

NCERT Solutions for Class 9 Maths Chapter 11 Surface Areas and Volumes Ex 11.2

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.

Height (h) of cylinder = 14 cm

Let the diameter of the cylinder be d

Curved surface area of cylinder = 88 cm^2

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

$\pi dh = 88 \text{ cm}^2$

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

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

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 = $(\frac{140}{2}) \text{ cm}$

$$= 70 \text{ cm}$$

$$= 0.7 \text{ m}$$

Area of sheet required = Total surface area of tank

$$= 2\pi r (r + h)$$

$$= [2 * \frac{22}{7} * 0.7 (0.7 + 1)] \text{ m}^2$$

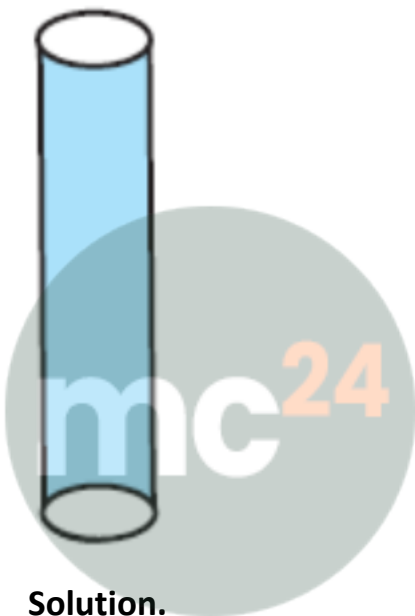
$$= (4.4 * 1.7) \text{ m}^2$$

$$= 7.48 \text{ m}^2$$

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



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Solution.

$$\text{Inner radius (r1)} = \frac{4}{2} = 2 \text{ cm}$$

$$\text{Outer radius (r2)} = \frac{4.4}{2} = 2.2 \text{ cm}$$

$$\text{Height} = \text{Length} = 77 \text{ cm}$$

(i) CSA of inner surface of pipe:

$$= 2\pi r_1 h$$

$$= (2 * \frac{22}{7} * 2 * 77) \text{ cm}^2$$

$$= 968 \text{ cm}^2$$

(ii) CSA of outer surface of pipe

$$= 2\pi r_2 h$$

$$= (2 * \frac{22}{7} * 2.2 * 77) \text{ cm}^2$$

$$= (22 * 22 * 2.2) \text{ cm}^2$$

$$= 1064.8 \text{ cm}^2$$

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

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

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

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

$$= (2032.8 + 5.28) \text{ cm}^2$$

$$= 2038.08 \text{ cm}^2$$

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

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 m²

Solution.

It can be observed that a roller is cylindrical

Height (h) of cylindrical roller = Length of roller

$$= 120 \text{ cm}$$

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

$$\text{CSA of roller} = 2\pi r h$$

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

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

$$\text{Area of field} = 500 \times \text{CSA of roller}$$

$$= (500 \times 31680) \text{ cm}^2$$

$$= 15840000 \text{ cm}^2$$

$$= 1584 \text{ m}^2$$

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 Rs 12.50 per m^2

Solution.

Height (h) cylindrical pillar = 3.5 m

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

$$= 0.25 \text{ m}$$

CSA of pillar = $2\pi rh$

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

$$= (44 * 0.125) \text{ m}^2$$

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

Cost of painting 1 m^2 area = Rs 12.50

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

$$= \text{Rs } 68.75$$

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 Question 2. If the radius of the base of the cylinder is 0.7 m, find its height

Solution.

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

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

$$(2 * \frac{22}{7} * 0.7 * h) \text{ m} = 4.4 \text{ m}^2$$

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

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 m²

Solution.

$$\text{Inner radius (r) of circular well} = \frac{3.5}{2} \text{ m}$$

$$= 1.75 \text{ m}$$

$$\text{Depth (h) of circular well} = 10 \text{ m}$$

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

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

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

$$= 110 \text{ m}^2$$

Therefore, the inner curved surface area of the circular well is 110 m²

$$(ii) \text{ Cost of plastering } 1 \text{ m}^2 \text{ area} = \text{Rs } 40$$

$$\text{Cost of plastering } 100 \text{ m}^2 \text{ area} = \text{Rs } (110 \times 40)$$

$$= \text{Rs } 4400$$

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.

$$\text{Height (h) of cylindrical pipe} = \text{Length of cylindrical pipe} = 28 \text{ m}$$

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

$$= 2.5 \text{ cm}$$

$$= 0.025 \text{ m}$$

CSA of cylindrical pipe = $2\pi rh$

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

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

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

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

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

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

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

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

Therefore, CSA of tank is 59.4 m^2

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

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

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

$$= 87.12 \text{ m}^2$$

Let $x \text{ m}^2$ steel sheet be actually used in making the tank

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

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

$$x = 95.04 \text{ m}^2$$

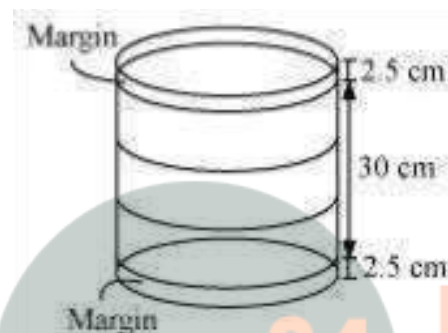
Therefore, 95.04 m^2 steel was used in making such a tank

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 = $(2.5 + 30 + 2.5) \text{ cm} = 35 \text{ cm}$



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

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

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

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

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 penholder = 3 cm

Height (h) of penholder = 10.5 cm

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

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

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

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

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

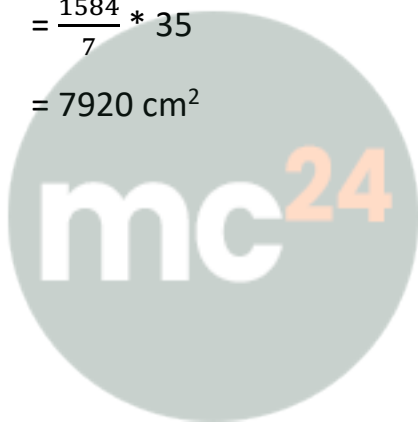
$$= \frac{1584}{7} \text{ cm}^2$$

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

Area of cardboard sheet used by 35 competitors

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

$$= 7920 \text{ cm}^2$$



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