

Answer **all** questions in the spaces provided.

1 Which sequence is a geometric progression?

Circle your answer.

[1 mark]

1 2 3 4

1 2 4 7

1 2 4 8

1 2 3 5

2 Which of these is **not** used to prove that triangles are congruent?

Circle your answer.

[1 mark]

SSS

SAS

AAA

RHS

3 Circle the expression that is equivalent to $2a + 5a \times 4a - a$

[1 mark]

$$a + 20a^2$$

$$21a^2$$

$$28a^2 - a$$

$$2a + 15a^2$$

4 Circle the equation of a line that is parallel to $y = 5x - 2$

[1 mark]

$$y = 2x - 5$$

$$y = 5x + 2$$

$$y = 3x - 2$$

$$y = -\frac{1}{5}x - 2$$

5 In a sale, the original price of a bag was reduced by $\frac{1}{5}$

The sale price of the bag is £29.40

Work out the original price.

[3 marks]

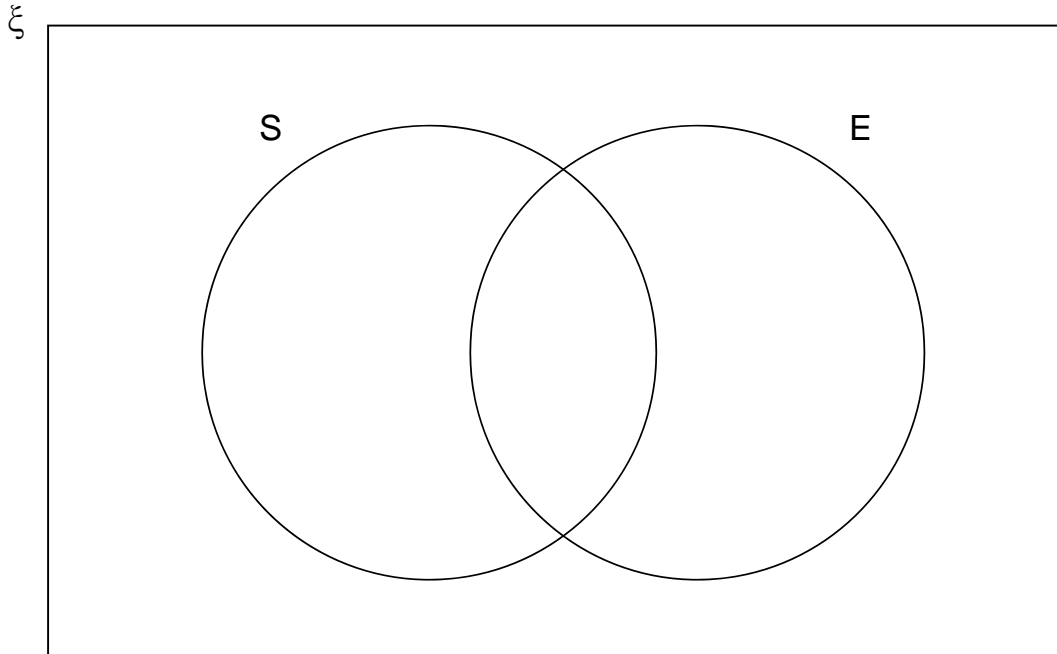
Answer £ _____

Turn over for the next question

- 6 $\xi = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$
S = square numbers
E = even numbers

- 6 (a) Complete the Venn diagram.

[3 marks]



- 6 (b) One of the numbers is chosen at random.

Write down $P(S \cap E)$

[1 mark]

Answer _____

- 7** A coin is rolled onto a grid of squares.
It lands randomly on the grid.
To win, the coin must land completely within one of the squares.

Meera and John each roll the coin a number of times and record their results.

	Number of wins	Number of losses
Meera	6	44
John	28	72

- 7 (a)** Work out **two** different estimates for the probability of winning.

