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Surface Areas and Volumes

Ex 13.2

Q1. The curved surface area of a right circular cylinder of height 14 cm is 88 cm^2. Find the diameter of the base of the cylinder.

Solution: Let r be the radius of the cylinder.

Here, height (h) = 14 cm and curved surface area = 88 cm^2

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

$\Rightarrow 2\pi rh = 88$

$\Rightarrow 2 \times 227 \times r \times 14 = 88$

$\Rightarrow r = 88 \times 72 \times 22 \times 14 = 1$ cm

$\therefore$ Diameter = $2 \times r = (2 \times 1)$ cm = 2 cm

Q2. It is required to make a closed cylindrical tank of height 1 m and base diameter 140 cm from a metal sheet. How many square metres of the sheet are required for the same?

Solution: Here, height (h) = 1 m

Diameter of the base = 140 cm = 1.40 m

Radius (r) = 1.402m = 0.70 m

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

$= 2 \times 227 \times 0.70(1 + 0.70)\ m^2$

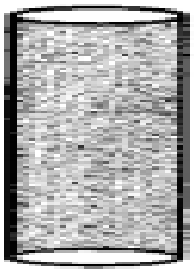
$= 2 \times 22 \times 0.10 \times 1.70\ m^2$

$= 2 \times 22 \times 10100 \times 170100 m^2$

$= 748100 m^2 = 7.48\ m^2$

Hence, the required sheet = 7.48 m^2

Q3.A metal pipe is 77 cm long. The inner ft diameter of a cross section is 4 cm, the outer diameter being 4.4 cm (see figure). Find its (i) inner curved surface area. (ii) outer curved surface area. (iii) total surface area.



Solution: Length of the metal pipe = 77 cm

It is in the form of a cylinder.

$\therefore$ Height of the cylinder (h) = 77 cm

Inner diameter = 4 cm

Inner radius (r) = 42 cm = 2 cm

Outer diameter = 4.4 cm

$\Rightarrow$ Outer radius (R) = 4.42 cm = 2.2 cm

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

$= 2 \times 227 \times 2 \times 77\ cm^2$

$= 2 \times 22 \times 2 \times 11\ cm^2 = 968\ cm^2$

(ii) (ii) Outer curved surface area = $2\pi Rh$

$$= 2 \times \frac{22}{7} \times 2.2 \times 77 \text{ cm}^2$$

$$= \frac{2 \times 22 \times 22 \times 11}{10} \text{ cm}^2 = \frac{10648}{10} \text{ cm}^2$$

$$= 1064.8 \text{ cm}^2$$

(iii)Total surface area =

[Inner curved surface area] + [Outer curved surface area] + [Area of two circular ends]

$= [2\pi rh] + [2\pi Rh] + 2[\pi (R^2 - r^2)]$

$= [968 \text{ cm}^2] + [1064.8 \text{ cm}^2]$

$= [968 \text{ cm}^2] + [1064.8 \text{ cm}^2]$

$$+ 2 \times \frac{22}{7} (2.2^2 - 2^2) \text{cm}^2$$

$$= 968 \text{ cm}^2 + 1064.8 \text{ cm}^2 + \frac{2 \times 22}{7} (4.84 - 4) \text{ cm}^2$$

$$= 2032.8 \text{ cm}^2 + \frac{2 \times 22 \times 0.84}{7} \text{ cm}^2$$

$$= 2032.8 \text{ cm}^2 + 5.28 \text{ cm}^2$$

$$= 2038.08 \text{ cm}^2$$

Q4. The diameter of a roller is 84 cm and its length is 120 cm. It takes 500 complete revolutions to move once over to level a playground. Find the area of the playground in m^2.

Solution: The roller is in the form of a cylinder of diameter = 84 cm

⇒ Radius of the roller(r) = 842 cm = 42 cm

Length of the roller (h) = 120 cm

Curved surface area of the roller = $2\pi rh$

= 2 x 227 x 42 x 120 cm^2

= 2 x 22 x 6 x 120 cm^2 = 31680 cm^2

Now, area of the playground levelled in one revolution of the roller = 31680 cm^2

= 3168010000m^2

∴ Area of the playground levelled in 500

revolutions = 500 x 3168010000m^2 = 1584m^2

Q5. A cylindrical pillar is 50 cm in diameter and 3.5 m in height. Find the cost of painting the curved surface of the pillar at the rate of ₹12.50 per m^2 .

Solution: Diameter of the pillar = 50 cm

∴ Radius (r) = 502m = 25 m = 14m

and height (h) = 3.5m

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

$$= 2 \times \frac{22}{7} \times \frac{1}{4} \times 3.50 \text{ m}^2$$

$$= \frac{44 \times 350}{7 \times 4 \times 100} \text{ m}^2 = \frac{11}{2} \text{ m}^2$$

∴ Curved surface area to be painted = 112m^2

∴ Cost of painting of 1 m^2 pillar = Rs. 12.50

∴ Cost of painting of 112 m^2 pillar= Rs. (112 x 12.50)

= Rs. 68.75.