

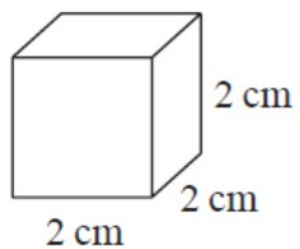
## G29 Surface Area of 3d Shapes

OCR

Edexcel

12 The diagram shows a cube of side length 2 cm.

Video creator



Vera says,

“The volume of any solid made with 6 of these cubes is  $48 \text{ cm}^3$ ”

(a) Is Vera correct?

You must show your working.

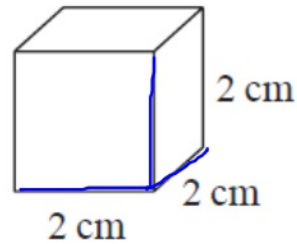
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(2)

12 The diagram shows a cube of side length 2 cm.

Video creator



$$2 \times 2 \times 2 = 8$$

Vera says,

“The volume of any solid made with 6 of these cubes is  $48 \text{ cm}^3$ ”

(a) Is Vera correct?

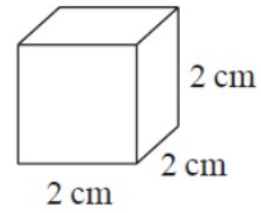
You must show your working.

$$1 \text{ cube} = 8 \text{ cm}^3$$

$$6 \text{ cubes} = 48 \text{ cm}^3$$

Vera is correct ✓

- (b) (i) Draw a cuboid that can be made with 6 of these cubes.  
Write the dimensions of the cuboid on your diagram.

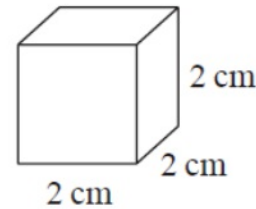


Video creator

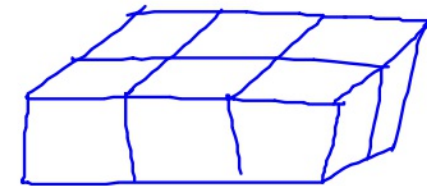
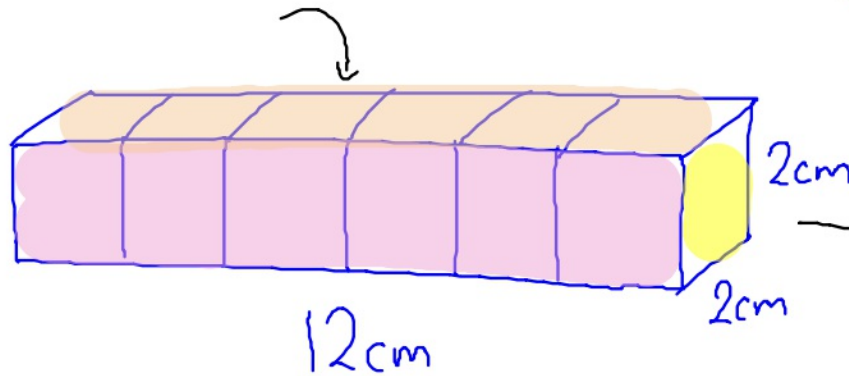
(1)

- (ii) Work out the surface area of your cuboid.

- (b) (i) Draw a cuboid that can be made with 6 of these cubes.  
Write the dimensions of the cuboid on your diagram.



Video camera



(i)  $\underline{\underline{\text{Total} = 104\text{cm}^2}}$  ✓

- (ii) Work out the surface area of your cuboid.

<p>● <math>12 \times 2 = 24\text{cm}^2</math> <math>24\text{cm}^2</math> <hr/><math>48\text{cm}^2</math></p>	<p>● <math>2 \times 2 = 4\text{cm}^2</math> <math>4\text{cm}^2</math> <hr/><math>8\text{cm}^2</math></p>	<p>● <math>12 \times 2 = 24\text{cm}^2</math> <math>24\text{cm}^2</math> <hr/><math>48\text{cm}^2</math></p>
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Created by

**13** The total surface area of a cube is  $294 \text{ cm}^2$ .

Work out the volume of the cube.

