

- 1 On a mountain, the temperature decreases by 6.5°C for every 1000 metres increase in height. At 2000 metres the temperature is 10°C .

Find the temperature at 6000 metres.

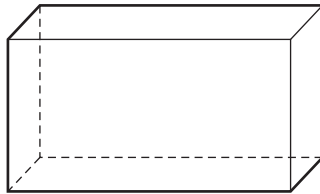
Answer $^{\circ}\text{C}$ [2]

- 2 Use your calculator to find the value of

$$\frac{8.1^2 + 6.2^2 - 4.3^2}{2 \times 8.1 \times 6.2}$$

Answer [2]

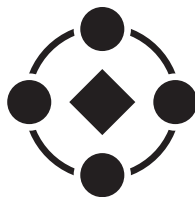
- 3 (a) The diagram shows a cuboid.



How many planes of symmetry does this cuboid have?

Answer(a) [1]

- (b) Write down the order of rotational symmetry for the following diagram.



Answer(b) [1]

- 4 Write down all your working to show that the following statement is correct.

$$\frac{1 + \frac{8}{9}}{2 + \frac{1}{2}} = \frac{34}{45}$$

Answer

[2]

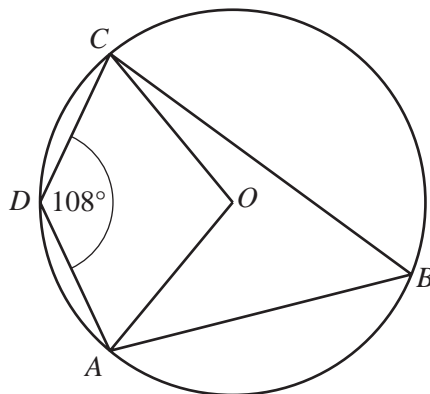
- 5 Simplify the expression.

$$(a^{\frac{1}{2}} - b^{\frac{1}{2}})(a^{\frac{1}{2}} + b^{\frac{1}{2}})$$

Answer

[2]

6



NOT TO
SCALE

A, B, C and D lie on a circle centre O . Angle $ADC = 108^\circ$.

Work out the obtuse angle AOC .

Answer Angle $AOC =$

[2]

- 7 The train fare from Bangkok to Chiang Mai is 768 baht.
The exchange rate is £1 = 48 baht.

Calculate the train fare in pounds (£).

Answer £ [2]

- 8 Acri invested \$500 for 3 years at a rate of 2.8% per year compound interest.

Calculate the final amount he has after 3 years.

Answer \$ [3]

- 9 Solve the inequality.

$$\frac{2x-3}{5} - \frac{x}{3} \leq 2$$

Answer [3]

- 10 A large water bottle holds 25 litres of water correct to the nearest litre.
A drinking glass holds 0.3 litres correct to the nearest 0.1 litre.

Calculate the lower bound for the number of glasses of water which can be filled from the bottle.

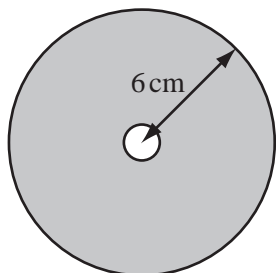
Answer [3]

- 11 The electrical resistance, R , of a length of cylindrical wire varies inversely as the square of the diameter, d , of the wire.
 $R = 10$ when $d = 2$.

Find R when $d = 4$.

Answer $R =$ [3]

12



NOT TO
SCALE

The diagram shows a circular disc with radius 6 cm.
In the centre of the disc there is a circular hole with radius 0.5 cm.

Calculate the area of the shaded section.

Answer cm^2 [3]

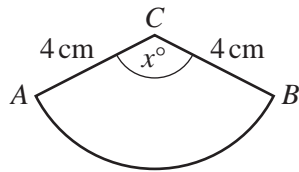
- 13 Find the matrix which represents the combined transformation of a reflection in the x axis followed by a reflection in the line $y = x$.

Answer

$$\left(\begin{array}{cc} & \\ & \end{array} \right)$$

[3]

