Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

GCSE MATHEMATICS

H

Higher Tier Paper 2 Calculator

Monday 6 November 2017 Morning Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- a calculator
- mathematical instruments.

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 outside the box around each page or 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.

For Examiner's Use	
Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22–23	
24–25	
26–27	
28–29	
TOTAL	

Do not write outside the box

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)

Do not write outside the box

4 Which **one** of these is a unit of density?

Circle your answer.

[1 mark]

kg/m^2 m^2/kg kg/m^3 m^3/kg

5 Solve $4(3x - 2) = 2x - 5$

[3 marks]

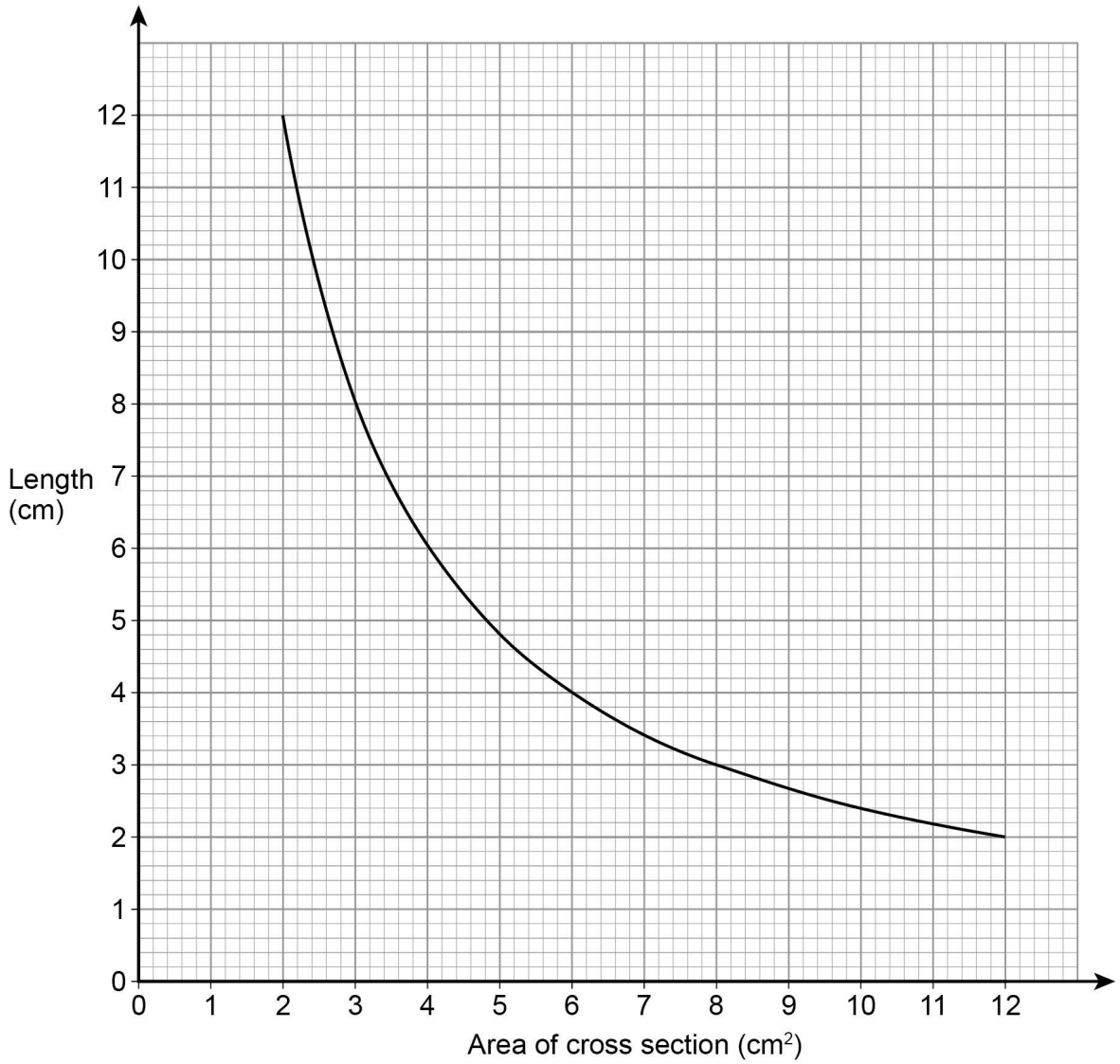
$x =$ _____

Turn over for the next question

7

Do not write outside the box

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



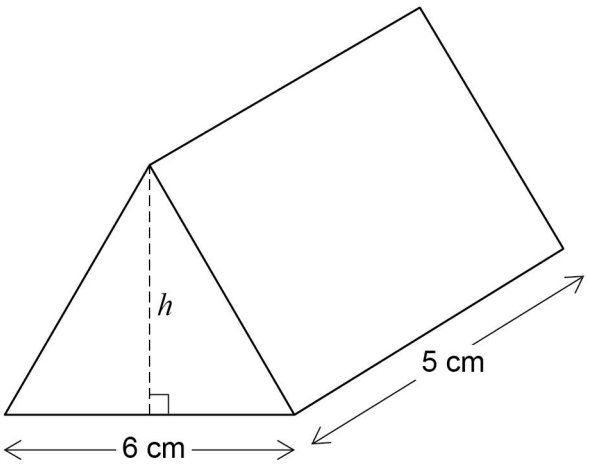
6 (a) Give **one** example to show the volume is 24 cm^3

[1 mark]

Do not write outside the box

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]

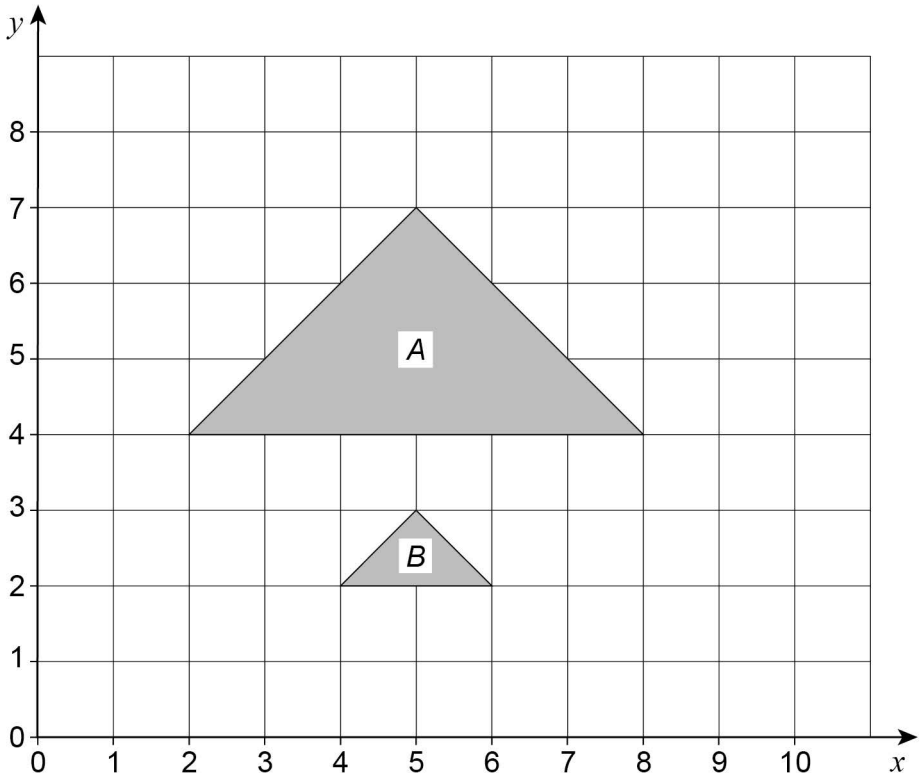
Answer _____ cm

Turn over for the next question

4

Do not write outside the box

7 Describe fully the **single** transformation that maps triangle *A* to triangle *B*.



[3 marks]

Do not write outside the box

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

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

Work out an estimate for the mean distance.

