

Dr Oliver Mathematics
AQA GCSE Mathematics
2017 November Paper 2: Calculator
1 hour 30 minutes

The total number of marks available is 80.

You must write down all the stages in your working.

1. Circle the fraction that is equivalent to 3.875. (1)

$$\frac{15}{4} \quad \frac{29}{8} \quad \frac{31}{8} \quad \frac{15}{8}.$$

2. What is 50 as a percentage of 20? (1)

Circle your answer.

$$10\% \quad 40\% \quad 150\% \quad 250\%.$$

3. Circle the point that does not lie on the curve (1)

$$y = x^3.$$

$$\left(-\frac{1}{2}, -\frac{1}{8}\right) \quad (5, 125) \quad \left(\frac{1}{3}, \frac{1}{9}\right) \quad (-1, -1).$$

4. Which **one** of these is a unit of density? (1)

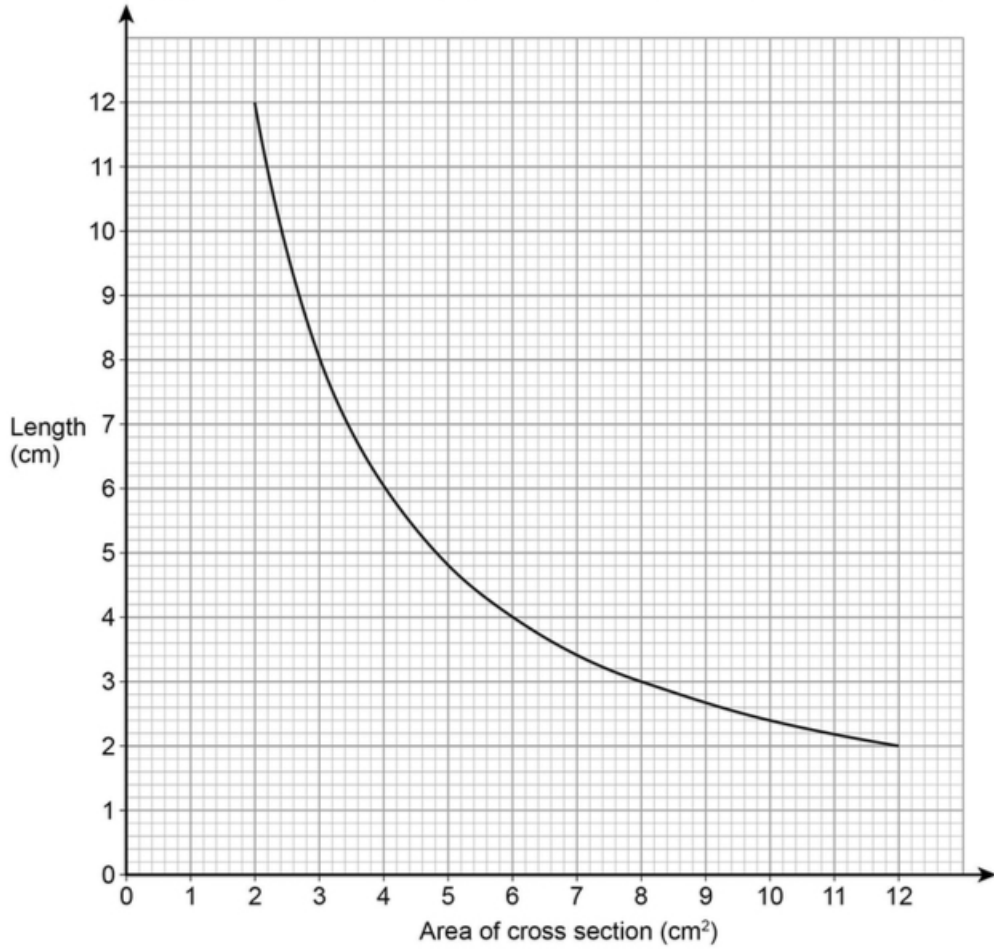
Circle your answer.