14



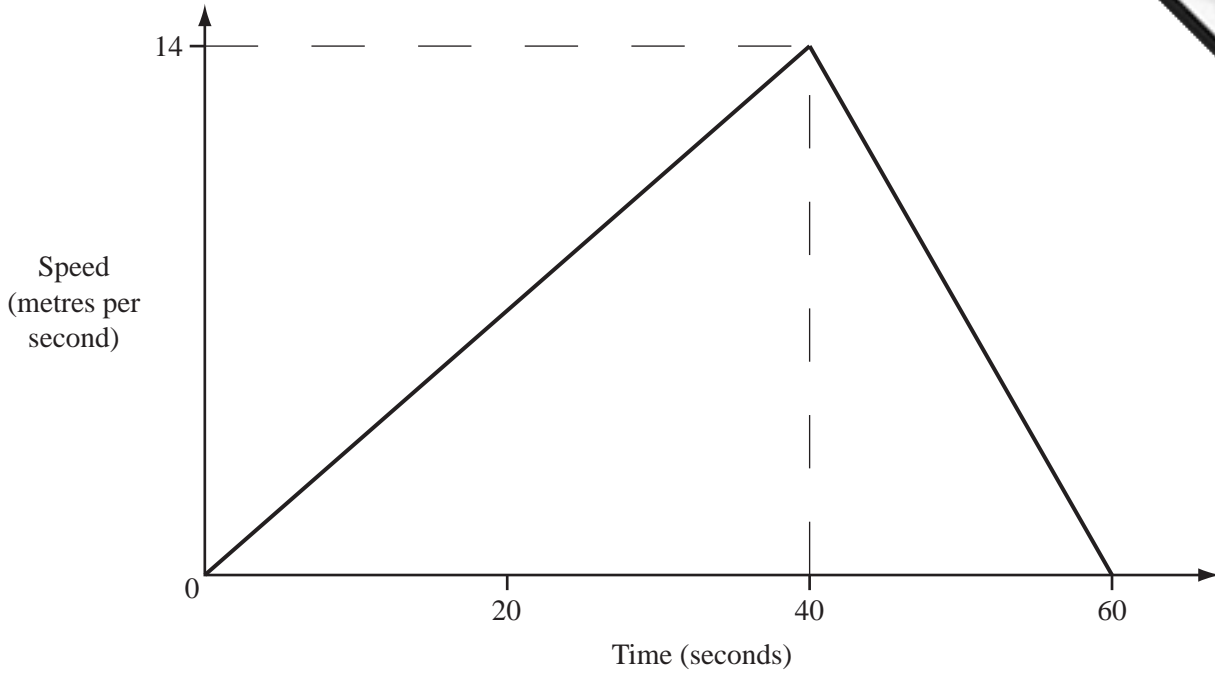
NOT TO
SCALE

ABC is a sector of a circle, radius 4 cm and centre C .
The length of the arc AB is 8 cm and angle $ACB = x^\circ$.

Calculate the value of x .

Answer $x =$ [3]

15



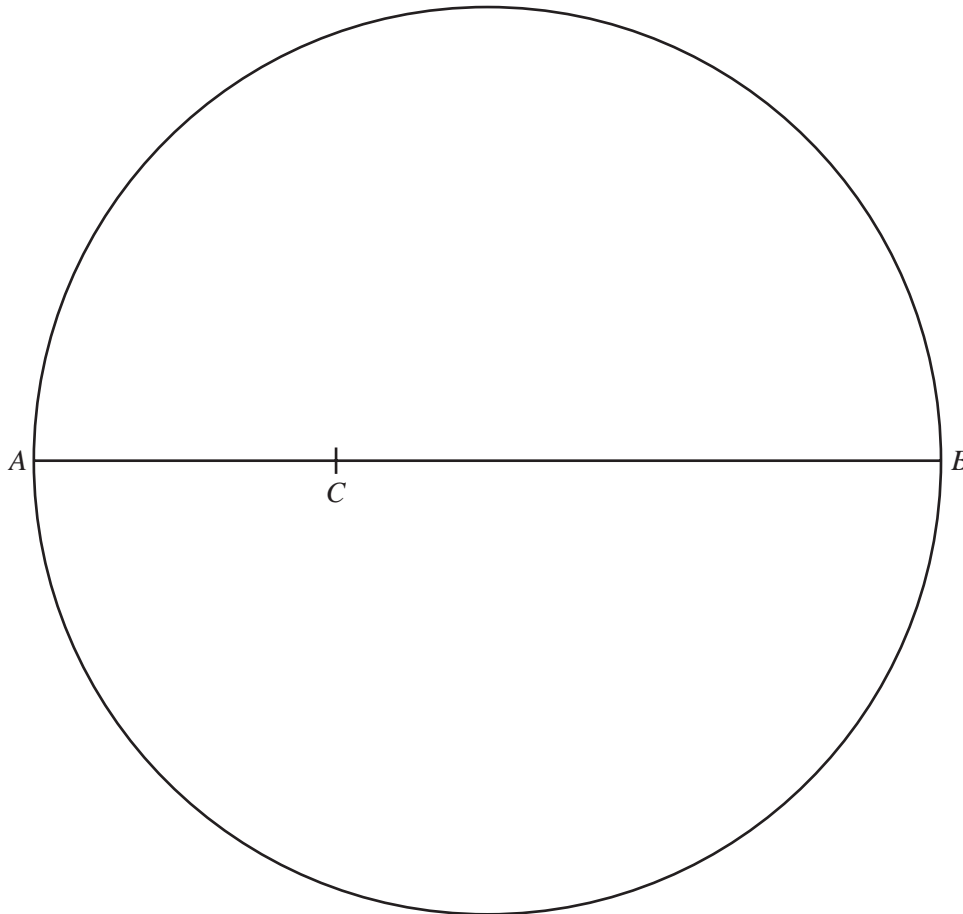
The diagram shows the speed-time graph of a bus journey between two bus stops. Hamid runs at a constant speed of 4 m/s along the bus route. He passes the bus as it leaves the first bus stop. The bus arrives at the second bus stop after 60 seconds.

