

1. The surface area of a solid sphere is 120 square centimetres. If it is cut into two halves, what would be the surface area of each hemisphere?

Since the surface area of the sphere is 120 sq.cm.,

$$4\pi r^2 = 120, \quad \pi r^2 = 120 \div 4 = 30$$

$$\begin{aligned} \text{Surface area of a hemisphere} \\ = 3\pi r^2 = 3 \times 30 = 90 \text{ sq.cm.} \end{aligned}$$

2. The volume of two spheres are in the ratio 27 : 64. What is the ratio of their radii? And the ratio of their surface areas?

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

Let the radii of the spheres be  $r_1$  and  $r_2$ .

$$\frac{4}{3}\pi r_1^3 : \frac{4}{3}\pi r_2^3 = 27 : 64$$

$$r_1^3 : r_2^3 = 27 : 64, \quad r_1^3 : r_2^3 = 3^3 : 4^3$$

$$\therefore r_1 : r_2 = 3 : 4$$

$$\text{Ratio of their radii} = 3 : 4$$

$$\text{Ratio of their surface areas}$$

$$= 4\pi \times (3r)^2 : 4\pi \times (4r)^2$$

$$= 4\pi \times 9r^2 : 4\pi \times 16r^2$$

$$= 9 : 16$$

3. The base radius and length of a metal cylinder are 4 centimetres and 10 centimetres. If it is melted and recast into spheres of radius 2 centimetres, how many spheres can be made?

$$\begin{aligned}\text{Volume of cylinder} &= \pi r^2 h \\ &= \pi \times 4^2 \times 10 \text{ cu.cm.} \\ &= \pi \times 4 \times 4 \times 10 \text{ cu.cm.}\end{aligned}$$

Volume of sphere

$$\begin{aligned}&= \frac{4}{3} \pi r^3 = \frac{4}{3} \pi \times 2^3 \\ &= \frac{4}{3} \pi \times 2 \times 2 \times 2 \text{ cu.cm.}\end{aligned}$$

$\therefore$  Number of spheres got

$$\begin{aligned}&= \frac{\pi \times 4 \times 4 \times 10}{\frac{4}{3} \pi \times 2 \times 2 \times 2} \\ &= \frac{4 \times 4 \times 10}{4 \times 2 \times 2 \times 2} \times 3 = 15\end{aligned}$$

- 4. A metal sphere of radius 12 cm is melted and recast into 27 small spheres. What is the radius of each sphere?**

If the radius of the big sphere is

$$R, \text{ its volume} = \frac{4}{3} \pi R^3$$

$$= \frac{4}{3} \times \pi \times 12 \times 12 \times 12$$

$$= 2304\pi \text{ cu.cm.}$$

Volume of 27 small spheres

$$= 2304 \pi \text{ cu.cm.}$$

If the radius of a small sphere is  $r$ ,

$$27 \times \frac{4}{3} \pi r^3 = 2304\pi,$$

$$27 \times \frac{4}{3} r^3 = 2304$$

$$36r^3 = 2304$$

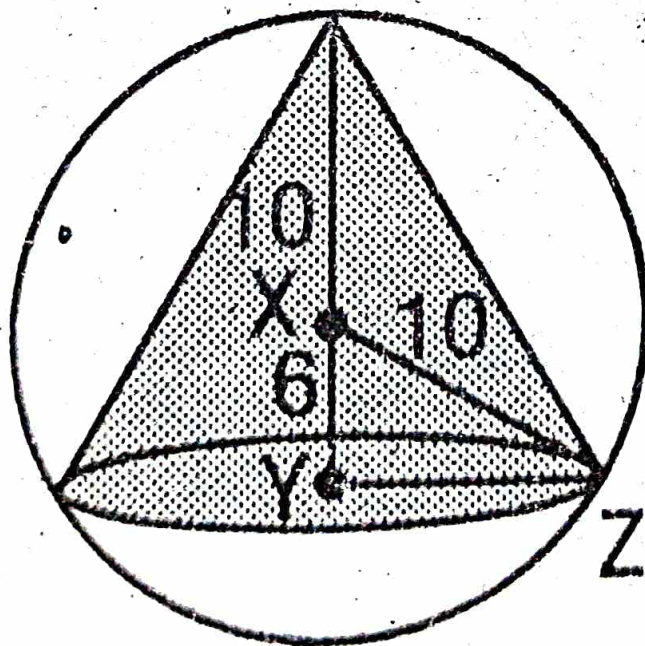
$$r^3 = 2304 \div 36 = 64$$

$$r^3 = 4^3 \quad \therefore r = 4$$

Radius of the small sphere = 4 cm

5. From a solid sphere of radius 10 cm, a cone of height 16 cm is carved out. What fraction of the volume of the sphere is the volume of the cone?

Let  $X$  be the centre of the sphere and  $Y$  the centre of the base of the cone.



$$YZ = \sqrt{10^2 - 6^2}$$

$$= \sqrt{100 - 36} = \sqrt{64} = 8$$

Base radius of the cone = 8 cm