

Exercise 13.2

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9. The curved surface area of a right circular cylinder of height 14 cm is 88 cm². Find the diameter of the base of the cylinder. (Assume $\pi = 22/7$)

Solution:

Height of cylinder, $h = 14\text{cm}$

Let the diameter of the cylinder be d

Curved surface area of cylinder = 88 cm^2

We know that, formula to find Curved surface area of cylinder is $2\pi rh$.

So $2\pi rh = 88\text{ cm}^2$ (r is the radius of the base of the cylinder)

$$2 \times 22/7 \times r \times 14 = 88\text{ cm}^2$$

$$2r = 2\text{ cm}$$

$$d = 2\text{ cm}$$

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

10. It is required to make a closed cylindrical tank of height 1m and base diameter 140 cm from a metal sheet. How many square meters of the sheet are required for the same? Assume $\pi=22/7$

Solution:

Let h be the height and r be the radius of a cylindrical tank.

Height of cylindrical tank, $h = 1\text{m}$

Radius = half of diameter = $(140/2)\text{ cm} = 70\text{ cm} = 0.7\text{m}$

Area of sheet required = Total surface area of tank = $2\pi r(r + h)$ unit square

$$[2 \times 22/7 \times 0.7 (0.7 + 1)]$$

$$= 7.48$$

Therefore, 7.48 square meters of the sheet are required.

11. A metal pipe is 77 cm long. The inner diameter of a cross section is 4 cm, the outer diameter being 4.4cm. (see fig. 13.11). Find its



Fig. 13.11

- (i) inner curved surface area,
- (ii) outer curved surface area
- (iii) total surface area

(Assume $\pi=22/7$)

Solution:

Let r_1 and r_2 Inner and outer radii of cylindrical pipe

$$r_1 = 4/2 \text{ cm} = 2\text{cm}$$

$$r_2 = 4.4/2 \text{ cm} = 2.2 \text{ cm}$$

Height of cylindrical pipe, h = length of cylindrical pipe = 77 cm

$$\begin{aligned} \text{(i) curved surface area of outer surface of pipe} &= 2\pi r_1 h \\ &= 2 \times 22/7 \times 2 \times 77 \text{ cm}^2 \\ &= 968 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{(ii) curved surface area of inner surface of pipe} &= 2\pi r_2 h \\ &= 2 \times 22/7 \times 2.2 \times 77 \text{ cm}^2 \\ &= (22 \times 22 \times 2.2) \text{ cm}^2 \\ &= 1064.8 \text{ cm}^2 \end{aligned}$$

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

$$\begin{aligned} &= 2\pi r_1 h + 2\pi r_2 h + (r_2^2 - r_1^2) \\ &= 968 + 1064.8 + 2\pi((2.2)^2 - 2^2) \\ &= 2031.8 + 5.28 \\ &= 2038.08 \text{ cm}^2 \end{aligned}$$

Therefore, the total surface area of the cylindrical pipe is 2038.08 cm².

4. The diameter of a roller is 84 cm and its length is 120 cm. It take 500 complete revolutions to move once over to level a playground. Find the area of the playground in m²? (Assume $\pi=22/7$)

Solution:

A roller is shaped like a cylinder.

Let h be the height of the roller and r be the radius.

$$h = \text{Length of roller} = 120 \text{ cm}$$

$$\text{Radius of the circular end of roller} = r = (84/2) \text{ cm} = 42 \text{ cm}$$

Now, CSA of roller = $2\pi rh$

$$= 2 \times 22/7 \times 42 \times 120$$

$$= 31680 \text{ cm}^2$$

$$\begin{aligned}\text{Area of field} &= 500 \times \text{CSA of roller} \\ &= (500 \times 31680) \text{ cm}^2 \\ &= 15840000 \text{ cm}^2 \\ &= 1584 \text{ m}^2.\end{aligned}$$

Therefore, area of playground is 1584 m^2 . Answer!

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 .

(Assume $\pi=22/7$)

Solution:

Let h be the height of a cylindrical pillar and r be the radius.

