

NCERT Solutions for Class 9 Maths Chapter 11 Surface Areas and Volumes Ex 11.8

Question 1.

Find the volume of a sphere whose radius is

(i) 7 cm (ii) 0.63 m

Solution.

(i) Radius (r) = 7 cm

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

$$= \frac{4}{3} * \frac{22}{7} * 7 * 7 * 7$$

$$= \frac{4312}{3}$$

$$= 1437 \frac{1}{3} \text{ cm}^3$$

(ii) Radius (r) = 0.63 m

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

$$= \frac{4}{3} * \frac{22}{7} * (0.63)^3$$

$$= 1.0478 \text{ m}^3$$

Question 2.

Find the amount of water displaced by a solid spherical ball of diameter

(i) 28 cm

(ii) 0.21 m

Solution.

Radius (r) = 14 cm

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

$$= \frac{4}{3} * \frac{22}{7} * (14)^3$$

$$= 11498 \frac{2}{3} \text{ cm}^3$$

(ii) Radius (r) = 0.105 m

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

$$= \frac{4}{3} * \frac{22}{7} * (0.105)^3$$

$$= 0.004851 \text{ m}^3$$

Question 3.

The diameter of a metallic ball is 4.2 cm. What is the mass of the ball, if the density of the metal is 8.9 g per cm³?

Solution.

Radius (r) = 2.1 cm

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

$$= \frac{4}{3} * \frac{22}{7} * (2.1)^3$$

$$= 38.808 \text{ cm}^3$$

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$\text{Mass} = \text{Density} * \text{Volume}$$

$$= 8.9 * 38.808$$

$$= 345.3912 \text{ g}$$

Question 4.

The diameter of the moon is approximately one-fourth of the diameter of the earth. What fraction of the volume of the earth is the volume of the moon?

Solution.

Diameter (Earth) = d

$$\text{Radius (Earth)} = \frac{d}{2}$$

$$\text{Diameter (Moon)} = \frac{d}{4}$$

$$\text{Radius (Moon)} = \frac{d}{8}$$

$$\text{Volume (Moon)} = \frac{4}{3} \pi r^3$$

$$= \frac{4}{3} * \pi * \left(\frac{d}{8}\right)^3$$

$$= \frac{1}{512} * \frac{4}{3} \pi d^3$$

$$\text{Volume (Earth)} = \frac{4}{3} \pi r^3$$

$$= \frac{4}{3} \pi \left(\frac{d}{2}\right)^3$$

$$= \frac{1}{8} * \frac{4}{3} \pi d^3$$

Now,

$$\frac{\text{Volume of Moon}}{\text{Volume of Earth}} = \frac{1}{64}$$

$$\text{Volume of moon} = \frac{1}{64} \text{ Volume of earth}$$

Question 5.

How many litres of milk can a hemispherical bowl of diameter 10.5 cm hold?

Solution.

$$\text{Radius } r = 5.25 \text{ cm}$$

$$\text{Volume} = \frac{2}{3} \pi r^3$$

$$= \frac{2}{3} * \frac{22}{7} * (5.25)^3$$

$$= 303.1875 \text{ cm}^3$$

$$\text{Capacity (Hemispherical bowl)} = \frac{303.1875}{1000} \text{ litres}$$

$$= 0.3031875$$

$$= 0.303 \text{ litres (Approx)}$$

Question 6.

A hemispherical tank is made up of an iron sheet 1 cm thick. If the inner radius is 1 m, then find the volume of the iron used to make the tank

Solution.

Inner radius (r_1) = 1 m

External radius (r_2) = (1 + 0.1) cm

= 1.01 cm

Volume = external volume – inner volume

$$= \frac{2}{3} \pi r_2^3 - \frac{2}{3} \pi r_1^3$$

$$= \frac{2}{3} \pi (r_2^3 - r_1^3)$$

$$= \frac{2}{3} * \frac{22}{7} * [(1.01)^3 - (1)^3]$$

$$= \frac{44}{21} * 0.030301$$

$$= 0.06348 \text{ m}^3 \text{ (Approx)}$$

Question 7.

Find the volume of a sphere whose surface area is 154 cm^2

Solution.

Let the radius be r

Given, Surface area = 154 cm^2

$$4\pi r^2 = 154$$

$$4 * \frac{22}{7} * r * r = 154$$

$$r = 3.5 \text{ cm}$$

Now,

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

$$= \frac{4}{3} * \frac{22}{7} * (3.5)^3$$

$$= 179 \frac{2}{3} \text{ cm}^3$$

Question 8.

A dome of a building is in the form of a hemisphere. From inside, it was white-washed at the cost of Rs 498.96. If the cost of white-washing is Rs 2.00 per square meter, find the

- (i) Inside surface area of the dome,
- (ii) Volume of the air inside the dome

Solution.

(i) Cost of white-washing the dome from inside = Rs 498.96

Cost of white-washing 1 m² area = Rs 2

Therefore, CSA of the inner side of dome = $\frac{498.96}{2}$

$$= 249.48 \text{ m}^2$$

(ii) Let the radius be r

$$\text{CSA} = 249.48 \text{ m}^2$$

$$2\pi r^2 = 249.48$$

$$2 * \frac{22}{7} * r^2 = 249.48$$

$$r = 6.3 \text{ m}$$

Volume of air inside the dome = Volume of hemispherical dome

$$= \frac{2}{3} \pi r^3$$

$$= \frac{2}{3} * \frac{22}{7} * (6.3)^3$$

$$= 523.908 \text{ m}^3$$

Question 9.

Twenty seven solid iron spheres, each of radius r and surface area S are melted to form a sphere with surface area S'. Find the

- (i) Radius r' of the new sphere,
- (ii) Ratio of S and S'

Solution.

(i) Volume of new sphere having radius r' = $\frac{4}{3} \pi r'^3$

Volume of 27 spheres having radius r = $27 * \frac{4}{3} \pi r^3$

According to the question,

$$\frac{4}{3} \pi r'^3 = 27 * \frac{4}{3} \pi r^3$$

$$= r'^3 = 27r^3$$

$$= r'^3 = (3r)^3$$

$$r' = 3r$$

$$(ii) \text{ Ratio} = \frac{4 \pi r * r}{4 \pi r' * r'}$$

$$= \frac{r * r}{9 * r * r}$$

$$= \frac{1}{9} = 1:9$$

Question 10.

A capsule of medicine is in the shape of a sphere of diameter 3.5 mm. How much medicine (in mm³) is needed to fill this capsule?

Solution.

Radius (r) = 1.75 mm

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

$$= \frac{4}{3} * \frac{22}{7} * (1.75)^3$$

$$= 22.458 \text{ mm}^3 \text{ or}$$

$$= 22.46 \text{ (Approx)}$$

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