



Surface Areas and Volumes Ex.16.1 Q23

Answer :

The internal and external radii of the hollow sphere are 2cm and 4cm respectively. Therefore, the volume of the hollow sphere is

$$\begin{aligned} V &= \frac{4}{3}\pi\{(4)^3 - (2)^3\} \\ &= \frac{4}{3} \times \frac{22}{7} \times 56 \\ &= \frac{32 \times 22}{3} \end{aligned}$$

The hollow sphere is melted to produce a right circular cone of base-radius 4cm. Let, the height and slant height of the cone be h cm and l cm respectively. Then, we have

$$l^2 = (4)^2 + h^2$$

$$\Rightarrow l^2 = 16 + h^2$$

The volume of the cone is

$$\begin{aligned} V_1 &= \frac{1}{3}\pi r_1^2 h_1 \\ &= \frac{1}{3} \times \frac{22}{7} \times (4)^2 \times h \end{aligned}$$

Since, the volume of the cone and hollow sphere are same, we have

$$\begin{aligned} V_1 &= V \\ \Rightarrow \frac{1}{3} \times \frac{22}{7} \times (4)^2 \times h &= \frac{32 \times 22}{3} \\ \Rightarrow \frac{1}{7} \times (4)^2 \times h &= 32 \\ \Rightarrow h &= \frac{32 \times 7}{16} \\ \Rightarrow h &= 14 \end{aligned}$$

Then, we have

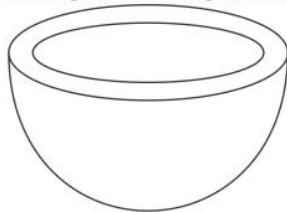
$$\begin{aligned} l^2 &= 16 + (14)^2 \\ \Rightarrow l^2 &= 212 \\ \Rightarrow l &= 14.56 \end{aligned}$$

Therefore, the height and the slant height of the cone are 14 cm and 14.56 cm respectively.

Surface Areas and Volumes Ex.16.1 Q24

Answer :

We are given the following hemi hollow sphere



The internal and external radii of the hollow hemispherical vessel are $\frac{21}{2} = 10.5$ cm and $\frac{25.2}{2} = 12.6$ cm respectively. Therefore, the total surface area of the hollow hemispherical vessel is

$$\begin{aligned} S &= 2\pi \times (12.6)^2 + 2\pi \times (10.5)^2 + \pi\{(12.6)^2 - (10.5)^2\} \\ &= 2 \times \frac{22}{7} \times 158.76 + 2 \times \frac{22}{7} \times 110.25 + \frac{22}{7} \times 48.51 \\ &= 997.92 + 693 + 152.46 \\ &= 1843.38 \end{aligned}$$

The cost of painting 1 square cm is 10 paise. Therefore the total cost of painting the vessel all over is $1843.38 \times 10 = 1843.38 \times 10$ Paise

$$= 184.338 \text{ Rupees}$$

Hence total cost of painting is 184.338 rupees

Surface Areas and Volumes Ex.16.1 Q25

Answer :

The radius of the cylindrical tub is 12cm. Upon dropping a spherical ball of radius 9cm into the tub, the height of the raised water is h cm. Therefore, the volume of the raised water is

$$V = \pi \times (12)^2 \times h \text{ cubic cm}$$

The volume of the spherical ball is

$$V_1 = \frac{4}{3} \pi \times (9)^3 \text{ cubic cm}$$

Since, the volume of the raised water is same as the volume of the spherical ball, we have

$$V_1 = V$$

$$\Rightarrow \frac{4}{3} \pi \times (9)^3 = \pi \times (12)^2 \times h$$

$$\Rightarrow h = \frac{4 \times (9)^3}{3 \times (12)^2}$$

$$\Rightarrow = \frac{27}{4}$$

$$\Rightarrow = 6.75$$

Therefore, the height of the raised water is $h = 6.75 \text{ cm}$

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