Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

MATHEMATICS **0580/33**

Paper 3 (Core) **May/June 2023**

2 hours

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π, use either your calculator value or 3.142.

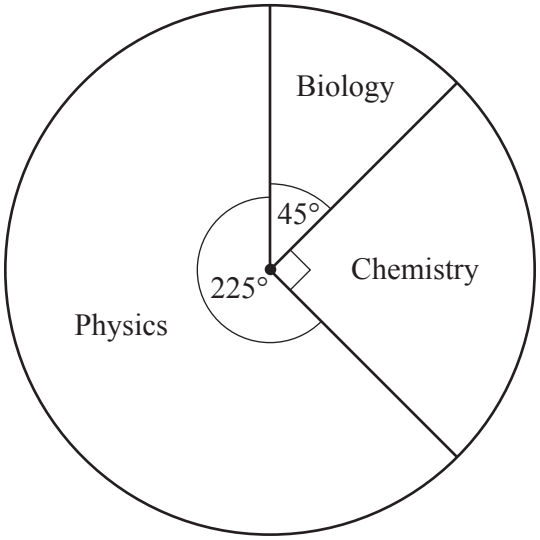
INFORMATION

- The total mark for this paper is 104.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **16** pages.

[Turn over

1 **(a)** Claudia asks some students to choose their favourite science from biology, chemistry and physics. The pie chart shows the results.



(i) Find the percentage of students who choose chemistry.

..... % [1]

(ii) Find the fraction of students who choose physics.
Give your answer in its simplest form.

..... [2]

(iii) For the number of students choosing each subject, find the ratio biology : chemistry : physics.
Give your answer in its simplest form.

..... : ..... : ..... [2]

(iv) Marcus says:

'I do not know how many people choose chemistry, but I do know it is an even number.'

Explain how Marcus knows this.

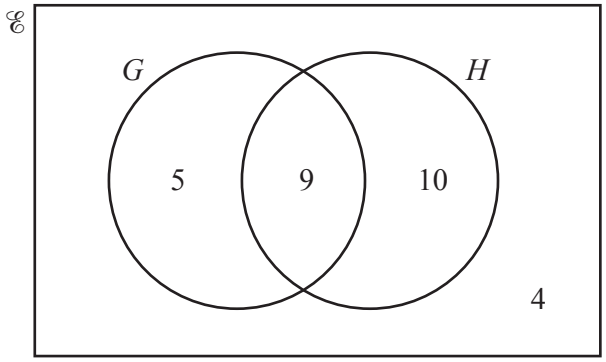
..... [1]

(v) Claudia now tells Marcus that 26 students choose chemistry.

Work out how many students choose physics.

..... [2]

(b) The Venn diagram shows information about the number of students in a class who study geography (G) and history (H).



(i) Work out the number of students in the class.

..... [1]

(ii) Find $n(G)$.

..... [1]

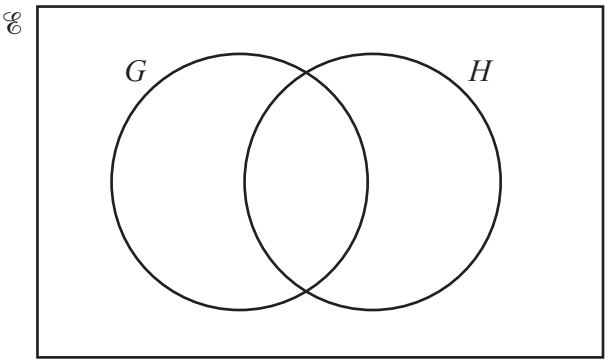
(iii) One of the students is chosen at random.

Find the probability that this student studies geography and history.

..... [1]

(iv) One of the students who studies geography and history stops studying history.

Complete this Venn diagram to show this change.



[1]

[Turn over

2 A shop sells food and drink.

(a) Bananas cost \$1.20 per kilogram and apples cost \$2.25 per bag.

