



Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

GCSE MATHEMATICS

H

Higher Tier Paper 2 Calculator

8300/2H

Monday 6 November 2017

Morning

Time allowed: 1 hour 30 minutes

For this paper you must have:

- a calculator
- mathematical instruments.



At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]



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INSTRUCTIONS

- **Use black ink or black ball-point pen. Draw diagrams in pencil.**
- **Answer ALL questions.**
- **You must answer the questions in the spaces provided. Do not write on blank pages.**
- **Do all rough work in this book. Cross through any work you do not want to be marked.**

INFORMATION

- **The marks for questions are shown in brackets.**
- **The maximum mark for this paper is 80.**
- **You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.**

ADVICE

- **In all calculations, show clearly how you work out your answer.**

DO NOT TURN OVER UNTIL TOLD TO DO SO



Answer ALL questions in the spaces provided

- 1 Circle the fraction that is equivalent to 3.875
[1 mark]

$$\frac{15}{4}$$

$$\frac{29}{8}$$

$$\frac{31}{8}$$

$$\frac{15}{8}$$

- 2 What is 50 as a percentage of 20?

Circle your answer. [1 mark]

10%

40%

150%

250%

- 3 Circle the point that does NOT lie on the curve
 $y = x^3$ [1 mark]

$$\left(-\frac{1}{2}, -\frac{1}{8}\right)$$

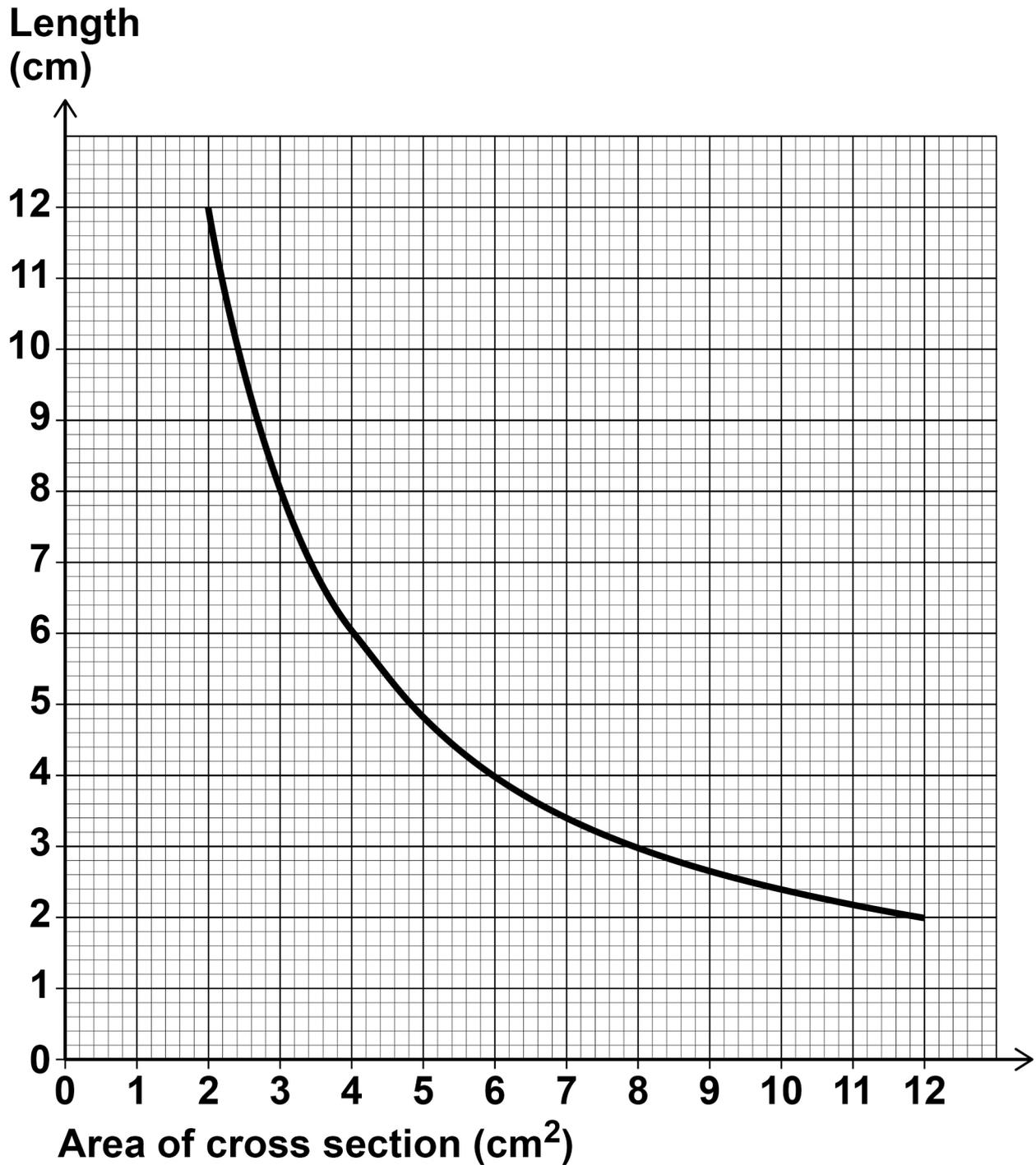
$$(5, 125)$$

$$\left(\frac{1}{3}, \frac{1}{9}\right)$$

$$(-1, -1)$$



- 6 The graph shows information about prisms with the same volume.



