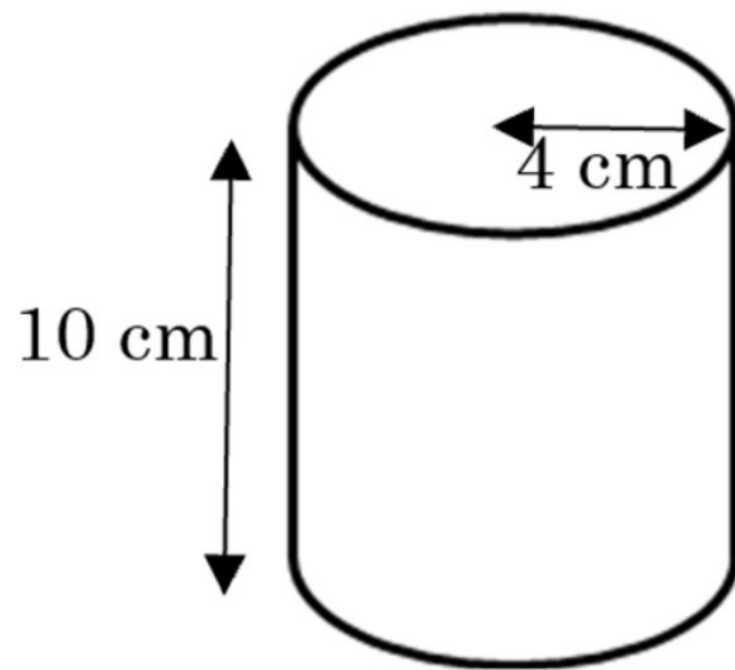


Volume and Surface Area of Cylinder Exam Practice



Q1.



a) Work out the volume of the shape shown to 1 d.p.

$$\begin{aligned}V &= \pi r^2 h \\ &= \pi (4)^2 10 \\ &= 502.65\dots\end{aligned}$$

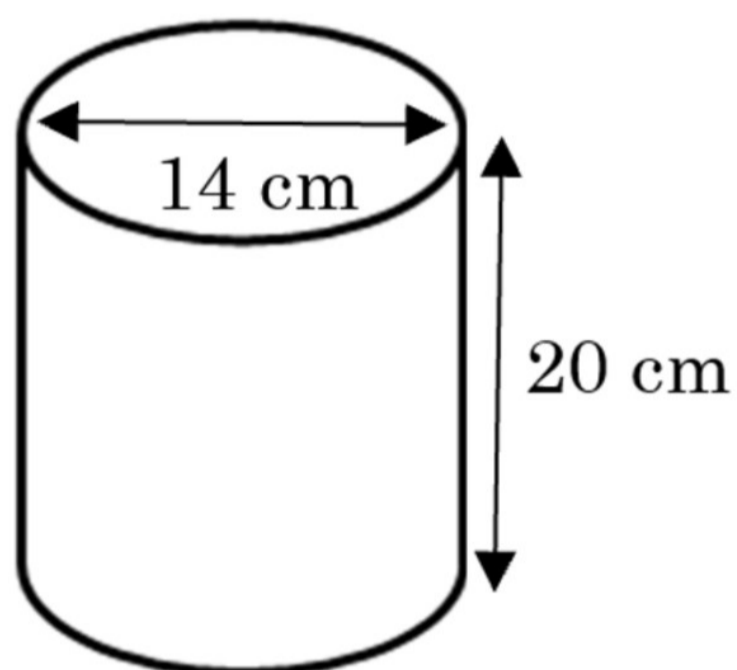
Answer: 502.7 cm³
(2 marks)

b) Work out the surface area of the shape shown to 1 d.p.

$$\begin{aligned}S &= 2\pi r^2 + 2\pi r h \\ &= 2\pi (4)^2 + 2\pi (4)(10) \\ &= 351.85\dots\end{aligned}$$

Answer: 351.9 cm²
(2 marks)

Q2.



a) Work out the volume of the shape shown to 1 d.p.

$$\begin{aligned}r &= \frac{14}{2} \Rightarrow r = 7 \\V &= \pi r^2 h \\V &= \pi (7)^2 20 \\&= 3078.758 \dots\end{aligned}$$

Answer: 3078.8 cm³
(2 marks)

