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

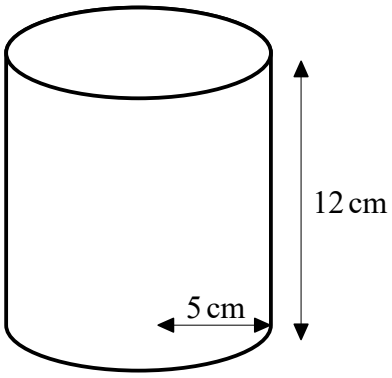
- The marks for each Question are shown in brackets
– *use this as a guide as to how much time to spend on each Question.*

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 π.



volume = area of circle × height

$= \pi r^2 \times h$

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

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

300π ..... cm^3

(Total for Question 1 is 3 marks)

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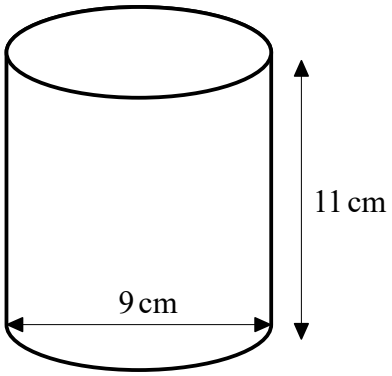
2 A cylinder has a diameter of 9 cm and a height of 11 cm.

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



$\text{radius} = \frac{9}{2} = 4.5 \text{ cm}$

$\text{volume} = \pi (4.5)^2 (11)$

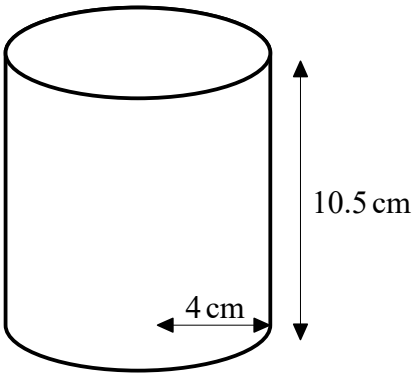
$= 699.8 \text{ cm}^3$

699.8 ..... cm^3

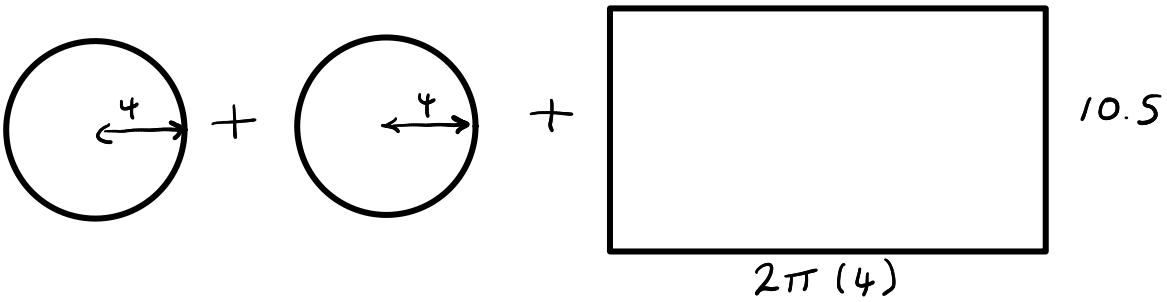
(Total for Question 2 is 3 marks)

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.



2 circles + circumference x height



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

364.4 cm²

364.4 ..... cm²

(Total for Question 3 is 3 marks)

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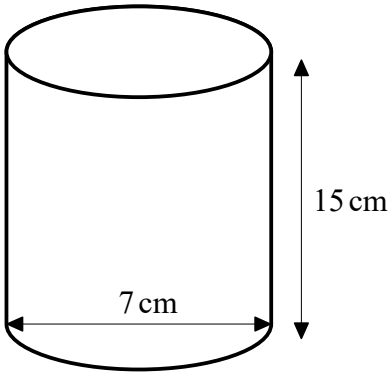
4 A solid cylinder has a diameter of 7 cm and a height of 15 cm.

