1. If 64 identical small spheres are made out of a big sphere of diameter 8 cm, what is the surface area of each small sphere?

π cm^2

2π cm^2

4π cm^2

8π cm^2

Answer (c)

Let the radius of small sphere be r cm
∴ volume of 64 small spheres is equal to volume if 1 big sphere

$$64 \times \frac{4\pi r^3}{3} = \frac{4\pi \times 4^3}{3}$$

$\Rightarrow 64r^3 = 64$
$\Rightarrow r = 1$
Surface Area of small circle = $4 \times \pi \times 1^2 = 4\pi$ cm^2

2. What is the diameter of the largest circle lying on the surface of a sphere of surface area 616 square cm?

14 cm

10.5 cm

7 cm

3.5 cm

Answer (a)

Surface area of a sphere is given by $4\pi r^2$
∴ $4\pi r^2 = 616$
$\Rightarrow 4 \times 22r^2/7 = 616$
$\Rightarrow r^2 = 616 \times 7/88 = 49 = 7^2$
$\Rightarrow r = 7$ cm
Therefore Diameter = 14 cm

3. What is the volume of the largest sphere that can be carved out of a cube of edge 3 cm?

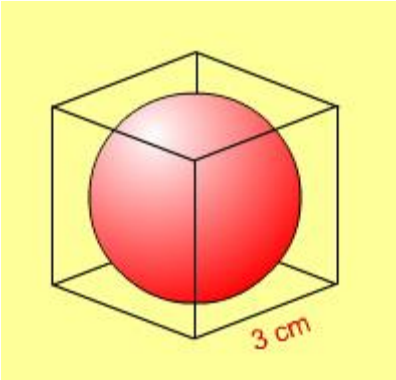
9π cubic cm

6π cubic cm

4.5π cubic cm

3π cubic cm

Answer (c)



From the adjoining figure it can be seen that the diameter of the sphere is equal to the length of the edge of the cube
∴ the radius of the sphere r = 3/2

Volume of a sphere is given by = $\frac{4}{3} \times \pi \times \frac{3^3}{2^3} = \frac{4 \times \pi \times 27}{3 \times 8} = \frac{9}{2}\pi \text{ cm}^3 = 4.5\pi \text{ cm}^3$

4. If the ratio of the diameters of two spheres is 3 : 5, then what is the ratio of their surface areas?

9 : 25

9 : 10

3 : 5

27 : 125

Answer (a)

$$\frac{\text{Surface Area 1}}{\text{Surface Area 2}} = \frac{4\pi(3x)^2}{4\pi(5x)^2} = \frac{9}{25}$$

5. A right circular metal cone (solid) is 8 cm high and the radius is 2 cm. It is melted and recast into a sphere. What is the radius of the sphere?

2 cm

3 cm

4 cm

5 cm

Answer (a)

Volume of a cone = $\pi r^2 h/3$ and volume of a sphere = $4\pi r^3/3$

$$\therefore \frac{\pi \times 2^2 \times 8}{3} = \frac{4\pi r^3}{3}$$

Therefore $r^3 = 8 \Rightarrow r = 2$ cm

6. Let the largest possible right circular cone and largest possible sphere be fitted into two cubes of same length. Let C and S denote the volume of cone and volume of sphere respectively, then which one of the following is correct?

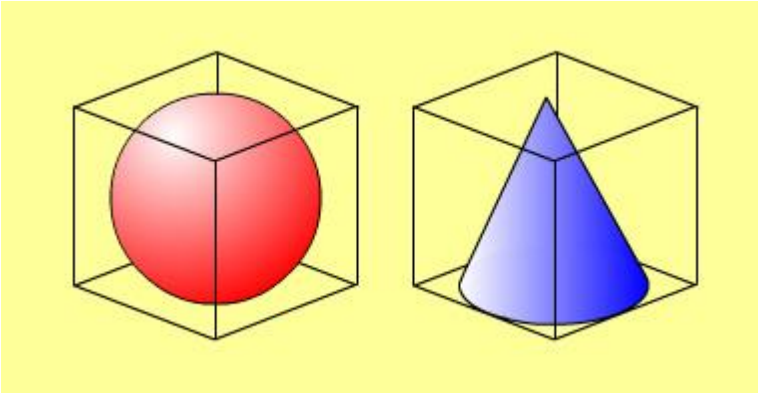
C = 2S

S = 2C

C = S

C = 3S

Answer (b)



From the figure it can be seen that radius of both cone and sphere is same and height of cone is twice its radius

Volume of cone = $\frac{\pi r^2 h}{3} = \frac{\pi r^2 \times 2r}{3} = \frac{2\pi r^3}{3}$

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

Comparing the two volumes it can be seen that the volume of sphere S is twice the volume of cone C.