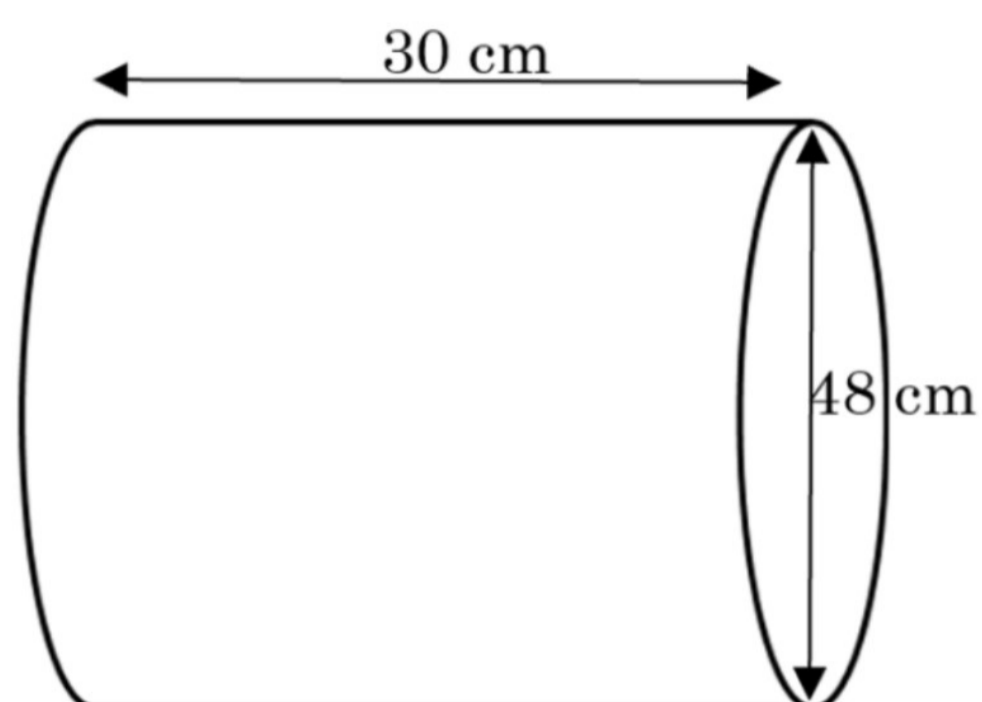
b) Work out the surface area of the shape shown to 1 d.p.

$$\begin{aligned}S &= 2\pi r^2 + 2\pi r h \\&= 2\pi (7)^2 + 2\pi (7)(20) \\&= 1187.521 \dots \text{ cm}^2\end{aligned}$$

Answer: 1187.5 cm²
(2 marks)



Q3.



Work out the volume of the shape shown. Leave your answer in terms of π .

