

Name: \_\_\_\_\_

## GCSE (1 – 9)

### Cylinders

#### Instructions

- Use **black** ink or ball-point pen.
- Answer all Questions.
- Answer the Questions in the spaces provided  
– *there may be more space than you need.*
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

#### Information

- The marks for each Question are shown in brackets  
– *use this as a guide as to how much time to spend on each Question.*

#### Advice

- Read each Question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every Question.
- Check your answers if you have time at the end

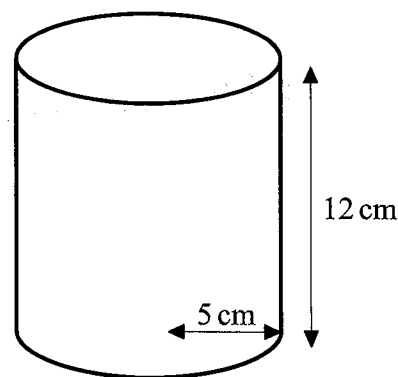
- 1 A cylinder has a radius of 5 cm and a height of 12 cm.

Work out the volume of the cylinder.  
Give your answer in terms of  $\pi$ .

$$\text{volume} = \pi r^2 \times h$$

$$= \pi (5)^2 \times 12$$

$$= 300\pi \text{ cm}^3$$



$$\dots\dots\dots 300\pi \dots\dots\dots \text{cm}^3$$

(Total for Question 1 is 3 marks)

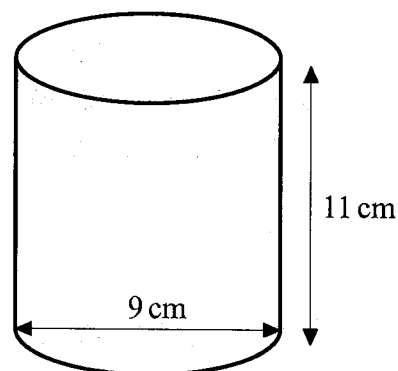
- 2 A cylinder has a diameter of 9 cm and a height of 11 cm.

Work out the volume of the cylinder.  
Give your answer correct to 1 decimal place.

$$\text{volume} = \pi r^2 \times h$$

$$= \pi (4.5)^2 \times 11$$

$$= 699.8 \text{ cm}^3$$



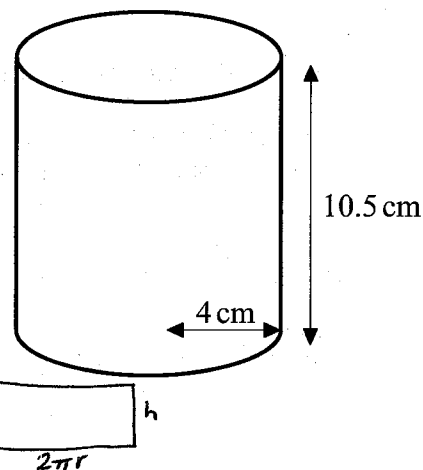
$$\text{Radius} = 4.5 \text{ cm}$$

$$\dots\dots\dots 699.8 \dots\dots\dots \text{cm}^3$$

(Total for Question 2 is 3 marks)

- 3 A solid cylinder has a radius of 4 cm and a height of 10.5 cm.

Work out the total surface area of the cylinder.  
Give your answer correct to 1 decimal place.



$$\text{Surface Area} = \text{Circle} + \text{Circle} + \text{Rectangle}$$

$$= 2 \times \pi r^2 + 2\pi r h$$

$$= 2\pi(4)^2 + 2\pi(4)(10.5)$$

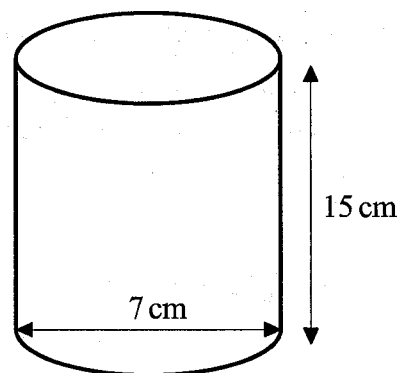
$$= 364.4 \text{ cm}^2$$

364.4 cm<sup>2</sup>

(Total for Question 3 is 3 marks)

- 4 A solid cylinder has a diameter of 7 cm and a height of 15 cm.