How many metres from the bus is Hamid at this time?

Answer m [3]

16 Rearrange the formula $y = \frac{x+2}{x-4}$ to make x the subject.

Answer $x =$ [4]



AB is the diameter of a circle.
 C is a point on AB such that $AC = 4$ cm.

(a) Using a straight edge and compasses only, construct

- (i) the locus of points which are equidistant from A and from B , [2]
 (ii) the locus of points which are 4 cm from C . [1]

(b) Shade the region in the diagram which is

- and**
- nearer to B than to A
 - less than 4 cm from C . [1]

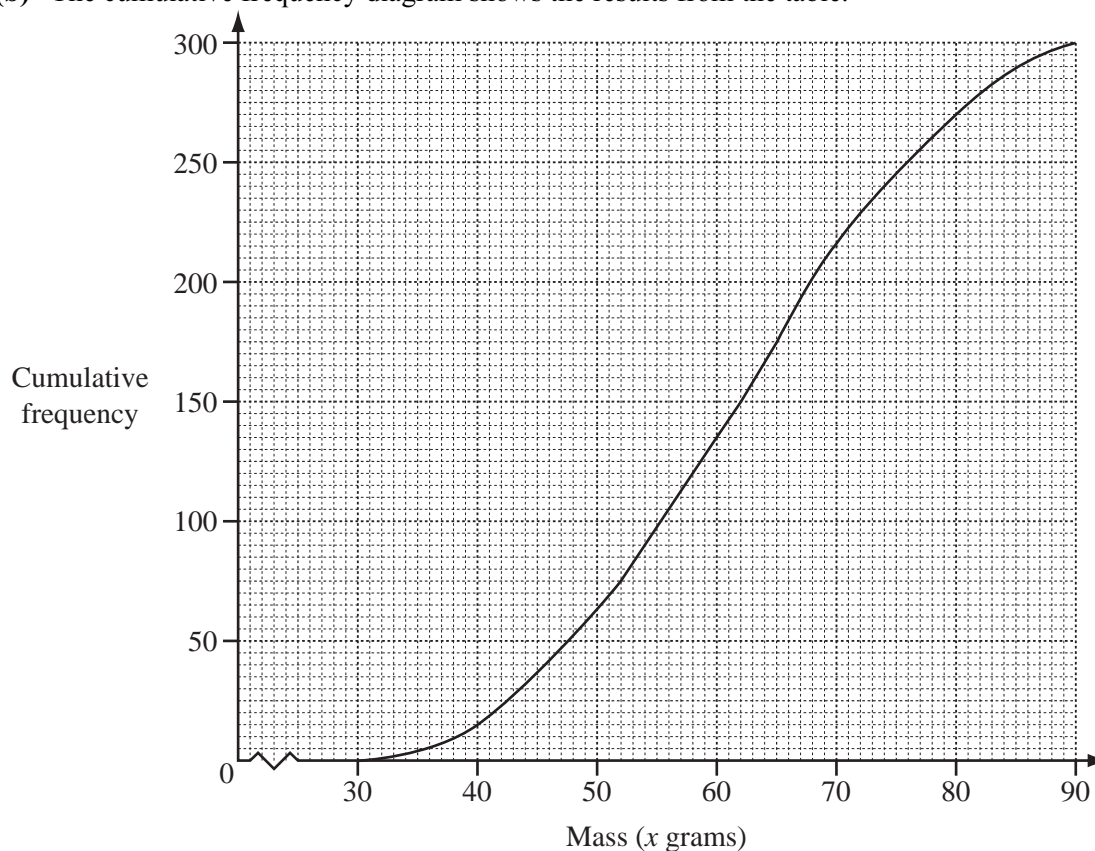
18 Lauris records the mass and grade of 300 eggs. The table shows the results.

| | | | | | | |
|----------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Mass (x grams) | $30 < x \leq 40$ | $40 < x \leq 50$ | $50 < x \leq 60$ | $60 < x \leq 70$ | $70 < x \leq 80$ | $80 < x \leq 90$ |
| Frequency | 15 | 48 | 72 | 81 | 54 | 30 |
| Grade | small | | medium | large | very large | |

(a) Find the probability that an egg chosen at random is graded very large.