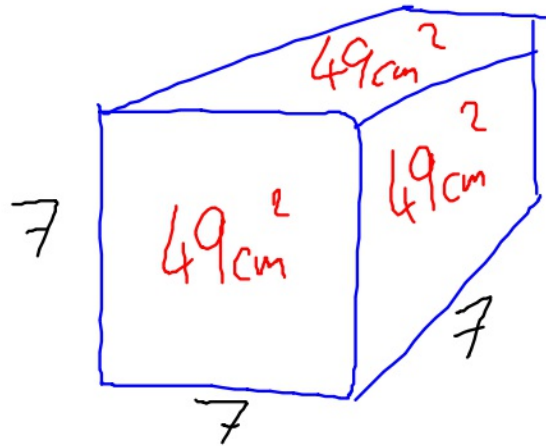
.....  $\text{cm}^3$

**(Total for Question 13 is 4 marks)**



13 The total surface area of a cube is  $294 \text{ cm}^2$ .

Work out the volume of the cube.



$$\text{Total Surface Area} = 294 \text{ cm}^2$$

$$1 \text{ face} = 294 \div 6 =$$

$$\begin{array}{r} 49 \\ \times 67 \\ \hline 343 \end{array}$$

Volume =

$$L \times W \times H$$

$$\frac{7 \times 7 \times 7}{49 \times 7}$$

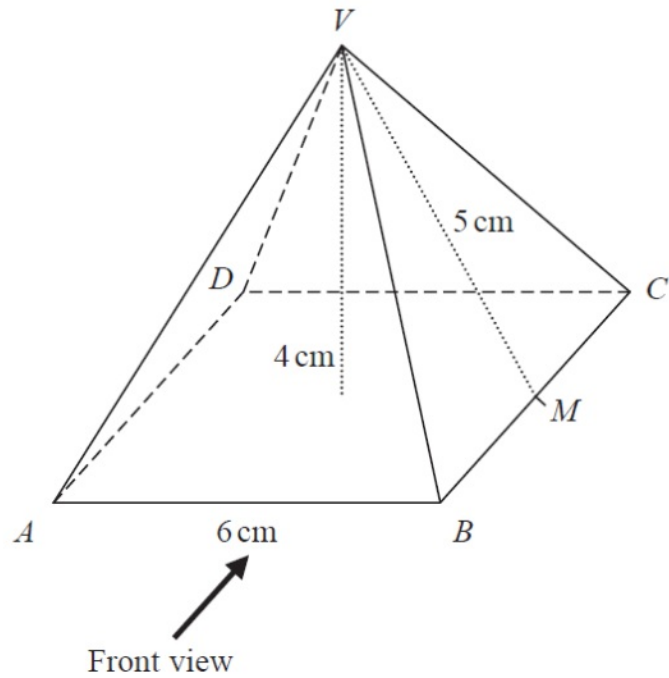
$$49 \times 7$$

$$\dots\dots\dots 343 \text{ cm}^3$$

(Total for Question 13 is 4 marks)