$$\text{kg/m}^2 \quad \text{m}^2/\text{kg} \quad \text{kg/m}^3 \quad \text{m}^3/\text{kg}.$$

5. Solve (3)

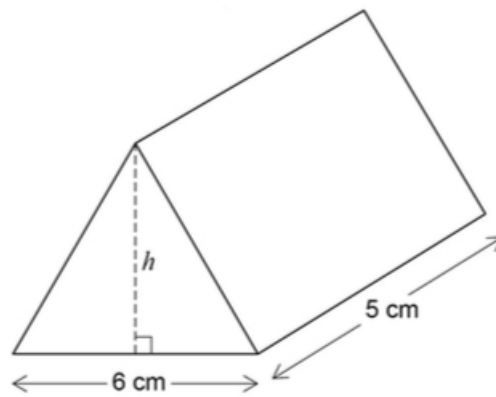
$$4(3x - 2) = 2x - 5.$$

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



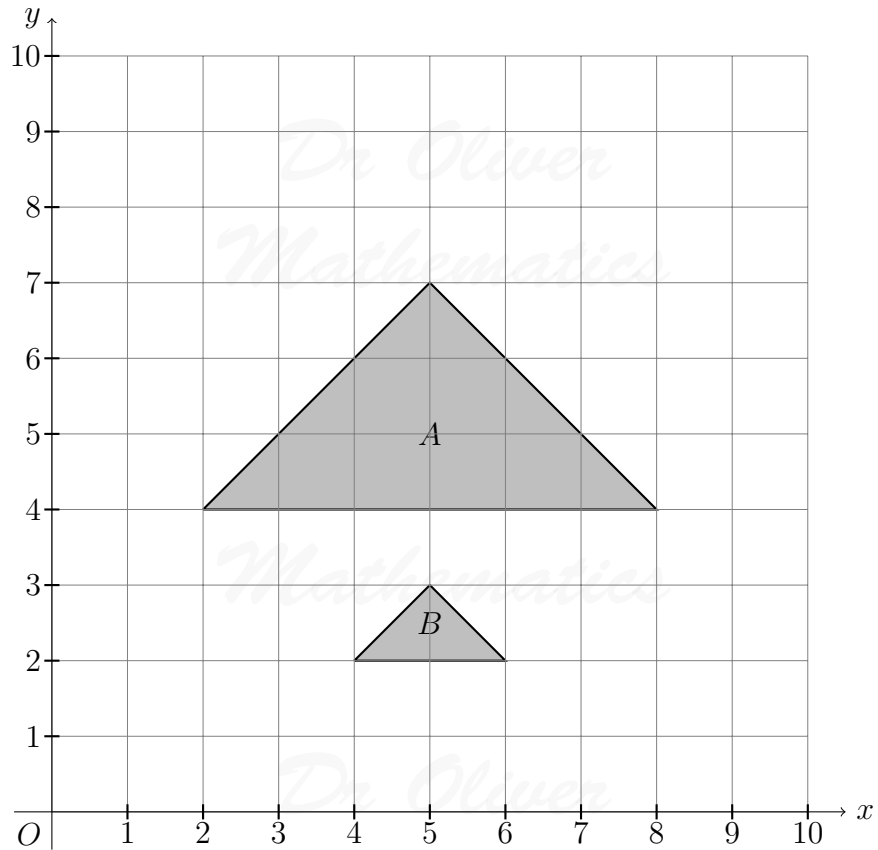
(a) Give **one** example to show the volume is 24 cm^3 . (1)

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



(b) Work out the height, h . (3)

7. Describe fully the **single** transformation that maps triangle A to triangle B . (3)

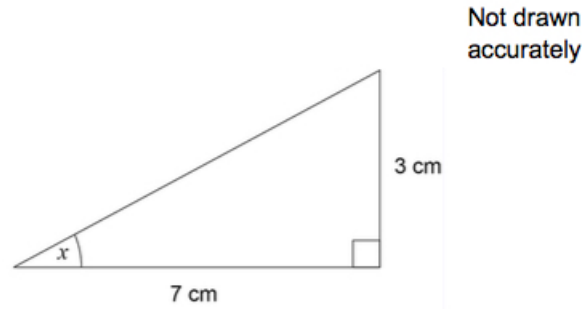


8. The table shows information about the distances walked by 120 students on their way to school one week. (3)

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.