$$r = 48/2 \Rightarrow r = 24$$

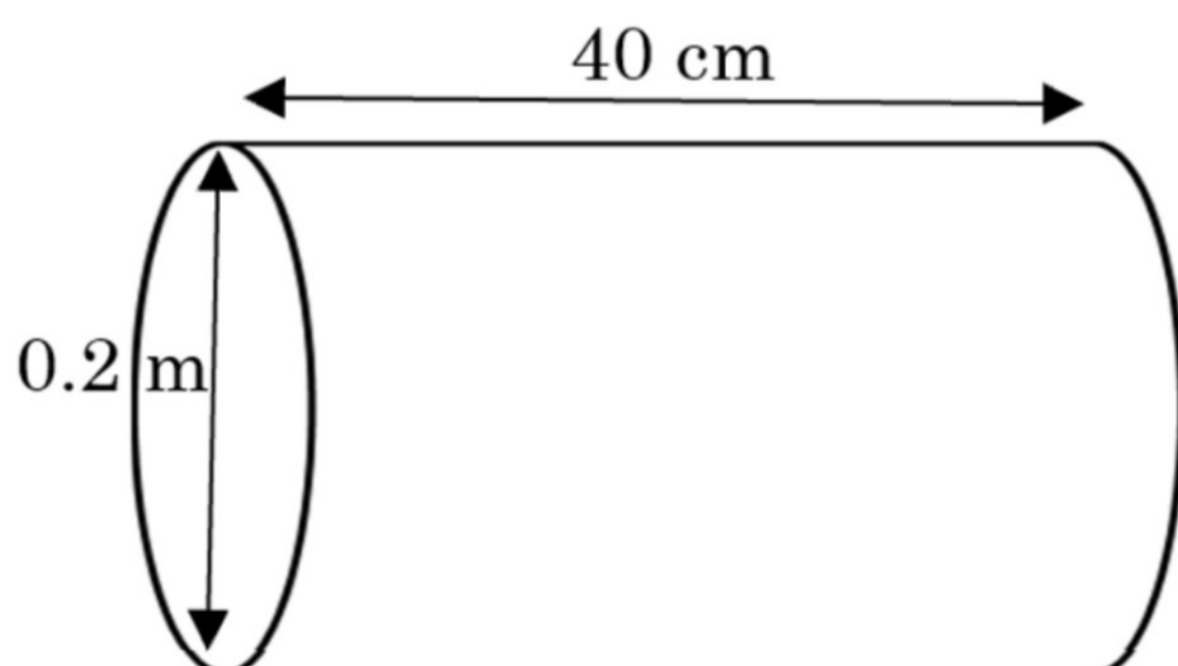
$$V = \pi r^2 h$$

$$V = \pi (24)^2 (30)$$

$$V = 17280\pi$$

Answer: $17280\pi \text{ cm}^3$
(2 marks)

Q4. Work out the surface area of the shape shown. Leave your answer in terms of π .



$$r = 0.2/2 \Rightarrow r = 0.1 \text{ m}$$

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

$$V = 2\pi (0.1)^2 + 2\pi (0.1) 40$$

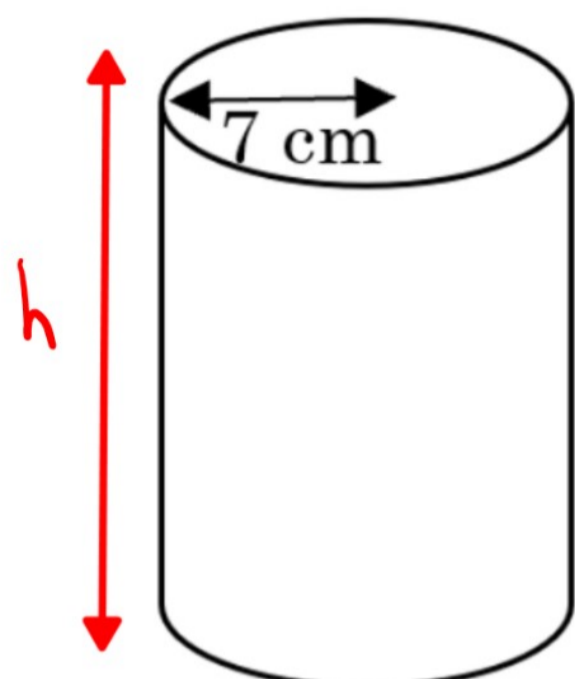
$$V = 0.02\pi + 8\pi$$

$$V = 8.02\pi$$

Answer: $8.02\pi \text{ cm}^2$
(3 marks)



Q4. The volume of the cylinder is $392\pi \text{ cm}^3$ shown. Find the height of the cylinder.



$$V = \pi r^2 h$$

$$392\pi = \pi (7)^2 h$$

$$392 = 49h$$

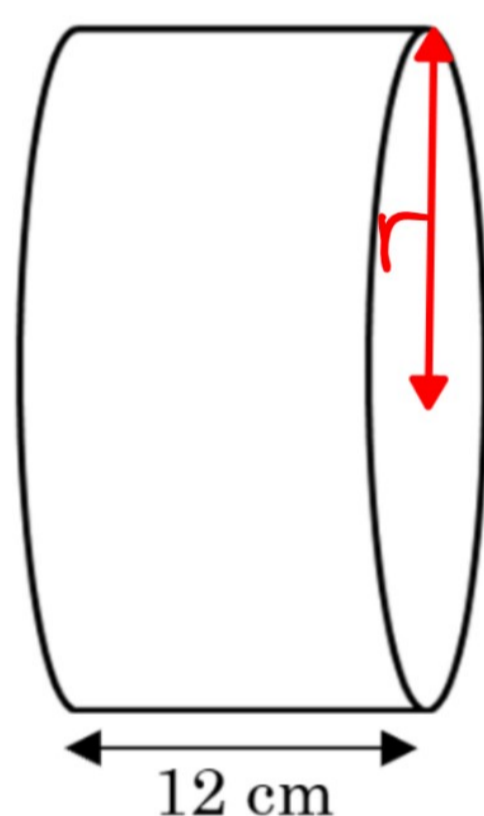
$$h = \frac{392}{49}$$

$$h = 8$$

Answer: 8 cm

(3 marks)