Answer(a) [1]

(b) The cumulative frequency diagram shows the results from the table.



Use the cumulative frequency diagram to find

(i) the median,

Answer(b)(i) g [1]

(ii) the lower quartile,

Answer(b)(ii) g [1]

(iii) the inter-quartile range,

Answer(b)(iii) g [1]

(iv) the number of eggs with a mass greater than 65 grams.

Answer(b)(iv) [2]

19

$$\mathbf{M} = \begin{pmatrix} 5 & -4 \\ 2 & 3 \end{pmatrix}$$

Find

(a) \mathbf{M}^2 ,

Answer(a) $\begin{pmatrix} \quad & \quad \\ \quad & \quad \end{pmatrix}$ [2]

(b) $2\mathbf{M}$,

Answer(b) $\begin{pmatrix} \quad & \quad \\ \quad & \quad \end{pmatrix}$ [1]

(c) $|\mathbf{M}|$, the determinant of \mathbf{M} ,

Answer(c) [1]

(d) \mathbf{M}^{-1} .

Answer(d) $\begin{pmatrix} \quad & \quad \\ \quad & \quad \end{pmatrix}$ [2]

20

$$f(x) = 4(x + 1)$$

$$g(x) = \frac{x^3}{2} - 1$$

(a) Write down the value of x when $f^{-1}(x) = 2$.

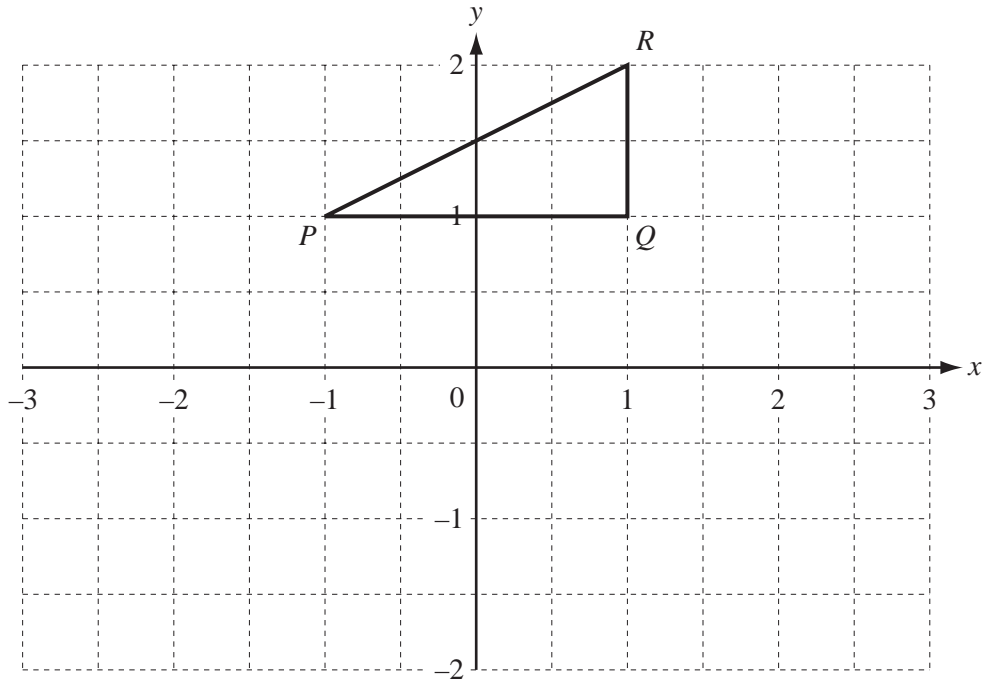
Answer(a) $x =$ [1]

(b) Find $fg(x)$. Give your answer in its simplest form.

Answer(b) $fg(x) =$ [2]

(c) Find $g^{-1}(x)$.

Answer(c) $g^{-1}(x) =$ [3]



The triangle PQR has co-ordinates $P(-1, 1)$, $Q(1, 1)$ and $R(1, 2)$.

- (a) Rotate triangle PQR by 90° clockwise about $(0, 0)$.
Label your image $P'Q'R'$. [2]

- (b) Reflect **your triangle** $P'Q'R'$ in the line $y = -x$.
Label your image $P''Q''R''$. [2]

- (c) Describe fully the **single** transformation which maps triangle PQR onto triangle $P''Q''R''$.

Answer(c) [2]