

1 Anna, Bobby and Carl receive a sum of money.
They share it in the ratio 12:7:8.
Anna receives \$504.

(a) Calculate the **total** amount.

Answer(a) \$ [3]

(b) (i) Anna uses 7% of her \$504 to pay a bill.
Calculate how much she has left.

Answer(b)(i) \$ [3]

(ii) She buys a coat in a sale for \$64.68.
This was 23% less than the original price.
Calculate the original price of the coat.

Answer(b)(ii) \$ [3]

(c) Bobby uses \$250 of his share to open a bank account.
This account pays compound interest at a rate of 1.6% per year.
Calculate the amount in the bank account after 3 years.
Give your answer correct to 2 decimal places.

Answer(c) \$ [3]

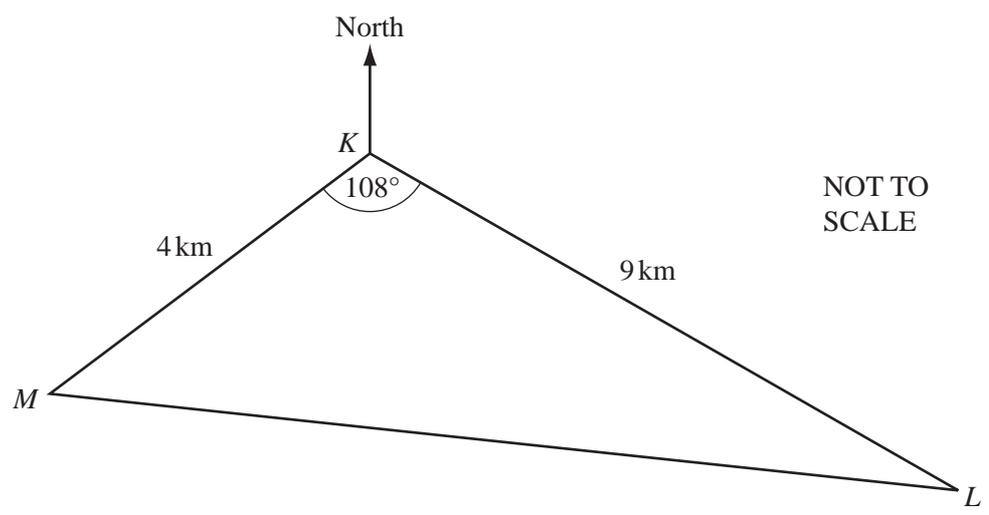
(d) Carl buys a computer for \$288 and sells it for \$324.
Calculate his percentage profit.

Answer(d) % [3]



3

2



Three buoys K , L and M show the course of a boat race.
 $MK = 4$ km, $KL = 9$ km and angle $MKL = 108^\circ$.

(a) Calculate the distance ML .

Answer(a) $ML = \dots\dots\dots$ km [4]

(b) The bearing of L from K is 125° .

(i) Calculate how far L is south of K .

Answer(b)(i) $\dots\dots\dots$ km [3]

(ii) Find the three figure bearing of K from M .