$$\begin{array}{r} 49 \\ 6 \overline{) 294} \end{array}$$

23 Here is a solid square-based pyramid,  $VABCD$ .

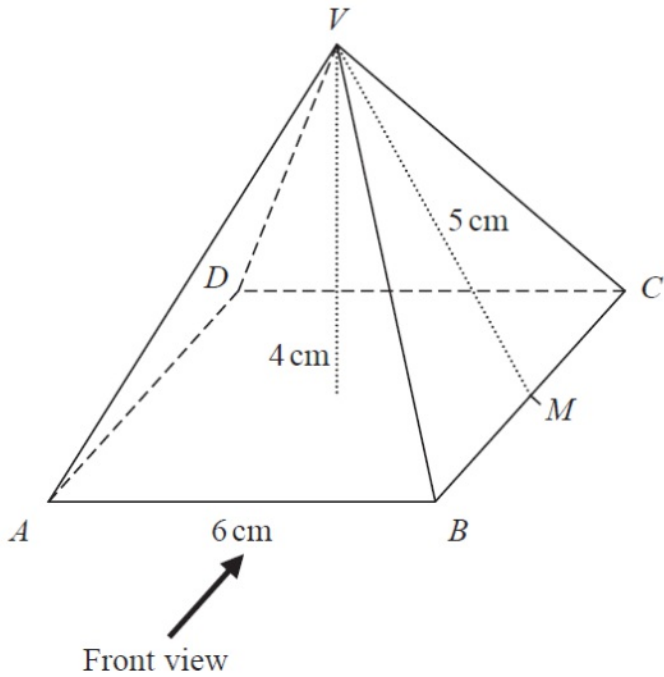


(a) Draw an accurate front elevation of the pyramid from the direction of the arrow.



The base of the pyramid is a square of side  $6\text{ cm}$ .  
The height of the pyramid is  $4\text{ cm}$ .  
 $M$  is the midpoint of  $BC$  and  $VM = 5\text{ cm}$ .

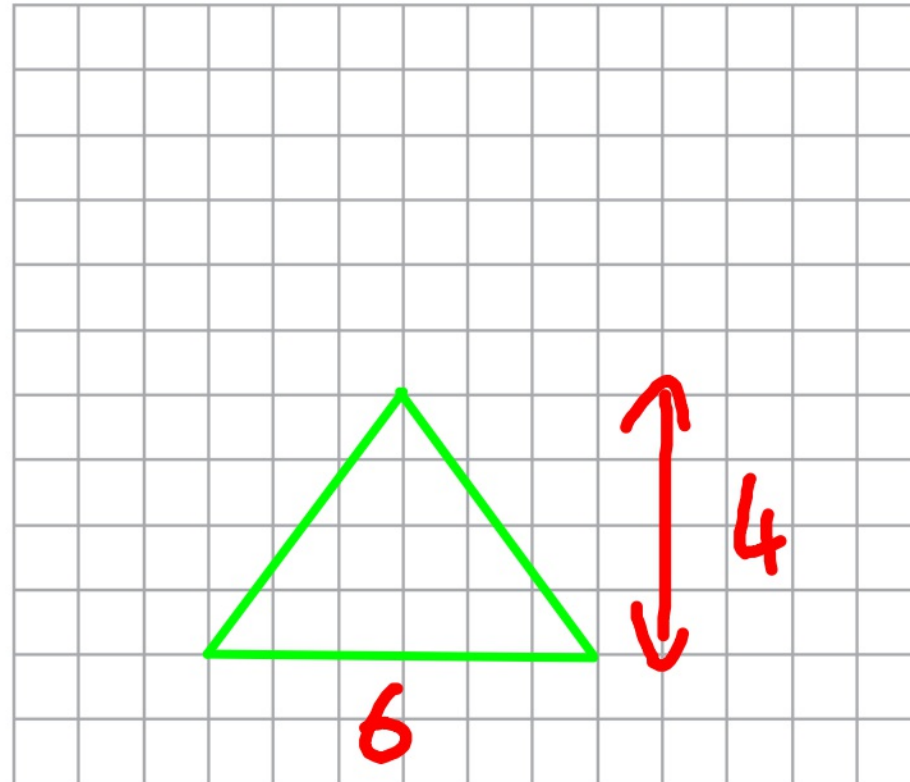
Here is a solid square-based pyramid,  $VABCD$ .