Work out the total cost of 3.5 kg of bananas and 2 bags of apples.

\$ ..... [3]

(b) Students receive a 10% discount on their shopping.
Before the discount, the cost of a student's shopping is \$16.80 .

Work out the amount of the discount.

\$ ..... [1]

(c) The cost of a cabbage increases by 15%.

Calculate the new price if the original price is \$1.80 .

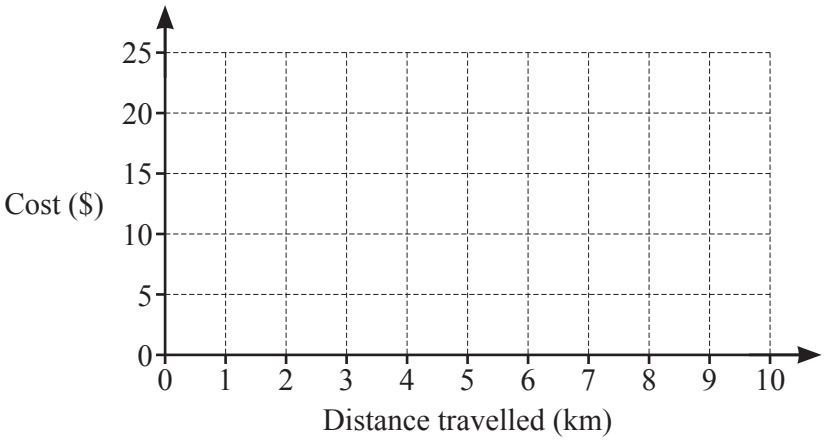
\$ ..... [2]

(d) Some customers have their shopping delivered to their home.
The cost is \$5 plus \$1.50 for each kilometre travelled from the shop to their home.

(i) Show that the cost for a customer living 10 km from the shop is \$20.

[1]

(ii)



On the grid, draw a line to show the cost of having shopping delivered. [2]

(e) A bottle of water costs $1.55 .
Suki has $20.

Work out the maximum number of bottles Suki can buy and the change she receives.

Maximum number of bottles .....

Change $ ..... [3]

(f) A farmer delivers eggs to the shop in trays of 50.
The eggs are then put into boxes of 12.
There are no eggs left in the trays and all of the egg boxes are full.

Work out the smallest possible number of eggs that the farmer delivers.

..... [2]

(g) The shop sells bottles of orange juice in three different sizes.

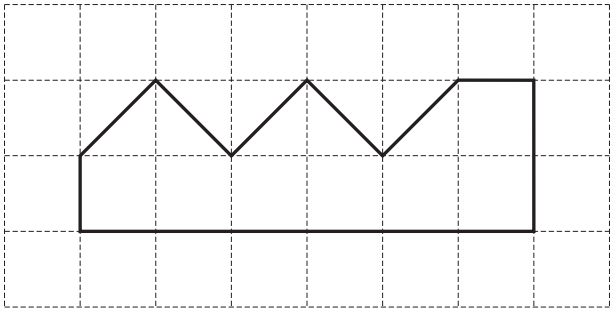
Bottle A	Bottle B	Bottle C
0.5 litres	1.2 litres	2 litres
$1.30	$3.20	$5.25

Work out which bottle is the best value.
Show how you decide.

Bottle ..... [3]

[Turn over

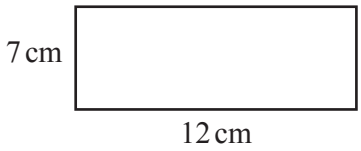
3 **(a)** The diagram shows a shape on a 1 cm^2 grid.



Work out the area of the shape.

..... cm^2 [1]

(b)



NOT TO SCALE

Work out the perimeter of the rectangle.

