



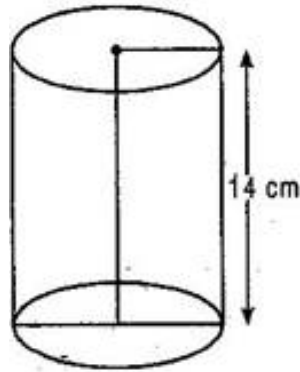
NCERT solutions for class-9 maths surface areas and volumes Ex
13.2

Assume $\pi = \frac{22}{7}$ **unless stated otherwise**

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.

Ans: Given: Height of cylinder (h) = 14 cm,
Curved Surface Area = 88 cm^2

Let radius of base of right circular cylinder = r cm



$$2\pi rh = 88$$

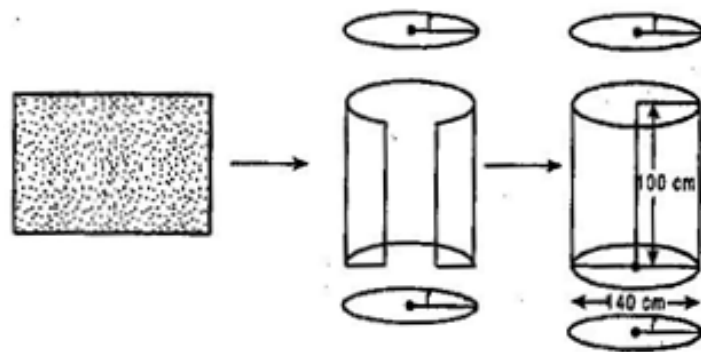
$$\Rightarrow 2 \times \frac{22}{7} \times r \times 14 = 88$$

$$\Rightarrow r = 88 \times \frac{7}{22} \times \frac{1}{14} \times \frac{1}{2}$$

$$\Rightarrow r = 1 \text{ cm}$$

Diameter of the base of the cylinder = $2r = 2 \times 1$
= 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 meters of the sheet are required for the same?



Ans: Given: Diameter = 140 cm

\Rightarrow Radius (r) = 70 cm = 0.7 m

Height of the cylinder (h) = 1 m

Total Surface Area of the cylinder

$$= 2\pi r(r + h)$$

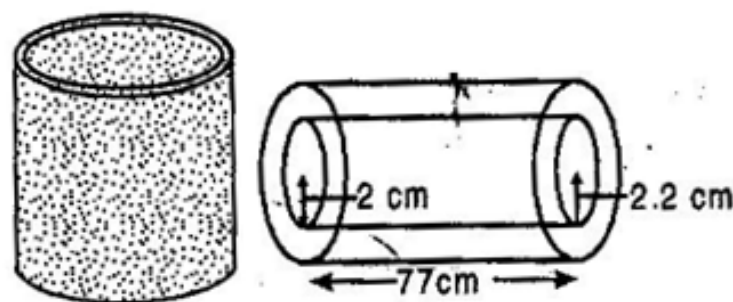
$$= 2 \times \frac{22}{7} \times 0.7(0.7 + 1)$$

$$= 2 \times 22 \times 0.7 \times 1.7 = 7.48 \text{ m}^2$$

Hence 7.48 m^2 metal sheet is required to make the close cylindrical tank.

Q3. A metal pipe is 77 cm long. The inner diameter of a cross section is 4 cm, the outer diameter being 4.4 cm. [See fig.]. Find its:

- (i) Inner curved surface area
- (ii) Outer curved surface area
- (iii) Total surface area



Ans: (i) Length of the pipe = 77 cm, Inner diameter of cross-section = 4 cm

\Rightarrow Inner radius of cross-section = 2 cm

Inner curved surface area of pipe = $2\pi rh =$

$$2 \times \frac{22}{7} \times 2 \times 77$$

$$= 2 \times 22 \times 2 \times 11 = 968 \text{ cm}^2$$

(ii) Length of pipe = 77 cm, Outer diameter of pipe = 4.4 cm

\Rightarrow Outer radius of the pipe = 2.2 cm

Outer surface area of the pipe = $2\pi rh$

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

$$= 44 \times 2.2 \times 11 = 1064.8 \text{ cm}^2$$

(iii) Now there are two circles of radii 2 cm and 2.2 cm at both the ends of the pipe.