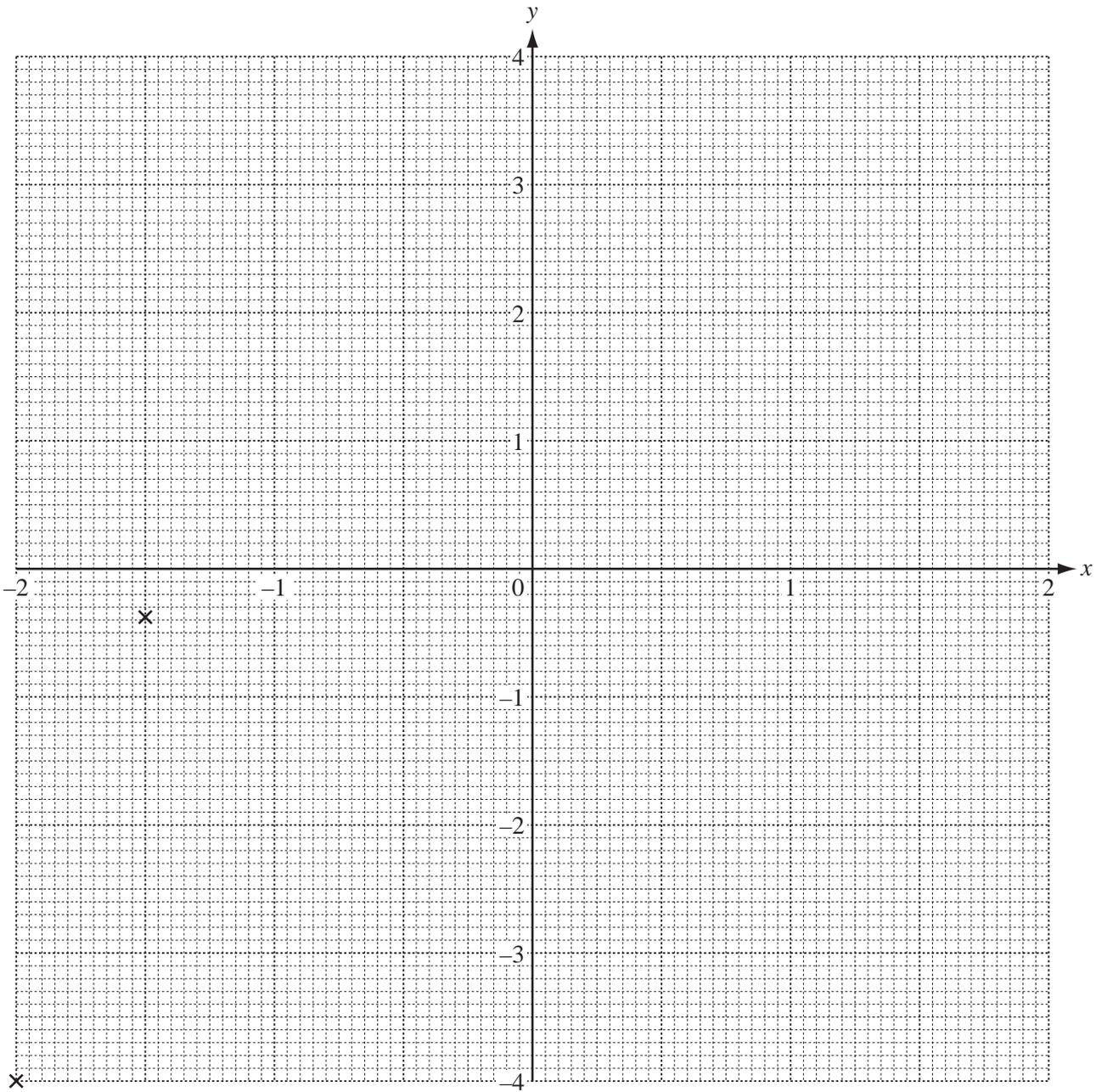
Answer(b)(ii) $\dots\dots\dots$ [2]

3 The table shows some values for the equation $y = x^3 - 2x$ for $-2 \leq x \leq 2$.

x	-2	-1.5	-1	-0.6	-0.3	0	0.3	0.6	1	1.5	2
y	-4	-0.38			0.57		-0.57			0.38	4

(a) Complete the table of values. [3]

(b) On the grid below, draw the graph of $y = x^3 - 2x$ for $-2 \leq x \leq 2$.
The first two points have been plotted for you.



[4]

