Peponi School

2023 VI Form Scholarship Examinations

Mathematics 1

Time: 1 hour

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator.

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name.

- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need*.
- **Calculators may be used.**

- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out**.

- The total mark for this paper is 60
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

1   The scatter graph shows information about the amount of rainfall, in mm, and the number of hours of sunshine for each of ten English towns on the same day.
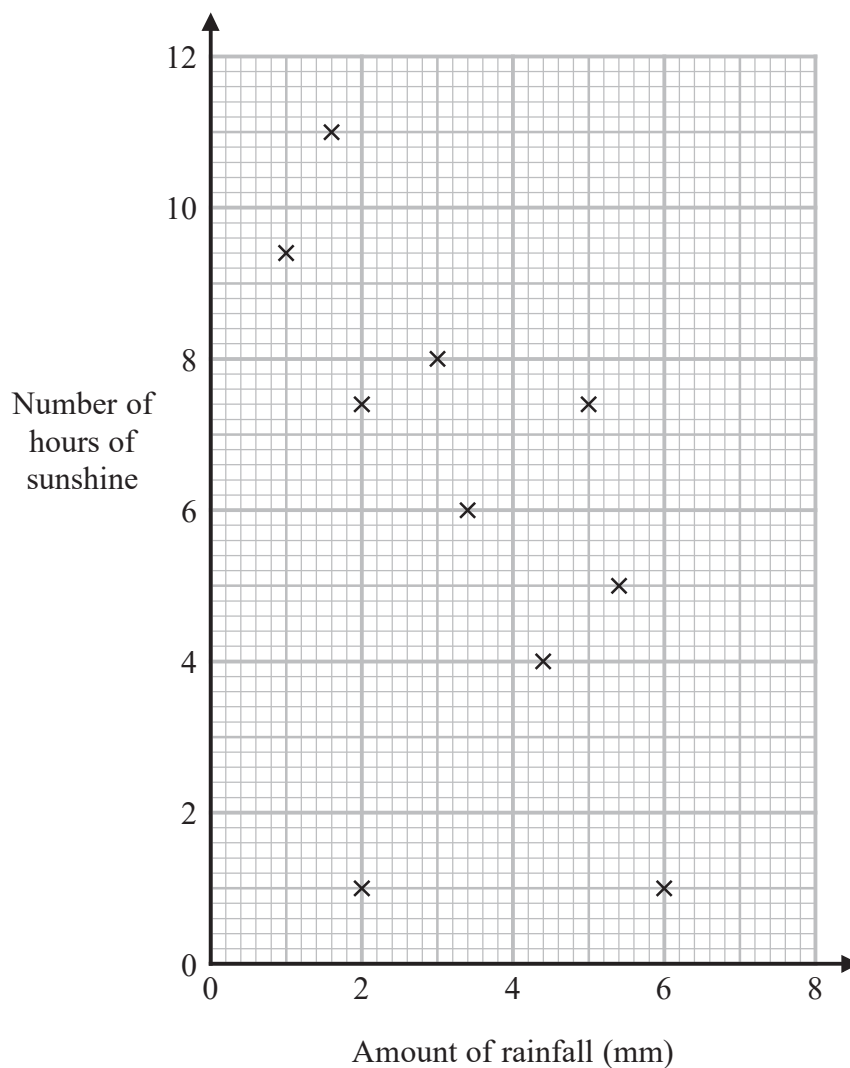
One of the points is an outlier.

(a) Write down the coordinates of this point.

(........................... , ...)

(1)

(b) Ignoring the outlier, describe the relationship between the amount of rainfall and the number of hours of sunshine.

....

....

....

(1)

On the same day in another English town there were 7 hours of sunshine.