[3 marks]

Answer _____ miles

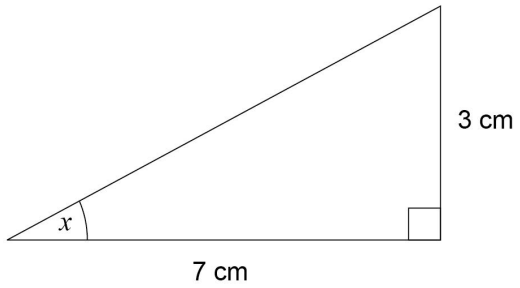
Turn over for the next question

6

Do not write outside the box

9 Work out the size of angle x.

Not drawn accurately



[2 marks]

Answer _____ degrees

Do not write outside the box

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 $\dfrac{3x^2}{6x^2+3}$

[1 mark]

$\dfrac{x^2}{2x^2+3}$ $\dfrac{x^2}{6x^2+1}$ $\dfrac{x^2}{2x^2+1}$ $\dfrac{1}{2} + x^2$

Turn over for the next question

5

Do not write outside the box

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

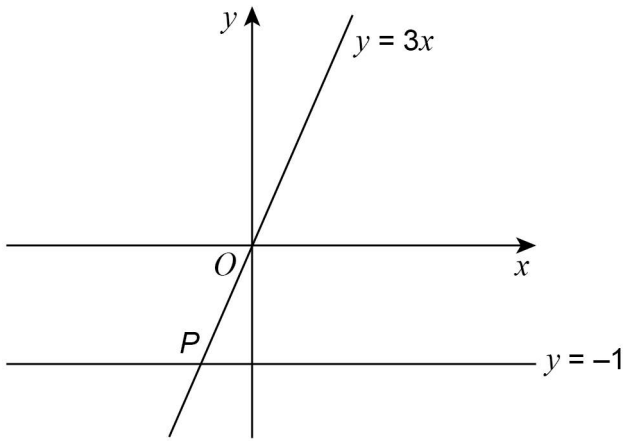
Population density = $\frac{\text{population}}{\text{area}}$

Compare the population densities of the UK and Germany.

[3 marks]

Do not write outside the box

13 Two straight lines intersect at point *P*.



Not drawn accurately

Circle the coordinates of *P*.

[1 mark]

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

Turn over for the next question

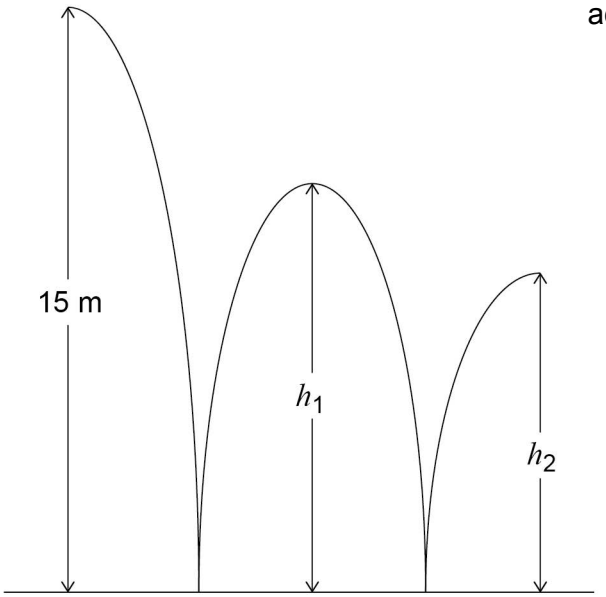
4

Do not write outside the box

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

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

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

Do not write outside the box

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]

Turn over for the next question

4

Do not write outside the box

15 Mirek invests £6000 at a compound interest rate of 1.5% per year.

He wants to earn more than £1000 interest.