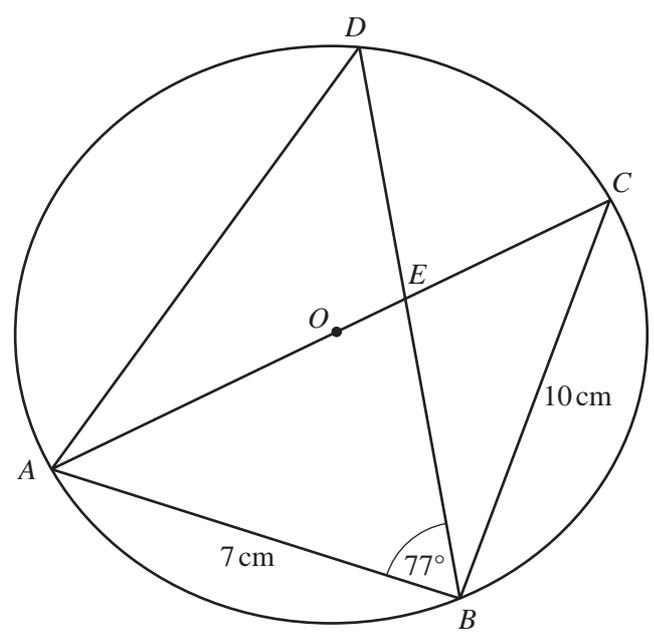
- (c) (i) On the grid, draw the line $y = 0.8$ for $-2 \leq x \leq 2$.
- (ii) Use your graph to solve the equation $x^3 - 2x = 0.8$.

Answer(c)(ii) $x =$ or $x =$ or $x =$ [3]

- (d) By drawing a suitable tangent, work out an estimate for the gradient of the graph of $y = x^3 - 2x$ where $x = -1.5$.

You must show your working.

Answer(d) [3]



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A, B, C and D lie on a circle, centre O .
 $AB = 7$ cm, $BC = 10$ cm and angle $ABD = 77^\circ$.
 AOC is a diameter of the circle.

(a) Find angle ABC .

Answer(a) Angle $ABC = \dots\dots\dots$ [1]

(b) Calculate angle ACB and show that it rounds to 35° correct to the nearest degree.

Answer(b)

[2]

(c) Explain why angle $ADB =$ angle ACB .

Answer(c) $\dots\dots\dots$ [1]

(d) (i) Calculate the length of AD .

Answer(d)(i) $AD =$ cm [3]

(ii) Calculate the area of triangle ABD .

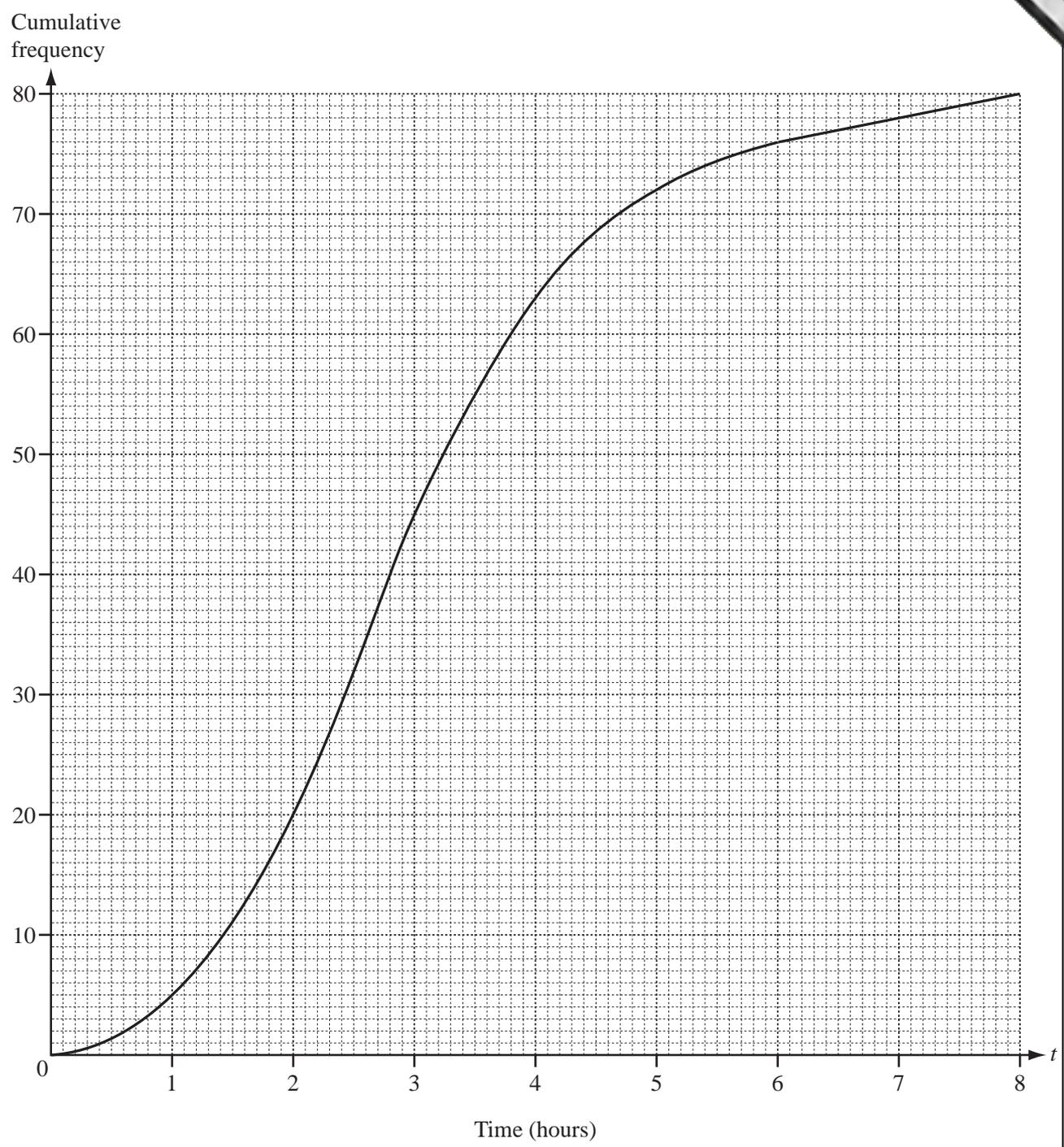
Answer(d)(ii) cm^2 [2]