**6 (a) Give ONE example to show the volume is 24 cm^3
[1 mark]**

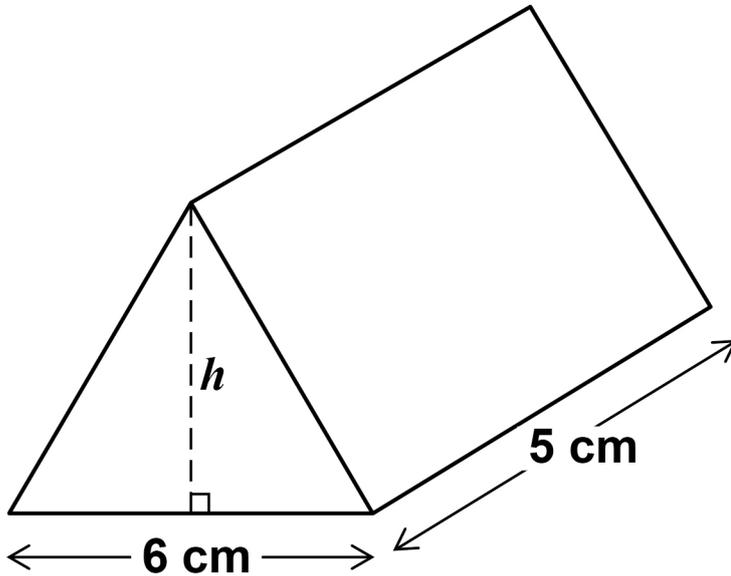
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- 6 (b) The diagram shows a prism with volume 24 cm^3
The height of the triangular cross section is h .



Work out the height, h . [3 marks]

Answer _____ cm

| |
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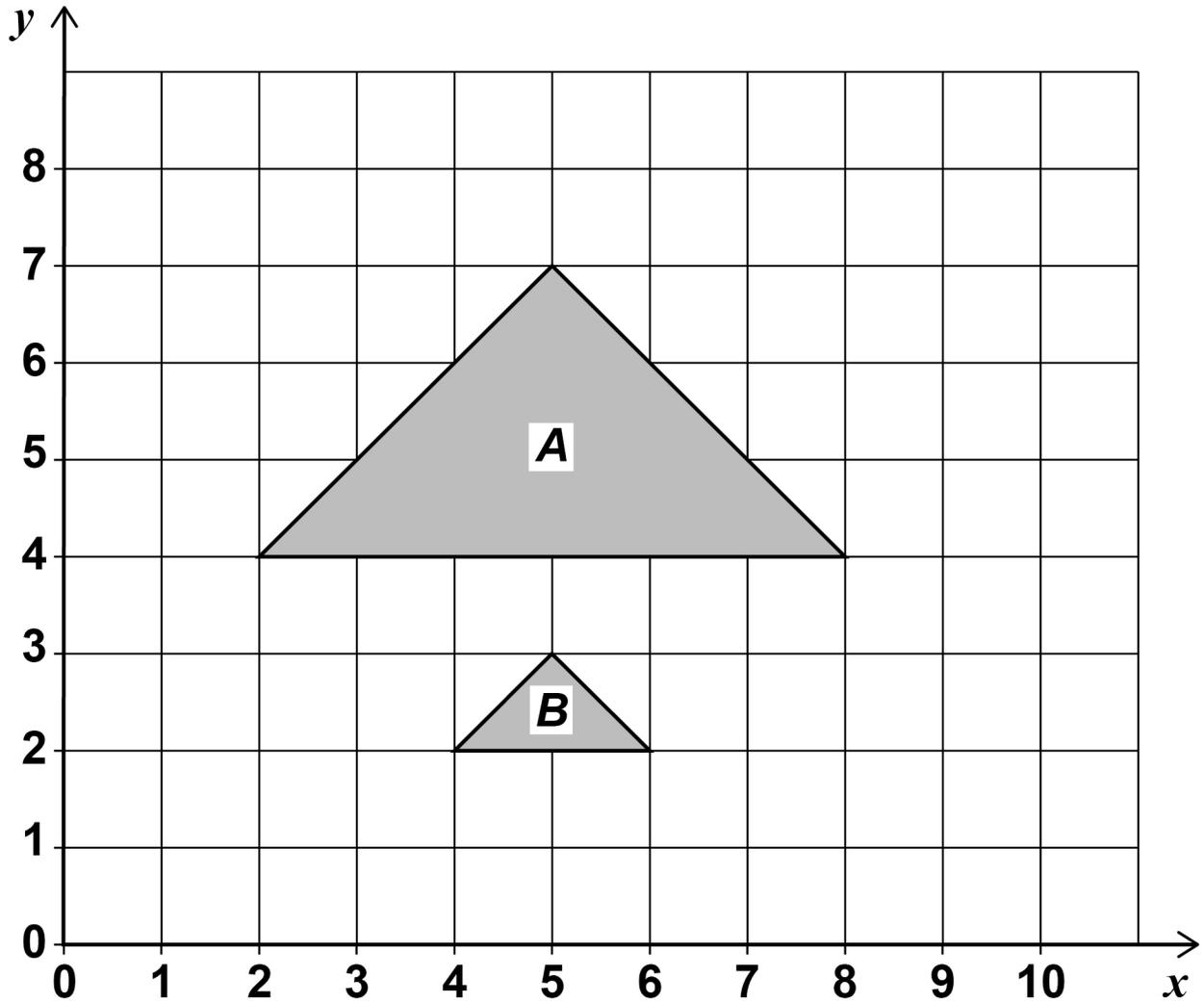
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- 7 Describe fully the **SINGLE** transformation that maps triangle *A* to triangle *B*. [3 marks]