[2 marks]

Answer _____ and _____

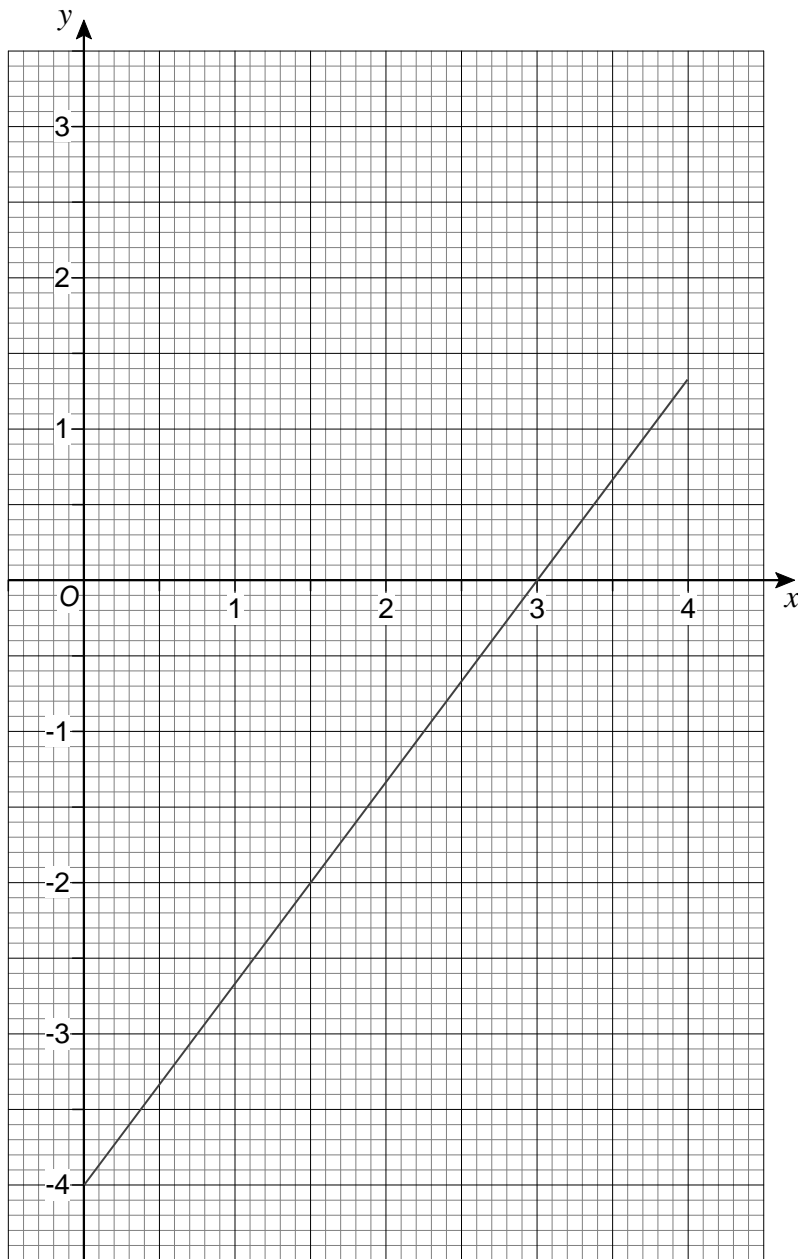
- 7 (b)** Which of your estimates is the better estimate for the probability of winning?
Give a reason for your answer.

[1 mark]

Answer _____

Reason _____

- 8 Here is the graph of $4x - 3y = 12$ for values of x from 0 to 4



By drawing a second graph on the grid,
work out an approximate solution to the simultaneous equations

$$4x - 3y = 12 \quad \text{and} \quad 3x + 2y = 6$$

[3 marks]

Answer _____

9 Written as the product of its prime factors

$$672 = 2^5 \times 3 \times 7$$

9 (a) Write 252 as the product of its prime factors.

[2 marks]

Answer _____

9 (b) Work out the value of the highest common factor of 672 and 252

[1 mark]

Answer _____

Turn over for the next question

10 At a school

number of boys : number of girls = 9 : 7

There are 116 **more** boys than girls.

Work out the total number of students at the school.

[3 marks]

Answer _____

11 Circle the equation with roots 4 and -8

[1 mark]

$$4x(x - 8) = 0$$

$$(x - 4)(x + 8) = 0$$

$$x^2 - 32 = 0$$

$$(x + 4)(x - 8) = 0$$

12 $R = \frac{x^2}{y}$

$$x = 3.6 \times 10^5$$

$$y = 7.5 \times 10^4$$

Work out the value of R .