(e) The area of triangle $AED = 12.3 \text{ cm}^2$, correct to 3 significant figures.

Use similar triangles to calculate the area of triangle BEC .

Answer(e) cm^2 [3]

5 Felix asked 80 motorists how many hours their journey took that day. He used the results to draw a cumulative frequency diagram.



(a) Find

(i) the median,

Answer(a)(i) h [1]

(ii) the upper quartile,

Answer(a)(ii) h [1]

(iii) the inter-quartile range.

Answer(a)(iii) h [1]

(b) Find the number of motorists whose journey took more than 5 hours but no more than 7 hours.

Answer(b)

(c) The frequency table shows some of the information about the 80 journeys.

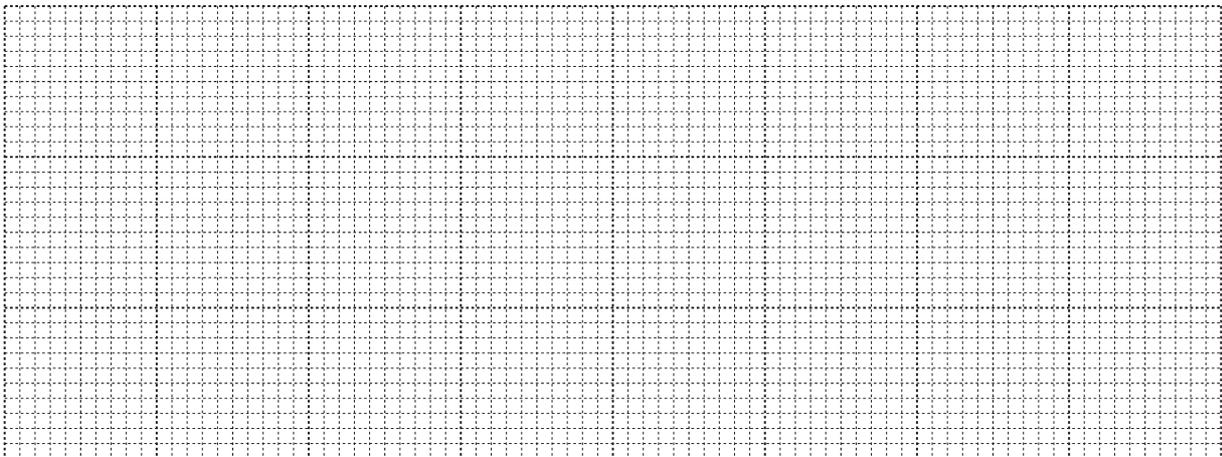
Time in hours (t)	$0 < t \leq 2$	$2 < t \leq 3$	$3 < t \leq 4$	$4 < t \leq 5$	$5 < t \leq 6$	$6 < t \leq 8$
Frequency	20	25	18			

(i) Use the cumulative frequency diagram to complete the table above. [2]

(ii) Calculate an estimate of the mean number of hours the 80 journeys took.