[Turn over]



- 8 The table shows information about the distances walked by 120 students on their way to school one week.

| Distance, x (miles) | Frequency | | |
|---|--------------------|--|--|
| $0 < x \leq 5$ | 20 | | |
| $5 < x \leq 10$ | 48 | | |
| $10 < x \leq 15$ | 30 | | |
| $15 < x \leq 20$ | 22 | | |
| | Total = 120 | | |



Work out an estimate for the mean distance. [3 marks]

Answer _____ **miles**

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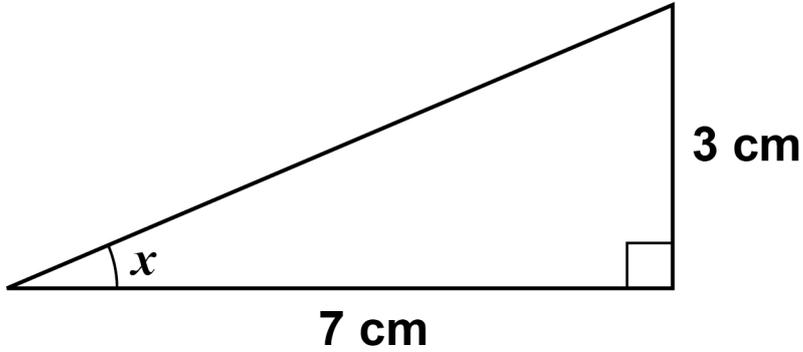
13

[Turn over]



9 Work out the size of angle x . [2 marks]

The diagram is not drawn accurately.



Answer _____ degrees



- 10 Work out the next term of this quadratic sequence.
[2 marks]

5 8 14 23 _____

Answer _____

- 11 Circle the expression that is equivalent to

$$\frac{3x^2}{6x^2 + 3} \quad [1 \text{ mark}]$$

$$\frac{x^2}{2x^2 + 3}$$

$$\frac{x^2}{6x^2 + 1}$$

$$\frac{x^2}{2x^2 + 1}$$

$$\frac{1}{2} + x^2$$

| |
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| 5 |
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[Turn over]



- 12 The table shows information about the UK and Germany.

| | Population | Area (square miles) |
|---------|------------|------------------------|
| UK | 64 000 000 | 95 000 |
| Germany | 82 000 000 | 140 000 |

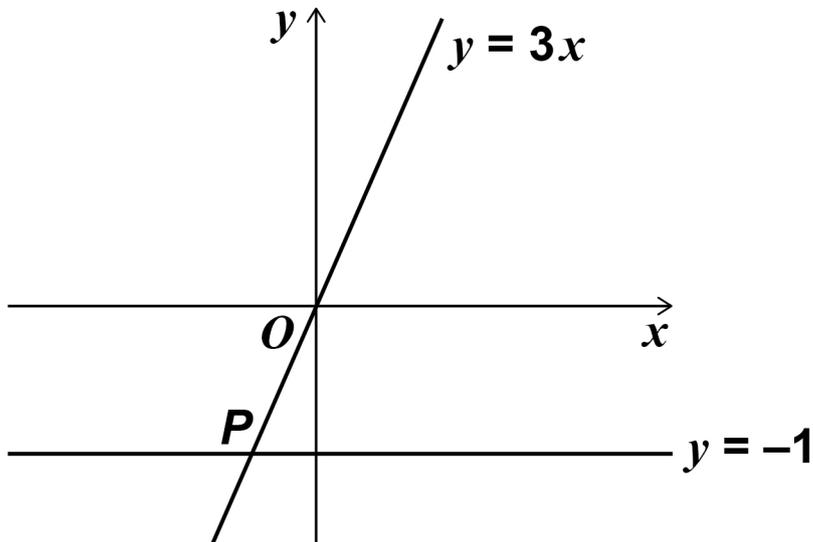
$$\text{Population density} = \frac{\text{population}}{\text{area}}$$

Compare the population densities of the UK and Germany. [3 marks]



13 Two straight lines intersect at point P .

The diagram is not drawn accurately.



Circle the coordinates of P . [1 mark]