9. Work out the size of angle x . (2)



10. Work out the next term of this quadratic sequence: (2)

5 8 14 23 ...

11. Circle the expression that is equivalent to (1)

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

$$\frac{x^2}{2x^2 + 3} \quad \frac{x^2}{6x^2 + 1} \quad \frac{x^2}{2x^2 + 1} \quad \frac{1}{2} + x^2.$$

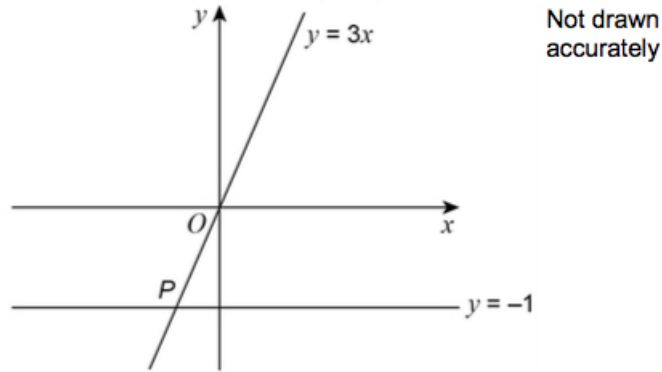
12. The table shows information about the UK and Germany. (3)

	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.

13. Two straight lines intersect at point P . (1)

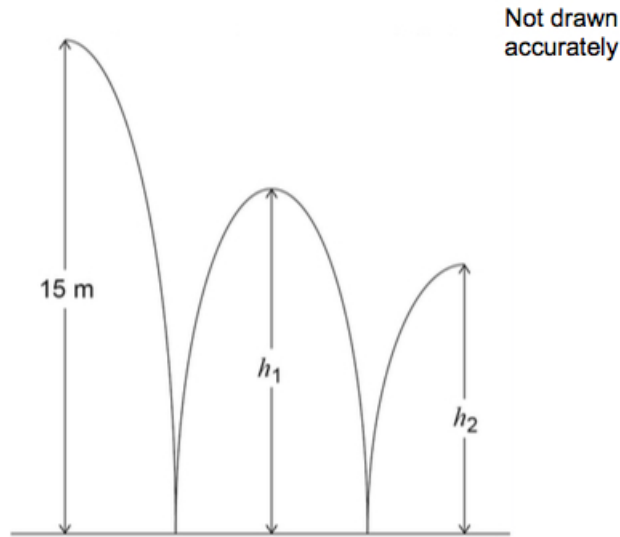


Circle the coordinates of P .

- $(-3, 1)$ $(-1, -\frac{1}{3})$ $(-1, -3)$ $(-\frac{1}{3}, -1)$.

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

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



h_1 is three quarters of the original height.

Jack expects h_2 to be three quarters of h_1 .

(a) Work out the value of h_2 that he expects.

(2)

In fact, h_2 is two thirds of h_1 .

- (b) How does this affect the answer to part (a)? (2)
Tick a box.

The ball bounced higher than he expected

The ball bounced lower than he expected

Show working to support your answer.