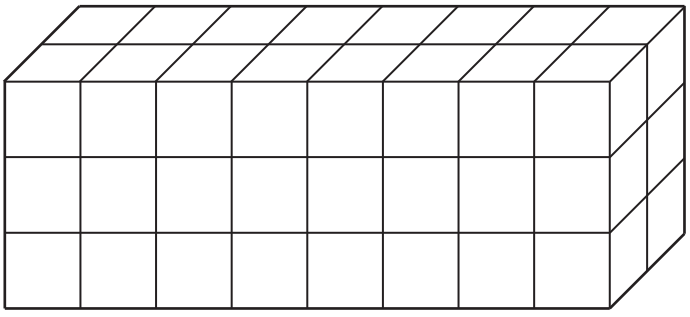
..... cm [1]

(c) A square has an area of 841 cm^2.

Work out the length of one side of the square.

..... cm [1]

(d) The diagram shows a cuboid made from 1 cm^3 cubes.



NOT TO SCALE

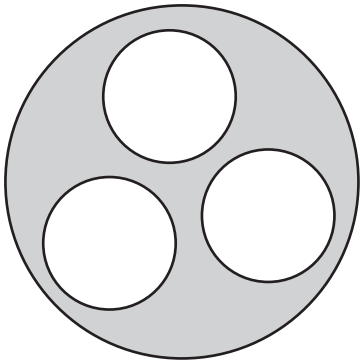
(i) Work out the volume of the cuboid.

..... cm^3 [1]

(ii) Write down the dimensions of a different cuboid that can be made using all of the cubes.

..... cm by ..... cm by ..... cm [1]

(e)



NOT TO SCALE

The diagram shows three small circles and one large circle.
The large circle has radius 20 cm.
The small circles each have radius 4 cm.

Work out the shaded area.
Give your answer in terms of π.

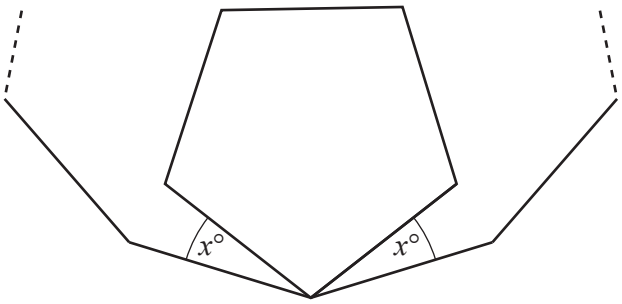
..... cm^2 [3]

(f) The exterior angle of a 9-sided regular polygon is 40°.

(i) Work out the size of the interior angle of this polygon.

..... [1]

(ii)