Q5. The volume of the cylinder is $8112\pi \text{ cm}^3$ shown. Find the radius of the cylinder.



$$V = \pi r^2 h$$

$$8112\pi = \pi r^2 (12)$$

$$8112 = 12r^2$$

$$\frac{8112}{12} = r^2$$

$$r^2 = 676$$

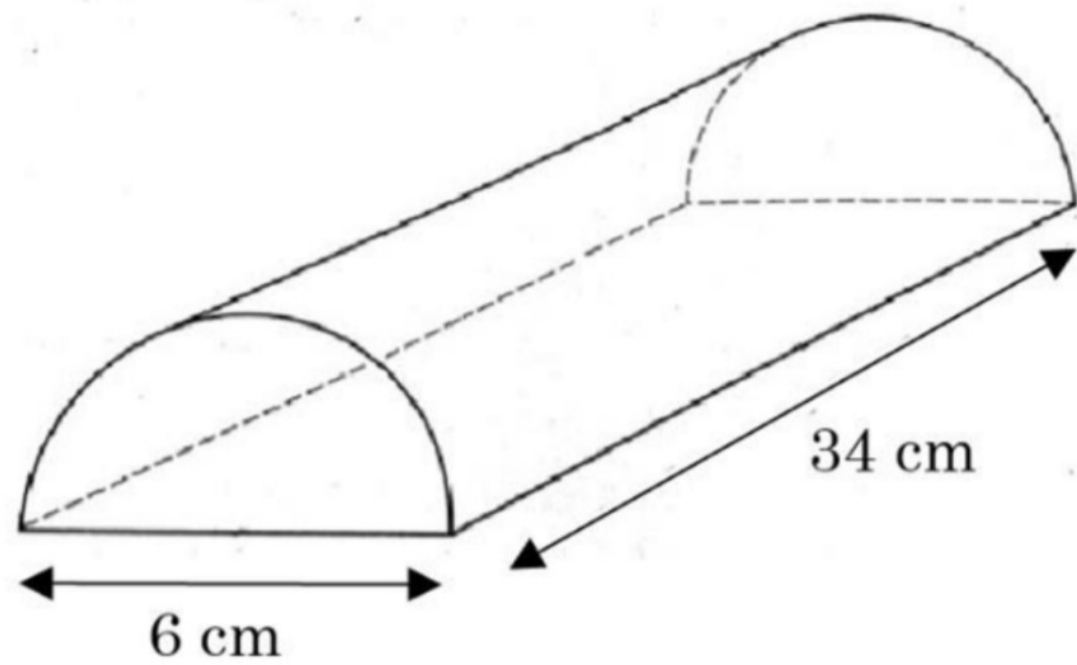
$$r = \sqrt{676}$$

$$r = 26$$

Answer: 26 cm

(3 marks)

Q6.



a) Work out the volume of the shape shown to 1 d.p.

$$V = \pi r^2 h \quad (\text{full cylinder})$$

$$V = \pi (3)^2 (34) \quad \text{where } r = 6/2 \\ r = 3$$

$$V = 306\pi$$

$$\Rightarrow \text{vol of half-cylinder} = \frac{306\pi}{2} \\ = 153\pi$$

Answer: 480.7 cm³
(3 marks)

b) Work out the surface area of the shape shown to 1 d.p.

$$\begin{aligned} \bullet \text{ Curved surface} &= \frac{1}{2} (\text{surface area of cylinder}) \\ &= \frac{1}{2} (2\pi(3)^2 + 2\pi(3)(34)) \\ &= \frac{1}{2} (18\pi + 204\pi) \\ &= \frac{1}{2} (222\pi) \\ &= 111\pi \end{aligned}$$