$(-3, -1)$ $\left(-1, -\frac{1}{3}\right)$

$(-1, -3)$ $\left(-\frac{1}{3}, -1\right)$

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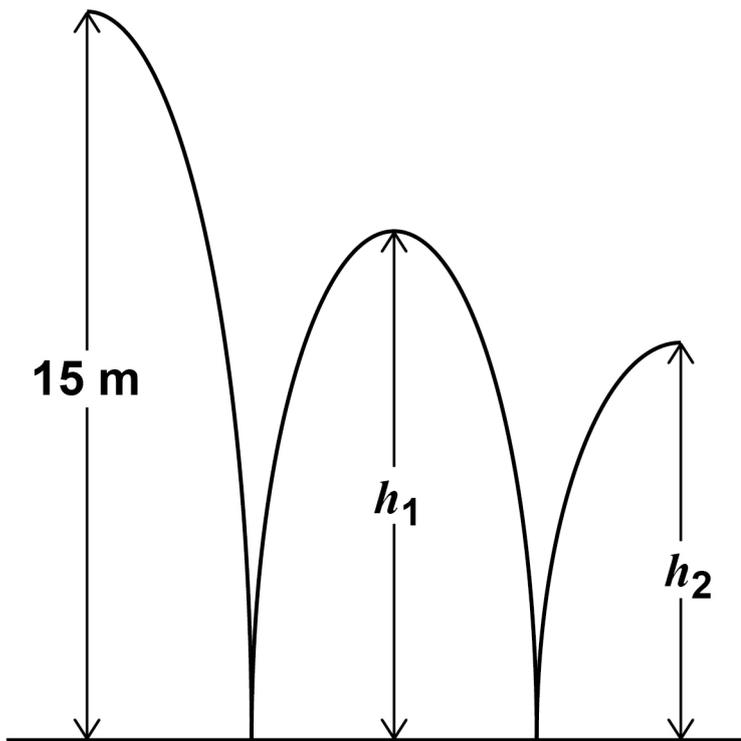
[Turn over]



14 A ball is thrown from a height of 15 metres.

It bounces to height h_1 , then to height h_2 as shown.

The diagram is not drawn accurately.



h_1 is three quarters of the original height.



14 (a) Jack expects h_2 to be three quarters of h_1

Work out the value of h_2 that he expects.

[2 marks]

Answer _____ metres

[Turn over]



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14 (b) In fact, h_2 is two thirds of h_1

How does this affect the answer to part (a)?

Tick a box.

The ball bounced higher than he expected

The ball bounced lower than he expected

Show working to support your answer. [2 marks]

| |
|---|
| |
| 4 |

[Turn over]



Answer _____ **years**

[Turn over]



16 (a) Factorise fully $9y^3 - 6y$ [2 marks]

Answer _____

16 (b) Factorise $3x^2 - 22x + 7$ [2 marks]

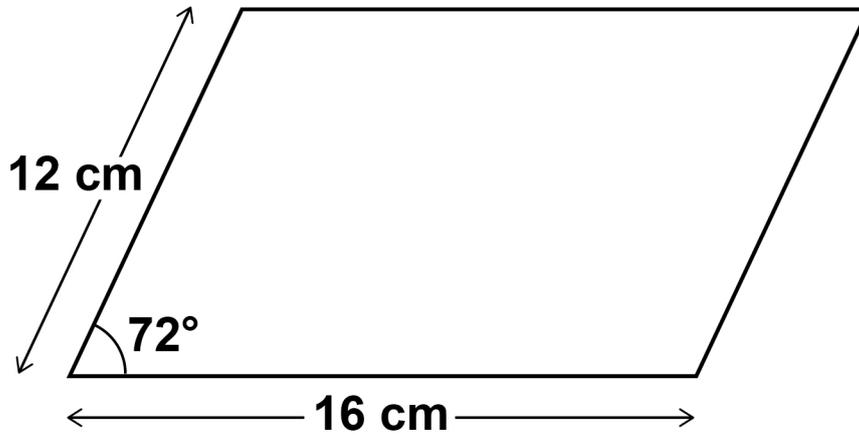
Answer _____

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17 Work out the area of the parallelogram. [3 marks]

It is not drawn accurately.

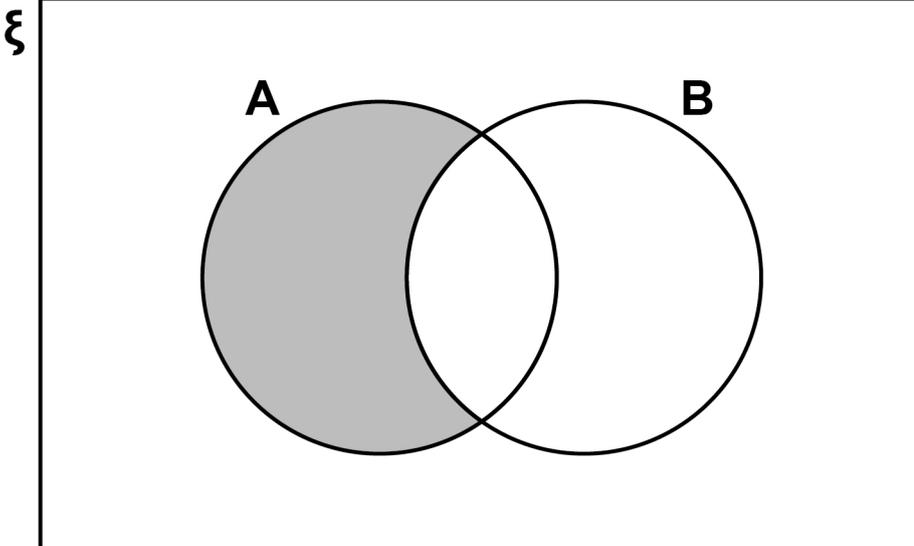


Answer _____ cm^2

[Turn over]



18 (a)



Which of these represents the shaded region?