Work out the **least** time, in whole years, that this will take.

[3 marks]

Answer _____ years

Do not write outside the box

16 (a) Factorise fully $9y^3 - 6y$

[2 marks]

Answer _____

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

[2 marks]

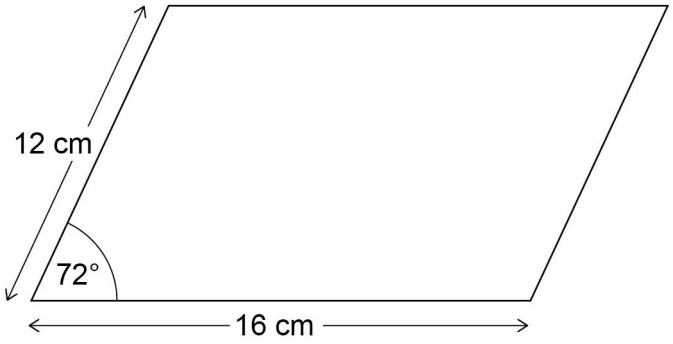
Answer _____

Turn over for the next question

7

Do not write outside the box

17 Work out the area of the parallelogram.



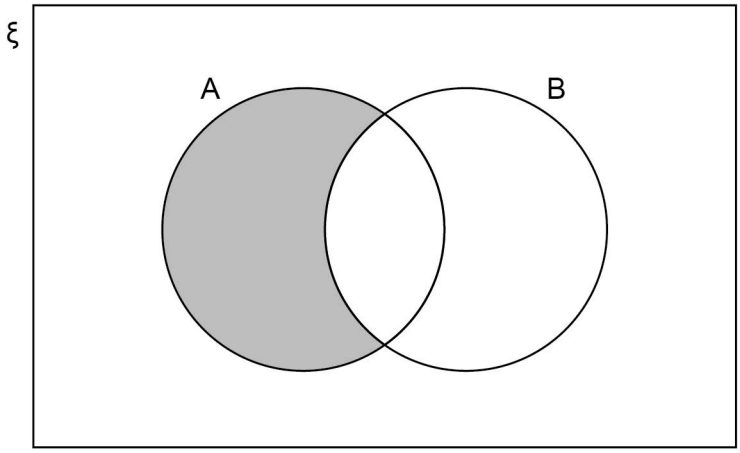
Not drawn accurately

[3 marks]

Answer _____ cm^2

Do not write outside the box

18 (a)



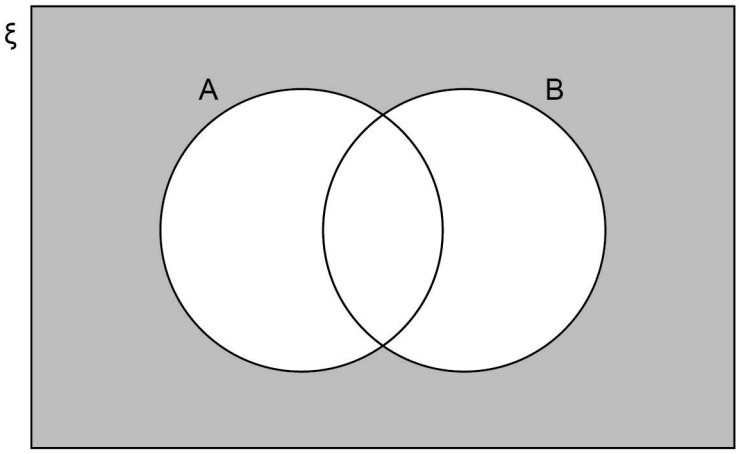
Which of these represents the shaded region?

Circle your answer.

[1 mark]

A $\quad$ B' $\quad$ $A \cap B'$ $\quad$ $A \cup B'$

18 (b)



Which of these represents the shaded region?

Circle your answer.

