

- 1 The diagram shows a rectangle  $ABCD$  and a semicircle with diameter  $AB$  where  $AB = 12$  cm. The point  $E$  lies on  $DC$  and also on the semicircle.

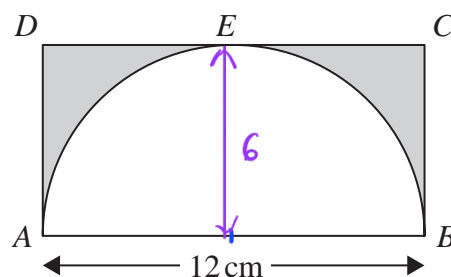


Diagram **NOT** accurately drawn

radius = 6 cm

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

$$\text{Area of rectangle} = 12 \times 6 = 72 \text{ cm}^2 \quad (1)$$

$$\text{Area of Semicircle} = \frac{1}{2} \times \pi \times 6^2 = 56.54 \text{ cm}^2$$

$$\text{Area of shaded region} = \text{Area of rectangle} - \text{Area of semicircle}$$

$$= 72 \text{ cm}^2 - 56.54 \text{ cm}^2 \quad (1)$$

$$= 15.5 \text{ cm}^2 \quad (1)$$

$$\dots\dots\dots 15.5 \text{ cm}^2$$

(Total for Question 1 is 3 marks)

2  $A$ ,  $B$  and  $C$  are points on a circle with centre  $O$ .

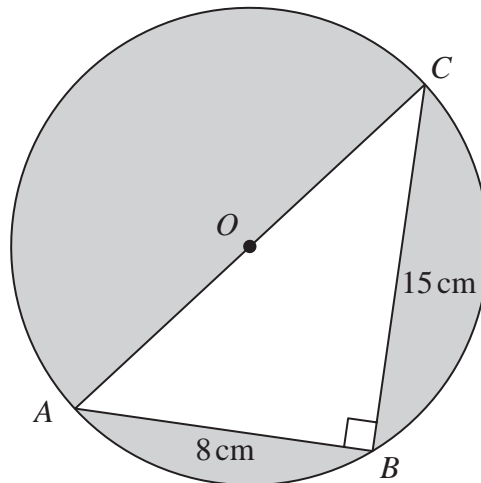


Diagram **NOT**  
accurately drawn

$AOC$  is a diameter of the circle.

$AB = 8\text{ cm}$      $BC = 15\text{ cm}$

Angle  $ABC = 90^\circ$

Work out the total area of the regions shown shaded in the diagram.  
Give your answer correct to 3 significant figures.

$$\text{Area of triangle} = \frac{1}{2} ab \sin C$$

$$\text{Area of triangle} = \frac{1}{2} \times 8 \times 15 \times \sin 90^\circ$$

$$= 60$$

$$AC = \sqrt{8^2 + 15^2} \text{ (1)}$$

$$= 17 \text{ (1)}$$

$$\text{radius of circle} = 17 \div 2 = 8.5\text{ cm}$$

$$\text{Area of circle} = \pi r^2$$

$$= \pi (8.5)^2$$

$$= 226.98 \text{ (1)}$$

$$\text{Area of shaded region} = 226.98 - 60 \text{ (1)}$$

$$= 166.98$$

$$= 167 \text{ (3sf) (1)}$$

.....<sup>167</sup> cm<sup>2</sup>

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(Total for Question 2 is 5 marks)

3 Jonty has a storage container in the shape of a cuboid, as shown in the diagram.

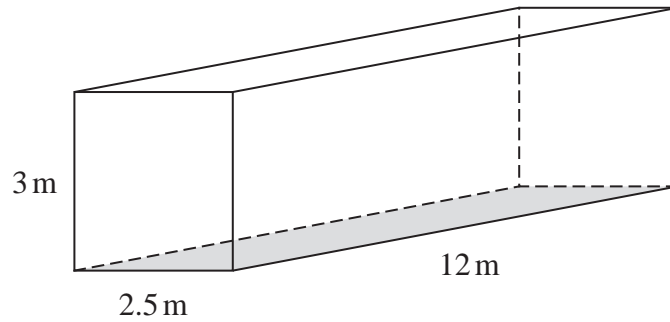


Diagram **NOT**  
accurately drawn

Jonty is going to paint the outside of his storage container, apart from the base which is shown shaded in the diagram.

He needs enough paint to cover the four sides and the top.

Each tin of paint covers an area of  $15 \text{ m}^2$

The cost of each tin of paint recently increased by 10%

**After** the increase, the cost of each tin of paint is £26.95

Jonty says

“**Before** the increase, I could have bought enough paint for less than £200”

Show that Jonty is correct.

Show your working clearly.

$$\begin{aligned} \text{Area : } 3 \times 2.5 &= 7.5 & \textcircled{1} \\ 12 \times 3 &= 36 \\ 12 \times 2.5 &= 30 \end{aligned}$$

$$\begin{aligned} \text{Total area : } (2 \times 7.5) + (2 \times 36) + 30 \\ &= 15 + 72 + 30 & \textcircled{1} \\ &= 117 \end{aligned}$$

$$\begin{aligned} \text{Tin of paint needed} &= \frac{117}{15} = 7.8 & \textcircled{1} \\ &\approx 8 \text{ tins are needed} \end{aligned}$$

$$100\% + 10\% = 110\% \text{ which is } £26.95 \quad (1)$$

$$\begin{aligned} \text{Price at } 100\% : x &= \frac{26.95}{110} \times 100 \\ &= 24.5 \quad (1) \end{aligned}$$

$$24.5 \times 8 \text{ tins} = 196$$

Yes. Jonty is correct. 1

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(Total for Question 3 is 6 marks)

4 The diagram shows a solid prism.

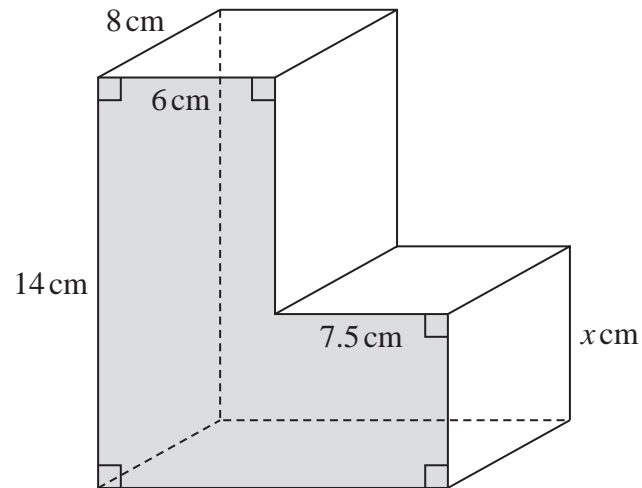


Diagram **NOT**  
accurately drawn

The cross section of the prism is shown shaded.

The volume of the prism is  $924 \text{ cm}^3$

Work out the value of  $x$

$$\text{Area of shaded region} = (6 \times 14) + (7.5 \times x)$$

$$= 84 + 7.5x \quad (1)$$

$$924 = (84 + 7.5x)8 \quad (1)$$

$$84 + 7.5x = 115.5$$

$$7.5x = 31.5 \quad (1)$$

$$x = 4.2 \quad (1)$$

$$x = 4.2$$

(Total for Question 4 is 4 marks)