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.

Solution: Given: Height (h) of cylinder = 14 cm, Curved surface area of cylinder = 88 cm^2

To Find: Diameter of the cylinder

Let the diameter of the cylinder be "d".

Formula used: Curved Surface Area of Cylinder = $2\pi rh$

where, r = radius of the base of the cylinder and h = height of the cylinder

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

[Now, we know that 2 times radius = diameter, 2r = d]

$\pi dh = 88\ cm^2$

$d = \frac{88\times7}{22\times14}$

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

$d = \frac{88\times7}{22\times14}$

d = 2cm

Therefore, the diameter of the base of the cylinder is 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 meters of the sheet are required for the same?

Solution: Height (h) of cylindrical tank = 1 m

Base radius (r) of cylindrical tank = ( ) cm

= 70 cm

= 0.7 m

Area of sheet required = Total surface area of tank

Area of sheet required = 2πr (r + h)

Area of sheet required = $2 \times \frac{22}{7} \times 0.7(0.7 + 1)$

Area of sheet required = $2 \times 22 \times 0.1 \times 1.7$

Area of Sheet Required = 44 x 0.17

Area of sheet required = 7.48 m^2

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. Find its

(i) Inner curved surface area,

(ii) Outer curved surface area,

(iii) Total surface area

Solution:

Radius = $\frac{Diameter}{2}$

Inner Radius (r_1) = $\frac{4}{2}$ = 2 cm

Inner Radius (r_1) = $\frac{4.4}{2}$ = 2.2 cm

Height = Length = 77 cm

Curved Surface Area of Cylinder = 2 π r h

(i) C S A of inner surface of pipe = 2 π r_1 h

Inner surface Area of pipe = $2 \times \frac{22}{7} \times 2 \times 77$

Inner surface Area of pipe = $968cm^2$

(ii) CSA of outer surface of pipe = 2 π r^2 h

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

= $2 \times 22 \times 2.2 \times 11$

= $1064.8cm^2$

(iii) TSA = Inner CSA + Outer CSA + Area of both circular ends of pipe

= 2 π r_1 h + 2 π r_2 h + 2 π ($r_2^{\,2} - r_1^{\,2}$)

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

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

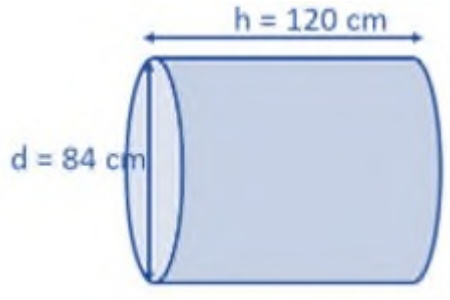
= (2032.8 + 5.28) cm^2

= 2038.08 cm^2

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

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.

Solution:



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 = $\frac{84}{2}$ = 42 cm

Curved Surface Area (CSA) of roller = 2πrh

= 2 * $\frac{22}{7}$ * 42 * 120 cm^2

= 31680 cm^2

Area of field = 500 × CSA of roller

= (500 × 31680) cm^2

= 15840000 cm^2

= 1584 m^2 (∵ 1 m^2 = 10000 cm^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 Rs 12.50 per m^2

Solution:

Given:
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 = 2πrh

= 2 x $\frac{22}{7}$ x 0.25 x 3.5 m^2

= (44 x 0.125) m^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

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

Solution: To Find: Height of the cylinder

Given: Curved surface area of cylinder = 4.4 m^2 and radius of cylinder = 0.7 m

Concept Used:

Curved Surface Area of cylinder = 2πrh

where, r = radius of base of cylinder and h = height of cylinder

Explanation:

Let the height of the circular cylinder be h

2πrh = 4.4 m^2

(2 × 22/7 × 0.7 × h) m2 = 4.4 m^2

$4.4\ h = 4.4\ m^2$

$h = 1\ m$

Therefore, 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 Rs 40 per m^2

Solution: Inner diameter of the circular well = 3.5 m

Inner radius (r) of circular well = $\frac{\text{Diameter}}{2}$ m

= 1.75 m

Depth (h) of circular well = 10 m

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

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

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

$= 110\ m^2$

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

(ii) 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.

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.

Solution:

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

Radius (r) of circular end of pipe = $\frac{5}{2}$

= 2.5 cm

As 1 cm = $\frac{1}{100}$ m

= 0.025 m

CSA of cylindrical pipe = $2\pi rh$

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

= 4.4 m^2

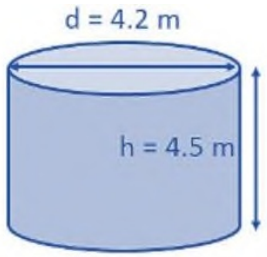
The area of the radiating surface of the system is 4.4 m^2

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

Solution:



Height (h) of cylindrical tank = 4.5 m

Radius (r) = $(\frac{4.2}{2})$ = 2.1 m

(i) Lateral or curved surface area of tank = 2πrh

= $2 \times \frac{22}{7} \times 2.1 \times 4.5$

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

= 59.4 m^2

Therefore, the CSA of the tank is 59.4 m^2.

(ii) Total surface area of tank = 2πr (r + h)

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

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

= 87.12 m^2

Let x m^2 steel sheet be actually used in making the tank $\frac{1}{12}$ of steel was wasted.

TSA = amount of steel - the amount of steel used

87.12 m^2 = x - $\frac{1}{12}$ x

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

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

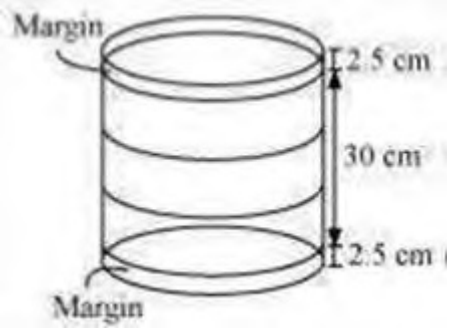
$x = 95.04\ m^2$

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

Question :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.

Solution:

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 = Curved Surface Area of the Cylinder = $2\pi rh$

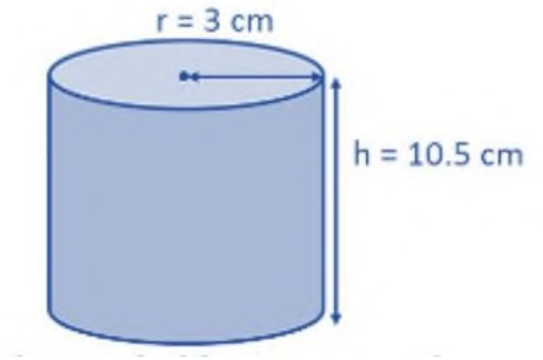
$= 2 \times \frac{22}{7} \times 10 \times 35 \text{ cm}^2$

$= 2200 \text{ cm}^2$

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

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?

Solution:



Radius (r) of the circular end of cylindrical pen holder = 3 cm

Height (h) of pen holder = 10.5 cm

for pen holder the curved Surface Area and Area of Base will be needed
Surface area of 1 pen holder = CSA of pen holder + Area of base of pen holder

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

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

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

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

$= \frac{(198 \times 7) + 198}{7}$

$= \frac{1386 + 198}{7}$

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

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

Area of cardboard sheet used by 35 competitors

$= \frac{1584}{7} \times 35$

$= 1584 \times 5$

$= 7920\ cm^2$