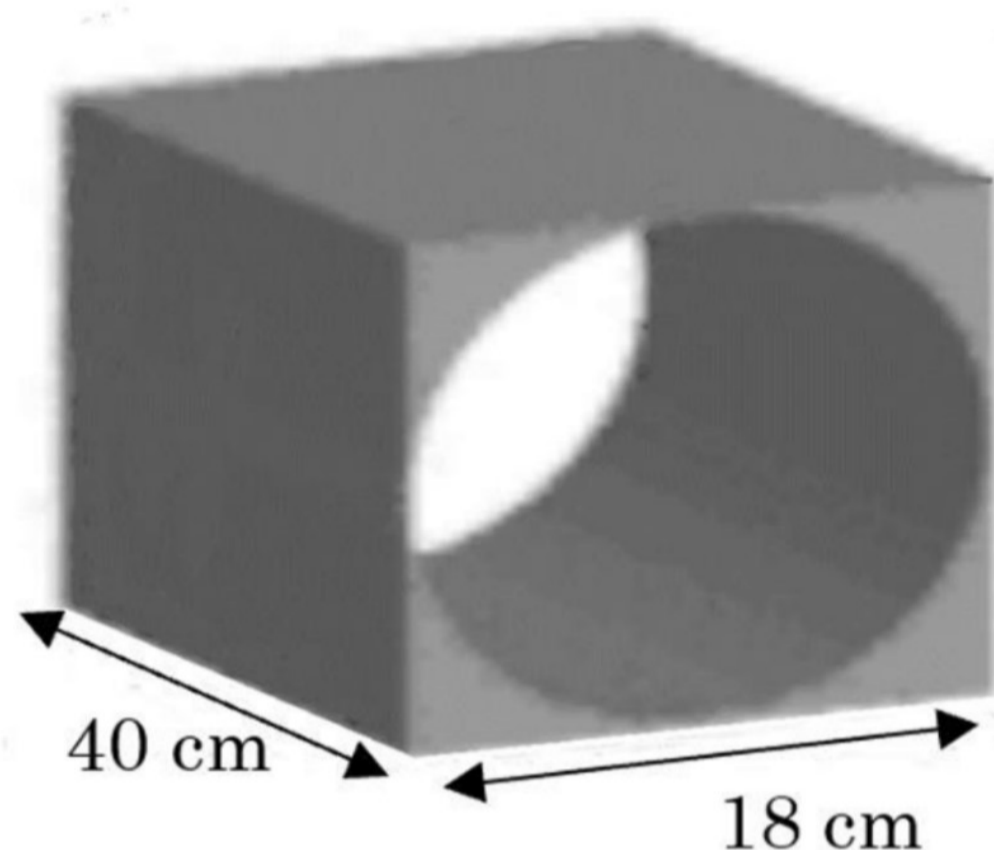
$$\begin{aligned} \bullet \text{ Flat base area} &= \text{diameter} \times \text{length} \\ &= 6 \times 34 \\ &= 204 \end{aligned}$$

$$\bullet \text{ Total} = 111\pi + 204$$

Answer: 552.7 cm²
(3 marks)



Q8. A cylinder is cut out of a wooden block in the shape of a cuboid.
Work out the volume of the wood which remains.
Leave your answer in terms of π .