Circle your answer. [1 mark]

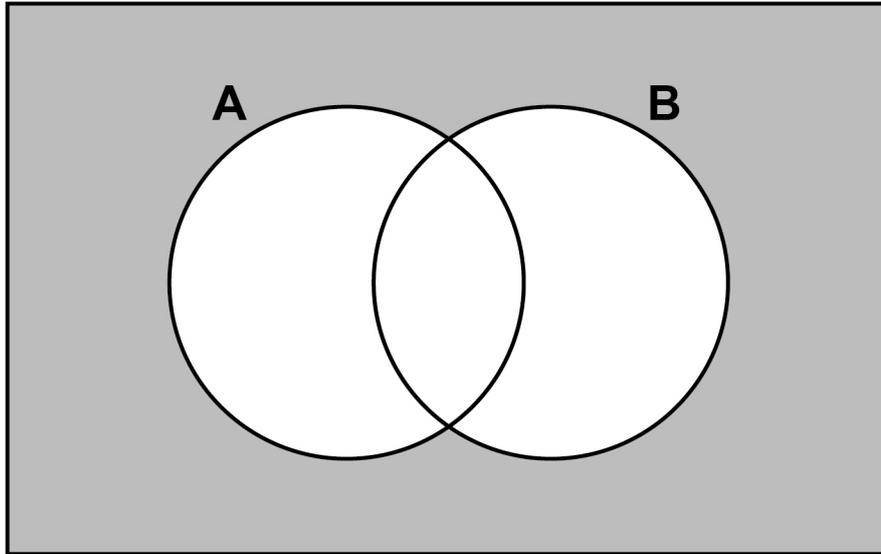
A

B'

$A \cap B'$

$A \cup B'$



18 (b) ξ 

Which of these represents the shaded region?

Circle your answer. [1 mark]

$(A \cup B)'$

$(A \cap B)'$

$A' \cap B$

$A' \cup B'$

| |
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[Turn over]



20 A stone is thrown upwards with a speed of v metres per second.

The stone reaches a maximum height of h metres.

h is directly proportional to v^2

When $v = 10$, $h = 5$

Work out the maximum height reached when $v = 24$ [4 marks]

Answer _____ m

| |
|---|
| 7 |
|---|

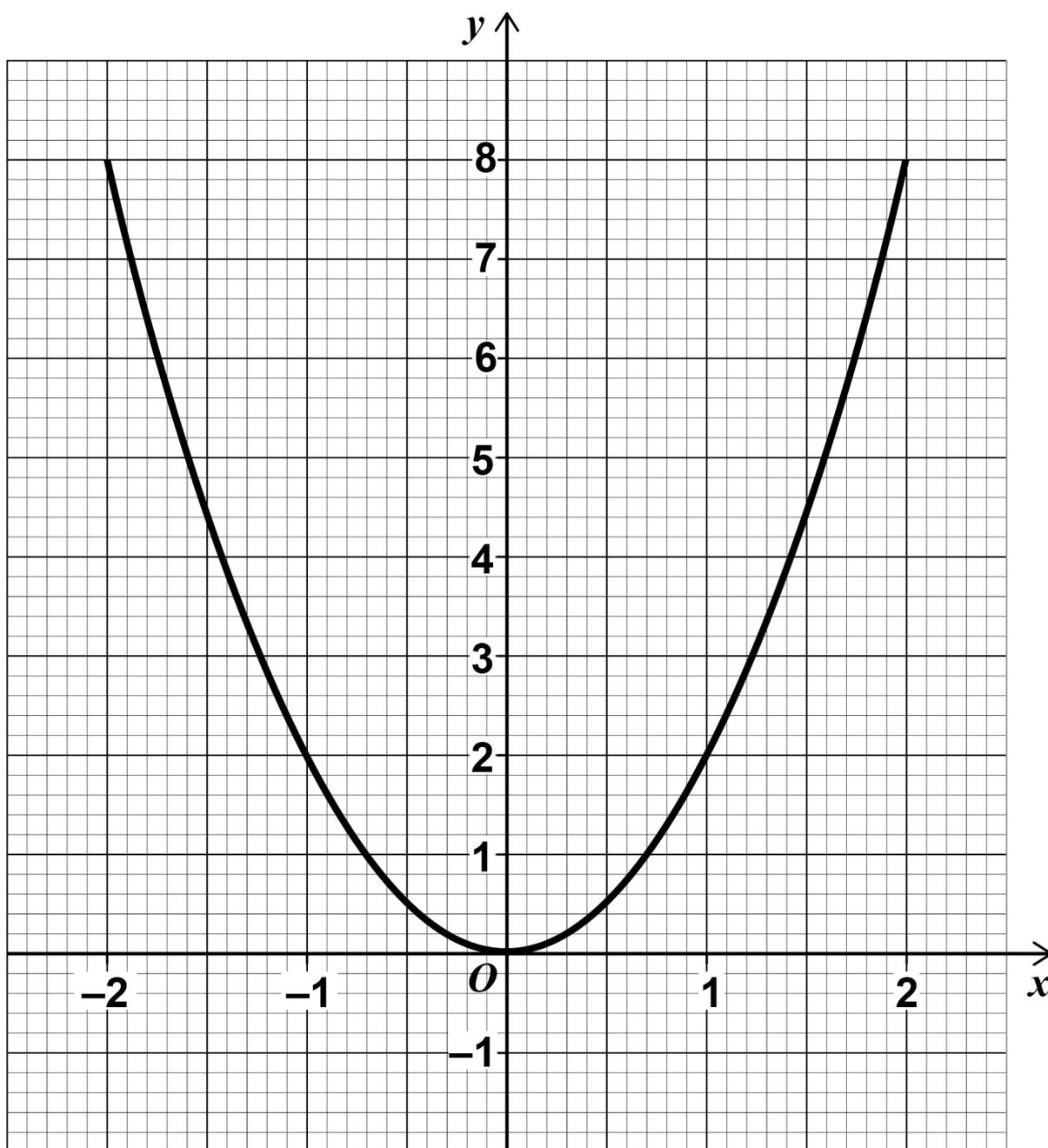
[Turn over]



21 (a) Meera is using a GRAPHICAL method to solve $2x^2 - 3x = 0$

She draws the graph of $y = 2x^2$ and a straight line graph on the same grid.

