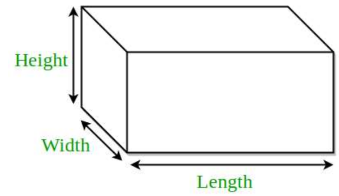
PARALLELOPIPED

It can also be called a rectangular parallelepiped. A cuboid has 12 edges and 8 vertices. Let us assume length, breadth, height of a cuboid be ℓ (length), b (width) and h (height) respectively.



Formulae:

(a) Total surface area = $2(\ell b + bh + \ell h)$ square units,

(b) Volume = (ℓbh) cubic units

(c) Length of the diagonal = $\sqrt{\ell^2 + b^2 + h^2}$ units

(d) Area of 4 walls of a room = $[2(\ell + b) \times h]$ square units

CUBES

If all the edges of cube are equal in length, it is called a cube.

For a cube, $\ell = b = h = a$ where a = length of the each edge of the cube

Formulae:

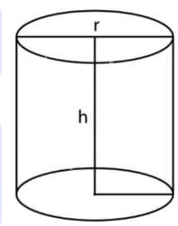
(a) Total Surface Area = $6a^2$ square units.

(b) Volume = a^3 cubic units.

(c) Length of the diagonal = $\sqrt{3}$ a units.

RIGHT CIRCULAR CYLINDER

For a right circular cylinder of base radius r and height (or length) h, we have



(i) Area of each end = Area of base = πr^2

(ii) Curved surface area = $2\pi rh$

= $2\pi r \times h$ = Perimeter of the base × Height

(iii) Total surface area = Curved surface area + Area of circular ends

$= 2\pi rh + 2\pi r^2 = 2\pi r(h + r)$

(iv) Volume $= \pi r^2 h$ = Area of the base × Height

RIGHT CIRCULAR HOLLOW CYLINDER

Let R and r be the external and internal radii of a hollow cylinder of height h. Then,

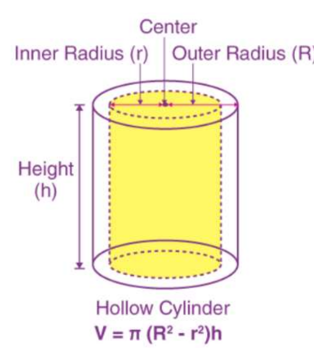
(i) Area of each end = $\pi(R^2 - r^2)$

(ii) Curved surface area of hollow cylinder

= External surface area + Internal surface area

= $2\pi Rh + 2\pi rh$

= $2\pi(R + r)h$



(iii) Total surface area = $2\pi Rh + 2\pi rh + 2\left(\pi R^2 - \pi r^2\right)$

$= 2\pi h(R+r) + 2\pi(R+r)(R-r)$

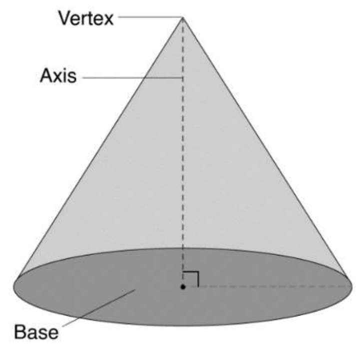
$= 2\pi(R+r)(R+h-r)$

(iv) Volume of material = External volume – Internal volume

$= \pi R^2 h - \pi r^2 h = \pi\left(R^2 - r^2\right)h$

Right Circular Cone

A right circular cone is the solid generated by rotating a right angled triangle



Formulae:

For a right circular cone of height h, base radius r and slant height ℓ.

(a) Volume = $\frac{1}{3}\pi r^2 h$

(b) Curved surface area = $\pi r\ell$

(c) Total surface area = curved surface area + Base surface area

$= \pi r + \pi r^2 = \pi r(\ell + r)$

Note: ℓ, r, h are related as: $\ell = \sqrt{r^2 + h^2}$ (Pythagoras theorem)

SPHERE

For a sphere of radius r, we have

(i) Surface area = $4\pi r^2$

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

For a hemisphere of radius r, we have

(i) Surface area = $2\pi r^2$

(ii) Total surface area = $2\pi r^2 + \pi r^2 = 3\pi r^2$

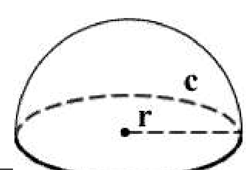
(iii) Volume = $\frac{2}{3}\pi r^3$

Hemisphere

A plane through the centre of a sphere cuts it into two equal halves called hemispheres.

Formulae:

(a) Volume = $\frac{2}{3}\pi r^3$



(b) Curved Surface Area = $2\pi r^2$

(c) Total Surfaces Area = $2\pi r^2 + r^2 = 3\pi r^2$