(c) Using the scatter graph, estimate the amount of rainfall in this town on this day.
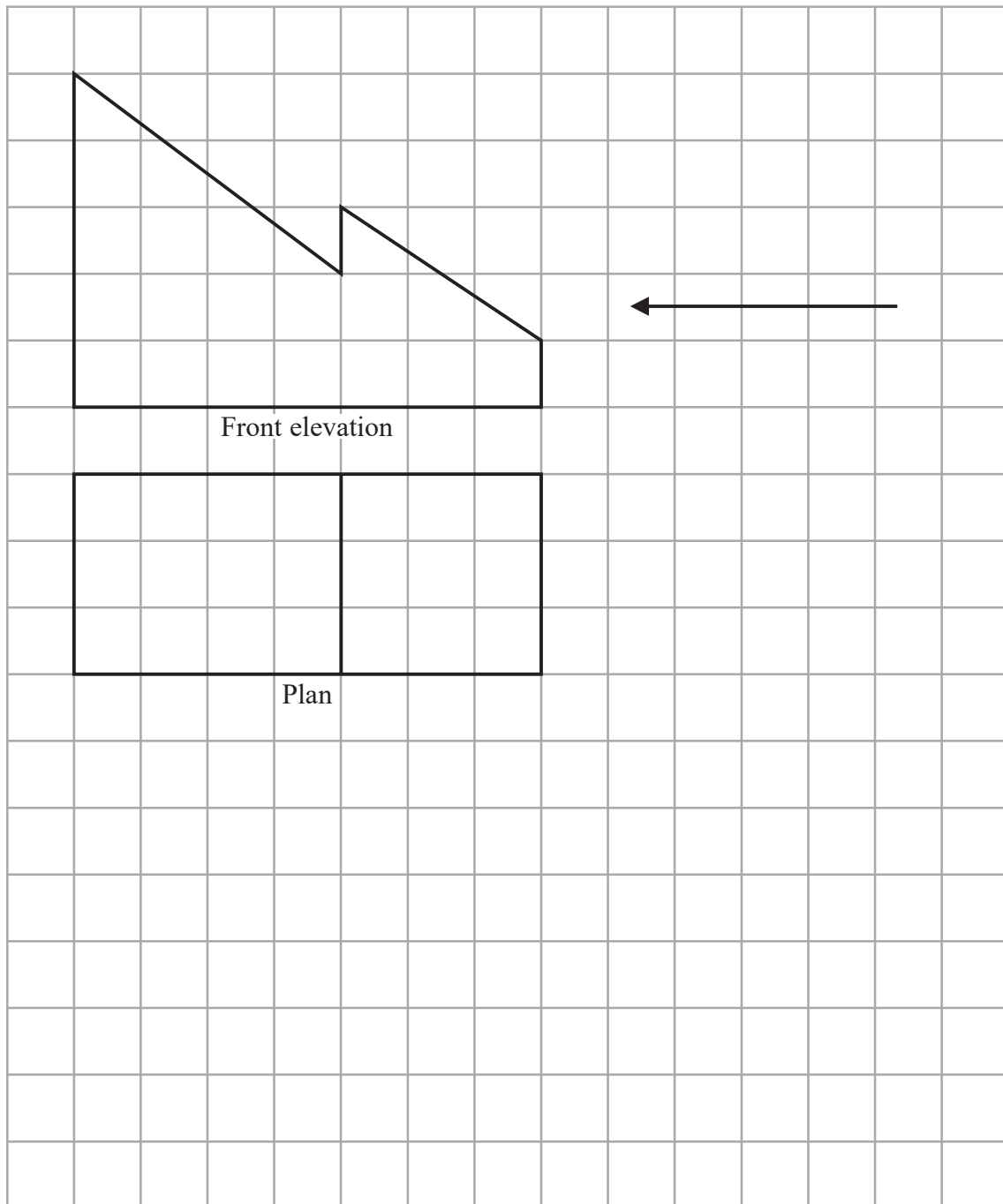
.... mm

(2)

(Total for Question 1 is 4 marks)

2   The front elevation and the plan of a solid are shown on the grid.

On the grid, draw the side elevation of the solid from the direction of the arrow.

Front elevation

Plan

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

$$7 \qquad 13 \qquad 19 \qquad 25 \qquad 31$$

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

....