Here is the graph of $y = 2x^2$



Complete her method to solve $2x^2 - 3x = 0$
[2 marks]

Answer _____

[Turn over]



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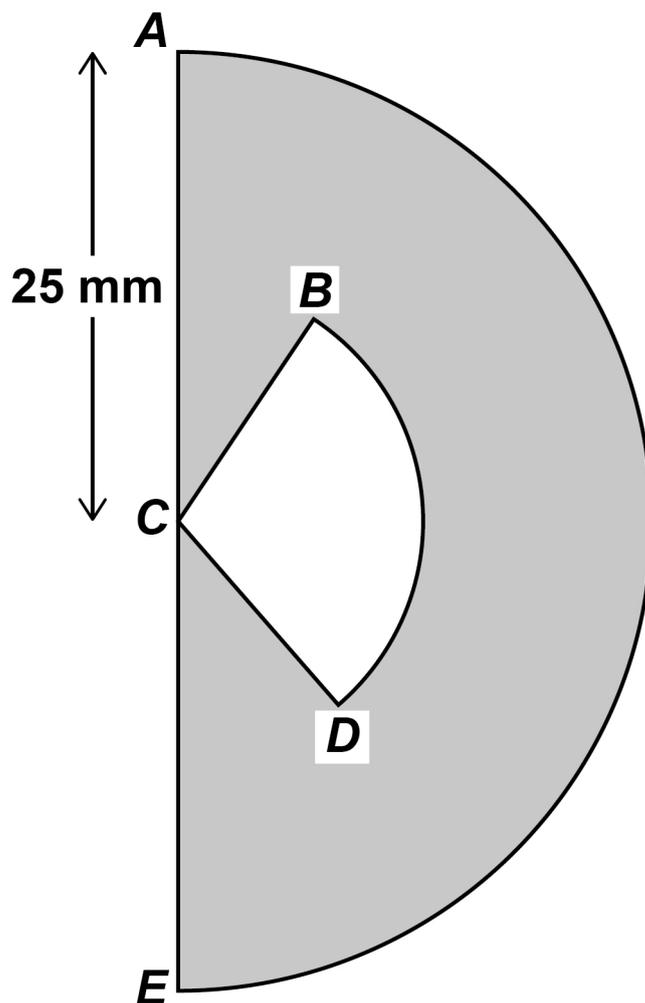


- 22 The cross section of an earring is a semicircle, centre C , radius 25 mm

The earring is black and white.

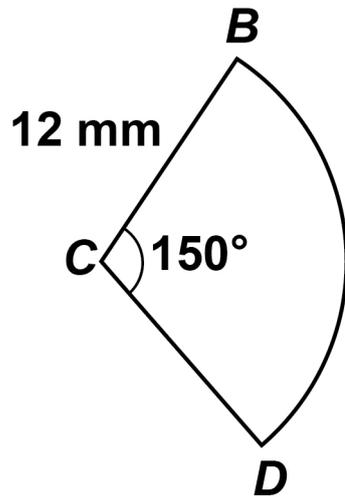
The shaded area is black.

It is not drawn accurately.



Sector BCD is white and has radius 12 mm

It is not drawn accurately.



[Turn over]



