## Exercise 13.2

### Question 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.

### Answer 1:

Curved surface area of cylinder 88 cm$^2$ and height $h$ = 14 cm
Let, the radius of base of cylinder = $r$ cm
Curved surface area of cylinder = $2\pi rh$

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

Hence, the diameter of base of cylinder $= 2r = 2 \times 1 = 2$ cm

### Question 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 metres of the sheet are required for the same?

### Answer 2:

Radius of base of cylinder $r = 140/2 = 70$ cm $= 0.7$ m and height $h = 1$ m
Total surface area of cylinder = $2\pi r(r + h)$

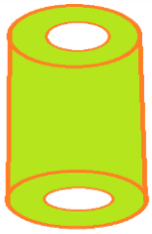
$= 2 \times \frac{22}{7} \times 0.7(0.7 + 1) = 4.4 \times 1.7 = 7.48$ m$^2$

Hence, 7.48 square meter metal sheet is required to make the closed cylindrical tank.

### Question 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 (see Figure). Find its

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



### Answer 3:

**(i)** Radius of metal pipe $r = 4/2 = 2$ cm and height $h = 77$ m
Inner curved surface area of pipe = $2\pi rh$

$= 2 \times \frac{22}{7} \times 2 \times 77 = 2 \times 22 \times 2 \times 11 = 968$ cm$^2$

Hence, the inner curved surface area of pipe is 968 cm$^2$.

**(ii)** Outer radius of pipe $R = 4.4/2 = 2.2$ cm and height $h = 77$ m
Outer curved surface area of pipe = $2\pi Rh$

$= 2 \times \frac{22}{7} \times 2.2 \times 77 = 2 \times 22 \times 2.2 \times 11 = 1064.80$ cm$^2$

Hence, the outer curved surface area of pipe is 1064.80 cm$^2$.

**(iii)** Inner radius of pipe $r = 2$ cm, outer radius $R = 2.2$ cm and height $h = 77$ m
Area of upper ring of pipe = $\pi(R^2 - r^2)$

$= \frac{22}{7} \times (2.2^2 - 2^2) = \frac{22}{7} \times (4.84 - 4) = 22 \times 0.12 = 2.64$ cm$^2$

Area of lower ring of pipe = 2.64 cm$^2$
Total surface area of pipe
= Inner curved surface area + Outer surface area + Area of upper ring + Area of lower ring
$= 968 + 1064.80 + 2.64 + 2.64 = 2038.08$ cm$^2$
Hence, the total surface area of pipe is 2038.08 cm$^2$.

## Question 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 $m^2$.

### Answer 4:

Radius of roller $r = 84/2 = 42$ cm $= 0.42$ m and length $h = 120$ cm $= 1.2$ m
Outer curved surface area of roller $= 2\pi rh$
$= 2 \times \frac{22}{7} \times 0.42 \times 1.2 = 2 \times 22 \times 0.06 \times 1.2 = 3.168 \text{ m}^2$
Area of ground levelled in on revolution $= 3.168 \text{ m}^2$
Therefore, area of ground levelled in 500 revolutions $= 500 \times 3.168 = 1584 \text{ m}^2$
Hence, the area of playground is $1584 \text{ m}^2$.

## Question 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 ₹ 12.50 per $m^2$.

### Answer 5:

Radius of cylindrical pillar $r = 50/2 = 25$ cm $= 0.25$ m and height $h = 3.5$ m
Curved surface area of cylindrical pillar $= 2\pi rh$
$= 2 \times \frac{22}{7} \times 0.25 \times 3.5 = 2 \times 22 \times 0.25 \times 0.5 = 5.5 \text{ m}^2$
Cost of painting 1 $m^2$ area = ₹ 12.50
Therefore, cost of painting 5.5 $m^2$ area = ₹ $12.50 \times 5.5$ = ₹ 68.75
Hence, the total cost of painting the cylindrical pillar is ₹ 68.75.