15. Mirek invests £6 000 at a compound interest rate of 1.5% per year. (3)
He wants to earn more than £1 000 interest.

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

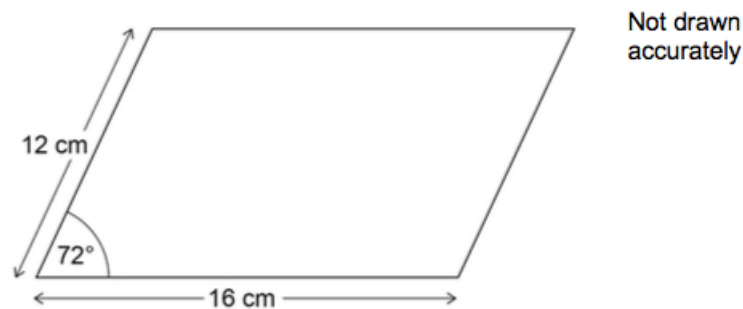
16. (a) Factorise fully (2)

$$9y^3 - 6y.$$

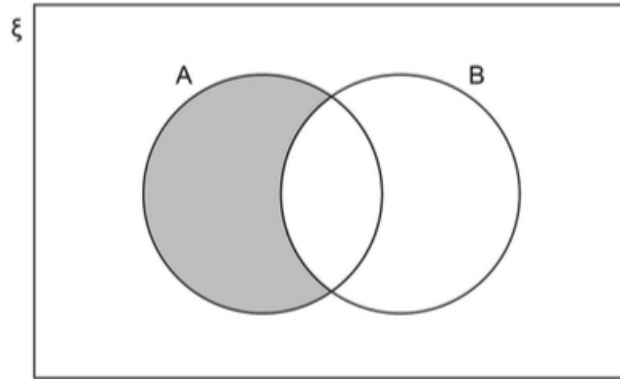
- (b) Factorise (2)

$$3x^2 - 22x + 7.$$

17. Work out the area of the parallelogram. (3)



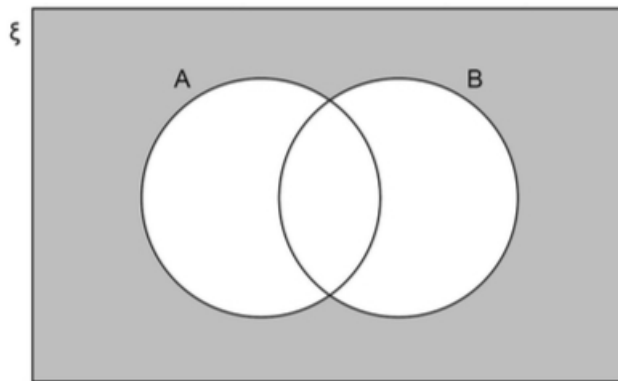
18. (a) Which of these represents the shaded region? (1)
Circle your answer.



Mathematics

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

- (b) Which of these represents the shaded region?
Circle your answer. (1)



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

19. The length of a rectangle is five times the width.
The area of the rectangle is 1620 cm^2 . (3)

Not drawn accurately



Work out the width of the rectangle.

20. A stone is thrown upwards with a speed of v metres per second.
The stone reaches a maximum height of h metres.

(4)

h is directly proportional to v^2 .

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

Work out the maximum height reached when $v = 24$.

21. Meera is using a **graphical** method to solve

$$2x^2 - 3x = 0.$$

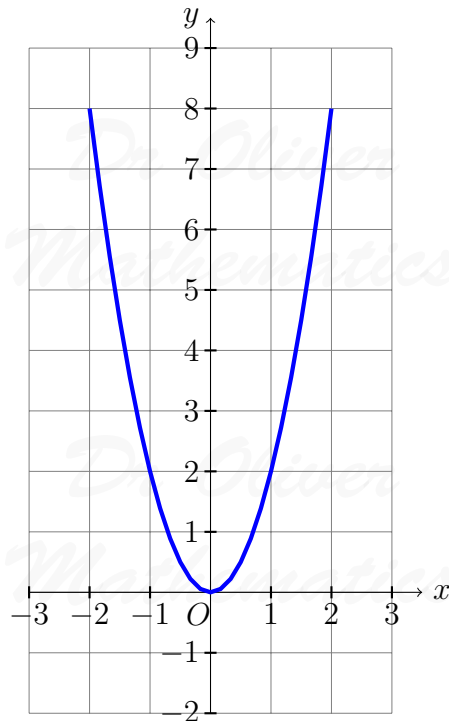
She draws the graph of

$$y = 2x^2$$

and a straight line graph on the same grid.