Answer _____

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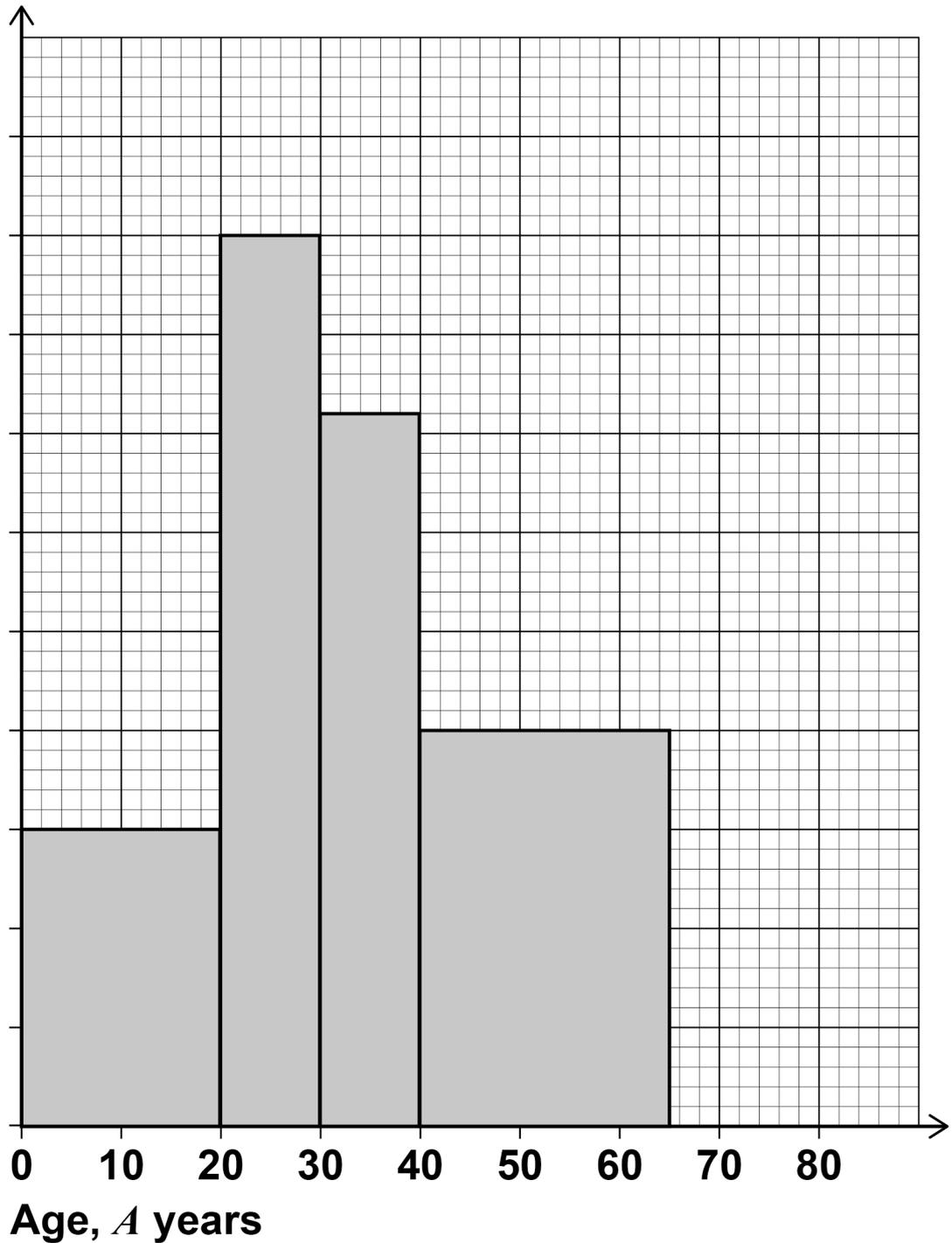
[Turn over]



23 Here is some information about a tennis club.

Members of a tennis club

Frequency
density



There are 30 members with $A < 20$

There are 12 members with $65 \leq A < 80$

There are no members with $A \geq 80$

23 (a) Complete the histogram. [3 marks]

[Turn over]



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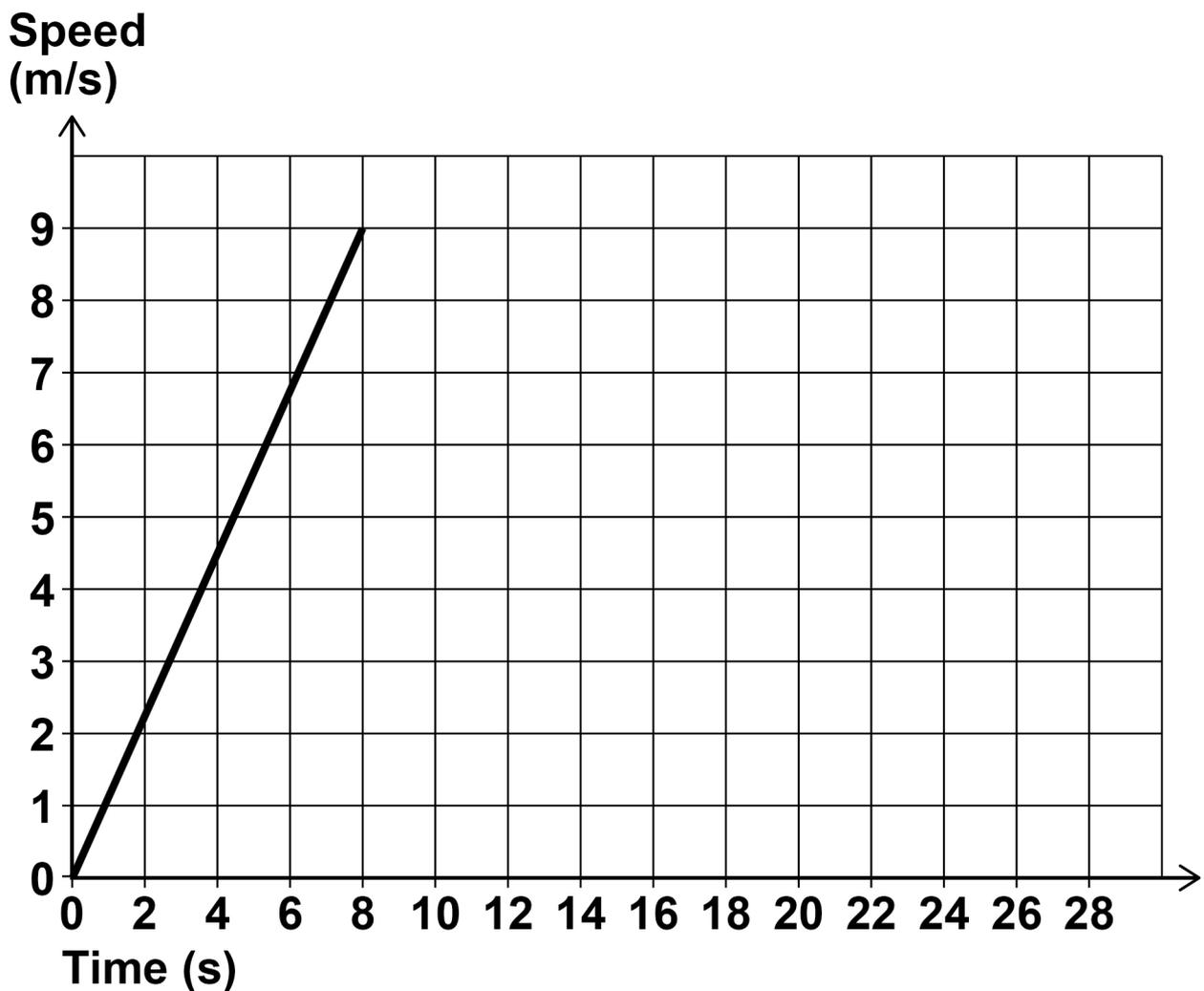