Work out the total surface area of the cylinder.  
Give your answer correct to 3 significant figures.



$$\text{Total s.a.} = 2\pi r^2 + 2\pi r h$$

$$= 2\pi(3.5)^2 + 2\pi(3.5)(15) \text{ Radius} = 3.5 \text{ cm}$$

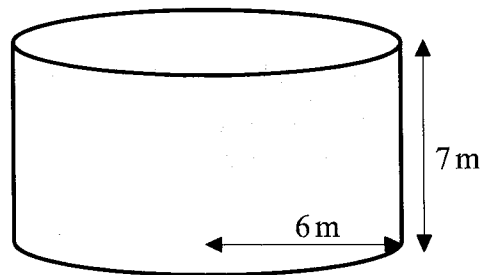
$$= 407 \text{ cm}^2$$

407 cm<sup>2</sup>

(Total for Question 4 is 3 marks)

- 5 A solid cylinder has a radius of 6 m and a height of 7 m.

Work out the total surface area of the cylinder.  
Give your answer in terms of  $\pi$ .



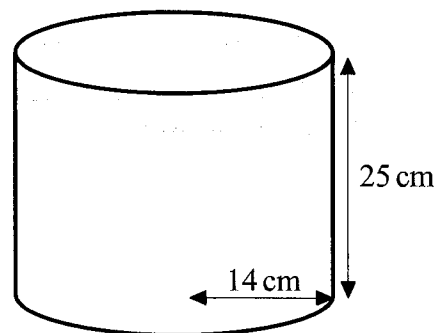
$$\begin{aligned}\text{Total s.a} &= 2\pi r^2 + 2\pi r h \\ &= 2\pi (6)^2 + 2\pi (6)(7) \\ &= 156\pi\end{aligned}$$

$$156\pi \text{ m}^2$$

(Total for Question 5 is 4 marks)

- 6 A solid cylinder has a radius of 14 cm and a height of 25 cm.

Work out the volume of the cylinder.  
Give your answer correct to 3 significant figures.



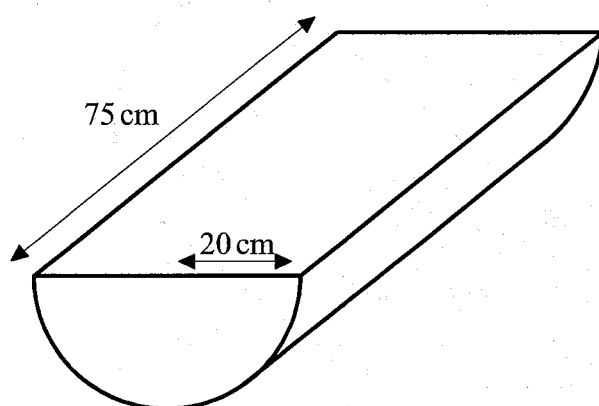
$$\begin{aligned}\text{Volume} &= \pi r^2 h \\ &= \pi (14)^2 (25) \\ &= 15400 \text{ cm}^3\end{aligned}$$

$$15400 \text{ cm}^3$$

(Total for Question 6 is 4 marks)

7

A solid cylinder is cut in half to form a semi-cylinder with a radius of 20 cm and a length of 75 cm.



- (a) Work out the volume of the semi-cylinder.  
Give your answer correct to 3 significant figures.

$$\begin{aligned} \text{volume} &= \frac{\pi r^2}{2} \times h \\ &= \frac{\pi (20)^2}{2} \times 75 \\ &= 47100 \text{ cm}^3 \end{aligned}$$

$$\underline{\underline{47100}} \text{ cm}^3 \quad (3)$$

- (b) Work out the total surface area of the semi-cylinder.  
Give your answer correct to 3 significant figures.

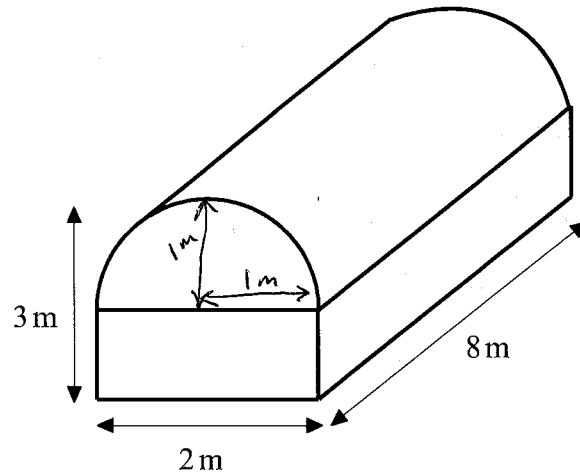
$$\begin{aligned} \text{Total surface area} &= \text{2 semi circles} + \text{top rectangle} + \text{curved rectangle} \\ &= \pi (20)^2 + 40 \times 75 + \frac{\cancel{2} \pi \cancel{r}^{(20)}}{\cancel{2}} \times 75 \\ &= 8970 \text{ cm}^2 \end{aligned}$$

$$\underline{\underline{8970}} \text{ cm}^2 \quad (3)$$

(Total for Question 7 is 6 marks)

8

A solid is formed by placing a half cylinder on a rectangular prism. The solid has a width of 2 m, a total height of 3 m and a length of 8 m.