[1 mark]

$(A \cup B)'$ $\quad$ $(A \cap B)'$ $\quad$ $A' \cap B$ $\quad$ $A' \cup B'$

5

Turn over ►

Do not write outside the box

19 The length of a rectangle is five times the width.

The area of the rectangle is 1620 cm^2

Not drawn accurately

Work out the width of the rectangle.

[3 marks]

Answer _____ cm

Do not write outside the box

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

Turn over for the next question

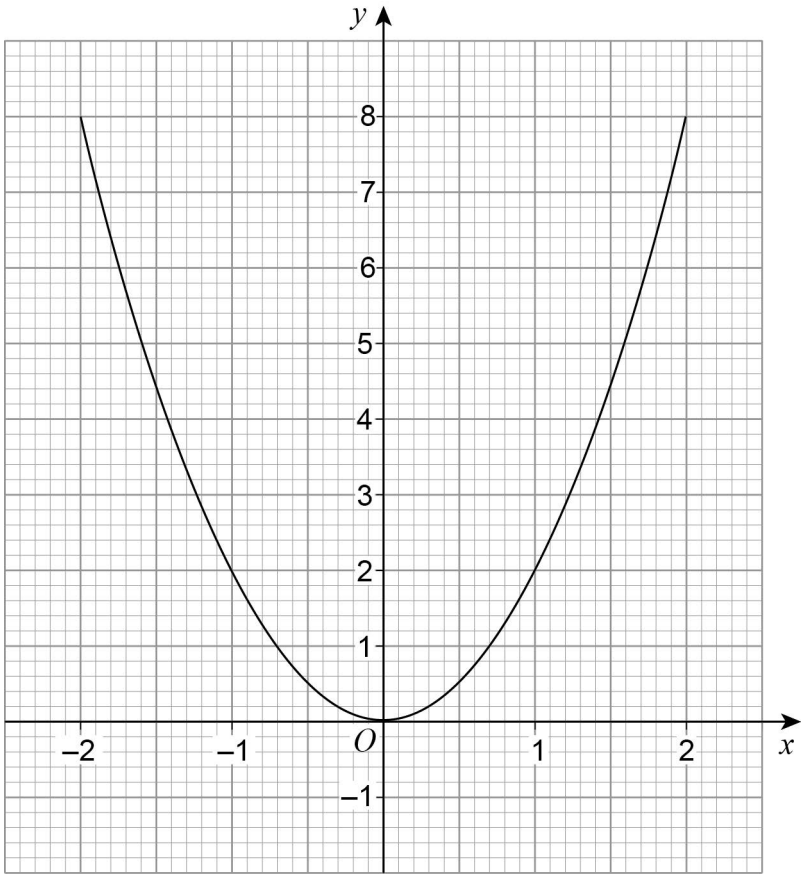
7

Do not write outside the box

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 _____

Do not write outside the box

21 (b) Levi is solving $2x^2 + 5x = 0$

He uses this method.

$2x^2 + 5x$	$= 0$	subtract $5x$ from both sides
$2x^2$	$= -5x$	divide both sides by x
$2x$	$= -5$	divide both sides by 2
x	$= -2.5$	

Evaluate his method and his answer.

[2 marks]