Here is the graph of

$$y = 2x^2.$$



- (a) Complete her method to solve

(2)

$$2x^2 - 3x = 0.$$

Levi is solving

$$2x^2 + 5x = 0.$$

He uses this method.

$$2x^2 + 5x = 0 \quad \text{subtract } 5x \text{ from both sides}$$

$$2x^2 = -5x \quad \text{divide both sides by } x$$

$$2x = -5 \quad \text{divide both sides by 2}$$

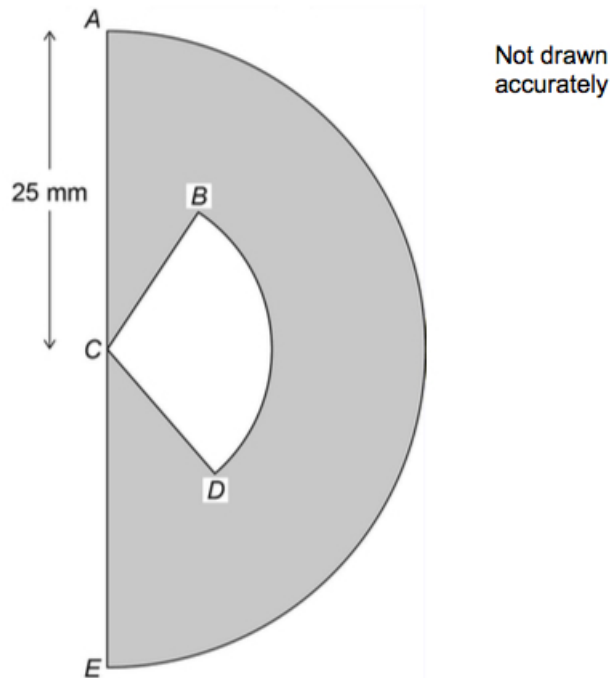
$$x = -2.5$$

(b) Evaluate his method and his answer. (2)

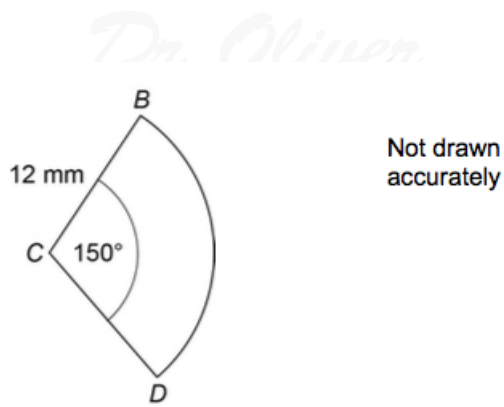
22. The cross section of an earring is a semi-circle, centre C , radius 25 mm. (5)

The earring is black and white.

The shaded area is black.