Give your answer in standard form to an appropriate degree of accuracy.

[3 marks]

Answer _____

13 Two spheres have radii in the ratio 5 : 3

Circle the ratio of their volumes.

[1 mark]

5 : 3

15 : 9

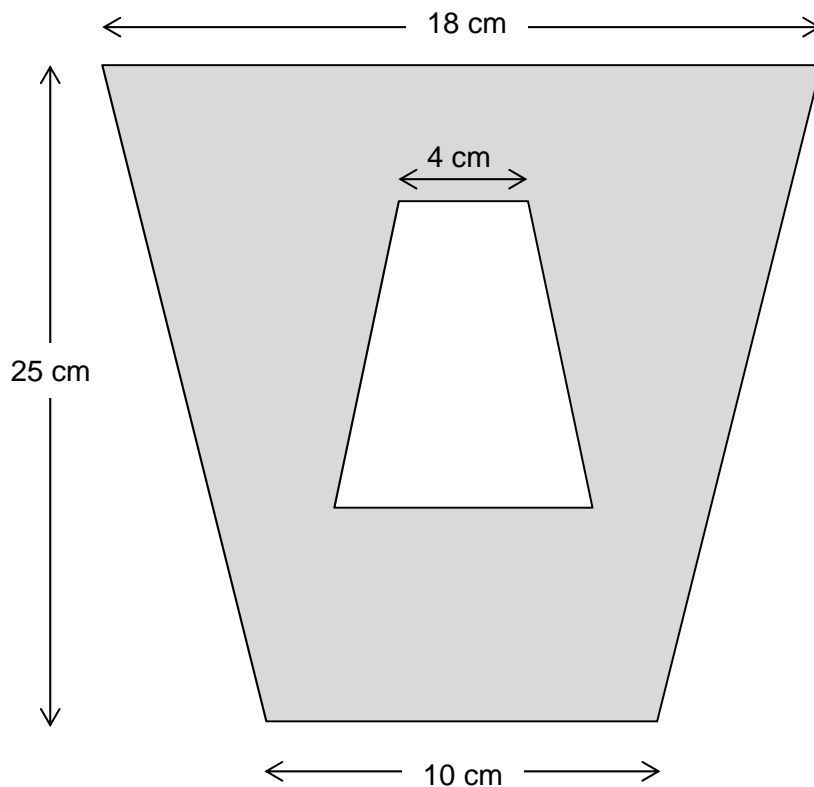
25 : 9

125 : 27

Turn over for the next question

14 (a) A pattern is made from two **similar** trapeziums.