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



$r = 3.5$ cm

$2\pi r^2 + 2\pi rh$

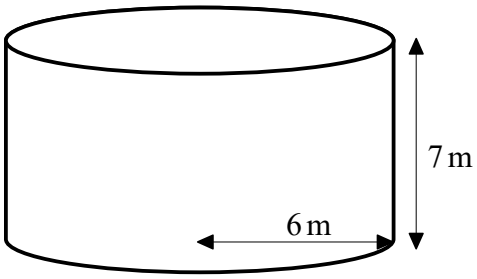
$2\pi(3.5)^2 + 2\pi(3.5)(15)$

407 cm²

407 ..... cm²

(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 π.

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

$2\pi(6)^2 + 2\pi(6) \times 7$

$156\pi \quad m^2$

156π m^2

(Total for Question 5 is 4 marks)

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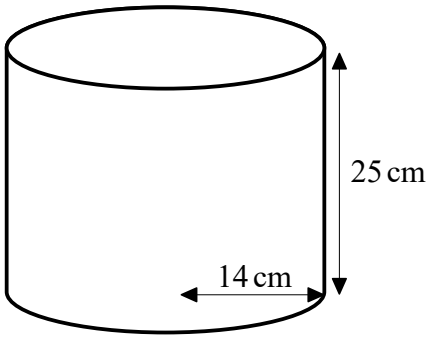
6 A solid cylinder has a radius of 14 cm and a height of 25 cm.



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

volume = area of circle × height

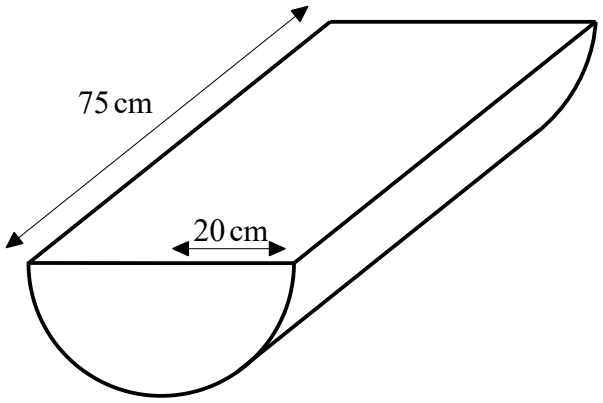
$= \pi(14)^2 \times 25$

$= 15400 \text{ cm}^3$

15400 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.

volume = area of semi-circle × length

$= \frac{\pi(20)^2}{2} \times 75$

$= 47100 \text{ cm}^3$

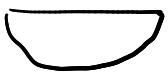
47100 ..... cm^3

(3)

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

Area of semi circle $= \frac{\pi(20)^2}{2} = 200\pi$

half of circumference $= \frac{2\pi(20)}{2} = 20\pi$

 + + top + curved face

$200\pi + 200\pi + 40 \times 75 + 20\pi \times 75$

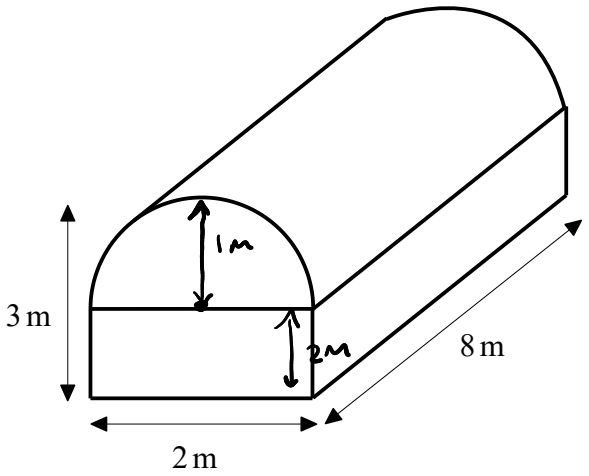
8969.0 cm^2

8970 ..... cm^2

(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.

radius = 1m

Area of semi circle $= \frac{\pi (1)^2}{2} = \frac{\pi}{2}$

Area of cross section $= 2 \times 2 + \frac{\pi}{2}$

$= 5.57 \ m^2$

volume $= 5.57 \times 8$

$= 44.566 \ m^3$

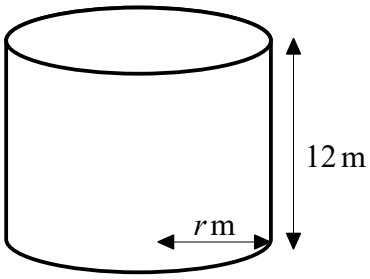
$= 44.6 \ m^3$

44.6 m³

(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 507π m^3.
Find the value of r.



