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

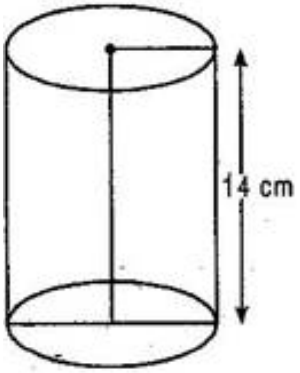
Assume $\pi = \frac{22}{7}$ unless stated otherwise

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



$2\pi rh = 88$

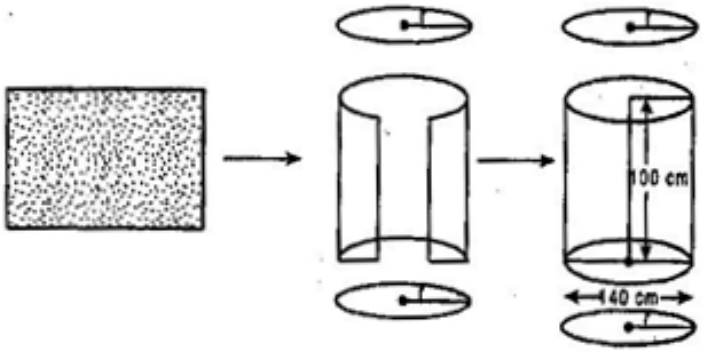
$\Rightarrow 2 \times \frac{22}{7} \times r \times 14 = 88$

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

$\Rightarrow r = 1$ cm

Diameter of the base of the cylinder = $2r$ = 2 x 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 x 22 x 0.1 x 1.7 = 7.48 m^2

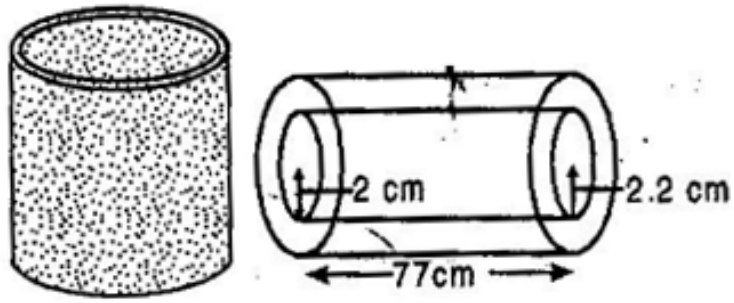
Hence 7.48 m^2 metal sheet is required to make the close cylindrical tank.

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 x 22 x 2 x 11 = 968 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 x 2.2 x 11 = 1064.8 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)

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

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

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

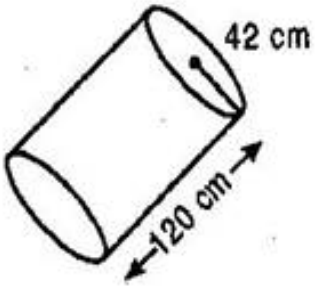
$\therefore$ Total surface area of pipe

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

= 968 + 1064.8 + 5.28 = 2038.08 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 = $2\pi rh$

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

$= 3.1680 \text{ m}^2$

$\because$ 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

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

Height of the pillar = 3.5 m

Now, Curved surface area of the pillar

$= 2\pi rh$

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

$\because$ Cost of white washing 1 m^2 = Rs. 12.50

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

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

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 m^2, Radius of cylinder = 0.7 m

Let height of the cylinder = h

$\therefore 2\pi rh = 4.4$

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

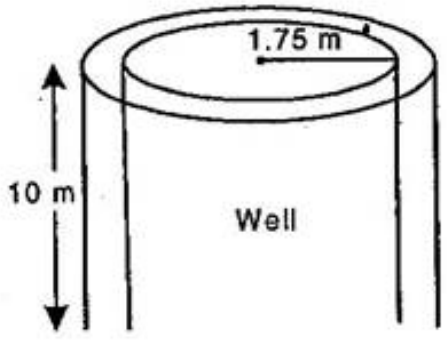
$\Rightarrow h = 4.4\times 7\times\frac{1}{22}\times\frac{1}{2}$

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

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

∴ Inner radius of circular well

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

And Depth of the well = 10 m

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

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

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

Cost of plastering 100 m^2 = 40 x 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

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

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

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

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

$\therefore$ Radius of the cylindrical petrol tank

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

And Height of the tank = 4.5 m

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

$= 2\times\frac{22}{7}\times 2.1\times 1.45 = 59.4 \text{ m}^2$

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

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

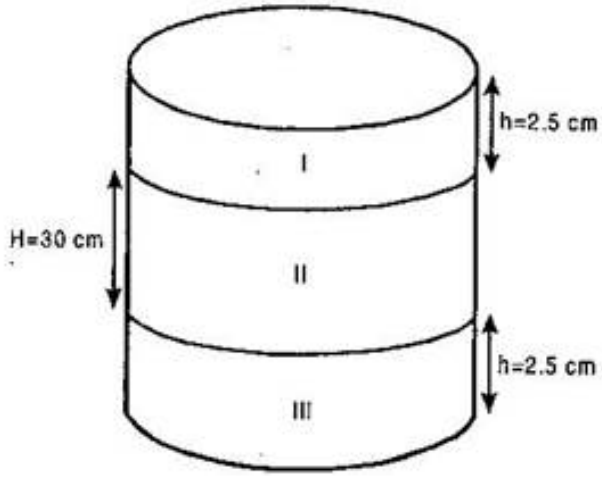
$= x - \frac{1}{12}x = \frac{11}{12}x$

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

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

Hence steel actually used is 64.8 m^2.

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

$= 2\pi rh + 2\pi r\mathrm{H} + 2\pi rh$

$= 2\pi r(h + \mathrm{H} + h)$

$= 2\pi r(\mathrm{H} + 2h)$

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

$= 2200 \text{ cm}^2$

Q10. The students of a Vidyalayawere 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 cm^2

$\therefore$ Cardboard required for making 35 pen holders = 226.28 x 35 = 7919.8 cm^2

= 7920 cm^2 (approx.)

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