

13. What is the volume (in cm^3) of a spherical shell with 8 cm and 10 cm as its internal and external diameters respectively?

$$61\pi/3$$

$$122\pi/3$$

$$244\pi/3$$

$$250\pi/3$$

Answer (c)

A spherical shell is the region between two concentric spheres of differing radii. Diameter of 10 and 8 means radii of 5 and 4 respectively

$$\text{Required volume} = \frac{4\pi(5^3 - 4^3)}{3} = \frac{4\pi(125 - 64)}{3} = \frac{244\pi}{3}$$

14. The volume of a sphere is 8 times that of another sphere. What is the ratio of their surface areas?

$$8 : 1$$

$$4 : 1$$

$$2 : 1$$

$$4 : 3$$

Answer (b)

We know that if volume ratio of two spheres is 8 : 1, then the ratio of their radii is 2 : 1. (Refer Q.9)

Therefore ratio of their surface areas = $4\pi 2^2 : 4\pi 1^2 = 4 : 1$

15. A sphere and a cube have same surface area. What is the ratio of the square of volume of the sphere to the square of volume of the cube?

$$\pi : 6$$

$$1 : 1$$

$$6 : \pi$$

$$3 : \pi$$

Answer (c)

$$4\pi r^2 = 6a^2 \Rightarrow r^2 = 3a^2/2\pi$$

Therefore

$$\left[\frac{4\pi r^3}{3}\right]^2 : (a^3)^2$$

$$\Rightarrow \frac{16\pi^2 r^6}{9} : a^6$$

$$\Rightarrow \frac{16\pi^2 27a^6}{9 \times 8\pi^3} : a^6 \text{ (substituting the value of } r^2 \text{ from above)}$$

$$\Rightarrow \frac{6}{\pi} : 1 \text{ or } 6 : \pi$$

16. If a sphere of radius 10 cm is intersected by a plane at a distance 8 cm from its centre, what is the radius of the curve of intersection of the plane and the sphere?

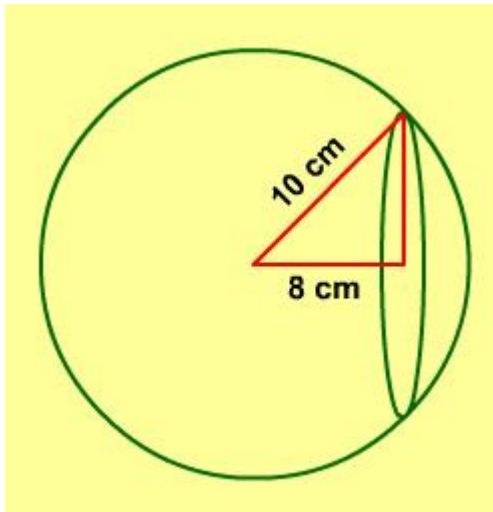
8 cm

6 cm

5 cm

4 cm

Answer (b)



From the figure the radius of the curve = $\sqrt{(10^2 - 8^2)} = \sqrt{6^2} = 6$ cm

17. If the number of square centimeters on the surface area of a sphere is three times the number of cubic centimeters in its volume, then what is its diameter?

1 cm

2 cm

3 cm

6 cm

Answer (b) If r be the radius, then surface area = $4\pi r^2$ and volume = $\frac{4\pi r^3}{3}$

From the question $4\pi r^2 = 3 \times \frac{4\pi r^3}{3}$

$\Rightarrow r^2 = r^3$ or $r = 1$ cm

\therefore diameter = 2 cm.

18. A sphere is cut into two equal halves and both the halves are painted from all the sides. The radius of the sphere is r units and the rate of painting is Rs 8 per sq. unit. What is the total cost of painting the two halves of the sphere in rupees?

$$6\pi r^2$$

$$32\pi r^2$$

$$48\pi r^2$$

Insufficient data to answer

Answer (c)

Curved surface area of the sphere = $4\pi r^2$

Flat surface areas of two hemispheres = $2 \times \pi r^2$

Total surface area = $6\pi r^2$

Therefore, total cost = Rs $8 \times 6\pi r^2$

= Rs $48 \pi r^2$