Exercise 19B

Question 10:

Volume of sphere (when r = 1 cm) = $\frac{4}{3}\pi r^3 = \left(\frac{4}{3} \times 1 \times 1 \times 1\right)\pi \text{ cm}^3$

Volume of sphere (when r = 8 cm) = $\frac{4}{3}\pi r^3 = \left(\frac{4}{3} \times 8 \times 8 \times 8\right)\pi \text{ cm}^3$

Let the number of balls = n

$$n \times \left(\frac{4}{3} \times 1 \times 1 \times 1\right)\pi = \left(\frac{4}{3} \times 8 \times 8 \times 8\right)\pi$$

$$n = \frac{4 \times 8 \times 8 \times 8 \times 3}{3 \times 4} = 512$$

Question 11:

$$\text{Radius of marbles} = \frac{\text{Diameter}}{2} = \left(\frac{1.4}{2}\right)\text{cm}$$

$$\text{Volume of marbles} = \frac{4}{3}\pi r^3$$

$$= \left[\frac{4}{3} \times \pi \times \left(\frac{1.4}{2}\right) \times \left(\frac{1.4}{2}\right) \times \left(\frac{1.4}{2}\right)\right]\text{cm}^3$$

$$\text{Radius of beaker} = \left(\frac{7}{2}\right)\text{cm}$$

Volume of rising water in beaker

$$= \pi r^2 h = \left(\pi \times \left(\frac{7}{2}\right)^2 \times \left(\frac{56}{10}\right)\right)\text{cm}^3$$

Let the number of marbles be n

∴ n × volume of marble = volume of rising water in beaker

$$n \times \left(\frac{4}{3}\pi \times \frac{1.4}{2} \times \frac{1.4}{2} \times \frac{1.4}{2}\right) = \pi \times \frac{7}{2} \times \frac{7}{2} \times \frac{56}{10}$$

$$n = 150$$

Hence the number of marbles is 150

Question 12:

Radius of sphere = 3 cm

Volume of sphere = $\left(\frac{4}{3} \times \pi \times 3 \times 3 \times 3\right) cm^3 = 36\pi \ cm^3$

Radius of small sphere = $\frac{0.6}{2} cm = 0.3 \ cm$

Volume of small sphere = $\left(\frac{4}{3} \times \pi \times 0.3 \times 0.3 \times 0.3\right) cm^3$

$$= \left(\frac{4}{3} \times \pi \times \frac{3}{10} \times \frac{3}{10} \times \frac{3}{10}\right) cm^3$$

$$= \left(\frac{4\pi}{3} \times \frac{3}{10} \times \frac{3}{10} \times \frac{3}{10}\right) cm^2$$

Let number of small balls be n

$$n \times \left(\frac{4\pi}{3} \times \frac{3}{10} \times \frac{3}{10} \times \frac{3}{10}\right) = \frac{4}{3}\pi \times 3 \times 3 \times 3$$

$$n = 1000$$

Hence, the number of small balls = 1000.

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