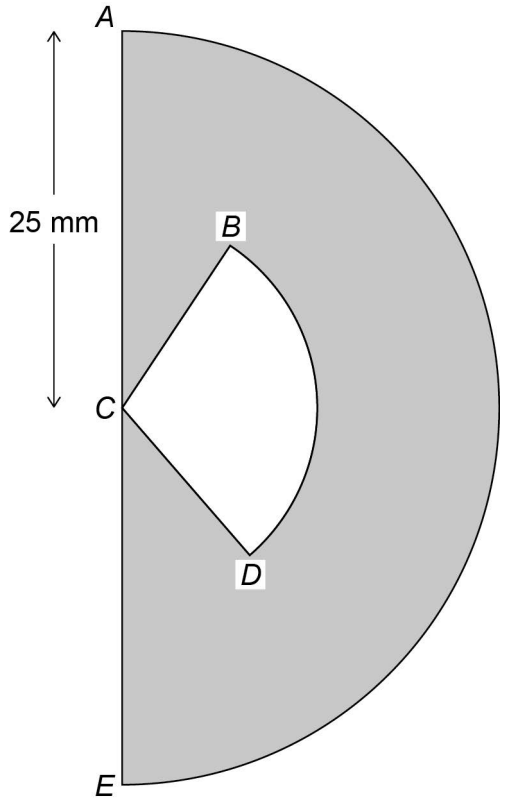
Turn over for the next question

4

Do not write outside the box

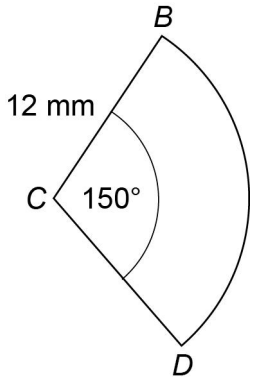
22 The cross section of an earring is a semicircle, centre *C*, radius 25 mm
The earring is black and white.

The shaded area is black.



Not drawn accurately

Sector *BCD* is white and has radius 12 mm



Not drawn accurately

Do not write outside the box

Is more than 20% of the semicircle white?

You **must** show your working.

[5 marks]

Answer _____

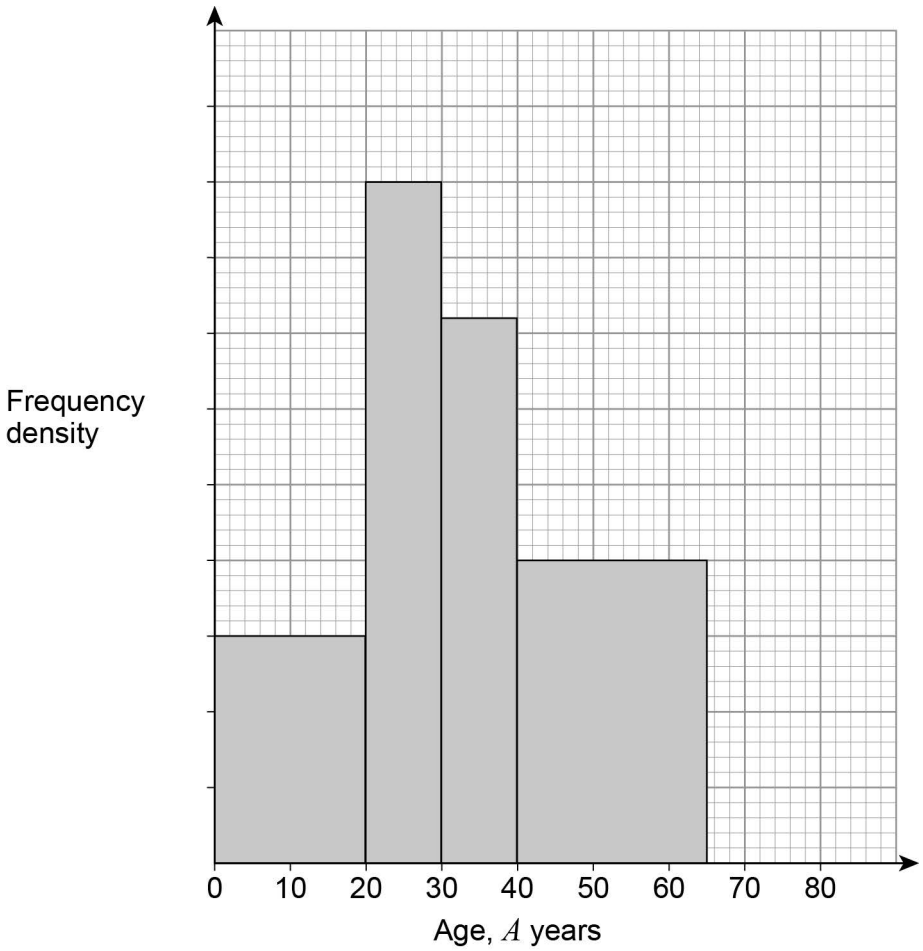
Turn over for the next question

5

Do not write outside the box

23 Here is some information about a tennis club.

Members of a tennis club



There are 30 members with $A < 20$

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

There are no members with $A \geqslant 80$

23 (a) Complete the histogram.

