1. Introduction

This chapter covers formulas to calculate the surface area and volume of 3D solid shapes like cubes, cuboids, cylinders, cones, spheres, and hemispheres.

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2. Cube

- Surface Area (Total) = $6a^2$
- Lateral Surface Area = $4a^2$
- Volume = a^3
  (a = side of cube)

🧊 3. Cuboid

- Surface Area (Total) = 2(lb + bh + hl)
- Lateral Surface Area = 2h(l + b)
- Volume = l × b × h
  (l = length, b = breadth, h = height)

🥫 4. Cylinder

- Curved Surface Area (CSA) = 2πrh
- Total Surface Area (TSA) = 2πr(h + r)

- Volume = $\pi r^2 h$
  (r = radius, h = height)

□ 5. Cone

- Slant height (l) = □$(r^2 + h^2)$
- CSA = $\pi r l$
- TSA = $\pi r(l + r)$
- Volume = $(1/3)\pi r^2 h$
  (r = radius, h = height)

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6. Sphere

- Surface Area = $4\pi r^2$
- Volume = $(4/3)\pi r^3$
  (r = radius)

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7. Hemisphere

- Curved Surface Area (CSA) = $2\pi r^2$
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- TSA = $3\pi r^2$
- Volume = $(2/3)\pi r^3$
  (r = radius)

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8. Conversion of Units

- 1 cm = 10 mm
- 1 m = 100 cm
- 1 m^2 = 10,000 cm^2
- 1 m^3 = 10,00,000 cm^3

 Convert all dimensions to the same unit before calculating area or volume.

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9. Composite Figures

For solid shapes made by combining two or more 3D figures (like a cone on top of a cylinder), calculate volume and surface area separately and then add.

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10. Common Questions in Exams

- Find the volume/surface area of a cone, cylinder, or sphere.
- Compare volumes and surface areas of two different shapes.
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Solve real-life word problems (e.g. capacity of tanks, wrapping paper for gift box).

- Calculate the volume of a container and how many smaller items (like balls or cubes) can fit inside.

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11. Important π Values

- Use π = 22/7 or 3.14 (as per question)
- For better accuracy in word problems, use π = 22/7 unless specified.