SpeedLabs

MATHS

CBSE 9th

TEEVRA EDUTECH PVT. LTD.

SURFACE AREAS AND VOLUMES
Exercise- 13.2

Q.1 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. Assume $\pi = \frac{22}{7}$

Ans - Height (h) of cylinder = 14 cm

Let the diameter of the cylinder be d.

Curved surface area of cylinder = 88 cm^2

$\Rightarrow 2\pi rh = 88\ cm^2$ (r is the radius of the base of the cylinder)

$\Rightarrow \pi dh = 88\ cm^2$ (d = 2r)

$\Rightarrow \frac{22}{7} \times d \times 14\ cm = 88\ cm^2$

$\Rightarrow d = 2\ cm$

Therefore, the diameter of the base of the cylinder is 2 cm.

Q.2 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? $\left[\text{Assume } \pi = \frac{22}{7}\right]$

Ans - Height (h) of cylindrical tank = 1 m

Base radius (r) of cylindrical tank = $\left(\frac{140}{2}\right)$ cm = 70 cm = 0.7 m

Area of radius (r) of cylindrical tank = Total surface area of tank = $2\pi r\ (r + h)$

$= \left[2 \times \frac{22}{7} \times 0.7(0.7 + 1)\right]\ m^2$

$= (4.4 \times 1.7)m^2$

$= 7.48\ m^2$

Therefore, it will require 7.48 m^2 area of sheet.

Q.3 A metal pipe is 77 cm long. The inner diameter of a cross section is 4 cm, the outer diameter being 4.4 cm.

(i) Inner curved surface area,

(ii) Outer curved surface area,

(iii) Total surface area. $\left[\text{Assume } \pi = \frac{22}{7}\right]$

Ans - Inner radius (r_1) of cylindrical pipe = $\left(\frac{4}{2}\right)$ cm = 2 cm

Outer radius (r_2) of cylindrical pipe = $\left(\frac{4.4}{2}\right)$ cm = 2.2 cm

Height (h) of cylindrical pipe = Length of cylindrical pipe = 77 cm

(i) CSA of inner surface of pipe= $2\pi r_1 h$

$= \left(2 \times \frac{22}{7} \times 2 \times 77\right) cm^2$

$= 968\ cm^2$

(ii) CSA of outer surface of pipe = $2\pi r_2 h$

$= \left(2 \times \frac{22}{7} \times 2 \times 77\right) cm^2$

$= (22 \times 22 \times 2.2) cm^2$

$= 1064.8\ cm^2$

(iii) Total surface area of pipe = CSA of inner surface + CSA of outer surface + Area of both circular ends of pipe

$= 2\pi r_1 h + 2\pi r_2 h + 2\pi(r_2^2 - r_1^2)$

$= [968 + 1064.8 + 2\pi\{(2.2)^2 - (2)^2\}]\ cm^2$

$= \left(2032.8 + 2 \times \frac{22}{7} \times 0.84\right) cm^2$

$= (2032.8 + 5.28) cm^2$

$= 2038.08\ cm^2$

Therefore, the total surface area of the cylindrical pipe is 2038.08 cm^2.

Q.4 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? $\left[\text{Assume } \pi = \frac{22}{7}\right]$

Ans - It can be observed that a roller is cylindrical.

Height (h) of cylindrical roller = Length of roller = 120 cm

Radius (r) of the circular end of roller = = $\left(\frac{84}{2}\right)$ cm = 42 cm

CSA of roller = $2\pi rh$

$= \left(2 \times \frac{22}{7} \times 42 \times 120\right) cm^2$

$= 31680\ cm^2$

Area of field = 500 × CSA of roller

$= (500 \times 31680)\ cm^2$

$= 15840000\ cm^2$

$= 1584\ m^2$

Q.5 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 Rs.12.50 per m^2. $\left[\text{Assume } \pi = \frac{22}{7}\right]$

Ans - Height (h) cylindrical pillar $= 3.5$ m

Radius (r) of the circular end of pillar $= \frac{50}{2} = 25$ cm

$= 0.25$ m

CSA of pillar $= 2\pi rh$

$= \left(2 \times \frac{22}{7} \times 0.25 \times 3.5\right) cm^2$

$= (44 \times 0.125) cm^2$

$= 5.5\ m^2$

Cost of painting 1 m^2 area = Rs 12.50

Cost of painting 5.5 m^2 area = Rs (5.5×12.50)

= Rs 68.75

Therefore, the cost of painting the CSA of the pillar is Rs 68.75.