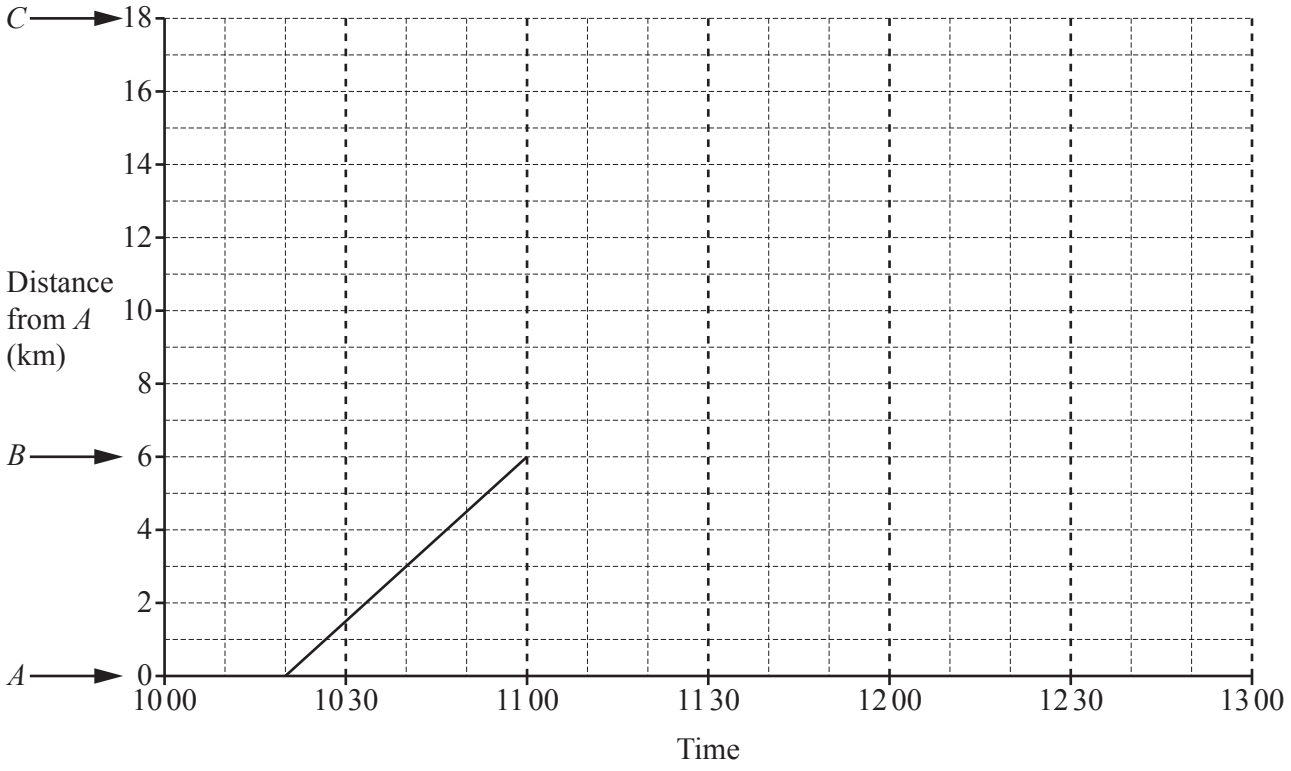
NOT TO SCALE

The diagram shows a regular pentagon inside part of a regular 9-sided polygon.

Work out the value of x.

$x =$ ..... [4]

4 **(a)** A boat sails from *A* to *B*.
The travel graph shows this journey.



(i) Write down the time that the boat leaves *A*. ..... [1]

(ii) Work out how long, in minutes, it takes the boat to sail from *A* to *B*.

..... min [1]

(iii) The boat stays at *B* for 20 minutes.
The boat then sails to *C* at a constant speed of 8 km/h.

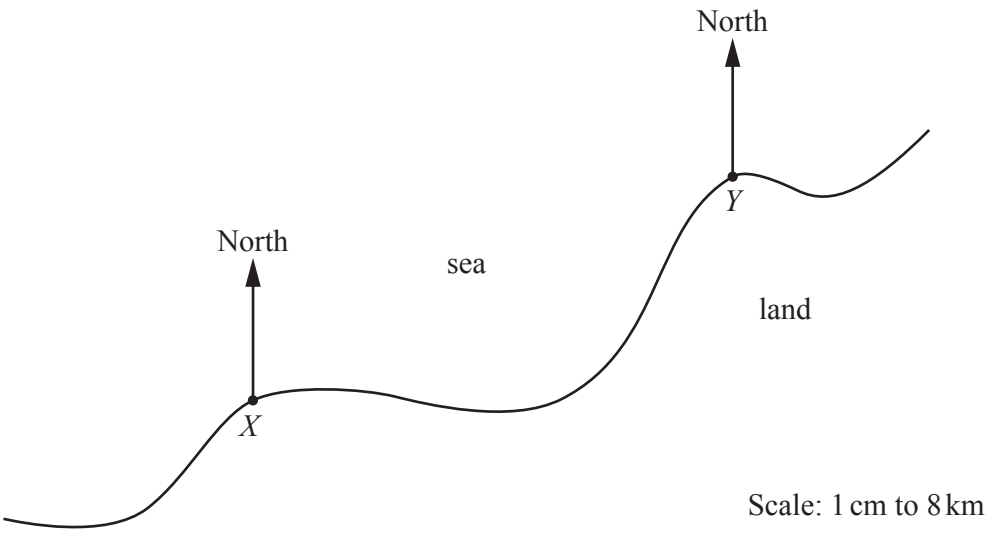
Complete the travel graph.