(2)

The nth term of a different sequence is $8 - 6n$

(b) Is -58 a term of this sequence?
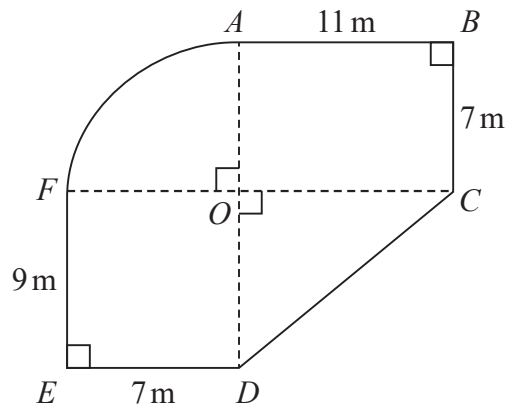You must show how you get your answer.

(2)

(Total for Question 3 is 4 marks)

4 The diagram shows a plan of Jason's garden.

ABCO and *DEFO* are rectangles.
CDO is a right-angled triangle.
AFO is a sector of a circle with centre *O* and angle *AOF* = 90°

Jason is going to cover his garden with grass seed.
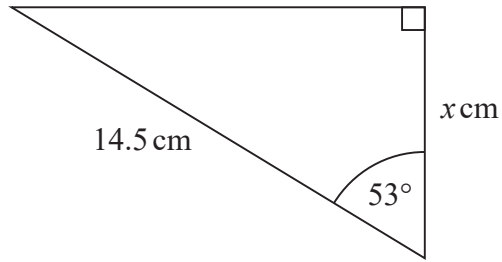Each bag of grass seed covers 14 m² of garden.