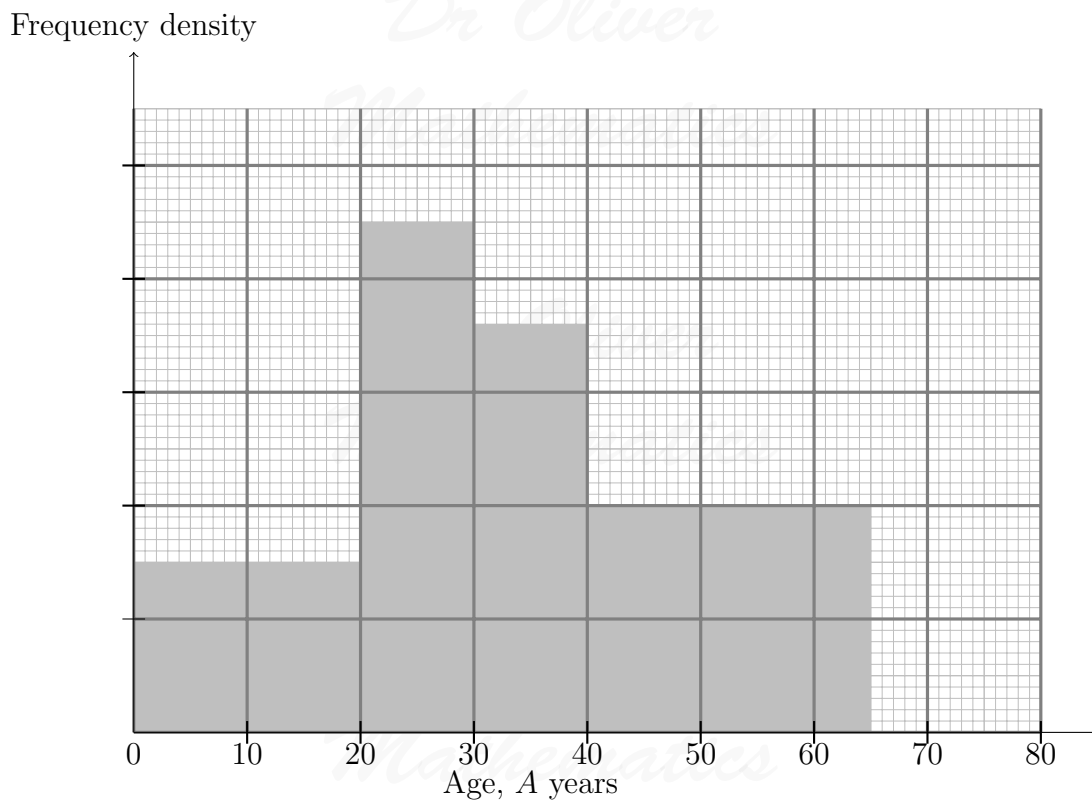
Sector BCD is white and has radius 12 mm.



Mathematics

Is more than 20% of the semi-circle white?
 You **must** show your working.

23. Here is some information about a tennis club.



- There are 30 members with $A < 20$.
- There are 12 members with $65 \leq A < 80$.
- There are no members with $A \geq 80$.

(a) Complete the histogram.

(3)