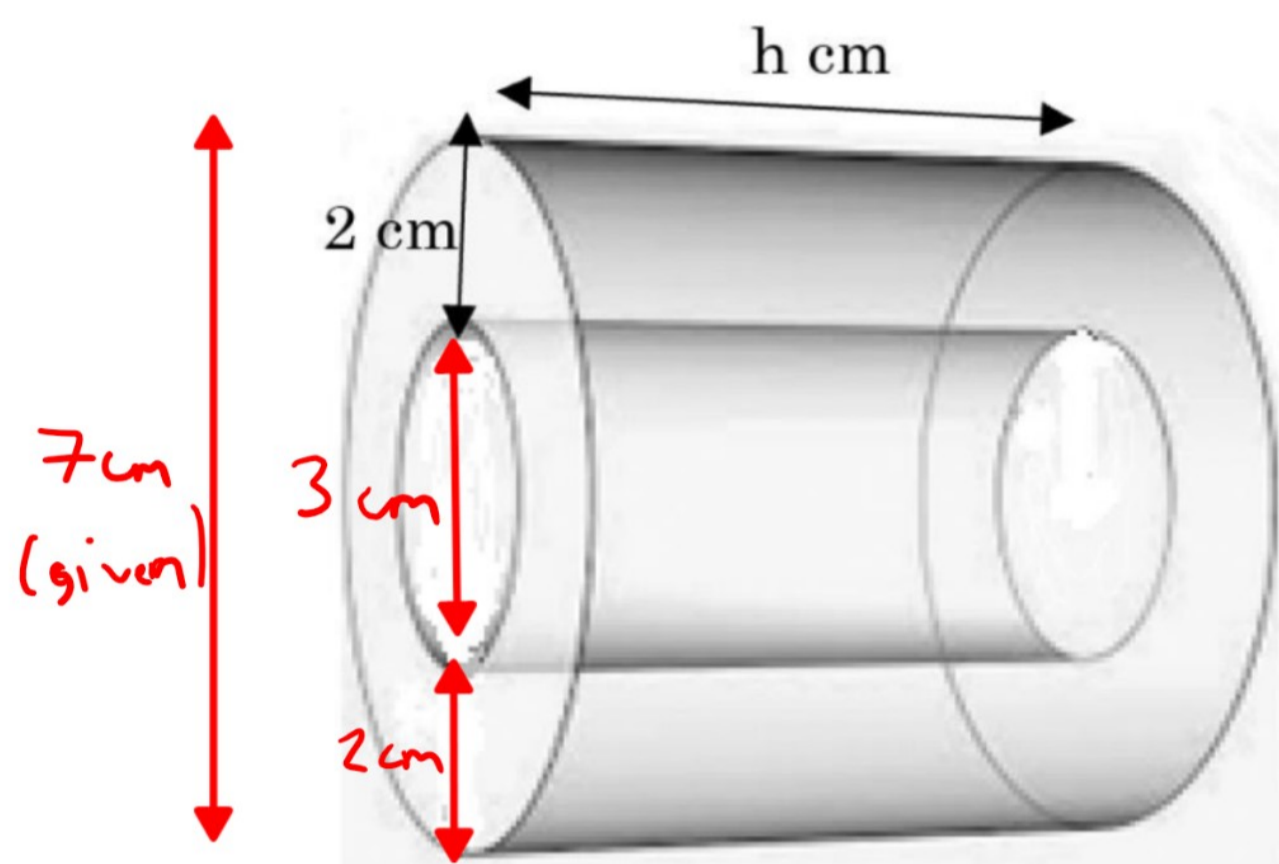


- Vol. required = vol. of cuboid - vol. of cylinder
- vol. cube = $40 \times 18 \times 18$
 $= 12960 \text{ cm}^3$
- Vol. cylinder = $\pi r^2 h$
 $= \pi (9)^2 40$
 $= 3240 \pi \text{ cm}^3$
- vol. required = $12960 - 3240 \pi \text{ cm}^3$

Answer: $12960 - 3240 \pi \text{ cm}^3$
(4 marks)



Q9. A type of component is made by forming a metal cylinder, which then has a cylinder cut, and removed, from the inside of it. The diameter of the component is 7 cm, and the thickness of the component is 2 cm as shown.



Given that the volume of the component is 4000 cm^3 , find the length h to the nearest mm.

$$\bullet \text{ vol. component} = \text{vol. outer cylinder} - \text{vol. inner cylinder}$$

$$\begin{aligned} \bullet \text{ vol. outer cylinder} &= \pi r^2 h \\ &= \pi (3.5)^2 h \\ &= 12.25 \pi h \end{aligned}$$

$$\begin{aligned} \bullet \text{ vol. inner cylinder} &= \pi (1.5)^2 h \\ &= 2.25 \pi h \end{aligned}$$