Each bag of grass seed costs £10.95

Work out how much it will cost Jason to buy all the bags of grass seed he needs.

£...

(Total for Question 4 is 5 marks)

5

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

x = ...

(Total for Question 5 is 2 marks)

6 Ella invests £7000 for 2 years in an account paying compound interest.

In the first year, the rate of interest is 3%
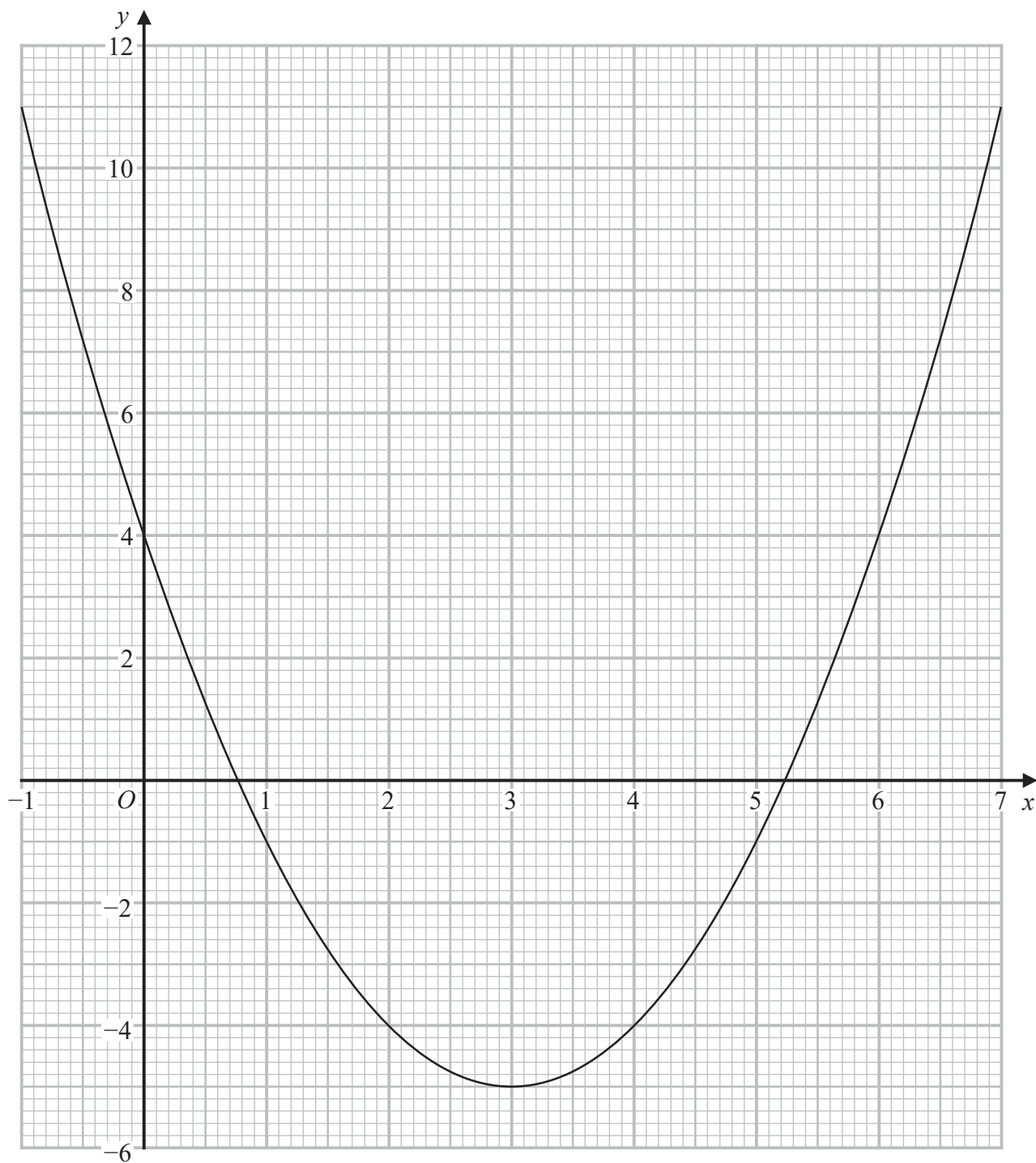In the second year, the rate of interest is 1.5%