Given:

$$\text{Height cylindrical pillar} = h = 3.5 \text{ m}$$

$$\text{Radius of the circular end of pillar} = r = \text{diameter}/2 = 50/2 = 25\text{cm} = 0.25\text{m}$$

$$\text{CSA of pillar} = 2\pi rh$$

$$= 2 \times 22/7 \times 0.25 \times 3.5$$

$$= 5.5 \text{ m}^2$$

$$\text{Cost of painting } 1 \text{ m}^2 \text{ area} = \text{Rs. } 12.50$$

$$\text{Cost of painting } 5.5 \text{ m}^2 \text{ area} = \text{Rs}(5.5 \times 12.50)$$

$$= \text{Rs. } 68.75$$

Therefore, the cost of painting the curved surface of the pillar at the rate of Rs. 12.50 per m^2 is Rs 68.75.

6. Curved surface area of a right circular cylinder is 4.4 m^2 . If the radius of the base of the base of the cylinder is 0.7 m , find its height. (Assume $\pi=22/7$)

Solution:

Let h be the height of the circular cylinder and r be the radius.

$$\text{Radius of the base of cylinder, } r = 0.7\text{m}$$

$$\text{CSA of cylinder} = 2\pi rh$$

$$\text{CSA of cylinder} = 4.4 \text{ m}^2$$

Equating both the equations, we have

$$2 \times 22/7 \times 0.7 \times h = 4.4$$

$$\text{Or } h = 1$$

Therefore, the height of the cylinder is 1 m .

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 .

(Assume $\pi=22/7$)

Solution:

Inner radius of circular well, $r = 3.5/2\text{m} = 1.75\text{m}$

Depth of circular well, say $h = 10\text{m}$

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

$$= (2 \times 22/7 \times 1.75 \times 10)$$

$$= 110$$

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

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

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

$$= \text{Rs.}4400$$

Therefore, the cost of plastering the curved surface of the well is Rs. 4400.

8. In a hot water heating system, there is cylindrical pipe of length 28 m and diameter 5 cm. Find the total radiating surface in the system. (Assume $\pi=22/7$)

Solution:

Height of cylindrical pipe = Length of cylindrical pipe = 28 m

Radius of circular end of pipe = diameter/ 2 = $5/2\text{ cm} = 2.5\text{ cm} = 0.025\text{ m}$

Now, CSA of cylindrical pipe = $2\pi rh$, where r = radius and h = height of the cylinder

$$= 2 \times 22/7 \times 0.025 \times 28\text{ m}^2$$

$$= 4.4\text{ m}^2$$

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

9. Find

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

(ii) How much steel was actually used, if $1/12$ of the steel actually used was wasted in making the tank. (Assume $\pi=22/7$)

Solution:

Height of cylindrical tank, $h = 4.5\text{ m}$

Radius of the circular end , $r = (4.2/2)\text{m} = 2.1\text{ m}$

(i) the lateral or curved surface area of cylindrical tank is $2\pi rh$

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

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

$$= 59.4\text{ m}^2$$

Therefore, CSA of tank is 59.4 m^2 .

$$\begin{aligned} \text{(ii) Total surface area of tank} &= 2\pi r(r + h) \\ &= 2 \times \frac{22}{7} \times (2.1 + 4.5) \\ &= 44 \times 0.3 \times 6.6 \\ &= 87.12 \text{ m}^2 \end{aligned}$$

Now, Let $S \text{ m}^2$ steel sheet be actually used in making the tank.

$$S(1 - 1/12) = 87.12 \text{ m}^2$$

This implies, $S = 95.04 \text{ m}^2$

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

10. In fig. 13.12, 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. (Assume $\pi=22/7$)



Fig. 13.12

Solution:

Say h = height of the frame of lampshade, looks like cylindrical shape

r = radius

Total height is $h = (2.5 + 30 + 2.5) \text{ cm} = 35 \text{ cm}$ and

$r = (20/2) \text{ cm} = 10 \text{ cm}$

Use curved surface area formula to find the cloth required for covering the lampshade which is $2\pi rh$

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

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

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

11. The students of 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? (Assume $\pi=22/7$)

Solution:

Radius of the circular end of cylindrical penholder, $r = 3\text{cm}$

Height of penholder, $h = 10.5\text{cm}$

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

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

$$= 2 \times 22/7 \times 3 \times 10.5 + 22/7 \times 3^2 = 1584/7$$

Therefore, Area of cardboard sheet used by one competitor is $1584/7 \text{ cm}^2$

So, Area of cardboard sheet used by 35 competitors = $35 \times 1584/7 = 7920 \text{ cm}^2$

Therefore, 7920 cm^2 cardboard sheet will be needed for the competition.