$$\bullet 4000 = 12.25 \pi h - 2.25 \pi h$$

$$\bullet 4000 = 10 \pi h$$

$$\bullet h = \frac{4000}{10 \pi}$$

$$h = 127.324 \dots$$

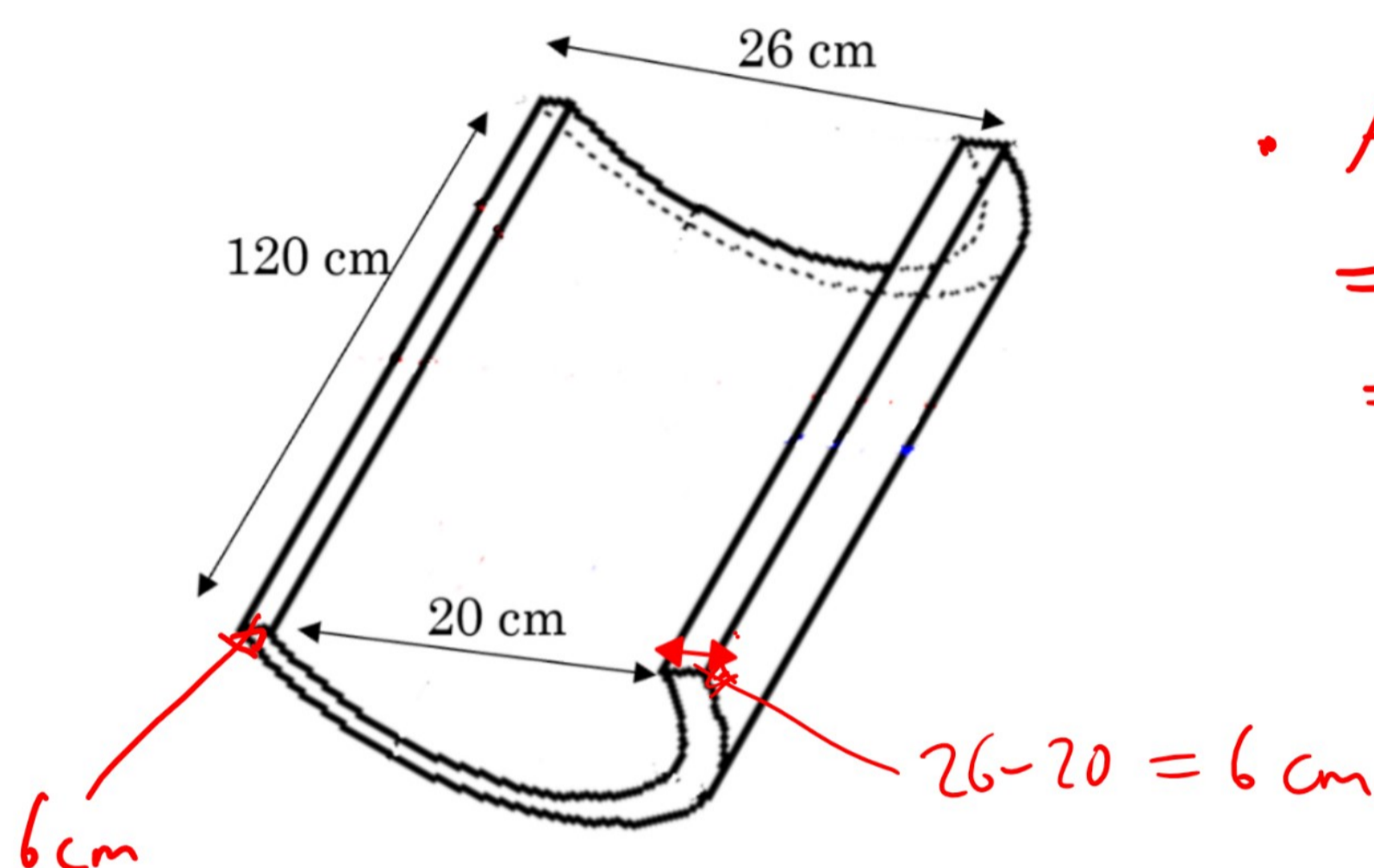
Answer: 127.3 cm

(6 marks)



Q10. A section of gutter pipe in the shape of an open half-cylinder of uniform thickness is shown below. The entire supply pipe will be formed by joining together 500 of these sections. The entire surface is to be painted in special anti-mould paint.

This type of paint costs £7.50 per can, and each can will cover 4 m^2 . How much will cost to paint the pipe?



$$\begin{aligned} \bullet \text{ Area of flat surfaces} &= (6 \times 120) \times 2 \\ &= 1440 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \bullet \text{ Area inside surface} &= \frac{1}{2} \times (\text{Curved area of cylinder, radius } 10) \\ &= \frac{1}{2} \times (2\pi(10)(120)) \\ &= 1200\pi \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \bullet \text{ Area outside surface} &= \frac{1}{2} \times (\text{Curved area of cylinder, radius } 13) \\ &= \frac{1}{2} (2\pi(13)(120)) \\ &= 1560\pi \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \bullet \text{ Total area} &= 1440 + 1200\pi + 1560\pi \\ \text{(1 section)} &= 1440 + 2760\pi \\ &= 10110.7884\dots \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \bullet \text{ Total area of pipe} &= 10110.7884 \times 500 \\ &= 5055394.20 \text{ cm}^2 \\ &= 505.54 \text{ m}^2 \end{aligned}$$

Answer: £947.89

$$\begin{aligned} \bullet \text{ Cost} &= (505.54 \div 4) \times £7.50 \\ &= £947.8875 \end{aligned}$$

(6 marks)