$\pi r^2 \times 12 = 507\pi$

$12r^2 = 507$

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

$r^2 = 42.25$

$r = \sqrt{42.25}$

$= 6.5$ m

$r =$ 6.5

(Total for Question 9 is 4 marks)

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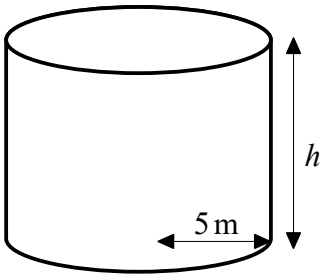
10 A solid cylinder has a radius of 5 m and a height of h m.

The total surface area of the cylinder is 165π m^2.
Find the value of h.



$2\pi r^2 + 2\pi rh = 165\pi$

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

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

$10\pi h = 115\pi$

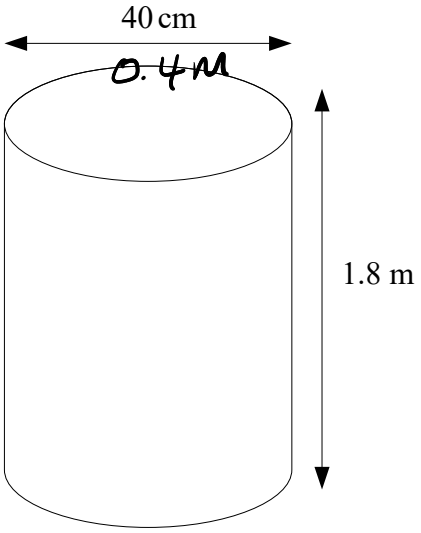
$10h = 115$

$h = 11.5$ m

$h =$ 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 m².

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

$r = 0.2m$

Area of circle $= \pi (0.2)^2$

circumference $= 0.4\pi$

surface area $= 2\pi(0.2)^2 + 0.4\pi(1.8)$

$= \frac{4}{5}\pi$

$= 2.51\ m^2$

5 tanks $2.51 \times 5 = 12.6\ m^2$

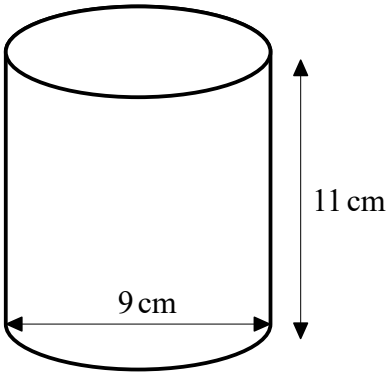
$\frac{12.6}{4} = 3.14$ pots of paint

4 pots are needed

4 pots

(Total for Question 11 is 4 marks)

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



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

$r = 4.5$

$\text{volume} = \pi (4.5)^2 \times 11$

$= 699.8 \text{ cm}^3$

699.8 cm^3

(3)

(b) The volume of another cylinder is 1500 cm^2.
Michael says that 1500cm^2 is the same as 15 m^2.

Is Michael correct?
You must give a reason for your answer.

$1 m^2 =$

$= 100 \times 100$

$= 10000 \text{ cm}^2$

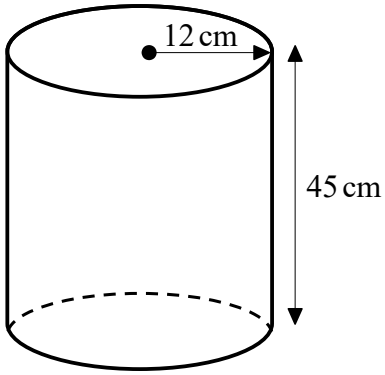
No.

$15 m^2$ is the same as 15000 cm^2

(1)

(Total for Question 12 is 4 marks)

13 The diagram shows an empty tank in the shape of a cylinder.



The cylinder has radius 12 cm and height 45 cm.

Water flows into the tank at a rate of 1.8 litres per minute.

Calculate the number of minutes it will take to completely fill the tank.
Give your answer correct to the nearest minute.

volume $= \pi(12)^2(45)$
$= 20357.5 \text{ cm}^3$

$1000 \text{ cm}^3 = 1 \text{ litre}$

volume $= 20.3575$ litres

$\frac{20.3575}{1.8} = 11.3$ minutes

11 minutes

(Total for Question 13 is 4 marks)