

Surface Areas and Volumes Ex.16.1 Q20

Answer:

The radius of the cylindrical tub is 12cm. Upon dropping a spherical ball into the tub, the height of the raised water is 6.75cm. Therefore, the volume of the raised water is

$$V = \pi \times (12)^2 \times 6.75 \text{ cm}^3$$

Let, the radius of the spherical ball is r. Therefore, the volume of the spherical ball is

$$V_1 = \frac{4}{3}\pi \times r^3 \text{ cm}^3$$

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

$$V_1 = V$$

$$\Rightarrow \frac{4}{3}\pi \times r^3 = \pi \times (12)^2 \times 6.75$$

$$\Rightarrow r^3 = \frac{(12)^2 \times 6.75 \times 3}{4}$$

$$\Rightarrow = 12 \times 3 \times 6.75 \times 3$$

Therefore, the radius of the spherical ball is 9 cm

Surface Areas and Volumes Ex.16.1 Q21

Answer

The average displacement of water by a person is 0.04 cubic m. Hence, the total displacement of water in the rectangular tank by 500 persons is $V = 500 \times 0.04 = 20$ Cubic m.

The length and width of the rectangular tank are 80m and 50m respectively. Upon dipping in the tank, let the height of the raised water is be h m. Therefore, the volume of the raised water is

$$V_1 = 80 \times 50 \times h$$

= 4000h cubic m

Since, the volume of the raised water is same as the volume of the water displaced by 500 persons, we have

$$V_1 = V$$
$$\Rightarrow 4000h = 20$$

$$\Rightarrow h = \frac{20}{4000}$$

$$\Rightarrow = 0.005$$

Therefore, the water will be raised by 0.005 m or 0.5 cm

Surface Areas and Volumes Ex.16.1 Q22

Answer:

The radius of the cylindrical jar is 6cm. The volume of the oil of height 2cm contained in the jar is $V = \pi \times (6)^2 \times 2$ cubic cm

The radius of each small sphere is 1.5cm. Therefore, the volume of each small sphere is

$$V_1 = \frac{4}{3} \times \pi \times (1.5)^3 \text{ cubic cm}$$

Since, the volume of the raised water is same as the sum of the volumes of the immersed iron spheres, we have the number of immersed sphere is

$$\frac{V}{V_1} = \frac{\pi \times (6)^2 \times 2}{\frac{4}{3} \times \pi \times (1.5)^3}$$
$$= \frac{3 \times 36 \times 2 \times 1000}{4 \times 15 \times 15 \times 15}$$
$$= 16$$

Therefore, the number of iron spheres is $\boxed{16}$