## Question 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.

### Answer 6:

Curved surface area of cylinder 4.4 $m^2$ and radius $r = 0.7$ m
Let, the height of cylinder = $h$ m
Curved surface area of cylinder $= 2\pi rh$
$\Rightarrow 4.4 = 2 \times \frac{22}{7} \times 0.7 \times h \Rightarrow 4.4 = 4.4h \Rightarrow h = 1$ m
Hence, the height of the cylinder is 1 m.

## Question 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 ₹ 40 per $m^2$.

### Answer 7:

**(i)** Radius of circular well $r = 3.5/2$ m and depth $h = 10$ m
Inner curved surface area of circular well $= 2\pi rh$
$= 2 \times \frac{22}{7} \times \frac{3.5}{2} \times 10 = 22 \times 0.5 \times 10 = 110 \text{ m}^2$
Hence, the inner curved surface area of circular well is $110 \text{ m}^2$.

**(ii)** The cost of plastering this curved surface at the rate of ₹ 40 per $m^2$ = ₹ $110 \times 40$ = ₹ 4400
Hence, the cost of plastering this curved surface at the rate of ₹ 40 per $m^2$ is ₹ 4400.

## Question 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.

**Answer 8:**

Radius of cylindrical pipe $r = 5/2$ cm = 2.5 cm = 0.025 m and length $h = 28$ m

Total surface area of cylindrical pipe = $2\pi r(r + h)$

$= 2 \times \frac{22}{7} \times 0.025 \times (0.025 + 28) = 2 \times \frac{22}{7} \times 0.025 \times 28.025 \ = 4.4 \text{ m}^2$ (approx.)

Hence, the total radiating surface in the system is 4.4 $\text{m}^2$.

## Question 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 $\frac{1}{12}$ of the steel actually used was wasted in making the tank.

**Answer 9:**

**(i)** Radius of cylindrical petrol storage tank $r = 4.2/2 = 2.1$ m and height $h = 4.5$ m.

Curved surface area of cylindrical petrol storage tank = $2\pi rh$

$= 2 \times \frac{22}{7} \times 2.1 \times 4.5 \ = 2 \times 22 \times 0.3 \times 4.5 \ = 59.4 \text{ m}^2$

Hence, the curved surface area of cylindrical petrol storage tank is 59.4 $\text{m}^2$.

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

$= 2 \times \frac{22}{7} \times 2.1 \times (2.1 + 4.5) = 2 \times \frac{22}{7} \times 2.1 \times 6.6 \ = 87.12 \text{ m}^2$

Let, the area of steel used to make this cylindrical petrol storage tank = $x$ $\text{m}^2$

Steel get wasted in preparation of petrol storage tank = $\frac{1}{12}x$ $\text{m}^2$

Therefore, the total steel used in cylindrical petrol storage tank = $x - \frac{1}{12}x = \frac{11}{12}x$ $\text{m}^2$

According toquestions: $\frac{11}{12}x = 87.12 \ \Rightarrow x = 87.12 \times \frac{12}{11} = 95.04 \text{ m}^2$

Hence, 95.04 $\text{m}^2$ steel is required to make this cylindrical petrol storage tank.

## Question 10:

In 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.

**Answer 10:**

Radius of lampshade $r = 20/2 = 10$ cm and height $h = 30$ cm

The height of margin for folding to cover the top and bottom $H = 30 + 2.5 + 2.5 = 35$ cm

The total area of cloth to cover the lampshade = $2\pi rH$

$= 2 \times \frac{22}{7} \times 10 \times 35 \ = 2 \times 22 \times 10 \times 5 \ = 2200 \text{ cm}^2$

## Question 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?

**Answer 11:**

Radius of each penholder $r = 3$ cm and height $h = 10.5$ cm

The penholder is open at the top, therefore, the area of cardboard for 1 penholder = $2\pi rh + \pi r^2$

$= 2 \times \pi \times 3 \times 10.5 + \pi \times 3^2 \ = 63\pi + 9\pi \ = 72\pi \text{ cm}^2$

So, the area of cardboard for 35 penholders = $35 \times 72\pi \text{ cm}^2$

$= 35 \times 72 \times \frac{22}{7} \ = 5 \times 72 \times 22 \ = 7920 \text{ cm}^2$

So, Vidhyalaya has to purchase 7920 $\text{cm}^2$ cardboard for the competition.