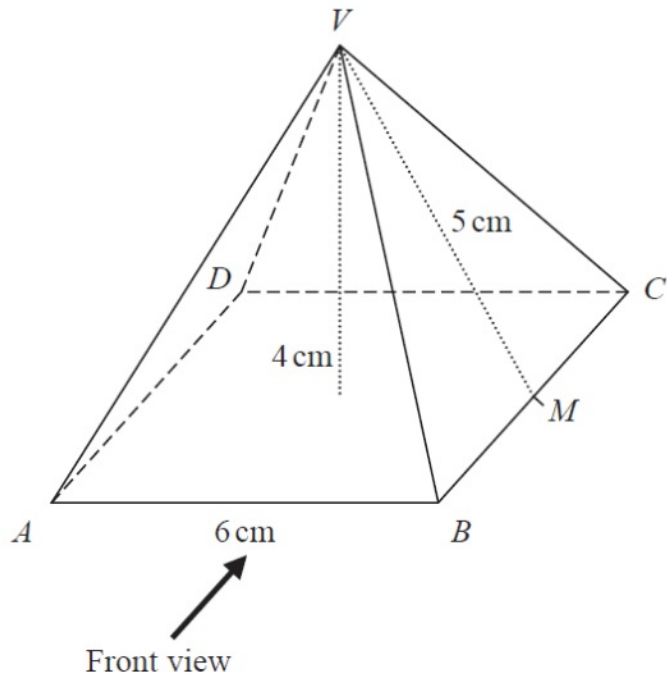
The base of the pyramid is a square of side 6 cm.  
The height of the pyramid is 4 cm.  
 $M$  is the midpoint of  $BC$  and  $VM = 5$  cm.

(a) Draw an accurate front elevation of the pyramid from the direction of the arrow.

G28



23 Here is a solid square-based pyramid,  $VABCD$ .

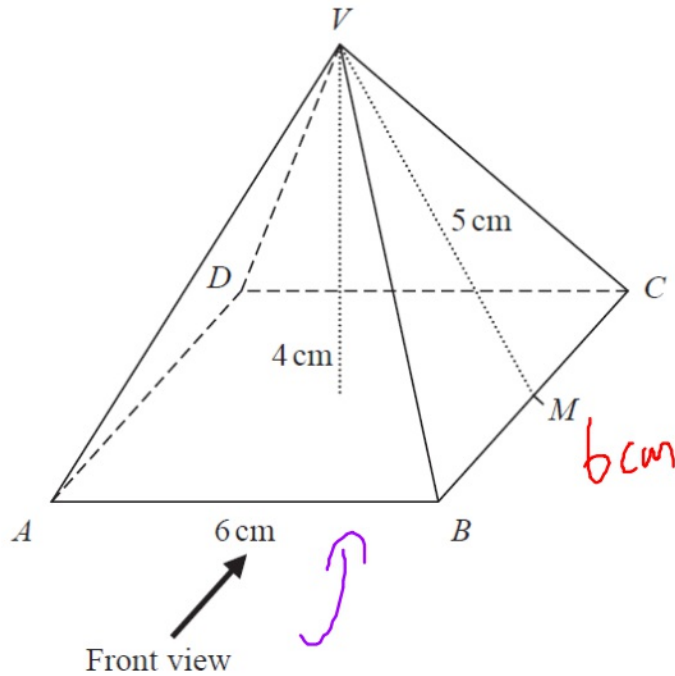


The base of the pyramid is a square of side  $6\text{ cm}$ .  
The height of the pyramid is  $4\text{ cm}$ .  
 $M$  is the midpoint of  $BC$  and  $VM = 5\text{ cm}$ .

(b) Work out the total surface area of the pyramid.

.....  
(4)

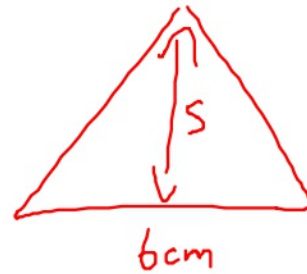
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(b) Work out the total surface area of the pyramid.

