

NCERT Solutions for Class 9 Maths Chapter 11 Surface Areas and Volumes Ex 11.6

Question 1.

The circumference of the base of a cylindrical vessel is 132 cm and its height is 25 cm. How many litres of water can it hold? ($1000 \text{ cm}^3 = 1\text{ l}$)

Solution.

Let the radius of the cylindrical vessel be r

Height (h) of vessel = 25 cm

Circumference of vessel = 132 cm

$$2\pi r = 132 \text{ cm}$$

$$r = \left(\frac{132 \times 7}{2 \times 22}\right)$$

$$= 21 \text{ cm}$$

Volume of cylindrical vessel = $\pi r^2 h$

$$= \frac{22}{7} \times 21 \times 21 \times 25$$

$$= 34650 \text{ cm}^3$$

$$= \left(\frac{34650}{1000}\right) \text{ litres}$$

$$= 34.65 \text{ litres}$$

Question 2.

The inner diameter of a cylindrical wooden pipe is 24 cm and its outer diameter is 28 cm. The length of the pipe is 35 cm. Find the mass of the pipe, if 1 cm^3 of wood has a mass of 0.6 g

Solution.

$$\text{Inner radius (} r_1 \text{)} = \frac{24}{2} = 12 \text{ cm}$$

$$\text{Outer radius (} r_2 \text{)} = \frac{28}{2} = 14 \text{ cm}$$

$$\text{Height (} h \text{)} = \text{Length} = 35 \text{ cm}$$

$$\text{Volume} = \pi (r_2^2 - r_1^2) h$$

$$= \frac{22}{7} * (14^2 - 12^2) * 35$$

$$= 110 * 52$$

$$= 5720 \text{ cm}^3$$

Mass of 1 cm^3 wood = 0.6 g

Mass of 5720 cm^3 wood = $(5720 \times 0.6) \text{ g}$

$$= 3432 \text{ g}$$

$$= 3.432 \text{ kg}$$

Question 3.

A soft drink is available in two packs – (i) a tin can with a rectangular base of length 5 cm and width 4 cm, having a height of 15 cm and (ii) a plastic cylinder with circular base of diameter 7 cm and height 10 cm. Which container has greater capacity and by how much?

Solution.

The tin can will be cuboidal in shape while the plastic cylinder will be cylindrical in shape

Length (l) of tin can = 5 cm

Breadth (b) of tin can = 4 cm

Height (h) of tin can = 15 cm

Capacity of tin can = $l \times b \times h$

$$= (5 \times 4 \times 15) \text{ cm}^3$$

$$= 300 \text{ cm}^3$$

Radius (r) of circular end of plastic cylinder = $\left(\frac{7}{2}\right) \text{ cm} = 3.5 \text{ cm}$

Height (H) of plastic cylinder = 10 cm

Capacity of plastic cylinder = $\pi r^2 H$

$$= \frac{22}{7} * 3.5 * 3.5 * 10$$

$$= 11 * 35$$

$$= 385 \text{ cm}^3$$

Clearly, plastic cylinder has the greater capacity

$$\text{Difference in capacity} = (385 - 300) = 85 \text{ cm}^3$$

Question 4.

If the lateral surface of a cylinder is 94.2 cm^2 and its height is 5 cm, then find (i) radius of its base (ii) its volume. (Use $\pi = 3.14$)

Solution.

(i) Height (h) of cylinder = 5 cm

Let radius of cylinder be r

$$\text{CSA of cylinder} = 94.2 \text{ cm}^2$$

$$2\pi rh = 94.2$$

$$(2 \times 3.14 \times r \times 5) = 94.2$$

$$r = 3 \text{ cm}$$

(ii) Volume of cylinder = $\pi r^2 h$

$$= (3.14 \times (3)^2 \times 5)$$

$$= 141.3 \text{ cm}^3$$

Question 5.

It costs Rs 2200 to paint the inner curved surface of a cylindrical vessel 10 m deep. If the cost of painting is at the rate of Rs 20 per m^2 , find (i) inner curved surface area of the vessel,

(ii) Radius of the base,

(iii) Capacity of the vessel

Solution.