Not drawn accurately

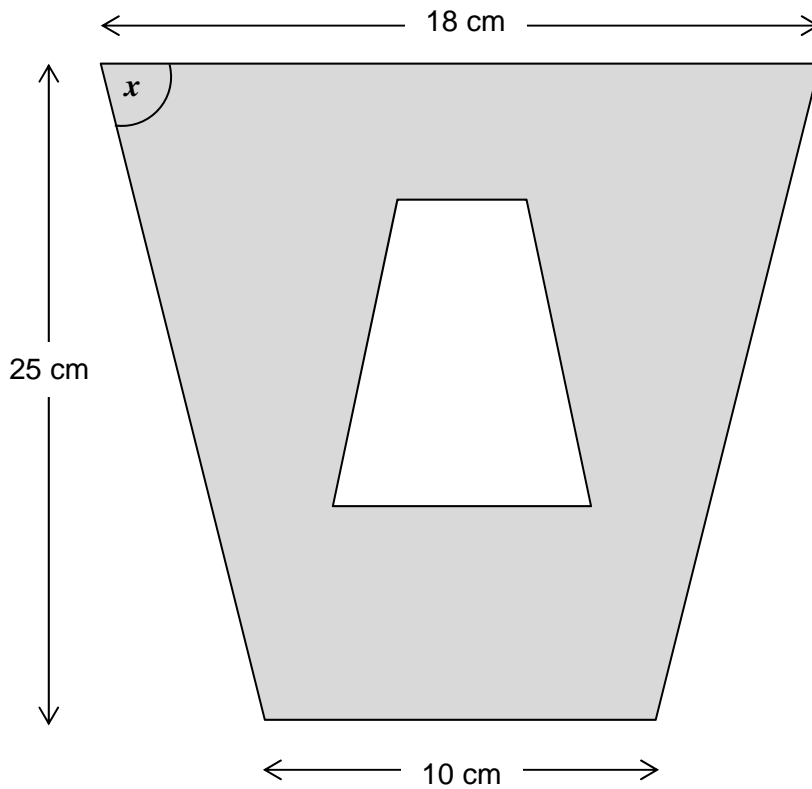


Show that the shaded area is 294 cm^2

[4 marks]

14 (b) The pattern has one line of symmetry.

Not drawn accurately



Work out the size of angle x .

[3 marks]

Answer _____ degrees

15 Ann picks a 4-digit number.

The first digit is **not** zero.

The 4-digit number is a multiple of 5

How many different 4-digit numbers could she pick?

[3 marks]

Answer _____

16 c is a positive integer.

Prove that $\frac{6c^3 + 30c}{3c^2 + 15}$ is an even number.

[3 marks]

18 In the formula $T = (n - 6)^2 + 1$ n is a positive integer.

18 (a) Kim says,

“The value of T is always greater than 1
because $(n - 6)^2$ is always greater than 0”

Comment on her statement.

[1 mark]

18 (b) What is the only value of T that is a square number?

[1 mark]

Answer _____

19 $f(x) = 3x$

Circle the expression for $f^{-1}(x)$ **[1 mark]**

$-3x$

$\frac{3}{x}$

$\frac{1}{3x}$

$\frac{x}{3}$

20 y is directly proportional to \sqrt{x}

x	36	a
y	2	5

Work out the value of a .**[4 marks]**

Answer _____

- 21 A company makes boxes of cereal.
A box usually contains 450 grams of cereal.
Here are two options for a special offer.

Option A

20% more cereal
Price remains the same

Option B

Usual amount of cereal
15% off the price

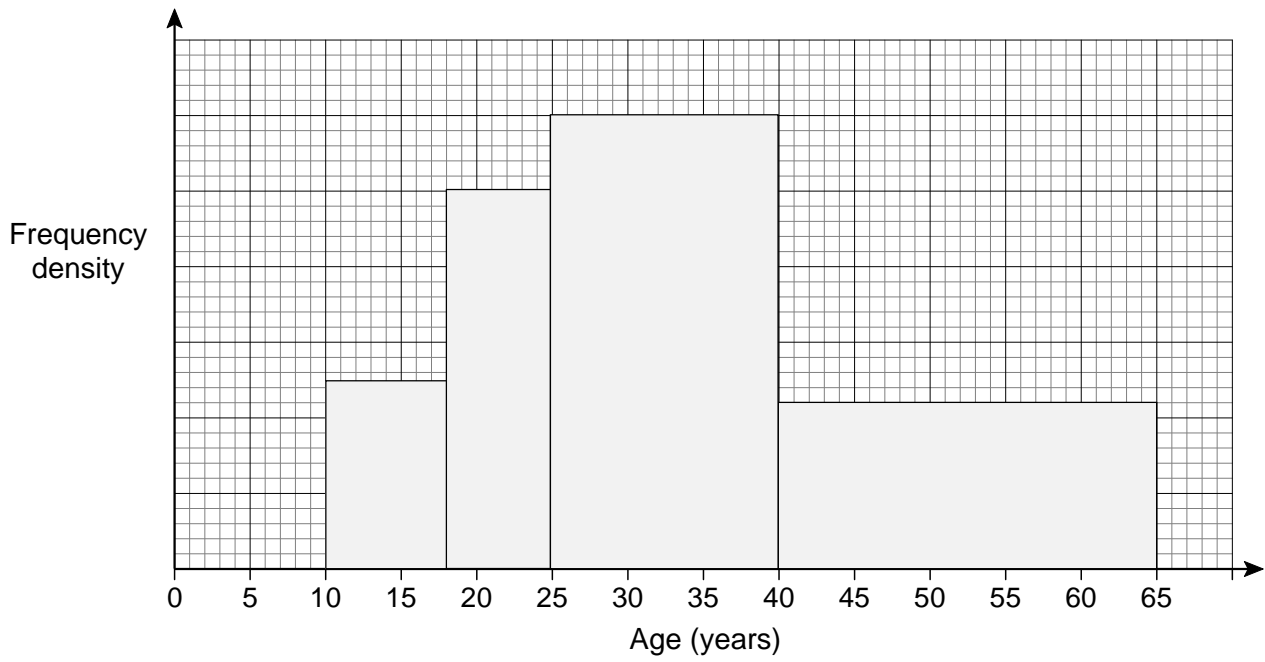
Which option is the better value for the customer?
You **must** show your working.