G29



$$\frac{B \times H}{2} = \frac{6 \times 5}{2} = 15\text{ cm}^2$$

$$4 \text{ faces} \times 15\text{ cm}^2 = 60\text{ cm}^2$$

$$\text{Bottom} = 6 \times 6 = 36\text{ cm}^2$$

$$60 + 36$$

$$\underline{\quad 96\text{ cm}^2 \quad}$$

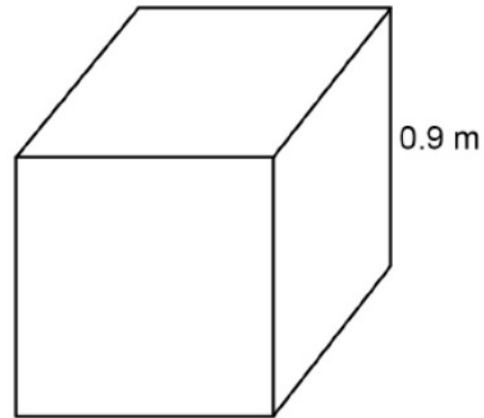
(4)

AQA

13

A cube has edge length 0.9 metres.

Video create



Work out the **total** surface area of the cube.

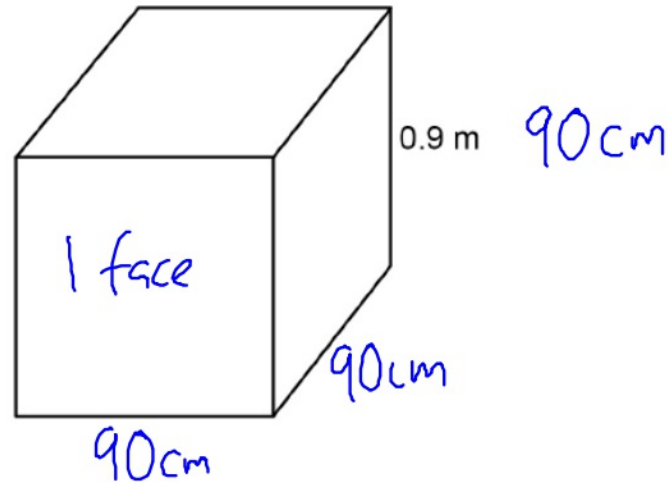
Give your answer in **square centimetres**.

[3 marks]

Answer \_\_\_\_\_  $\text{cm}^2$

13 A cube has edge length 0.9 metres.

G29



$$\begin{aligned} 1 \text{ face} &= 90 \times 90 \\ &= 8100 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} &6 \text{ faces} \\ &\quad \underline{\quad \times 6 \quad} \end{aligned}$$

Work out the total surface area of the cube.  
Give your answer in **square centimetres**.

[3 marks]

Answer 48000 ✓ cm<sup>2</sup>



15

A company makes two types of lampshade using fabric on wire frames.

Video created by W Neill

**Lampshade A**

G29

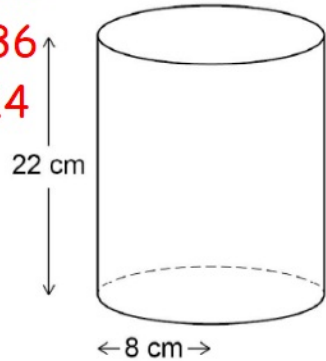
Fabric is used to make the curved surface of a cylinder.

G30

The cylinder has radius 8 cm and height 22 cm

G36

R14



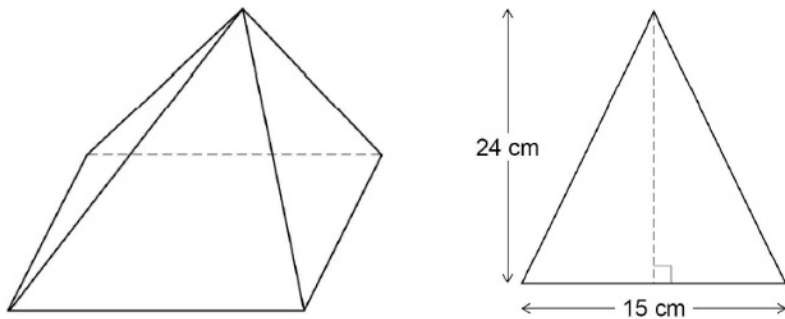
Cost of fabric	£400 per square metre
Other costs for A	£3.50 per lampshade
Other costs for B	£7.50 per lampshade

Work out the ratio cost of one lampshade A : cost of one lampshade B

Give your answer in the form  $n : 1$  [5 marks]

**Lampshade B**

Fabric is used to make the four triangular faces of a pyramid.