Q.6 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. $\left[\text{Assume } \pi = \frac{22}{7}\right]$

Ans - Let the height of the circular cylinder be h.

Radius (r) of the base of cylinder $= 0.7$ m

CSA of cylinder $= 4.4\ m^2$

$2\pi rh = 4.4\ m^2$

$= \left(2 \times \frac{22}{7} \times 0.7 \times h\right) m^2$

$h = 1$ m

Therefore, the height of the cylinder is 1 m.

Q.7 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. $\left[\text{Assume } \pi = \frac{22}{7}\right]$

Ans - Inner radius (r) of circular well $= \left(\frac{3.5}{2}\right) m = 1.75$ m

Depth (h) of circular well $= 10$ m

Inner curved surface area $= 2\pi rh$

$= \left(2 \times \frac{22}{7} \times 1.75 \times 10\right) m^2$

$= (44 \times 0.25 \times 10)\ m^2$

$= 110\ m^2$

Therefore, the inner curved surface area of the circular well is 110 m^2.

Cost of plastering 1 m^2 area = Rs 40

Cost of plastering 110 m^2 area = Rs (110×40)

= Rs 4400

Therefore, the cost of plastering the CSA of this well is Rs 4400.

Q.8 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. = $\left(2 \times \frac{22}{7} \times 1.75 \times 10\right) m^2$

Ans - Height (h) of cylindrical pipe = Length of cylindrical pipe = 28 m

Radius (r) of circular end of pipe = $\frac{56}{2}$ = 2.5 cm = 0.025 m

CSA of cylindrical pipe = $2\pi rh$

$= \left(2 \times \frac{22}{7} \times 0.025 \times 28\right) m^2$

$= 4.4\ m^2$

The area of the radiating surface of the system is 4.4 m^2.

Q.9 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 $\frac{4.2}{2}$ of the steel actually used was wasted in making the tank.

$\left[\text{Assume } \pi = \frac{22}{7}\right]$

Ans - Height (h) of cylindrical tank = 4.5 m

Radius (r) of the circular end of cylindrical tank = $\frac{4.2}{2}$ m = 2.1 m

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

$= \left(2 \times \frac{22}{7} \times 2.1 \times 4.5\right) m^2$

$= (44 \times 0.3 \times 4.5)\ m^2$

$= 59.4\ m^2$

Therefore, CSA of tank is 59.4 m^2.

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

$= \left[2 \times \frac{22}{7} \times 2.1 \times (2.1 + 4.5)\right] m^2$

$= (44 \times 0.3 \times 6.6)\ m^2$

$= 87.12\ m^2$

Let A m2 steel sheet be actually used in making the tank.

$\therefore A\left(1 - \frac{1}{12}\right) = 87.12 m^2$

$\Rightarrow A = \left(\frac{12}{11} \times 87.12\right) m^2$

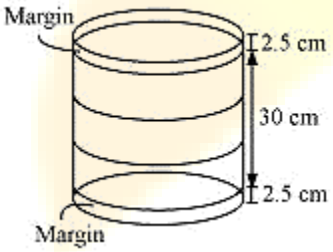
$\Rightarrow A = 95.04\ m^2$

Therefore, 95.04 m^2 steel was used in actual while making such a tank.

Q.10 In the given 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.

$\left[\text{Assume } \pi = \frac{22}{7}\right]$

Ans -



Height (h) of the frame of lampshade = (2.5 + 30 + 2.5) cm = 35 cm

Radius (r) of the circular end of the frame of lampshade = $\left(\frac{20}{2}\right)$ cm = 10 cm

Cloth required for covering the lampshade = $2\pi rh$

$= \left(2 \times \frac{22}{7} \times 10 \times 35\right) cm^2$

$= 2200\ cm^2$

Hence, for covering the lampshade, 2200 cm^2 cloth will be required.

Q.11 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?

$\left[\text{Assume } \pi = \frac{22}{7}\right]$

Ans - Radius (r) of the circular end of cylindrical penholder = 3 cm

Height (h) of penholder = 10.5 cm

Surface area of 1 penholder = CSA of penholder + Area of base of penholder

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

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

$= \left(132 \times 1.5 + \frac{198}{7}\right) \text{cm}^2$

$= \left(198 + \frac{198}{7}\right) \text{cm}^2$

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

Area of cardboard sheet used by 1 competitor $= \frac{1584}{7} \text{ cm}^2$

Area of cardboard sheet used by 35 competitors

$= \left(\frac{1584}{7} \times 35\right) \text{cm}^2 = 9720 \text{cm}^2$

Therefore, 7920 cm^2 cardboard sheet will be bought.