Work out the value of Ella's investment at the end of 2 years.

£...

(Total for Question 6 is 3 marks)

Turn over ▶

7 Here is the graph of $y = x^2 - 6x + 4$

(a) Write down the y intercept of the graph of $y = x^2 - 6x + 4$

....

(1)

(b) Write down the coordinates of the turning point of the graph of $y = x^2 - 6x + 4$

(........................ , ...)

(1)

(c) Use the graph to find estimates for the roots of $x^2 - 6x + 4 = 0$

....

(2)

(Total for Question 7 is 4 marks)

8   Chanda buys a necklace for £120
       She sells the necklace for £135

       Work out her percentage profit.

       ....%

       (Total for Question 8 is 3 marks)

9   Here are the equations of two straight lines.

$$y = \frac{1}{2}x - 6 \qquad 6y = 3x + 7$$

       Oscar says that these lines are parallel.

       Is Oscar correct?
       You must give a reason for your answer.

       ....

       ....

       ....

       (Total for Question 9 is 2 marks)

10 *A* and *B* are points on a centimetre grid.
 A is the point with coordinates (−7, 6)
 B is the point with coordinates (8, −5)

 Work out the length of *AB*.
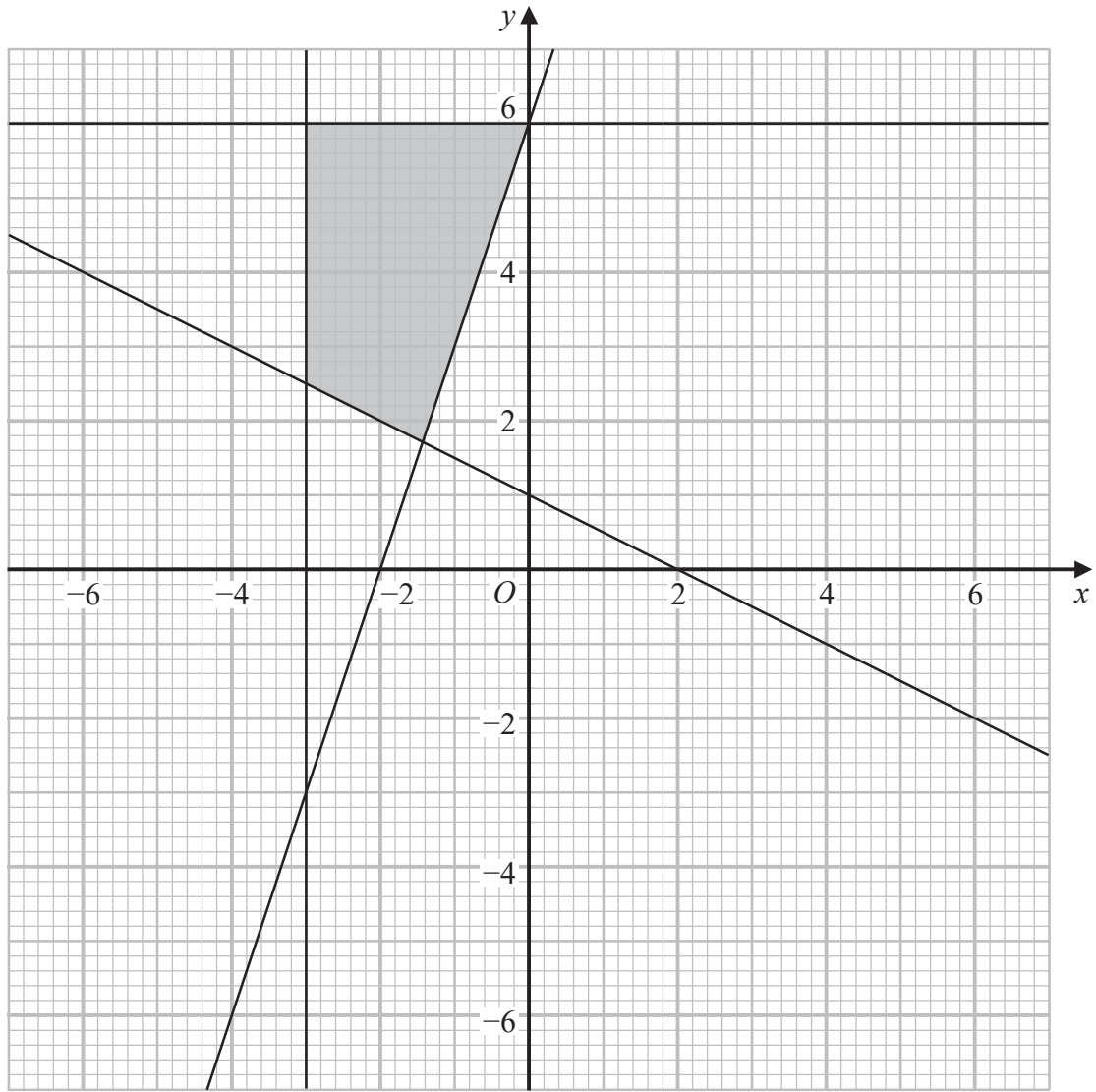 Give your answer correct to 1 decimal place.

.... cm

(Total for Question 10 is 2 marks)

11 Using algebra, prove that $1.06\dot{2}$ can be written as $1\dfrac{14}{225}$

(Total for Question 11 is 3 marks)

