



## Exercise 20B

Q11.

**Answer :**

$$\text{Curved surface area} = 2\pi rh = 4400 \text{ cm}^2$$

$$\text{Circumference} = 2\pi r = 110 \text{ cm}$$

$$\text{Now, height} = h = \frac{\text{curved surface area}}{\text{circumference}} = \frac{4400}{110} = 40 \text{ cm}$$

$$\text{Also, radius, } r = \frac{4400}{2\pi h} = \frac{4400 \times 7}{2 \times 22 \times 40} = \frac{35}{2}$$

$$\therefore \text{Volume} = \pi r^2 h = \frac{22}{7} \times \frac{35}{2} \times \frac{35}{2} \times 40 = 22 \times 5 \times 35 \times 10 = 38500 \text{ cm}^3$$

Q12.

**Answer :**

For the cubic pack:

Length of the side,  $a = 5 \text{ cm}$

Height = 14 cm

$$\text{Volume} = a^2 h = 5 \times 5 \times 14 = 350 \text{ cm}^3$$

For the cylindrical pack:

Base radius =  $r = 3.5 \text{ cm}$

Height = 12 cm

$$\text{Volume} = \pi r^2 h = \frac{22}{7} \times 3.5 \times 3.5 \times 12 = 462 \text{ cm}^3$$

We can see that the pack with a circular base has a greater capacity than the pack with a square base.

$$\text{Also, difference in volume} = 462 - 350 = 112 \text{ cm}^3$$

Q13.

**Answer :**

Diameter = 48 cm

Radius = 24 cm = 0.24 m

Height = 7 m

Now, we have:

$$\text{Lateral surface area of one pillar} = \pi dh = \frac{22}{7} \times 0.48 \times 7 = 10.56 \text{ m}^2$$

$$\text{Surface area to be painted} = \text{total surface area of 15 pillars} = 10.56 \times 15 = 158.4 \text{ m}^2$$

$$\therefore \text{Total cost} = \text{Rs } (158.4 \times 2.5) = \text{Rs } 396$$

Q14.

**Answer :**

Volume of the rectangular vessel =  $22 \times 16 \times 14 = 4928 \text{ cm}^3$

Radius of the cylindrical vessel = 8 cm

Volume =  $\pi r^2 h$

As the water is poured from the rectangular vessel to the cylindrical vessel, we have:

Volume of the rectangular vessel = volume of the cylindrical vessel

$$\therefore \text{Height of the water in the cylindrical vessel} = \frac{\text{volume}}{\pi r^2} = \frac{4928 \times 7}{22 \times 8 \times 8} = \frac{28 \times 7}{8} = \frac{49}{2} = 24.5 \text{ cm}$$

Q15.

**Answer :**

Diameter of the given wire = 1 cm

Radius = 0.5 cm

Length = 11 cm

Now, volume =  $\pi r^2 h = \frac{22}{7} \times 0.5 \times 0.5 \times 11 = 8.643 \text{ cm}^3$

The volumes of the two cylinders would be the same.

Now, diameter of the new wire = 1 mm = 0.1 cm

Radius = 0.05 cm

$$\therefore \text{New length} = \frac{\text{volume}}{\pi r^2} = \frac{8.643 \times 7}{22 \times 0.05 \times 0.05} = 1100.02 \text{ cm} \cong 11 \text{ m}$$

Q16.

**Answer :**

Length of the edge,  $a = 2.2 \text{ cm}$

Volume of the cube =  $a^3 = (2.2)^3 = 10.648 \text{ cm}^3$

Volume of the wire =  $\pi r^2 h$

Radius = 1 mm = 0.1 cm

As volume of cube = volume of wire, we have:

$$h = \frac{\text{volume}}{\pi r^2} = \frac{10.648 \times 7}{22 \times 0.1 \times 0.1} = 338.8 \text{ cm}$$

Q17.

**Answer :**

Diameter = 7 m

Radius = 3.5 m

Depth = 20 m

Volume of the earth dug out =  $\pi r^2 h = \frac{22}{7} \times 3.5 \times 3.5 \times 20 = 770 \text{ m}^3$

Volume of the earth piled upon the given plot =  $28 \times 11 \times h = 770 \text{ m}^3$

$$\therefore h = \frac{770}{28 \times 11} = \frac{70}{28} = 2.5 \text{ m}$$

Q18.

**Answer :**

Inner diameter = 14 m

i.e., radius = 7 m

Depth = 12 m

Volume of the earth dug out =  $\pi r^2 h = \frac{22}{7} \times 7 \times 7 \times 12 = 1848 \text{ m}^3$

Width of embankment = 7 m

Now, total radius =  $7 + 7 = 14 \text{ m}$

**Volume of the embankment = total volume – inner volume**

$$= \pi r_o^2 h - \pi r_i^2 h = \pi h (r_o^2 - r_i^2)$$

$$= \frac{22}{7} h (14^2 - 7^2) = \frac{22}{7} h (196 - 49)$$

$$= \frac{22}{7} h \times 147 = 21 \times 22h$$

$$= 462 \times h \text{ m}^3$$

Since volume of embankment = volume of earth dug out, we have:

$$1848 = 462 h$$

$$\Rightarrow h = \frac{1848}{462} = 4 \text{ m}$$

$\therefore$  Height of the embankment = 4 m

Q19.

**Answer :**

Diameter = 84 cm

i.e., radius = 42 cm

Length = 1 m = 100 cm

Now, lateral surface area =  $2\pi rh = 2 \times \frac{22}{7} \times 42 \times 100 = 26400 \text{ cm}^2$

$\therefore$  Area of the road

$$= \text{lateral surface area} \times \text{no. of rotations} = 26400 \times 750 = 19800000 \text{ cm}^2 = 1980 \text{ m}^2$$

Q20.

**Answer :**

Thickness of the cylinder = 1.5 cm

External diameter = 12 cm

i.e., radius = 6 cm

also, internal radius = 4.5 cm

Height = 84 cm

Now, we have the following:

$$\text{Total volume} = \pi r^2 h = \frac{22}{7} \times 6 \times 6 \times 84 = 9504 \text{ cm}^3$$

$$\text{Inner volume} = \pi r^2 h = \frac{22}{7} \times 4.5 \times 4.5 \times 84 = 5346 \text{ cm}^3$$

$$\text{Now, volume of the metal} = \text{total volume} - \text{inner volume} = 9504 - 5346 = 4158 \text{ cm}^3$$

$$\therefore \text{Weight of iron} = 4158 \times 7.5 = 31185 \text{ g} = 31.185 \text{ kg} \quad [\text{Given: } 1 \text{ cm}^3 = 7.5 \text{ g}]$$

Q21.

**Answer :**

Length = 1 m = 100 cm

Inner diameter = 12 cm

Radius = 6 cm

$$\text{Now, inner volume} = \pi r^2 h = \frac{22}{7} \times 6 \times 6 \times 100 = 11314.286 \text{ cm}^3$$

Thickness = 1 cm

Total radius = 7 cm

Now, we have the following:

$$\text{Total volume} = \pi r^2 h = \frac{22}{7} \times 7 \times 7 \times 100 = 15400 \text{ cm}^3$$

$$\text{Volume of the tube} = \text{total volume} - \text{inner volume} = 15400 - 11314.286 = 4085.714 \text{ cm}^3$$

$$\text{Density of the tube} = 7.7 \text{ g/cm}^3$$

$$\therefore \text{Weight of the tube} = \text{volume} \times \text{density} = 4085.714 \times 7.7 = 31459.9978 \text{ g} = 31.459 \text{ kg}$$

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