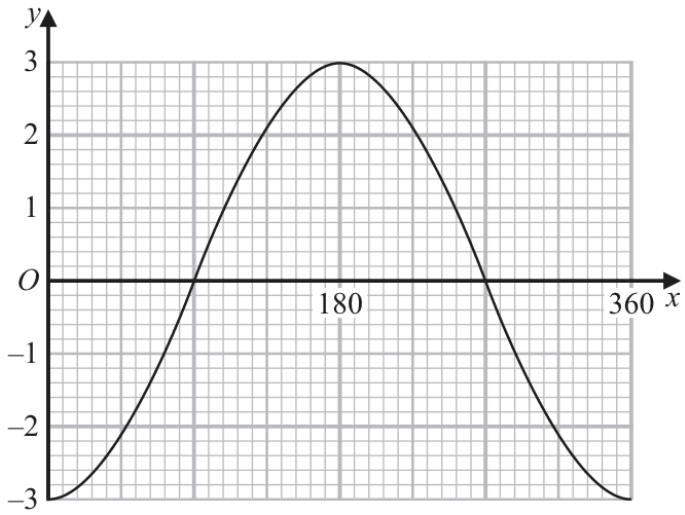
5040°.

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Question 25

4 marks | Transformations of Graphs

25 The graph of $y = a\sin(x + b)°$ for $0 \leqslant x \leqslant 360$ is drawn on the grid below.



Given that $a < 0$ and that $0 < b < 360$

(a) find the value of a and the value of b

$a =$ .....

$b =$ .....

(2)

A curve has equation $y = f(x)$
The point T with coordinates (p, q) lies on the curve.

(b) Find the coordinates of the image of T on the curve with equation

$$y = f(2x) + 5$$

Give your coordinates in terms of p and q

(..... , ...)

(2)

(Total for Question 25 is 4 marks)

WORKED SOLUTION

Question 25 · 4MA1/2HR June 2026

1 **Part (a) | Step 1**

The graph has maximum 3 and minimum -3, so $|a| = 3$. Since $a < 0$, $a = -3$.

The amplitude is half the vertical range.

2 **Part (a) | Step 2**

At $x = 0$, $y = -3$, so $-3 \sin b° = -3$ and $\sin b° = 1$. Hence $b = 90$ for $0 < b < 360$.

The minimum at x=0 fixes the phase when the amplitude is negative.

3 **Part (b) | Step 1**

To use the original input p, set $2x = p$, giving $x = p/2$.

The replacement of x by 2x halves horizontal coordinates.

4 **Part (b) | Step 2**

The corresponding output is $f(p) + 5 = q + 5$.

Adding 5 translates every output upwards by 5.

✓ **FINAL ANSWER**

(a) $a = -3, \quad b = 90$. (b) $\left(\frac{p}{2}, q + 5\right)$.

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Question 26

6 marks | Sequences

26 Here are the first four terms of an arithmetic series.

$$(k+2) \qquad (k+5) \qquad (k+8) \qquad (k+11)$$

The sum of the first $2n$ terms of the series is 4 times the sum of the first n terms of the series.

Work out the numerical value of the 100th term of the series.
Show your working clearly.

.....

(Total for Question 26 is 6 marks)

WORKED SOLUTION

Question 26 · 4MA1/2HR June 2026

1 Solution | Step 1

The first term is $a = k + 2$ and the common difference is $d = 3$.

Successive listed terms differ by 3.

2 Solution | Step 2

$$S_n = \frac{n}{2}\{2(k+2) + 3(n-1)\} = \frac{n}{2}(2k + 1 + 3n).$$

Apply the arithmetic-series sum formula.

3 Solution | Step 3

$$S_{2n} = n\{2(k+2) + 3(2n-1)\} = n(2k + 1 + 6n).$$

Use 2n in place of n throughout the sum formula.

4 Solution | Step 4

Using $S_{2n} = 4S_n$ and $n > 0$,

$$2k + 1 + 6n = 2(2k + 1 + 3n) = 4k + 2 + 6n.$$

Divide the equation by n, then expand the right-hand side.

5 Solution | Step 5

$$2k + 1 = 4k + 2 \quad \Rightarrow \quad k = -\frac{1}{2}.$$

The n-terms cancel, leaving a linear equation for k.

6 Solution | Step 6

$$u_{100} = k + 2 + 99(3) = -\frac{1}{2} + 2 + 297 = 298.5.$$

The 100th term is the first term plus 99 common differences.

FINAL ANSWER

The 100th term is $\mathbf{298.5}$.

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Question 27

4 marks | Percentages

27 Bryan owns a house.

During 2024, the value of Bryan's house increased by $x\%$
During 2025, the value of Bryan's house increased by $2x\%$

Overall, during 2024 and 2025, the value of Bryan's house increased by 38.88%

Work out the value of x
Show clear algebraic working.

$x =$ .....

(Total for Question 27 is 4 marks)

WORKED SOLUTION

Question 27 · 4MA1/2HR June 2026

1 Solution | Step 1

$$\left(1+\frac{x}{100}\right)\left(1+\frac{2x}{100}\right)=1.3888.$$

The second increase acts on the already-increased house value.

2 Solution | Step 2

$$1+\frac{3x}{100}+\frac{2x^2}{10000}=1.3888 \quad \Rightarrow \quad x^2+150x-1944=0.$$

Expand, subtract 1, and multiply by 5000.

3 Solution | Step 3

$$(x-12)(x+162)=0 \quad \Rightarrow \quad x=12 \text{ or } x=-162.$$

Factorize the quadratic.

4 Solution | Step 4

Reject $x=-162$, since both changes are increases, so $x>0$.
The positive root gives multipliers 1.12 and 1.24, whose product is 1.3888.

FINAL ANSWER

$x=12$.