Mathematics

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

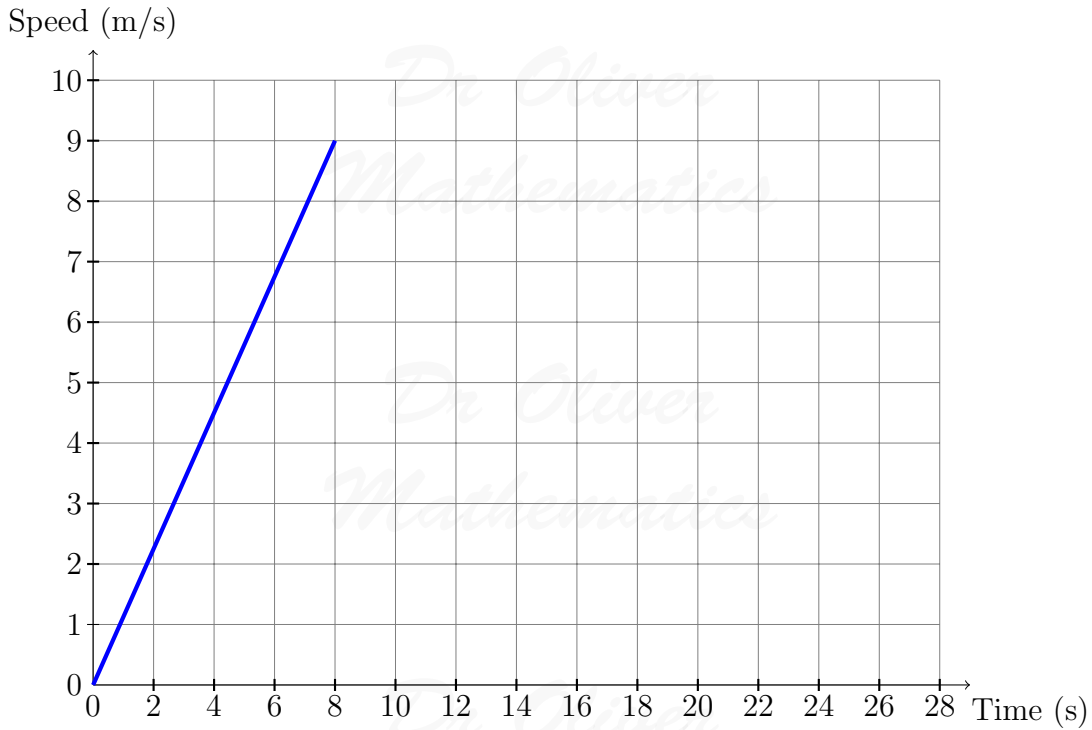
(2)

24. Beth ran a 200 metre race.

(3)

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

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



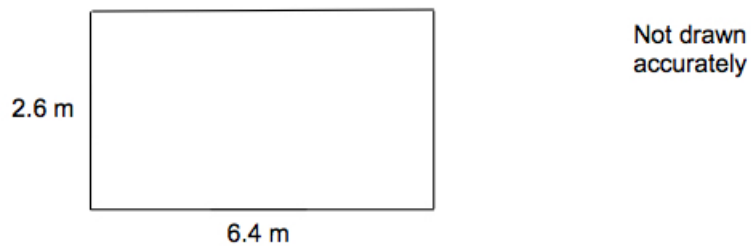
Amy completed the race in 27 seconds.

Did Beth finish before Amy?

You **must** show your working.

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

(5)



A force of 345 Newtons is applied to the floor.

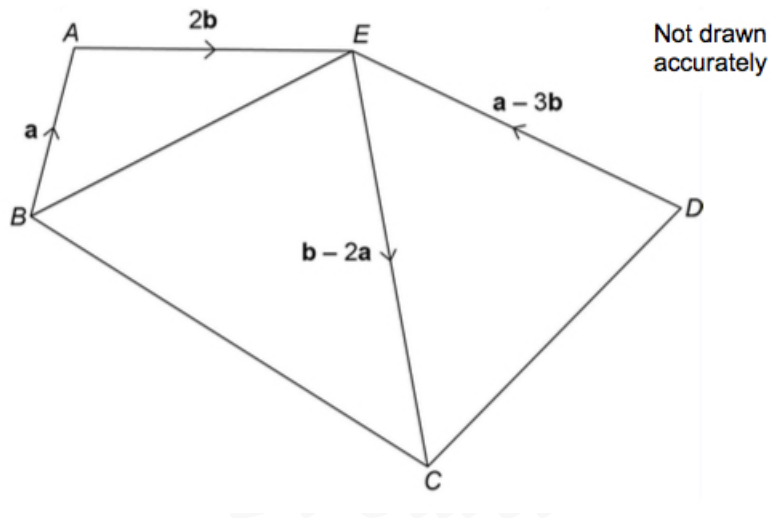
The force is to the nearest 5 Newtons.

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

Work out the upper bound of the pressure.
 Give your answer to 4 significant figures.
 You **must** show your working.

26. $ABCDE$ is a pentagon.

(3)



Show that $BCDE$ is a parallelogram.

27. Solve

(6)

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

Give your solutions to 2 decimal places.
 You **must** show your working.