Answer(c)(ii) h [4]

(d) On the grid, draw a histogram to represent the information in your table in part (c).



[5]

6 (a) A parallelogram has base $(2x - 1)$ metres and height $(4x - 7)$ metres. The area of the parallelogram is 1 m^2 .

(i) Show that $4x^2 - 9x + 3 = 0$.

Answer (a)(i)

[3]

(ii) Solve the equation $4x^2 - 9x + 3 = 0$.

Show all your working and give your answers correct to 2 decimal places.

Answer(a)(ii) $x = \dots\dots\dots$ or $x = \dots\dots\dots$ [4]

(iii) Calculate the height of the parallelogram.

Answer(a)(iii) $\dots\dots\dots$ m [1]

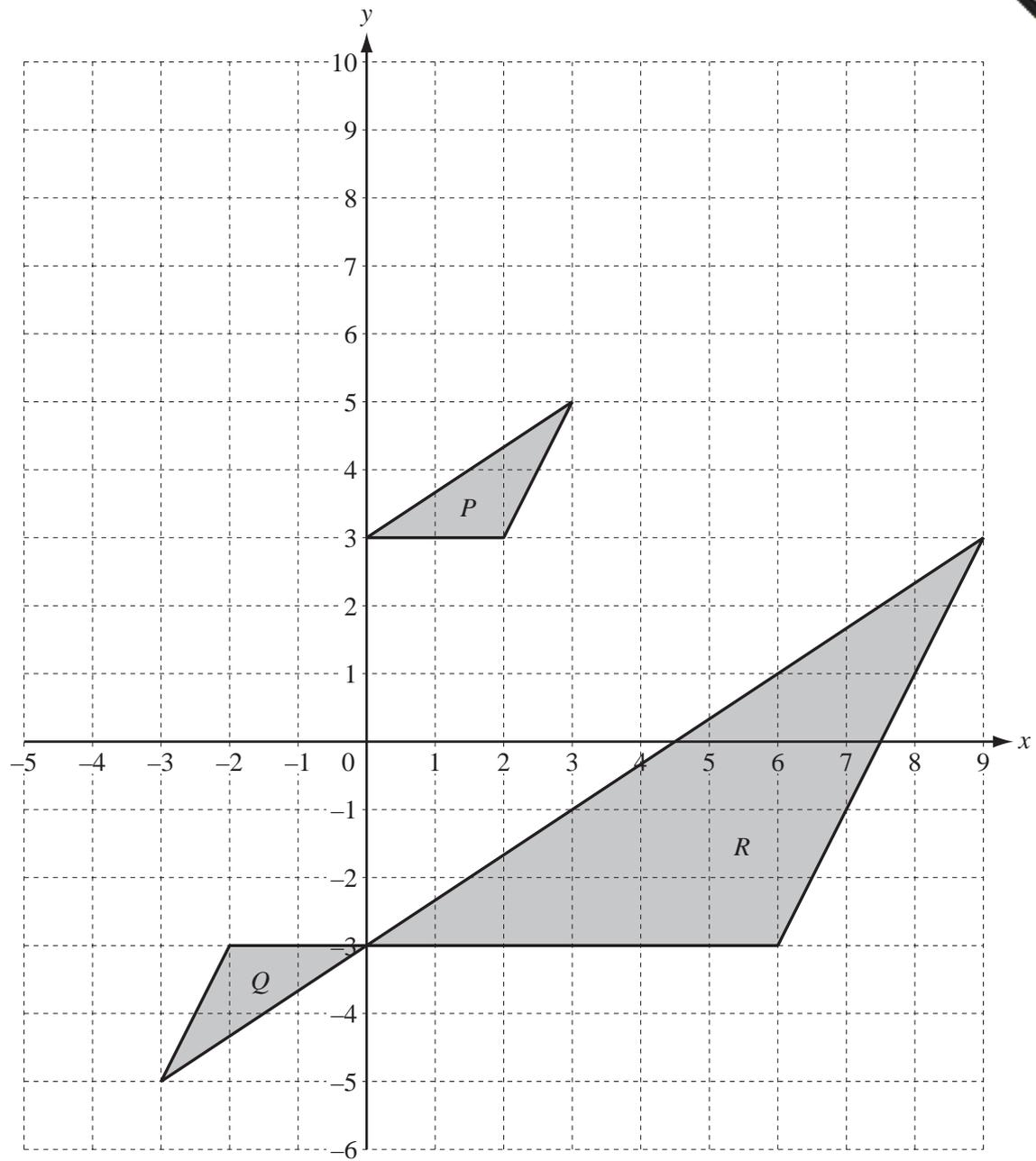
(b) (i) Factorise $x^2 - 16$.

