Maths Class 10 Notes for Surface Areas and Volumes

(A) RIGHT CIRCULAR CYLINDER:

A right circular cylinder is solid generated by the revolution of a rectangle about of its sides.

NOTE : If a paper, cylinder open at both the ends is cut along a vertical line on the curved surface and stretched on a plane surface, we obtain a rectangle of length i.e., $27\pi r$ and breadth= Height of cylinder h.
So, curved surface area (C.S.A) or lateral surface area = $2\pi r$ * height

Important Formula For Cylinder

1. C. S. A of cylinder = (Perimeter of base) * Height = $2\pi rh$
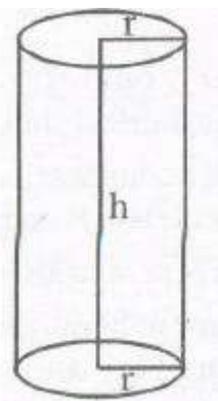
2. Area of each end of cylinder = $2\pi r^2$

3. Total surface area (including both circular ends) = $2\pi rh + 2\pi r^2 = 27\pi r(h + r)$

4. Volume of cylinder — $\pi r^2 h$ = **[(Area of base) * height]**

Hollow Cylinder's formulae e.g., (Rubber tubes pipes, etc.)

1. Volume of material = Exterior volume — Interior
volume = $\pi R^2 h$ — $\pi r^2 h$ = $\pi h(R^2 – r^2)$

2. C. S. A or L. S. A = external surface area + internal surface area
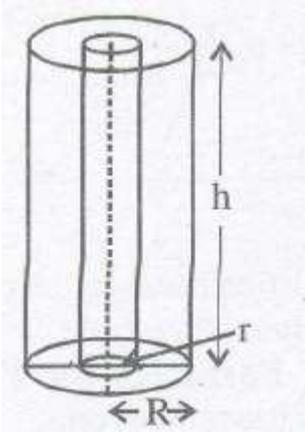
$= 2\pi Rh + 2\pi rh$

3. T. S . A. of hollow cylinder = C. S. A+ 2 (area of base ring)

$= (2\pi Rh + 2\pi rh) + 2(\pi R^2 - \pi r^2)$

NOTE:

1. Two end faces of right circular cylinder are circles having each area $= \pi r^2$

2. Mass of cylinder = Volume * density

3. When rectangular sheet of paper is rolled along its length , we get a cylinder whose base circumference is length of sheet and height is same as breadth of sheet.

(B) CONE

From figure, AO = height of cone and is denoted by 'h'
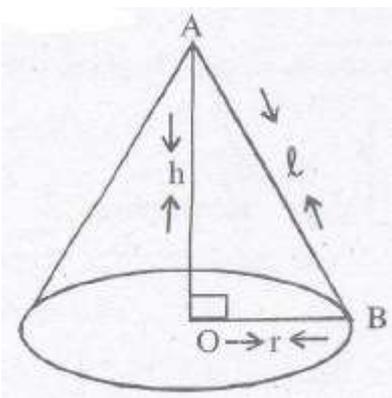
OB = radius of the base of cone, AB = slant height of a cone (l)

Important Formula Of rt. Circular Cone :

1. Volume of cone $= 1 / 3 \ \pi r^2 h$

2 C. S. A or L. S. A=πrl where slant height

$= l = \sqrt{r^2 + hr^2}$

3. T. S. A of cone $= \pi rl + \pi r^2$

(C) FRUSTUM OF A CONE

FRUSTUM : A cone is cut by a plane parallel to the base of the cone,
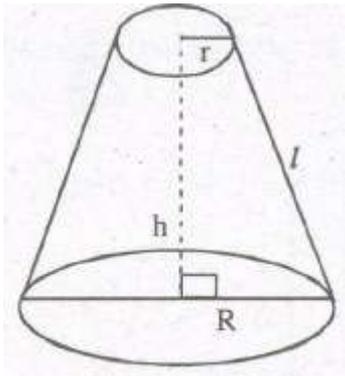
then the portion between the plane and base is called frustum of the cone

Important Formulae for Frustum :

1. Volume of frustum of cone
$= \pi h / 3[R^2 + r^2 + Rr]$ cubic unit

2. L. S. A or C. S. A $= \pi l(R + r)$ Sq units where $l^2 = h^2 + (R - r)^2$

3. T. S. A $= \pi R^2 + \pi r^2 + \pi l(R + r)$ Sq. units.
(Area of base + Area of top + Area of lateral)

4. Slant height (l) $= \sqrt{h^2 2 + (R - r)^2}$

(D) IMPORTANT FORMULA FOR SPHERE AND HEW-SPHERE

(a) Surface area of sphere $= 4\pi r^2$
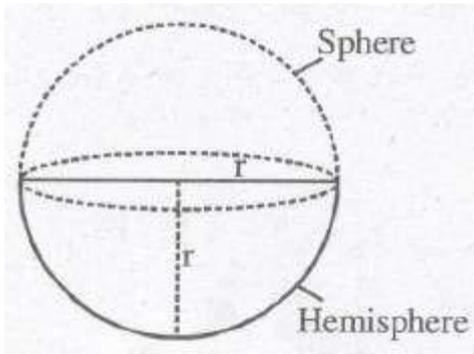
(b) Volume of sphere = 4 / 3 πr^3

(c) Volume of hemisphere = 2 / 3 πr^3

(d) C.S.A. of hemisphere = $2\pi r^2$

(e) Total surface area of Hemi-sphere = $2\pi r^2 + \pi r^2 = 3\pi r^2$

(E) IMPORTANT FORMULA FUR SPHERICAL SHELL/ HEMILSPHERICAL SHELL

(a) Outer surface area of spherical shell = $4\pi R^2$

(b) Inner S.A. of spherical shell = $4\pi r^2$

(c) Total surface area of spherical shell = $4\pi(R^2 + r^2)$

(d) Volume of spherical shell of external radius R and internal

radius 'r' = 4 / 3$\pi(R^3 - r^3)$

(e) Outer curved surface area hemispherical shell = $2\pi R^2$
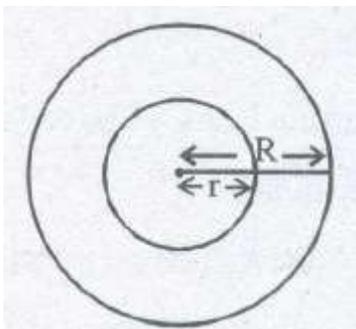
(f) Inner curved surface area of hemispherical shell = $2\pi r^2$

(g) Thick hemispherical bowl of external and internal radii R and r,

Total S.A. = $\pi(3R^2 + r^2)$

(h) Volume of hemispherical shell of external radius 'R' and internal radius 'r'

$= 2 / 3\pi(R^3 - r^2).$