24 Beth ran a 200 metre race.

Here is a graph of the first 8 seconds of her race.

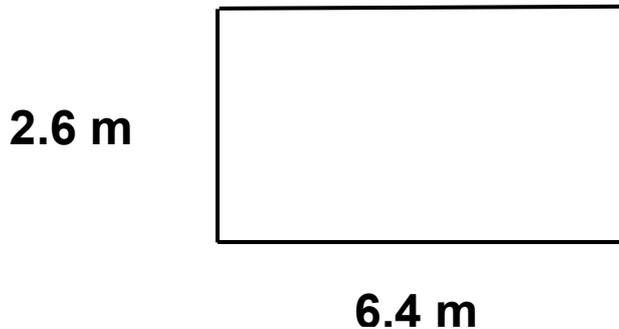
She completed the race at a constant speed of 9 m/s

Speed-time graph for Beth



- 25 The dimensions of a rectangular floor are to the nearest 0.1 metres.

It is not drawn accurately.



A force of 345 Newtons is applied to the floor.

The force is to the nearest 5 Newtons.

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

Work out the upper bound of the pressure.

Give your answer to 4 significant figures.

You MUST show your working. [5 marks]



Answer _____

N/m²

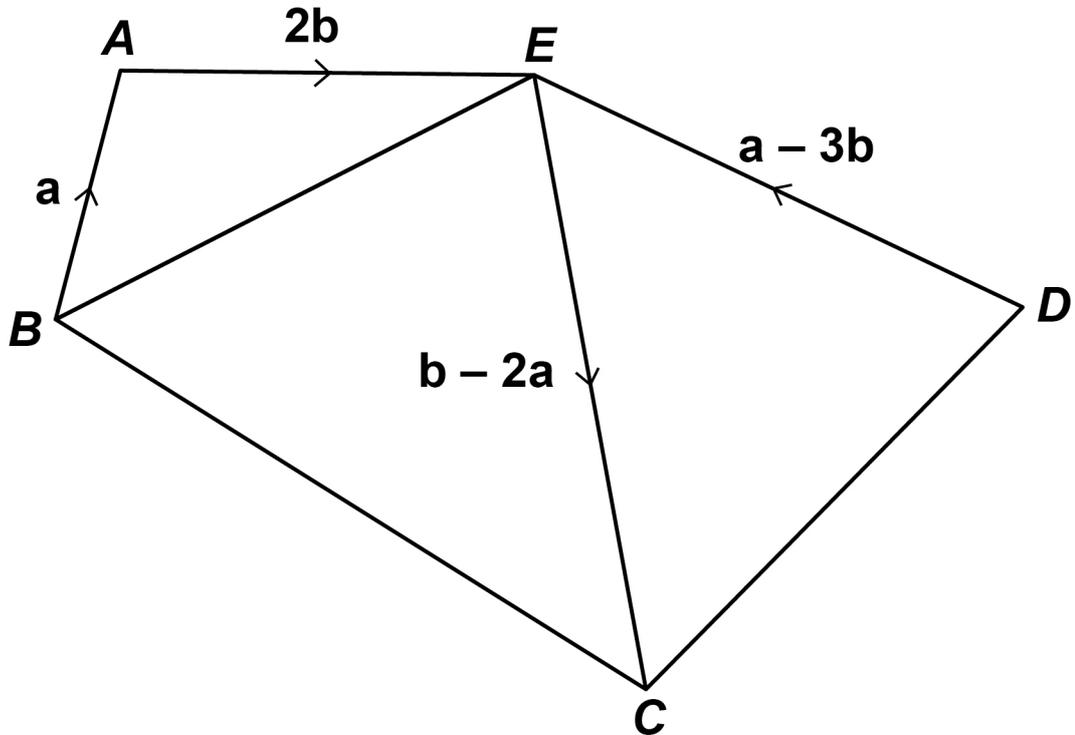
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[Turn over]



26 *ABCDE* is a pentagon.

It is not drawn accurately.



Show that $BCDE$ is a parallelogram. [3 marks]



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| For Examiner's Use | |
|--------------------|------|
| Pages | Mark |
| 4-5 | |
| 6-9 | |
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| 30-33 | |
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| 46-49 | |
| TOTAL | |

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