(i) Rs 20 is the cost of painting 1 m^2 area Rs 2200 is the cost of painting = $\left(\frac{1}{20} \times 2200\right) \text{ m}^2$

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

Therefore, the inner surface area of the vessel is 110 m^2

(ii) Let the radius of the base of the vessel be r

Height (h) = 10 m

$$\text{Surface Area} = 2\pi rh = 110 \text{ m}^2$$

$$= 2 * \frac{22}{7} * r * 10 = 110$$

$$= r = \frac{7}{4} \text{ m}$$

$$r = 1.75 \text{ m}$$

(iii) Volume = $\pi r^2 h$

$$= \frac{22}{7} * 1.75 * 1.75 * 10$$

$$= 96.25 \text{ m}^3$$

The capacity of the vessel is 96.25 m^3 or 96250 litres

Question 6.

The capacity of a closed cylindrical vessel of height 1 m is 15.4 litres. How many square metres of metal sheet would be needed to make it?

Solution.

Let the radius of the circular end be r

$$\text{Volume of cylindrical vessel} = 15.4 \text{ litres} = 0.0154 \text{ m}^3$$

$$\pi r^2 h = 0.0154 \text{ m}^3$$

$$\left(\frac{22}{7} * r * r * 1\right) \text{ m} = 0.0154 \text{ m}^3$$

$$r = 0.07 \text{ m}$$

$$\text{TSA of vessel} = 2\pi r (r + h)$$

$$= 2 * \frac{22}{7} * 0.07 (0.07 + 1)$$

$$= 0.44 * 1.07$$

$$= 0.4708 \text{ m}^2$$

Height (h) of cylindrical vessel = 1 m

Therefore, the metal sheet would be required to make the cylindrical vessel is 0.4708 m^2

Question 7.

A lead pencil consists of a cylinder of wood with a solid cylinder of graphite filled in the interior. The diameter of the pencil is 7 mm and the diameter of the graphite is 1 mm. If the length of the pencil is 14 cm, find the volume of the wood and that of the graphite

Solution.

$$\text{Radius (pencil), } r_1 = \frac{7}{2} \text{ mm} = 0.35 \text{ cm}$$

$$\text{Radius (graphite), } r_2 = \frac{1}{2} \text{ mm} = 0.05 \text{ cm}$$

$$\text{Height (Pencil), } h = 14 \text{ cm}$$

$$\text{Volume of wood in pencil} = \pi (r_1^2 - r_2^2) h$$

$$= \frac{22}{7} [(0.35)^2 - (0.05)^2] * 14$$

$$= \frac{22}{7} (0.1225 - 0.0025) * 14$$

$$= 44 * 0.12$$

$$= 5.28 \text{ cm}^3$$

$$\text{Volume of graphite} = \pi r_2^2 h$$

$$= \frac{22}{7} * (0.05)^2 * 14$$

$$= 44 * 0.0025$$

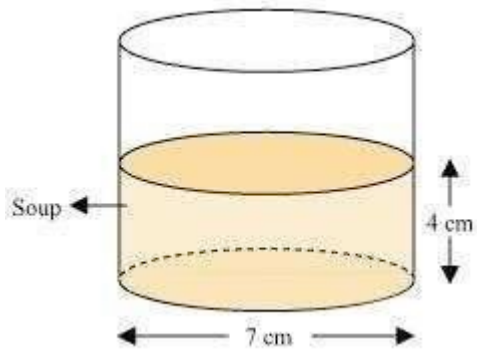
$$= 0.11 \text{ cm}^3$$

Question 8.

A patient in a hospital is given soup daily in a cylindrical bowl of diameter 7 cm. If the bowl is filled with soup to a height of 4 cm, how much soup the hospital has to prepare daily to serve 250 patients?

Solution.

$$\text{Radius (} r \text{) of cylindrical bowl} = \frac{7}{2} = 3.5 \text{ cm}$$



Height (h) of bowl, up to which bowl is filled with soup = 4 cm

Volume of soup in 1 bowl = $\pi r^2 h$

$$= \frac{22}{7} * 3.5 * 3.5 * 4$$

$$= (11 \times 3.5 \times 4)$$

$$= 154 \text{ cm}^3$$

Volume of soup given to 250 patients = $(250 \times 154) \text{ cm}^3$

$$= 38500 \text{ cm}^3$$

$$= 38.5 \text{ litres}$$