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Affiliated to CBSE up to +2 Level

Class: 9th

Subject: Mathematics

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Surface Areas and Volumes

EXERCISE: 11.4

Q6. Curved surface area of a right circular cylinder is 4.4 m². If the radius of the base of the cylinder is 0.7 m, find its height. Curved surface area of a right circular cylinder is 4.4 m². If the radius of the base of the cylinder is 0.7 m, find its height.

Solution: Radius (r) = 0.7 m

Let height of the cylinder be h m

Curved surface area of a cylinder = $2\pi rh$

$$= 2 \times 227 \times 710 \times hm^2$$

But the curved surface area is 4.4 m². [Given]

$$\Rightarrow 2 \times \frac{22}{7} \times \frac{7}{10} \times h = 4.4$$

$$\Rightarrow h = \frac{44}{10} \times \frac{7}{22} \times \frac{10}{7} \times \frac{1}{2} = 1 \text{ m}$$

Thus, the required height is 1 m.

Q7. The inner diameter of a circular well is 3.5 m. It is 10 m deep. Find

(i) its inner curved surface area. (ii) the cost of plastering this curved surface at the rate of ₹40 per m².

Solution : Inner diameter of the well = 3.5 m

Radius of the well (r) = 3.52, Height of the well (h) = 10 m

(i) Inner curved surface area = $2\pi rh$

$$= 2 \times \frac{22}{7} \times \frac{3.5}{2} \times 10 \text{ m}^2$$

$$= \frac{2 \times 22 \times 35 \times 10}{7 \times 2 \times 10} \text{ m}^2 = 22 \times 5 \text{ m}^2 = 110 \text{ m}^2$$

(ii) Cost of plastering per m² = Rs. 40

∴ Total cost of plastering the area 110 m²

$$= \text{Rs. } (110 \times 40) = \text{Rs. } 4400$$

Q8. In a hot water heating system, there is a cylindrical pipe of length 28 m and diameter 5 cm. Find the total radiating surface in the system.

Solution: Length of the cylindrical pipe (h) = 28 m

Diameter of the pipe = 5 cm

∴ Radius (r) = 52 cm = 5200 m

Curved surface area of a cylinder = $2\pi rh$

$$= 2 \times \frac{22}{7} \times \frac{5}{200} \times 28 \text{ m}^2 = \frac{22 \times 5 \times 4}{100} \text{ m}^2$$

$$= 4.4 \text{ m}^2$$

Thus, the total radiating surface is 4.4 m².

Q9. Find (i) the lateral or curved surface area of a closed cylindrical petrol storage tank that is 4.2 m in diameter and 4.5 m high.

(ii) how much steel was actually used, if 112 of the steel actually used was wasted in making the tank.

Solution: The storage tank is in the form of a cylinder.

∴ Diameter of the tank = 4.2 m

⇒ Radius (r) = $\frac{4.2}{2} = 2.1$ m

Height (h) = 4.5 m

Now, (i) Lateral (or curved) surface area of the tank = $2\pi rh$

$$= 2 \times 227 \times 2.1 \times 4.5 \text{ m}^2$$

$$= 2 \times 22 \times 0.3 \times 4.5 \text{ m}^2 = 59.4 \text{ m}^2$$

(ii) Total surface area of the tank = $2\pi r(r + h)$

$$= 2 \times 227 \times 2.1(2.1 + 4.5) \text{ m}^2$$

$$= 44 \times 0.3 \times 6.6 \text{ m}^2 = 87.13 \text{ m}^2$$

Let actual area of the steel used be $x \text{ m}^2$

∴ Area of steel that was wasted = $112 \times x \text{ m}^2$

$$= x12 \text{ m}^2$$

Area of steel used = $x - x12 \text{ m}^2$

$$= \frac{12x - x}{12} \text{ m}^2 = \frac{11x}{12} \text{ m}^2$$

$$\Rightarrow \frac{11x}{12} = 87.12 \Rightarrow x = \frac{8712}{100} \times \frac{12}{11}$$

$$\Rightarrow x = \frac{104544}{1100} \Rightarrow x = 95.04$$

Thus, the required area of the steel that was actually used is 95.04 m^2 .

Q10. In figure, you see the frame of a lampshade. It is to be covered with a decorative cloth. The frame has a base diameter of 20 cm and height of 30 cm. A margin of 2.5 cm is to be given for folding it over the top and bottom of the frame. Find how much cloth is required for covering the lampshade.

Solution: The lampshade is in the form of a cylinder,

where radius (r) = $\frac{20}{2} \text{ cm} = 10 \text{ cm}$

and height = 30 cm.

A margin of 2.5 cm is to be added to the top and bottom of the frame.

∴ Total height of the cylinder, (h)

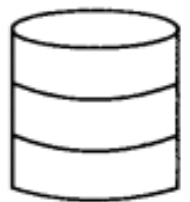
$$= 30 \text{ cm} + 2.5 \text{ cm} + 2.5 \text{ cm} = 35 \text{ cm}$$

Now, curved surface area = $2\pi rh$

$$= 2 \times 227 \times 10 \times 35 \text{ cm}^2$$

$$= 2200 \text{ cm}^2$$

Thus, the required area of the cloth = 2200 cm^2



Q11. The students of a Vidyalaya were asked to participate in a competition for making and decorating penholders in the shape of a cylinder with a base, using cardboard. Each penholder was to be of radius 3 cm and height 10.5 cm. The Vidyalaya was to supply the competitors with cardboard. If there were 35 competitors, how much cardboard was required to be bought for the competition?

Solution: Here, the penholders are in the form of cylinder.

Radius of a penholder (r) = 3 cm

Height of a penholder (h) = 10.5 cm

Since, a penholder must be open from the top.

Now, surface area of a penholder = [Lateral surface area] + [Base area]

$$= [2\pi rh] + [\pi r^2]$$

$$= \left(2 \times \frac{22}{7} \times 3 \times 10.5 \right) \text{ cm}^2 + \left(\frac{22}{7} \times 3 \times 3 \right) \text{ cm}^2$$

$$= (44 \times 3 \times 1.5) \text{ cm}^2 + \frac{198}{7} \text{ cm}^2$$

$$= 198 \text{ cm}^2 + \frac{198}{7} \text{ cm}^2$$

$$= \frac{1386 + 198}{7} \text{ cm}^2 = \frac{1584}{7} \text{ cm}^2$$

∴ Surface area of 35 penholders

$$= 35 \times \frac{1584}{7} \text{ cm}^2 = 7920 \text{ cm}^2$$

Thus, 7920 cm² of cardboard was required to be bought.