[2]

(iv) Work out the average speed, in km/h, for the whole journey from *A* to *C*.

..... km/h [3]

(b) The scale drawing shows the positions of two ports, X and Y.
The scale is 1 cm represents 8 km.



(i) Measure the bearing of Y from X.

..... [1]

(ii) A boat, B, is 52 km from X and 80 km from Y.

On the scale drawing, mark the position of B. [2]

(iii) A ship, S, is on a bearing of 284° from X.

Work out the bearing of X from S.

..... [2]

5 The grid shows the first three diagrams in a sequence.
Each diagram is made using sticks.

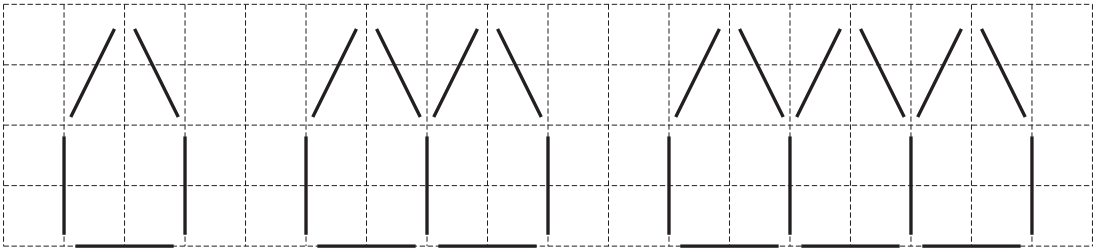


Diagram 1 Diagram 2 Diagram 3

(a) On the grid, draw Diagram 4.

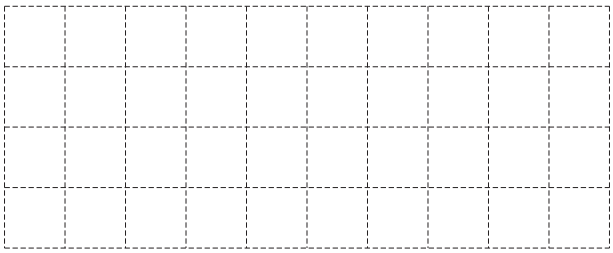


Diagram 4

[1]

(b) Complete the table.

Diagram number	1	2	3	4	5
Number of sticks	5	9	13		

[2]

(c) **(i)** Find an expression, in terms of n, for the number of sticks in Diagram n.

..... [2]

(ii) One of the diagrams has 73 sticks.

Work out its Diagram number.

Diagram ..... [2]

(d) (i) Show that the total number of sticks needed to make the first 3 diagrams is 27.

[1]

(ii) The total number of sticks needed to make the first k diagrams is $2k^2 + 3k$.

Show that this expression gives the correct total number of sticks needed to make the first 3 diagrams.

