DEPARTMENT OF EDUCATION (S)
Government of Manipur

CHAPTER 12
MENSURATION

NOTES

- **Area of a triangle** $= \frac{1}{2} \times \text{base} \times \text{altitude}$
- **Heron's Formula**

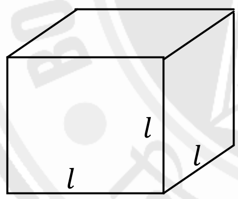
If a, b, c are the lengths of the three sides of a triangle, then

$$\text{Area of the triangle} = \sqrt{s(s-a)(s-b)(s-c)}$$

where $s = \text{semi} - \text{perimeter of the triangle} = \frac{a+b+c}{2}$

Surface Area and Volume of Some Basic Solids

1 Cube

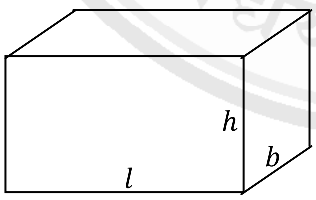


Lateral Surface Area $= 4l^2$

Total Surface Area $= 6l^2$

Volume (Capacity) $= l^3$

2 Cuboid

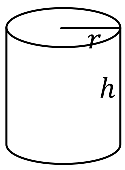


Lateral Surface Area $= 2(l+b)h$

Total Surface Area $= 2(lb + bh + hl)$

Volume (Capacity) $= lbh$

3 Cylinder

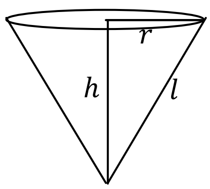


Curve Surface Area $= 2\pi rh$

Total Surface Area $= 2\pi r(r+h)$

Volume (Capacity) $= \pi r^2 h$

4 Cone



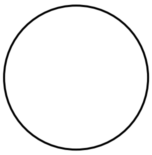
Slant Height, $l = \sqrt{r^2 + h^2}$

Curve Surface Area $= \pi rl$

Total Surface Area $= \pi r(r+l)$

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

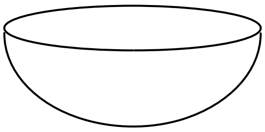
5 **Sphere**



Curve Surface Area $= 4\pi r^2$

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

6 **Hemisphere**

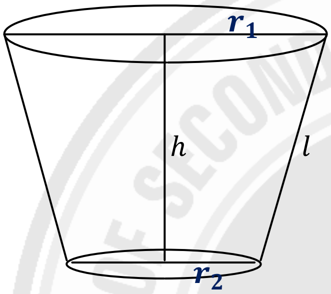


Curve Surface Area $= 2\pi r^2$

Total Surface Area $= 3\pi r^2$

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

7 **Frustum**



Slant Height of a frustum $(l) = \sqrt{(r_1 - r_2)^2 + h^2}$

Curve Surface Area $= \pi(r_1 + r_2)l$

Total Surface Area $= \pi[(r_1 + r_2)l + {r_1}^2 + {r_2}^2]$

Surface Area of a Frustum with larger face open

$= \pi[(r_1 + r_2)l + {r_2}^2]$

Volume $= \frac{1}{3}\pi({r_1}^2 + r_1.r_2 + {r_2}^2)h$