\therefore Area of two edges of the pipe = 2 (Area of outer circle – area of inner circle)

$$= 2(\pi R^2 - \pi r^2) = 2\pi(R^2 - r^2)$$

$$= 2 \times \frac{22}{7} [(2.2)^2 - (2)^2] = \frac{44}{7} (4.84 - 4)$$

$$= \frac{44}{7} \times 0.84 = 5.28 \text{ cm}^2$$

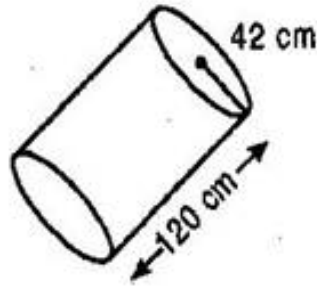
\therefore Total surface area of pipe

= Inner curved surface area + Outer curved surface area + Area of two edges

$$= 968 + 1064.8 + 5.28 = 2038.08 \text{ cm}^2$$

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 .

Ans: Diameter of roller = 84 cm



\Rightarrow Radius of the roller = 42 cm

Length (Height) of the roller = 120 cm

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

$$= 2 \times \frac{22}{7} \times 42 \times 120 = 31680 \text{ cm}^2$$

$$= 3.1680 \text{ m}^2$$

\therefore Now area leveled by roller in one revolution = 3.1680 m^2

\therefore Area leveled by roller in 500 revolutions

$$= 3.1680 \times 500 = 1584.0000 = 1584 \text{ m}^2$$

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

Ans: Diameter of pillar = 50 cm

$$\Rightarrow \text{Radius of pillar} = 25 \text{ cm} = \frac{25}{100} = \frac{1}{4} \text{ m}$$

Height of the pillar = 3.5 m

Now, Curved surface area of the pillar

$$= 2\pi rh$$

$$= 2 \times \frac{22}{7} \times \frac{1}{4} \times 3.5 = \frac{11}{2} \text{ m}^2$$

$$\therefore \text{Cost of white washing } 1 \text{ m}^2 = \text{Rs. } 12.50$$

$$\therefore \text{Cost of white washing } \frac{11}{2} \text{ m}^2$$

$$= 12.50 \times \frac{11}{2} = \text{Rs. } 68.75$$

Q6. Curved surface area of a right circular cylinder is 4.4 m^2 . If the radius of the base of the cylinder is 0.7 m , find its height.

Ans: Curved surface area of the cylinder

$$= 4.4 \text{ m}^2, \text{ Radius of cylinder} = 0.7 \text{ m}$$

Let height of the cylinder = h

$$\therefore 2\pi rh = 4.4$$

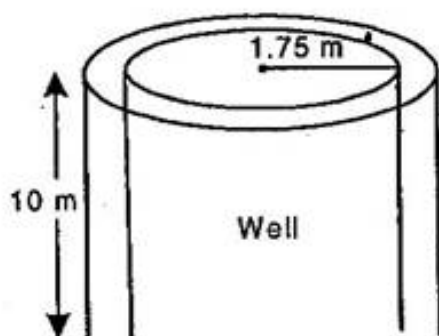
$$\Rightarrow 2 \times \frac{22}{7} \times 0.7 \times h = 4.4$$

$$\Rightarrow h = 4.4 \times 7 \times \frac{1}{22} \times \frac{1}{2}$$

$$\Rightarrow h = 1 \text{ m}$$

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 Rs. 40 per m^2 .