[3 marks]

Answer _____

22

The histogram shows the ages, in years, of members of a chess club.



There are 22 members with ages in the range $40 \leq \text{age} < 65$

Work out the number of members with ages in the range $25 \leq \text{age} < 40$

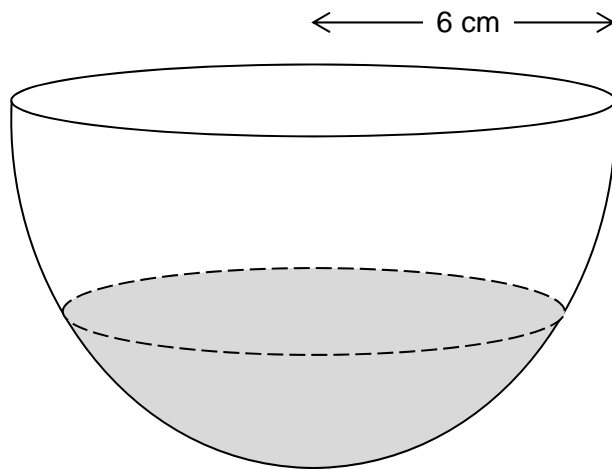
[4 marks]

Answer _____

23

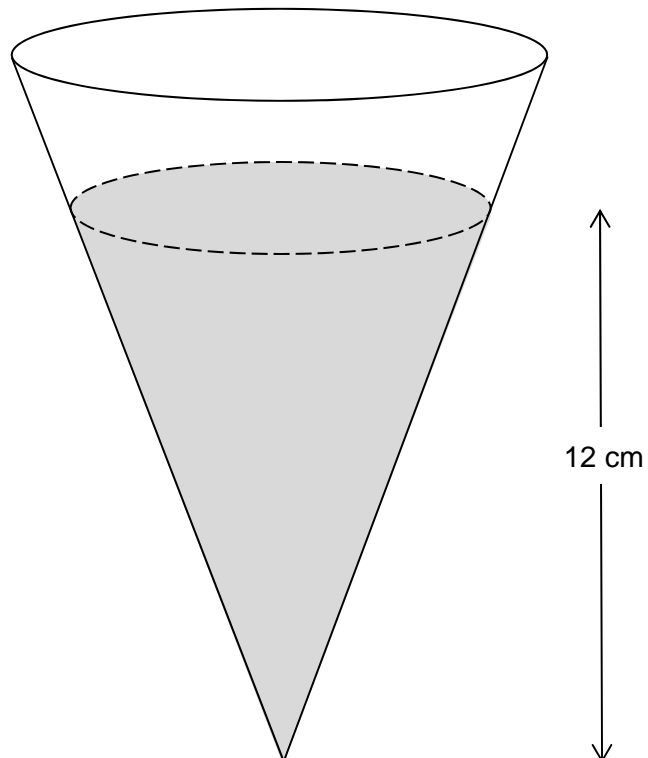
A bowl is a hemisphere with radius 6 cm

Water fills two-fifths of the volume of the bowl.



The water is poured into a hollow cone.

The depth of the water in the cone is 12 cm



Volume of a sphere = $\frac{4}{3}\pi r^3$ where r is the radius.