Turn over ▶

12 The shaded region shown on the grid is bounded by four straight lines.

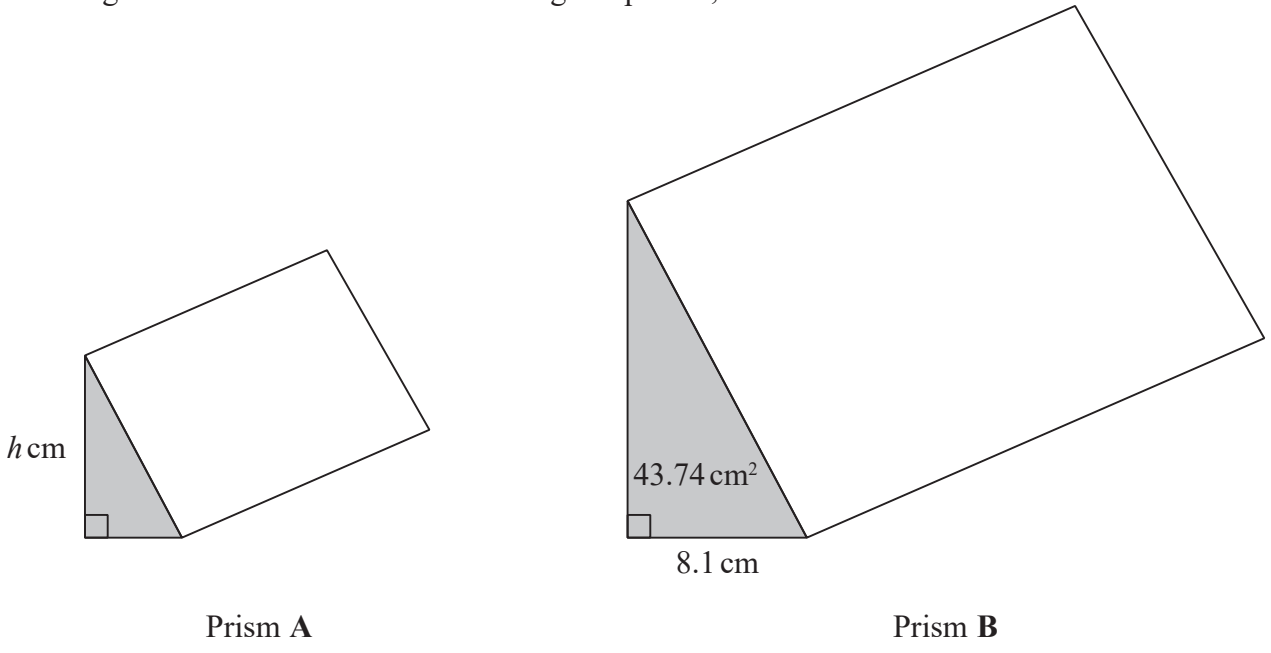Find the four inequalities that define the shaded region.

....

....

....

....

(Total for Question 12 is 4 marks)

13 The diagram shows two similar solid triangular prisms, **A** and **B**.

h cm

43.74 cm²

8.1 cm

Prism **A**   Prism **B**

The volume of prism **A** is 58.806 cm³
The volume of prism **B** is 1587.762 cm³

The cross section of each prism is a right-angled triangle.

For prism **B**
the length of the base of the triangle is 8.1 cm
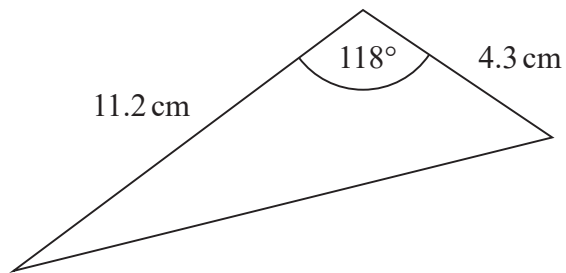the area of the triangle is 43.74 cm²

The height of the triangle for prism **A** is h cm.

Work out the value of h.

$h = $ ....

(Total for Question 13 is 4 marks)

14 Here is a triangle.

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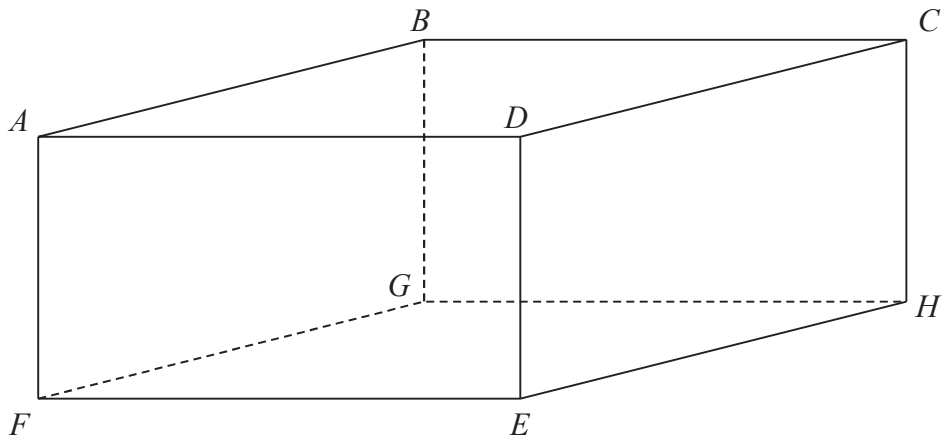Give your answer correct to 3 significant figures.

