



Surface Areas and Volumes-Worksheet

1. A cylinder with a base radius of 10 cm and height of 25 cm is surmounted by a cone with the same radius, and height of 12 cm . What is the volume of both figures?
2. A hollow metallic cylindrical tube has an internal radius of 7 cm and height 21 cm . The thickness of the metal is 2 cm . The tube is melted and recast into a right circular cone of height 14 cm . Find the radius of the circular cone correct to one decimal place.
3. A heap of sand is in the form of a cone with base diameter of 18 m and height 5 m . Find the volume of the sand. How much canvas cloth is required to just cover the heap?
4. Find the volume of the largest circular cone which fits into a cube of edge 4.2 m .
5. If a large metal ball with a surface area of 352 m^2 needs to be filled with a certain liquid, what is the volume of the liquid required to fill the ball completely?
6. A solid has a cylinder with hemispherical ends, with a total height of 25 cm and a cylinder diameter of 6 cm . What is the total volume of the solid?
7. A solid hemisphere of lead of radius 21 cm is recast into a right circular cone of height 35 cm . Find the radius of the base of the cone.
8. A solid sphere of radius 35 cm is recast into small spherical balls each of diameter 14 cm . Find the number of balls obtained.
9. The radius of a copper sphere is 12 cm . The sphere is melted and converted into a long wire of uniform circular cross section. If the length of the wire is 1 m , then find the radius of its cross section.



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Solutions:

1. Volume of both figures = Volume of cylinder + Volume of cone

$$\begin{aligned} &= (\pi \times 10^2 \times 25) + \left(\frac{1}{3} \pi \times 10^2 \times 12\right) \\ 100 \pi (25 + 4) &= 100 \times 3.14 \times 29 = 9106 \text{ cm}^3 \end{aligned}$$

2. Internal radius and external radius of the tube are respectively 7 cm and 9 cm and its height = 21 cm .

$$\begin{aligned} \text{Volume of the tube} &= \text{Volume of the outer cylinder} - \text{Volume of the inner cylinder} \\ &= \pi \times 9^2 \times 21 - \pi \times 7^2 \times 21 = 21 \pi (9^2 - 7^2) = 21 \pi \times 32 \end{aligned}$$

Let the radius of the cone = r . Its height $h = 14\text{ cm}$

$$\text{Volume of the cone} = \frac{1}{3} \pi \times r^2 \times 14 = 21 \pi \times 32$$

$$\text{Solving, } r^2 = 144, r = \sqrt{144} = 12\text{ cm}$$

3. Radius of the base $r = 9\text{ m}$ and height $h = 5\text{ m}$

$$\text{Volume of sand} = \frac{1}{3} \pi \times r^2 \times h = \frac{1}{3} \times \frac{22}{7} \times 81 \times 5 = 424.3 \text{ m}^3$$

$$\text{Lateral height of the cone } l = \sqrt{r^2 + h^2} = \sqrt{9^2 + 5^2} = \sqrt{106} = 10.3\text{ m}$$

$$\text{Area of cloth required} = \text{Lateral surface area} = \pi r l = \frac{22}{7} \times 9 \times 10.3 = 291 \text{ m}^2$$

4. Diameter and height of the cone = 4.2 m

$$r = 2.1\text{ m and height } h = 4.2\text{ m}$$

$$\text{Volume} = \frac{1}{3} \pi \times r^2 \times h = \frac{1}{3} \times \frac{22}{7} \times 2.1^2 \times 4.2 = 19.404 \text{ m}^3$$

5. Surface area $4 \pi \times r^2 = 352$

$$4 \times \frac{22}{7} \times r^2 = 352$$

$$r^2 = 28, r = \sqrt{28} = 5.3 \text{ approximately}$$

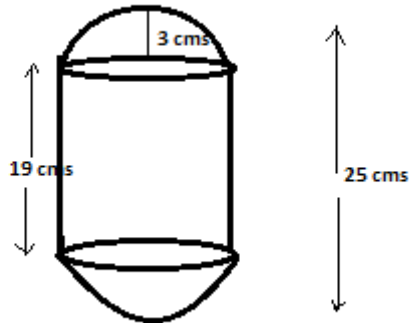
$$\text{Volume} = \frac{4}{3} \pi \times r^3 = \frac{4}{3} \times \frac{22}{7} \times 5.3^3 = 623.86 \text{ m}^3$$



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6.



Total height of the solid = 25 cm

Radius of the cylinder = Radii of the hemispheres = 3 cm

Height of the cylinder, $h = 25 - 3 - 3 = 19$ cm

Volume of the solid = Volume of the cylinder + 2 × volume of hemisphere

$$= \pi r^2 h + 2 \times \frac{2}{3} \pi \times r^3 = \pi \times 3^2 \times 19 + \frac{4}{3} \times \pi \times 3^3 = 207 \pi = 207 \times 3.14$$

$$= 650 \text{ cm}^3$$

7. Volume of hemisphere = $\frac{2}{3} \pi \times r^3 = \frac{2}{3} \pi \times 21^3$

Let radius of the base of the cone = r , its height = 35 cm

Volume of the cone = Volume of hemisphere = $\frac{2}{3} \pi \times 21^3$

$$\frac{1}{3} \pi \times r^2 \times 35 = \frac{2}{3} \pi \times 21^3$$

Simplifying, $r^2 = 529.2 = 529$ approximately

$$r = \sqrt{529} = 23 \text{ cm}$$

8. No of balls = $\frac{\text{Volume of the solid ball}}{\text{Volume of a small spherical ball}} = \frac{\frac{4}{3} \times \pi \times 35^3}{\frac{4}{3} \times \pi \times 7^3} = 125$

9. Volume of copper sphere = $\frac{4}{3} \pi \times 12^3$

Length of wire $h = 1 \text{ m} = 100 \text{ cm}$

Let radius of cross section of the wire = r cm

Volume of the wire = Volume of the solid sphere.

$$\pi \times r^2 \times 100 = \frac{4}{3} \pi \times 12^3$$

$$\text{Simplifying, } r^2 = \frac{4 \times 4 \times 12 \times 12}{100}, r = \frac{4 \times 12}{10} = 4.8 \text{ cm}$$