Each triangular face has base 15 cm and perpendicular height 24 cm

Answer \_\_\_\_\_ : \_\_\_\_\_

15

A company makes two types of lampshade using fabric on wire frames.

Video created by W Neill

**Lampshade A**

Fabric is used to make the curved surface of a cylinder.

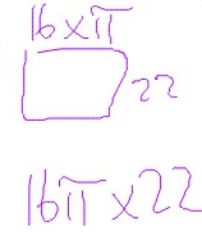
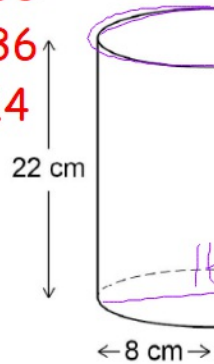
The cylinder has radius 8 cm and height 22 cm

G29

G30

G36

R14



$16\pi \times 22 = 1105.84 \text{ cm}^2$   
 $= 0.110584 \text{ m}^2 \times £400$

$1 \text{ m} = 100 \text{ cm}$

$1 \text{ m}^2 = 100 \times 100$   
 $10000 \text{ cm}^2$

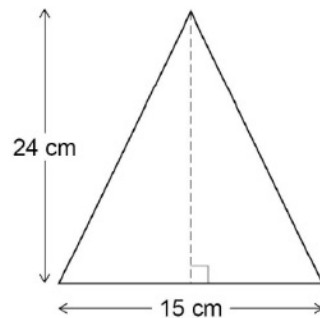
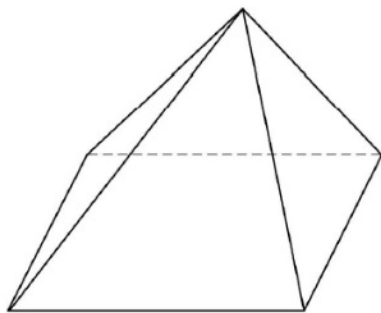
Cost of fabric	£400 per square metre
Other costs for A	£3.50 per lampshade
Other costs for B	£7.50 per lampshade

Work out the ratio cost of one lampshade A : cost of one lampshade B

Give your answer in the form  $n : 1$  [5 marks]

**Lampshade B**

Fabric is used to make the four triangular faces of a pyramid.



Each triangular face has base 15 cm and perpendicular height 24 cm

$= £44.23$   
 $+ 3.50$   


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 $47.73$

$\frac{B \times H}{2} \quad \frac{15 \times 24}{2} \times 4 = 720 \text{ cm}^2$   
 $\downarrow \div 10000$   
 $= 0.072 \text{ m}^2$   
 $\times 400$   


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 $£28.80$   
 $+ 7.50$   


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 $£36.30$

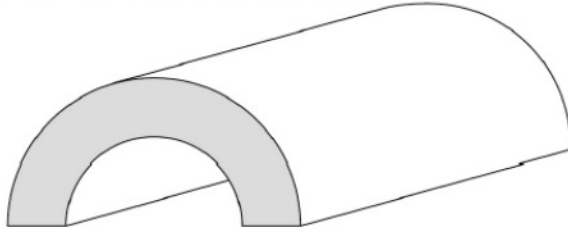
$A - B$   
 $47.73 : 36.30$   
 $\div 36.3$   
 $\rightarrow 1.31 : 1$