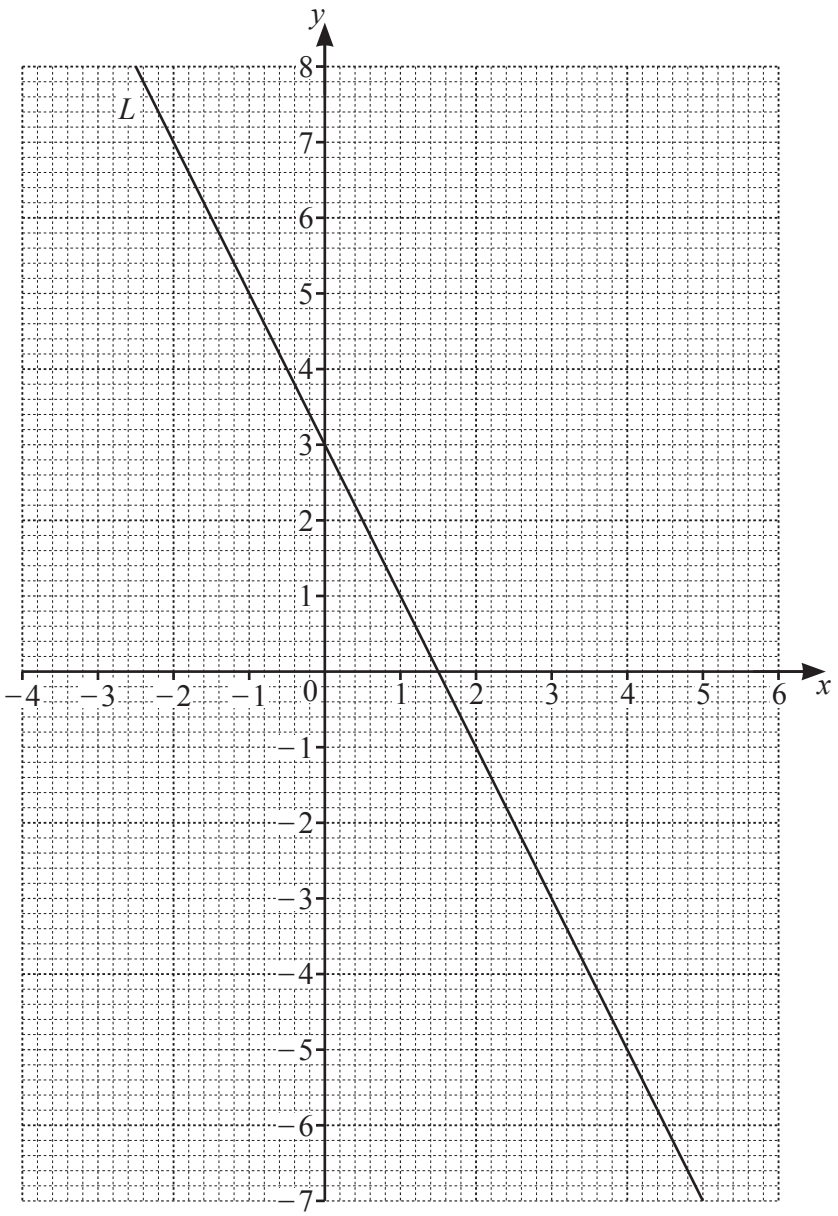
[2]

(iii) Tobias wants to make the first 10 diagrams.
He has already made the first 3 diagrams.
He has 240 sticks left to make the remaining 7 diagrams.

Work out how many sticks he has left when all 10 diagrams are made.

..... [4]

6



(a) Write down the equation of line L in the form $y = mx + c$.

$y =$ ..... [2]

(b) **(i)** Complete the table of values for $y = x^2 - 3x - 3$.

x	-2	-1	0	1	2	3	4	5
y		1		-5	-5		1	

[2]

(ii) On the grid, draw the graph of $y = x^2 - 3x - 3$ for $-2 \leqslant x \leqslant 5$. [4]

(c) **(i)** Write down the coordinates of the lowest point of the graph of $y = x^2 - 3x - 3$.

(..... , ...) [1]

(ii) On the grid, draw the line of symmetry of the graph of $y = x^2 - 3x - 3$. [1]

(iii) Write down the equation of the line of symmetry.

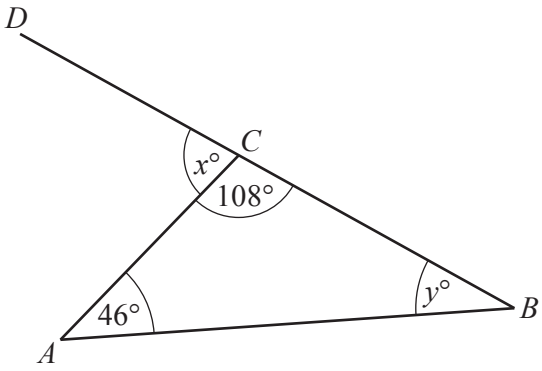
..... [1]

(d) Write down the coordinates of the point where line L intersects the graph of $y = x^2 - 3x - 3$ for $x > 0$.