Work out the volume of the solid.  
Give your answer correct to 3 significant figures.

$$\text{Radius} = 1\text{ m}$$

$$\text{volume of half cylinder} = \frac{\pi r^2}{2} \times L$$

$$= \frac{\pi (1)^2}{2} \times 8 = 4\pi$$

$$\begin{aligned} \text{volume of prism} &= 2 \times 2 \times 8 \\ &= 32 \text{ m}^3 \end{aligned}$$

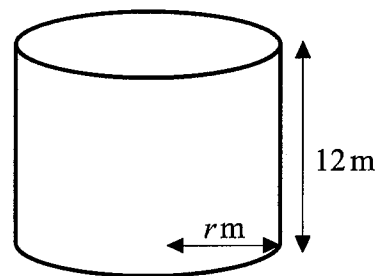
$$\begin{aligned} \text{total volume} &= 4\pi + 32 \\ &= 44.6 \text{ m}^3 \end{aligned}$$

44.6 m<sup>3</sup>

(Total for Question 8 is 4 marks)

- 9 A solid cylinder has a radius of  $r$  m and a height of 12 m.

The volume of the cylinder is  $507\pi$  m<sup>3</sup>.  
Find the value of  $r$ .



$$\text{volume} = \pi r^2 h$$

$$507\pi = \pi r^2 (12)$$

$$507 = r^2 (12)$$

$$r^2 = \frac{507}{12}$$

$$r = \sqrt{\frac{507}{12}}$$

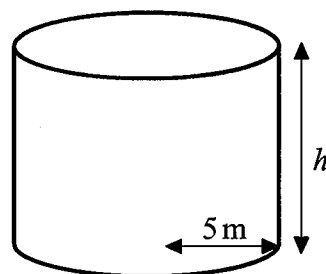
$$= 6.5 \text{ m}$$

$$r = \underline{6.5}$$

(Total for Question 9 is 4 marks)

- 10 A solid cylinder has a radius of 5 m and a height of  $h$  m.

The total surface area of the cylinder is  $165\pi$  m<sup>2</sup>.  
Find the value of  $h$ .



$$\text{surface area} = 2\pi r^2 + 2\pi r h$$

$$165\pi = 2\pi(5)^2 + 2\pi(5)(h)$$

$$165\pi = 50\pi + 10\pi h$$

$$-50\pi \quad -50\pi$$

$$115\pi = 10\pi h$$

$$115 = 10h$$

$$h = 11.5 \text{ m}$$

$$h = \underline{11.5}$$

(Total for Question 10 is 4 marks)

11

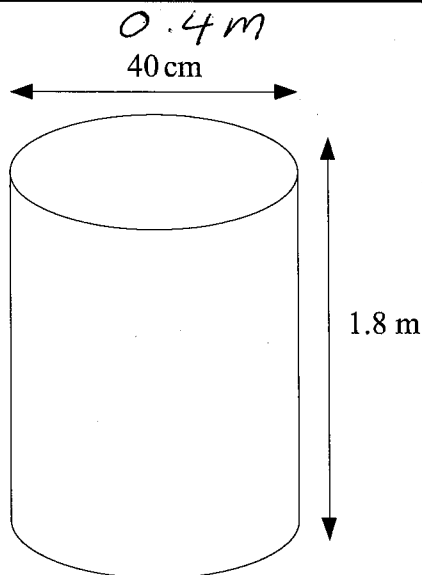
The diagram shows a cylindrical tank.  
The tank has a top and a bottom.

5 of these tanks are going to be painted.  
Each tank has a diameter of 40 cm and a height of 1.8 m.

Each pot of paint can cover  $4 \text{ m}^2$ .

How many pots of paint are needed to paint the 5 tanks?

$$r = 0.2 \text{ m}$$



$$\begin{aligned} \text{surface area} &= 2\pi r^2 + 2\pi r h \\ &= 2\pi (0.2)^2 + 2\pi (0.2)(1.8) \\ &= 2.513 \quad \text{m}^2 \end{aligned}$$

$$\begin{aligned} \text{Total area of 5 tanks} &= 5 \times "2.513" \\ &= 12.566 \quad \text{m}^2 \end{aligned}$$

$$\frac{12.566}{4} = 3.14$$

$$= \underline{\underline{4 \text{ pots of paint}}}$$

.....4.....pots

(Total for Question 11 is 4 marks)