



Exercise 13D

Question 16:

Let the radius of the third ball be r cm

Then,

$$\begin{aligned}\frac{4}{3} \times \pi \times (3)^3 &= \frac{4}{3} \pi \left(\frac{3}{2}\right)^3 + \frac{4}{3} \times \pi (2)^3 + \frac{4}{3} \pi \times (r)^3 \\ \Rightarrow \frac{4}{3} \times \pi \times 27 &= \frac{4}{3} \pi \times \frac{27}{8} + \frac{4}{3} \times \pi \times 8 + \frac{4}{3} \pi \times (r)^3 \\ \Rightarrow 27 &= \frac{27}{8} + 8 + (r)^3 \\ \Rightarrow r^3 &= \left\{ 27 - \left(\frac{27}{8} + 8 \right) \right\} \\ \Rightarrow r^3 &= \left\{ 27 - \left(\frac{27 + 64}{8} \right) \right\} \\ \Rightarrow r^3 &= \left\{ 27 - \frac{91}{8} \right\} \\ \Rightarrow r^3 &= \left\{ \frac{216 - 91}{8} \right\} \\ \Rightarrow r^3 &= \frac{125}{8} \Rightarrow r^3 = \left(\frac{5}{2} \right)^3 \\ \Rightarrow r &= \frac{5}{2} = 2.5 \text{ cm}\end{aligned}$$

\therefore radius of the third ball = 2.5 cm

Question 17:

Let the radii of two spheres be x and $2x$ and their respective surface areas be S_1 and S_2 .

$$\begin{aligned}\text{Then,} \quad \frac{S_1}{S_2} &= \frac{4\pi x^2}{4\pi (2x)^2} \\ &= \frac{x^2}{4x^2} = \frac{1}{4}\end{aligned}$$

\therefore the ratio of their surface areas = 1 : 4.

Question 18:

Let the radii of two spheres be r and R

Then,

$$\frac{4\pi r^2}{4\pi R^2} = \frac{1}{4}$$
$$\Rightarrow \left(\frac{r}{R}\right)^2 = \left(\frac{1}{2}\right)^2 \Rightarrow \frac{r}{R} = \frac{1}{2}$$

Let V_1 and V_2 be the volumes of the respective spheres whose radii are r and R

$$\therefore \frac{V_1}{V_2} = \frac{\frac{4}{3}\pi r^3}{\frac{4}{3}\pi R^3} = \left(\frac{r}{R}\right)^3 = \left(\frac{1}{2}\right)^3 = \frac{1}{8}$$

\therefore the ratio of their volume = 1 : 8.

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