Answer(b)(i) [1]

(ii) Solve the equation $\frac{2x+3}{x-4} + \frac{x+40}{x^2-16} = 2$.

Answer(b)(ii) $x =$ [4]

7



(a) Describe fully

(i) the **single** transformation which maps **triangle P** onto triangle **Q**,

Answer(a)(i) [3]

(ii) the **single** transformation which maps **triangle Q** onto triangle **R**,

Answer(a)(ii) [3]

(iii) the **single** transformation which maps **triangle R** onto triangle **P**.

Answer(a)(iii) [3]

(b) On the grid, draw the image of

(i) **triangle P** after translation by $\begin{pmatrix} -4 \\ -5 \end{pmatrix}$, [2]

(ii) **triangle P** after reflection in the line $x = -1$. [2]

(c) (i) On the grid, draw the image of **triangle P** after a stretch, scale factor 2 and the y -axis as the invariant line. [2]

(ii) Find the matrix which represents this stretch.

Answer(c)(ii) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

9 $f(x) = 3x + 5$ $g(x) = 7 - 2x$ $h(x) = x^2 - 8$

(a) Find

(i) $f(3)$,

Answer(a)(i) [1]

(ii) $g(x - 3)$ in terms of x in its simplest form,

Answer(a)(ii) [2]

(iii) $h(5x)$ in terms of x in its simplest form.

Answer(a)(iii) [1]

(b) Find the inverse function $g^{-1}(x)$.

Answer(b) $g^{-1}(x) =$ [2]

(c) Find $hf(x)$ in the form $ax^2 + bx + c$.

Answer(c) $hf(x) =$ [3]

(d) Solve the equation $ff(x) = 83$.

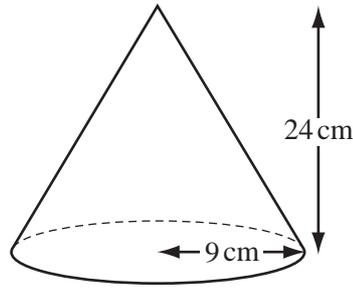
Answer(d) $x =$ [3]

(e) Solve the inequality $2f(x) < g(x)$.

Answer(e) [3]

10

16



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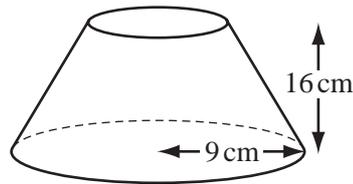
A solid metal cone has base radius 9 cm and vertical height 24 cm.

(a) Calculate the volume of the cone.

[The volume, V , of a cone with radius r and height h is $V = \frac{1}{3} \pi r^2 h$.]

Answer(a) cm³ [2]

(b)



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A cone of height 8 cm is removed by cutting parallel to the base, leaving the solid shown above. Show that the volume of this solid rounds to 1960 cm³, correct to 3 significant figures.

Answer (b)

[4]

(c) The 1960 cm³ of metal in the solid in **part (b)** is melted and made into 5 identical cylinders, each of length 15 cm. Show that the radius of each cylinder rounds to 2.9 cm, correct to 1 decimal place.

Answer (c)

[4]