[3 marks]

Do not write outside the box

23 (b) Work out the total number of members of the club.

[2 marks]

Answer _____

Turn over for the next question

5

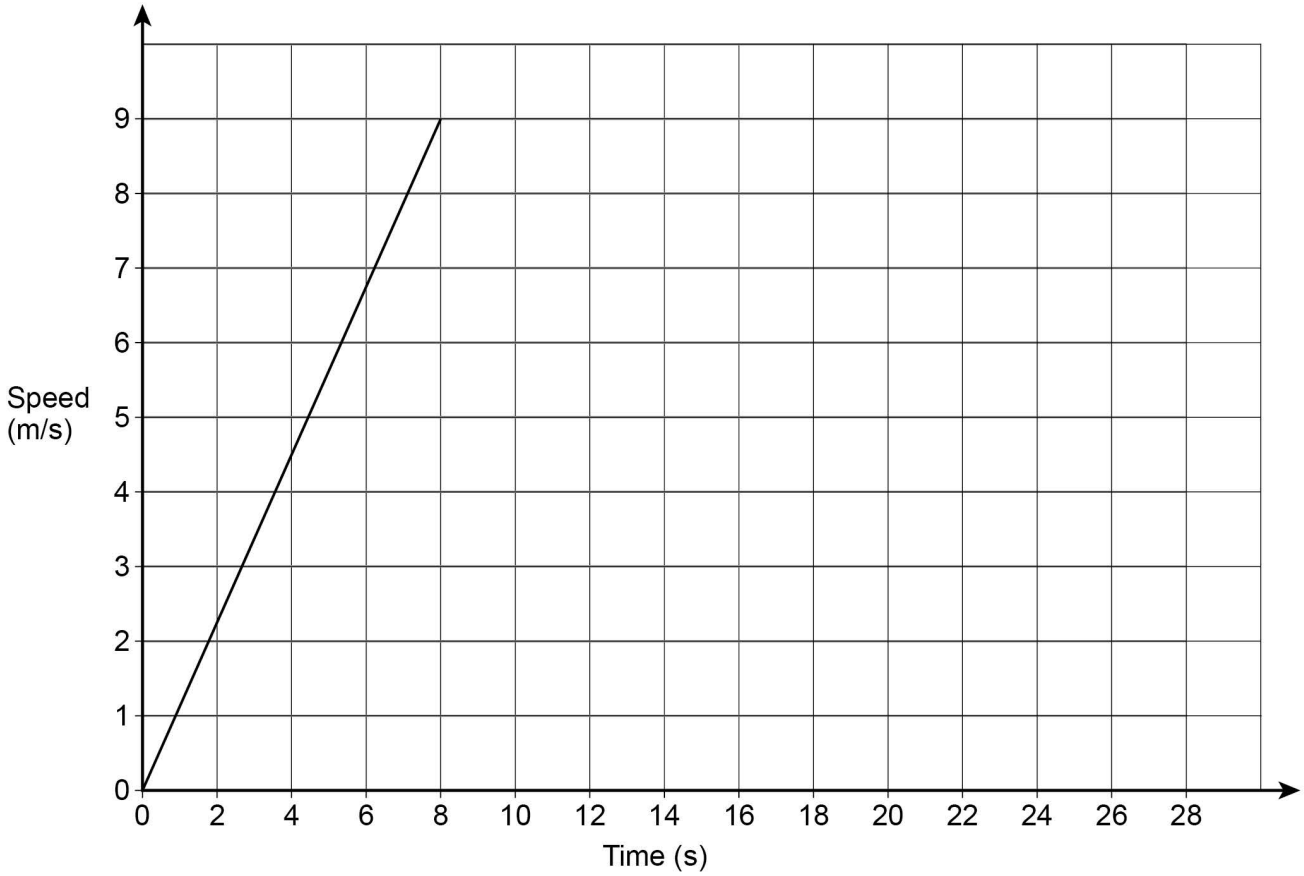
Do not write outside the box

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



Amy completed the race in 27 seconds.