(..... , ...) [1]

[Turn over

7 **(a)**



NOT TO SCALE

The diagram shows a triangle ABC and a straight line BCD.

(i) Angle $ACB = 108°$.

Write down the mathematical name for this type of angle.

..... [1]

(ii) Work out the value of x.

$x =$ ..... [1]

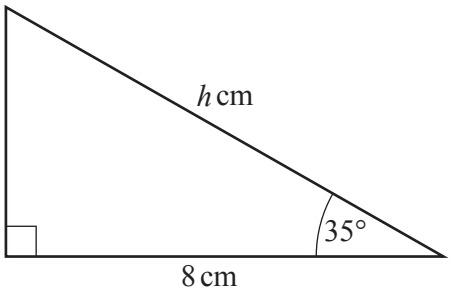
(iii) Work out the value of y.

$y =$ ..... [1]

(b) Show that the mean of the angles in any triangle is 60°.

[1]

(c)



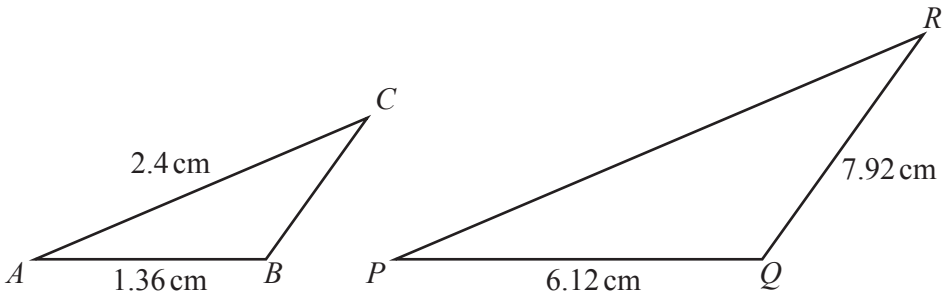
NOT TO SCALE

The diagram shows a right-angled triangle.

Calculate the value of h.

$h =$ ..... [3]

(d)



NOT TO SCALE

Triangle ABC is similar to triangle PQR.

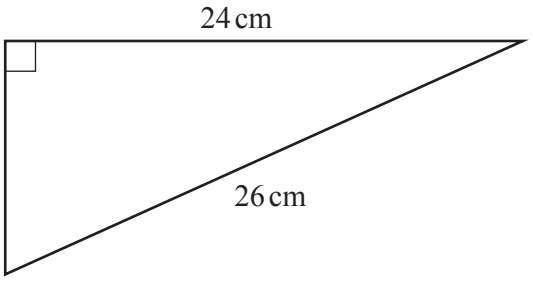
(i) Calculate PR.

$PR =$ ..... cm [2]

(ii) Calculate BC.

$BC =$ ..... cm [2]

(e)



NOT TO SCALE

The diagram shows a right-angled triangle.

Calculate the perimeter of this triangle.

..... cm [4]

Question 8 is printed on the next page.

8 **(a)** The length, l m, of a piece of wire is 18.7 metres, correct to the nearest 10 centimetres.

Complete the statement about the value of l.

..... $\leqslant l <$ ..... [2]

(b) 850 metres of wire has a mass of 130.5 kilograms.

Work out the length of wire, in metres, that has a mass of 900 grams.

..... m [3]

(c) Aluminium is used to make the wire.
The mass of 1 cm^3 of aluminium is 2.7 grams.

Work out the mass, in grams, of 6000 cm^3 of aluminium.
Give your answer in standard form.

..... g [2]

(d) A 12 metre length of wire increases in length to 12.017 metres when its temperature rises.

Calculate the percentage increase in the length of the wire.

..... % [2]