Ans: Inner diameter of circular well = 3.5 m

\therefore Inner radius of circular well

$$= \frac{3.5}{2} = 1.75 \text{ m}$$

And Depth of the well = 10 m

(i) Inner surface area of the well = $2\pi rh$

$$= 2 \times \frac{22}{7} \times 1.75 \times 10 = 110 \text{ m}^2$$

(ii) Cost of plastering 1 m^2 = Rs. 40

Cost of plastering 110 m^2 = 40×110 = Rs. 4400

Q8. Find:

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

(ii) how much steel was actually used if $\frac{1}{12}$ of the steel actually used was wasted in making the tank?

Ans: The length (height) of the cylindrical pipe
= 28 m

Diameter = 5 cm

$$\Rightarrow \text{Radius} = \frac{5}{2} \text{ cm}$$

\therefore Curved surface area of the pipe = $2\pi rh$

$$= 2 \times \frac{22}{7} \times \frac{5}{2} \times 2800 = 44000 \text{ cm}^2 = \frac{44000}{10000} = 4.4 \text{ m}^2$$

Ans: (i) Diameter of cylindrical petrol tank = 4.2 m

\therefore Radius of the cylindrical petrol tank

$$= \frac{4.2}{2} = 2.1 \text{ m}$$

And Height of the tank = 4.5 m

\therefore Curved surface area of the cylindrical tank = $2\pi rh$

$$= 2 \times \frac{22}{7} \times 2.1 \times 4.5 = 59.4 \text{ m}^2$$

(ii) Let the actual area of steel used be x meters

$\frac{1}{12}$
Since $\frac{1}{12}$ of the actual steel used was wasted, the area of steel which has gone into the tank.

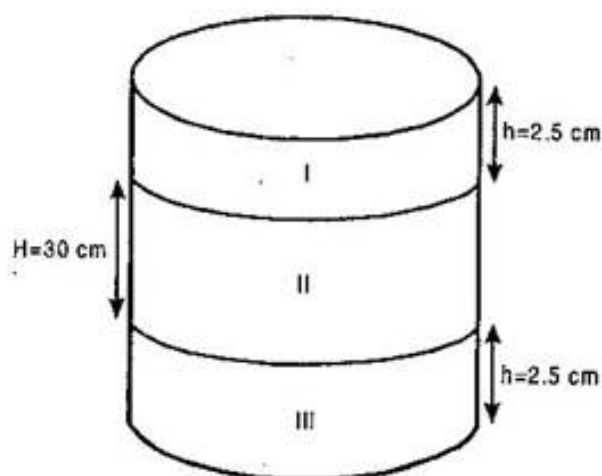
$$= x - \frac{1}{12}x = \frac{11}{12}x$$

$$\therefore \frac{11}{12}x = 59.4$$

$$\Rightarrow x = 59.4 \times \frac{12}{11} = 64.8 \text{ m}^2$$

Hence steel actually used is 64.8 m².

Q9. In the adjoining 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. [See fig.]



Ans: Height of each of the folding at the top and bottom (h) = 2.5 cm

Height of the frame (H) = 30 cm

Diameter = 20 cm

\Rightarrow Radius = 10 cm

Now cloth required for covering the lampshade

= CSA of top part + CSA of middle part + CSA of bottom part

$$= 2\pi rh + 2\pi rH + 2\pi rh$$

$$= 2\pi r(h + H + h)$$

$$= 2\pi r(H + 2h)$$

$$= 2 \times \frac{22}{7} \times 10(30 + 2 \times 2.5)$$

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

Q10. 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?

Ans: Radius of a cylindrical pen holder (r) = 3 cm

Height of the cylindrical pen holder (h)

= 10.5 cm

Cardboard required for pen holder = CSA of pen holder + Area of circular base

$$= 2\pi rh + \pi r^2 = \pi r(2h + r)$$

$$= \frac{22}{7} \times 3(2 \times 10.5 + 3) = 226.28 \text{ cm}^2$$

Since Cardboard required for making 1 pen holder = 226.28 cm²

\therefore Cardboard required for making 35 pen holders

$$= 226.28 \times 35 = 7919.8 \text{ cm}^2$$

$$= 7920 \text{ cm}^2 \text{ (approx.)}$$

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