Did Beth finish before Amy?

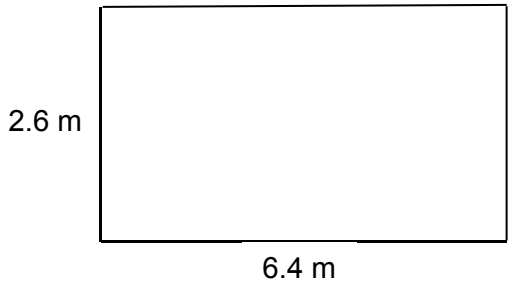
You **must** show your working.

[3 marks]

Answer _____

Do not write outside the box

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



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]

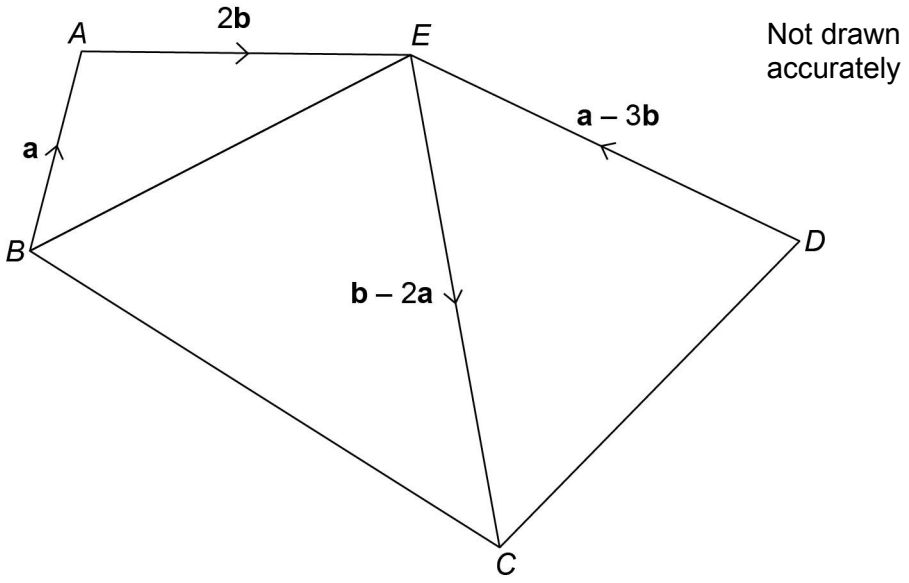
Answer _____ N/m^2

8

Turn over ►

Do not write outside the box

26 *ABCDE* is a pentagon.



Show that *BCDE* is a parallelogram.

[3 marks]

Do not write outside the box

27 Solve $\frac{x}{4} - \frac{2x}{x+2} = 1$

Give your solutions to 2 decimal places.

You **must** show your working.

[6 marks]

Answer _____

END OF QUESTIONS

9

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Copyright Information

For confidentiality purposes, from the November 2015 examination series, acknowledgements of third party copyright material will be published in a separate booklet rather than including them on the examination paper or support materials. This booklet is published after each examination series and is available for free download from www.aqa.org.uk after the live examination series.

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders may have been unsuccessful and AQA will be happy to rectify any omissions of acknowledgements. If you have any queries please contact the Copyright Team, AQA, Stag Hill House, Guildford, GU2 7XJ.

Copyright © 2017 AQA and its licensors. All rights reserved.