Exercise 13D

Question 16:

Let the radius of the third ball be r cm

Then,

$$\frac{4}{3}\times\pi\times(3)^3=\frac{4}{3}\pi\left(\frac{3}{2}\right)^3+\frac{4}{3}\times\pi(2)^3+\frac{4}{3}\pi\times(r)^3$$

$$\Rightarrow \quad \frac{4}{3}\times\pi\times 27=\frac{4}{3}\pi\times\frac{27}{8}+\frac{4}{3}\times\pi\times 8+\frac{4}{3}\pi\times(r)^3$$

$$\Rightarrow \quad 27=\frac{27}{8}+8+(r)^3$$

$$\Rightarrow \quad r^3=\left\{27-\left(\frac{27}{8}+8\right)\right\}$$

$$\Rightarrow \quad r^3=\left\{27-\left(\frac{27+64}{8}\right)\right\}$$

$$\Rightarrow \quad r^3=\left\{27-\frac{91}{8}\right\}$$

$$\Rightarrow \quad r^3=\left\{\frac{216-91}{8}\right\}$$

$$\Rightarrow \quad r^3=\frac{125}{8} \quad \Rightarrow \quad r^3=\left(\frac{5}{2}\right)^3$$

$$\Rightarrow \quad r=\frac{5}{2}=2.5\text{cm}$$

$\therefore$ 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.

Then,

$$\frac{S_1}{S_2}=\frac{4\pi x^2}{4\pi(2x)^2}$$

$$=\frac{x^2}{4x^2}=\frac{1}{4}$$

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

Question 18:

Let the radii of two spheres be r and R

Then,

$$\frac{4\pi r^2}{4\pi R^2} = \frac{1}{4}$$

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

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

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

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

********** END **********