.... cm^2

(Total for Question 14 is 2 marks)

15 Solve $6x^2 + 5x - 6 = 0$

....

(Total for Question 15 is 3 marks)

16 *ABCDEFGH* is a cuboid.

AD = 9 cm
FD = 13 cm
Angle *GHF* = 49°

Work out the size of angle *FAH*.
Give your answer correct to the nearest degree.

....°

(Total for Question 16 is 4 marks)

17 The graph below gives the volume, in litres, of water in a container t seconds after the water starts to fill the container.
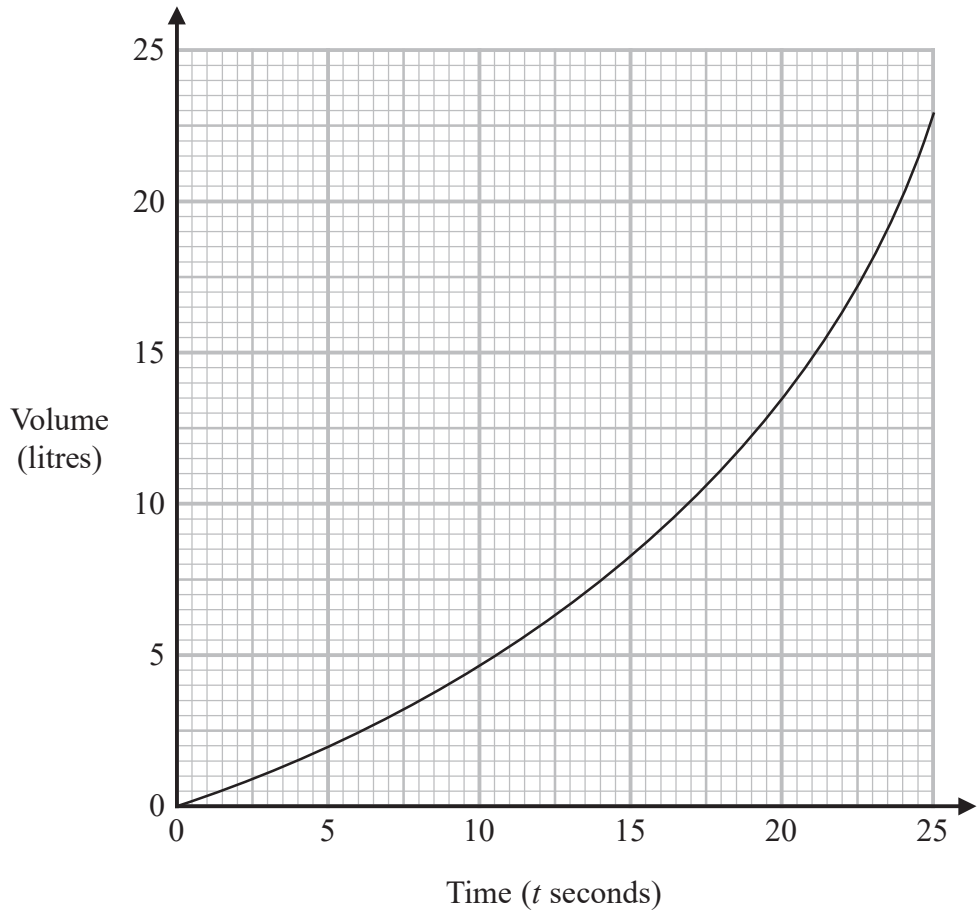
(a) Calculate an estimate for the gradient of the graph when $t = 17.5$
You must show how you get your answer.

....

(3)

(b) Describe fully what the gradient in part (a) represents.

....

....

....

(1)

(Total for Question 17 is 4 marks)

18 A race is measured to have a distance of 10.6 km, correct to the nearest 0.1 km.
Sam runs the race in a time of 31 minutes 48 seconds, correct to the nearest second.

Sam's average speed in this race is V km/hour.

By considering bounds, calculate the value of V to a suitable degree of accuracy.
You must show all your working and give a reason for your answer.

(Total for Question 18 is 5 marks)