

Chapter 13: Surface Areas and Volumes

This chapter deals with calculating the surface area (total outside covering) and volume (space occupied) of various 3D shapes like cubes, cuboids, cylinders, cones, and spheres.

1. Cuboid

A cuboid is a box-shaped object with 6 rectangular faces.

1. Surface Area of Cuboid

$$\text{TSA} = 2(lb + bh + hl)$$

- **TSA:** Total Surface Area (all 6 faces).
- l : Length, b : Breadth, h : Height.
- **Usage:** Sum areas of all faces: two each of $l \times b$, $b \times h$, $h \times l$.

2. Lateral Surface Area of Cuboid

$$\text{LSA} = 2h(l + b)$$

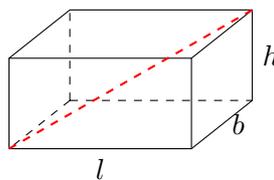
- **LSA:** Lateral Surface Area (only the 4 side faces).
- **Usage:** Useful when calculating area to paint the walls of a room.

3. Volume of Cuboid

$$V = l \times b \times h$$

4. Diagonal of Cuboid

$$d = \sqrt{l^2 + b^2 + h^2}$$



2. Cube

A cube is a special cuboid where $l = b = h = a$.

5. **Surface Area of Cube:** $\text{TSA} = 6a^2$

6. **Lateral Surface Area:** $\text{LSA} = 4a^2$

7. **Volume of Cube:** $V = a^3$

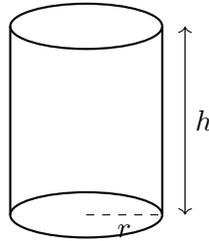
8. **Diagonal of Cube:** $d = a\sqrt{3}$

3. Right Circular Cylinder

9. **Curved Surface Area (CSA):** $2\pi rh$

10. **Total Surface Area (TSA):** $2\pi r(h + r)$

11. **Volume:** $\pi r^2 h$

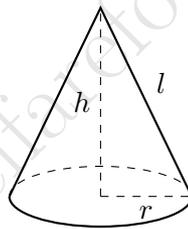


4. Right Circular Cone

12. **Slant Height (l):** $l = \sqrt{h^2 + r^2}$

13. **CSA:** πrl

14. **Volume:** $\frac{1}{3}\pi r^2 h$



5. Sphere & Hemisphere

15. **Sphere Surface Area:** $4\pi r^2$

16. **Sphere Volume:** $\frac{4}{3}\pi r^3$

17. **Hemisphere TSA:** $3\pi r^2$ (CSA $2\pi r^2$ + base πr^2)

18. **Hemisphere Volume:** $\frac{2}{3}\pi r^3$

Quick Revision Summary

✓ **Cuboid:** $V = lbh$, $TSA = 2(lb + bh + hl)$

✓ **Cylinder:** $V = \pi r^2 h$, $CSA = 2\pi rh$

✓ **Cone:** $V = \frac{1}{3}\pi r^2 h$, $CSA = \pi rl$

✓ **Sphere:** $V = \frac{4}{3}\pi r^3$, $SA = 4\pi r^2$

✓ **Units:** $1 \text{ L} = 1000 \text{ cm}^3$; $1 \text{ m}^3 = 1000 \text{ L}$