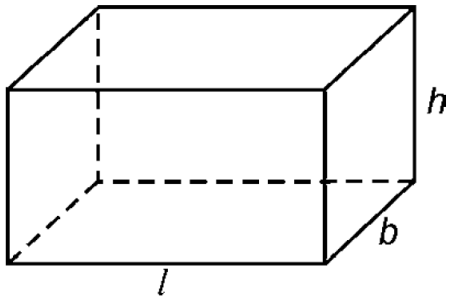
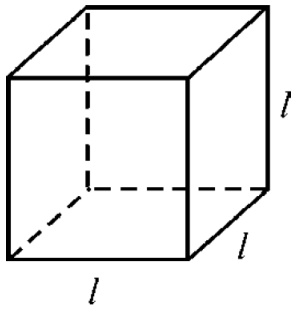
Basic Concepts

1. **Cuboid:**



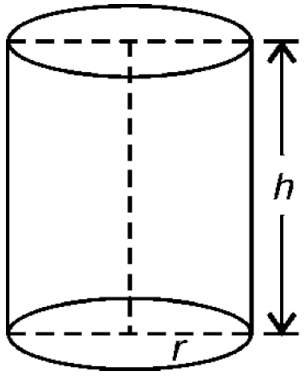
a. Lateral surface area = $2h(l+b)$
b. Surface area = $2(lb+bh+lh)$
c. Volume = lbh
d. Length of diagonal = $\sqrt{l^2+b^2+h^2}$
   where l, b, h are length, breadth and thickness of the cuboid.

2. **Cube:**



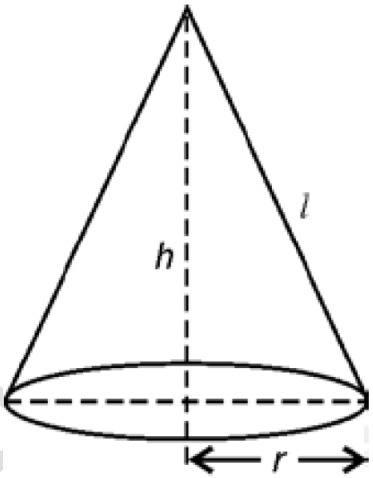
a. Lateral surface area = $4l^2$
b. Surface area = $6l^2$
c. Length of the diagonal = $\sqrt{3}\,l$
   where, l is the edge of the cube.

3. **Cylinder:** r = radius, h = height



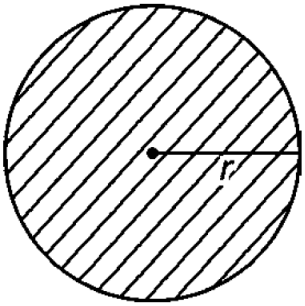
a. Area of curved surface = $2\pi rh$
b. Total surface area = $2\pi r^2 + 2\pi rh = 2\pi r(r + h)$
c. Volume = $\pi r^2 h$
d. Curved surface area of hollow cylinder = $2\pi h(R + r)$, where R is the outer radius.
e. Total surface area of hollow cylinder = $2\pi h(R + r) + 2\pi(R^2 - r^2)$

4. **Cone:** r = radius, h = height, l = slant height



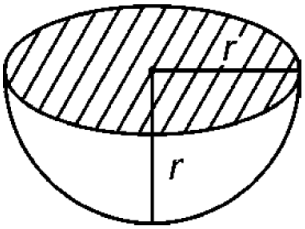
a. Curved surface area = $\pi rl = \pi r\sqrt{h^2 + r^2}$
b. Total surface area = $\pi r^2 + \pi rl = \pi r(r + l)$
c. Volume = $\frac{1}{3}\pi r^2 h$

5. **Sphere:** $r =$ radius



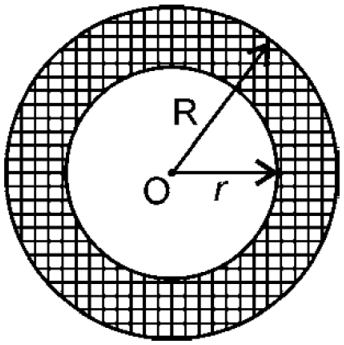
a. Surface area = $4\pi r^2$
b. Volume = $\frac{4}{3}\pi r^3$

6. **Hemisphere (solid):** $r =$ radius



a. Curved surface area = $2\pi r^2$
b. Total surface area = $3\pi r^2$
c. Volume = $\frac{2}{3}\pi r^3$

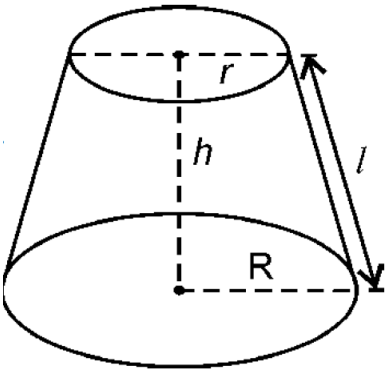
7. Spherical shell:



Outer radius = R
Inner radius = r

a. Surface area (outer) = $4\pi R^2$
b. Surface area (inner) = $4\pi r^2$
c. Volume of the material = $\frac{4}{3}\pi(R^3 - r^3) = \frac{4}{3}(R - r)(R^2 + Rr + r^2)$

8. When a cone is cut by a plane parallel to the base of the cone, then the portion between the plane and the base is called the **frustum** of the cone.



a. Slant height of the frustum, $l = \sqrt{h^2 + (R - r)^2}$

b. Volume of the frustum of the cone = $\frac{\pi h}{3}(R^2 + r^2 + Rr)$

c. Lateral surface area of the frustum of the cone = $\pi l(R + r)$

d. Total surface area of the frustum of the cone
= (area of the base) + (area of the top) + (lateral surface area)
= $\pi R^2 + \pi r^2 + \pi l(R + r)$
= $\pi[R^2 + r^2 + l(R + r)]$