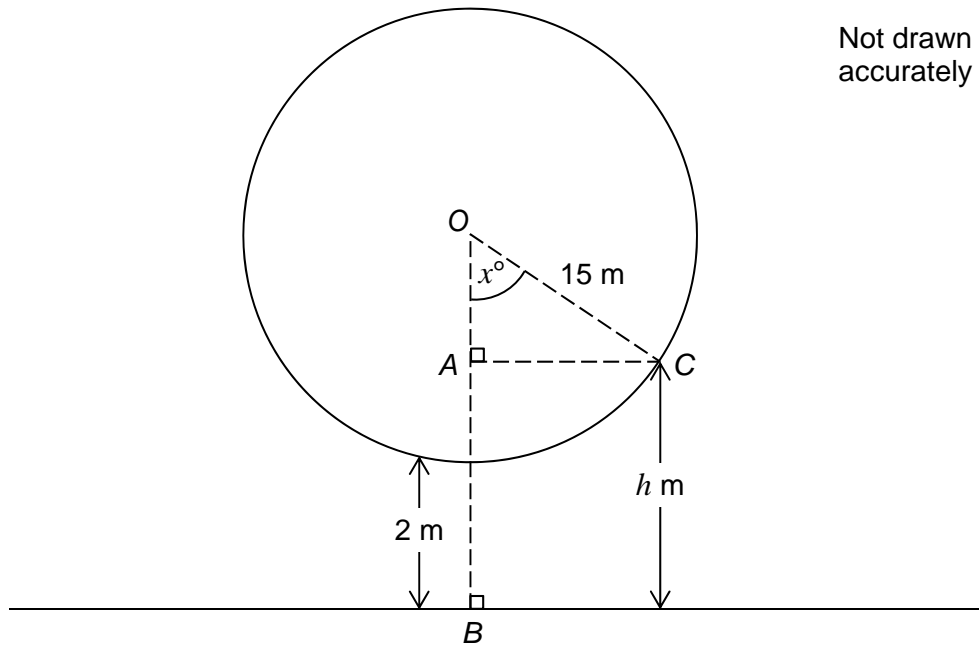
Volume of a cone = $\frac{1}{3}\pi r^2 h$ where r is the radius and h is the perpendicular height

Work out the radius of the surface of the water in the cone.

[4 marks]

Answer _____ cm

- 24** A Big Wheel is modelled as a circle with centre O and radius 15 metres.
The wheel turns in an anticlockwise direction.
The lowest point on the wheel is always 2 metres above horizontal ground.

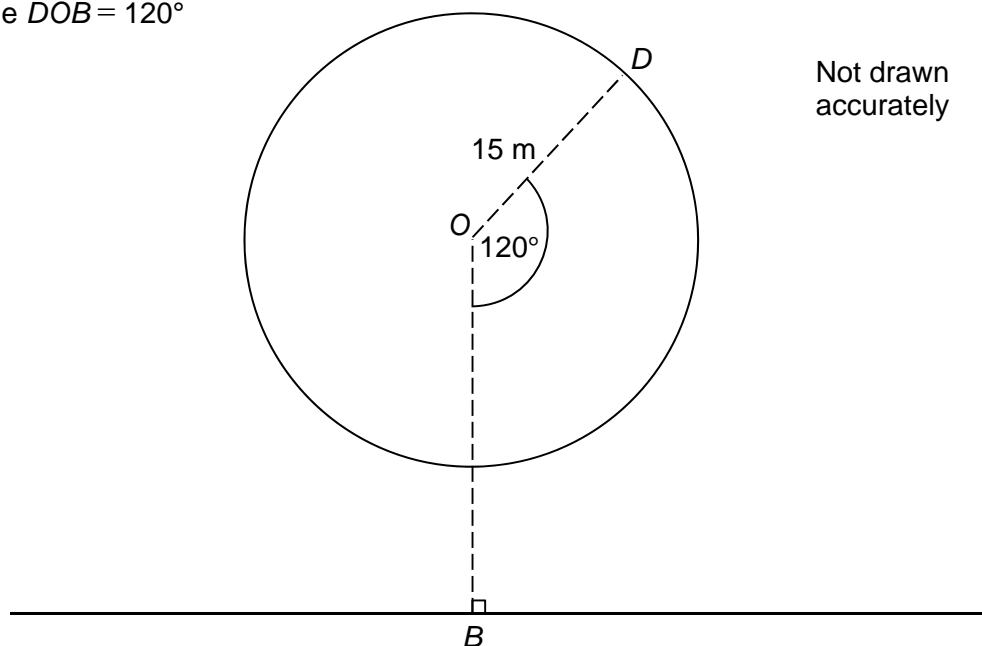


- 24 (a)** C is a point on the wheel, h metres above horizontal ground.
Angle $COB = x^\circ$