Answer 1.31 : 1 ✓

18 Here is a tunnel for a toy train.

G29

G30



$AD$  is a semicircular arc of radius 10 cm

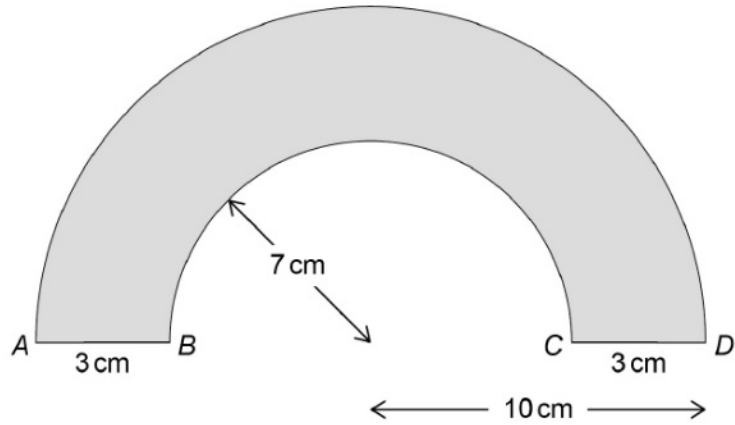
$BC$  is a semicircular arc of radius 7 cm

The length of the tunnel is 30 cm

Work out the total area of all **six** faces of the tunnel.

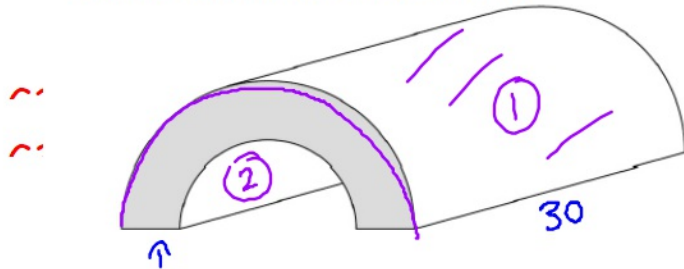
Give your answer in terms of  $\pi$ .

The diagram below shows the cross section of the tunnel.



[5 marks]

18 Here is a tunnel for a toy train.

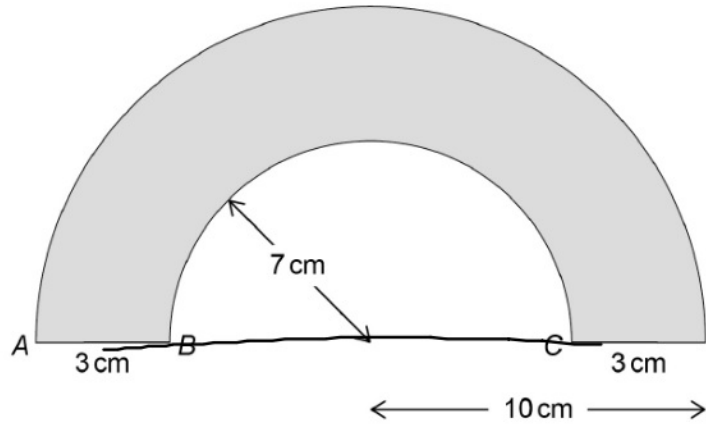


$AD$  is a semicircular arc of radius 10 cm  
 $BC$  is a semicircular arc of radius 7 cm  
 The length of the tunnel is 30 cm

Work out the total area of all **six** faces of the tunnel.

Give your answer in terms of  $\pi$ .

The diagram below shows the cross section of the tunnel.



$$2 \text{ Rectangles} \dots 3 \times 30 = 90 \text{ cm}^2 \times 2 = 180 \text{ cm}^2$$

$$\text{CS} \dots R^2 \times \pi \div 2 \dots 10^2 \times \pi \div 2 = 50\pi$$

$$- 7^2 \times \pi \div 2 = 24.5\pi \quad \left. \vphantom{\begin{matrix} 50\pi \\ 24.5\pi \end{matrix}} \right\} 25.5\pi$$

$$2 \text{ CS's} \dots 25.5\pi \times 2 = 51\pi \checkmark$$

$$\textcircled{1} (10 \times \pi \div 2) \times 30$$

$$(20 \times \pi \div 2) \times 30 = 300\pi$$

$$\textcircled{2} (14 \times \pi \div 2) \times 30$$

$$7\pi \times 30 = 210\pi$$

Total

$$56\pi + 180 \checkmark$$

[5 marks]