Show that $h = 17 - 15 \cos x^\circ$

[2 marks]

- 24 (b)** D is a point on the wheel.
Angle $DOB = 120^\circ$

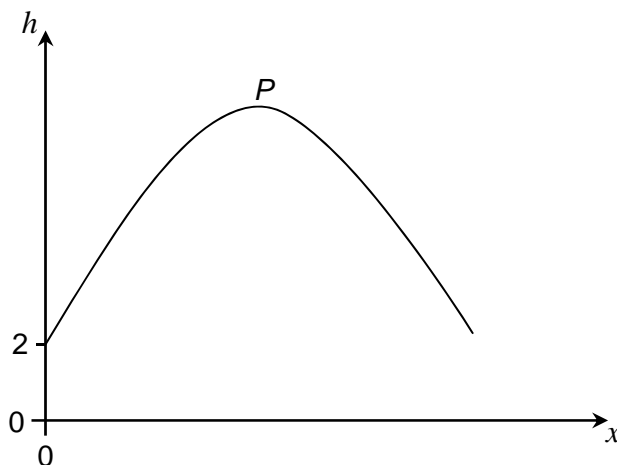


Work out the height of D above horizontal ground.

[2 marks]

Answer _____ metres

- 24 (c)** Here is a sketch of the graph $h = 17 - 15 \cos x^\circ$ for one **complete** turn of the wheel.
 P is the highest point on the graph.



Work out the coordinates of P .

[2 marks]

Answer (_____ , _____)

25 $2x^2 - 6x + 5$ can be written in the form $a(x - b)^2 + c$
where a , b and c are positive numbers.

25 (a) Work out the values of a , b and c .

[3 marks]

$$a = \underline{\hspace{4cm}}$$

$$b = \underline{\hspace{4cm}}$$

$$c = \underline{\hspace{4cm}}$$

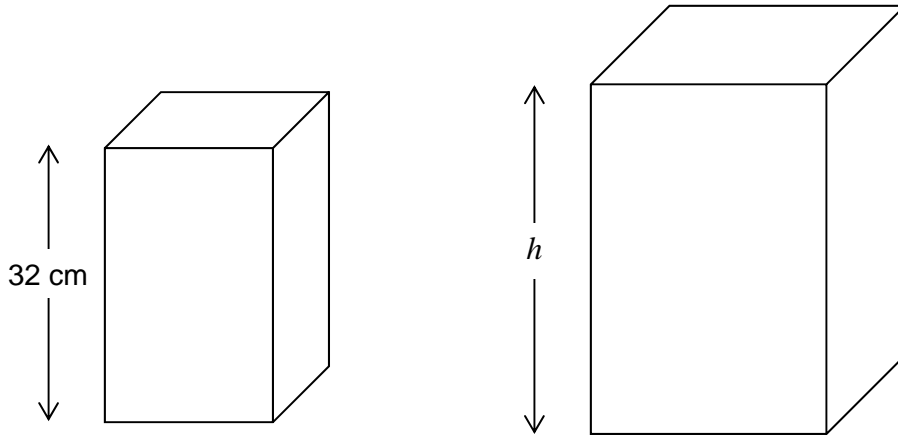
25 (b) Using your answer to part (a), or otherwise, solve $2x^2 - 6x + 5 = 8.5$

[3 marks]

Answer _____

Turn over for the next question

- 26** Two boxes are made with card.
The boxes are similar cuboids.
The smaller box has height 32 cm



It takes 44% more card to make the larger box.

Work out the height, h , of the larger box.

[4 marks]

Answer _____ cm

END OF QUESTIONS