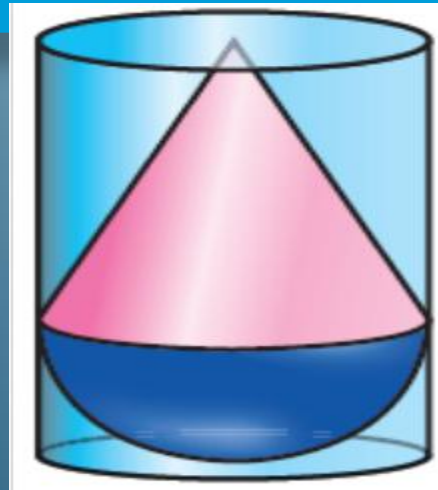
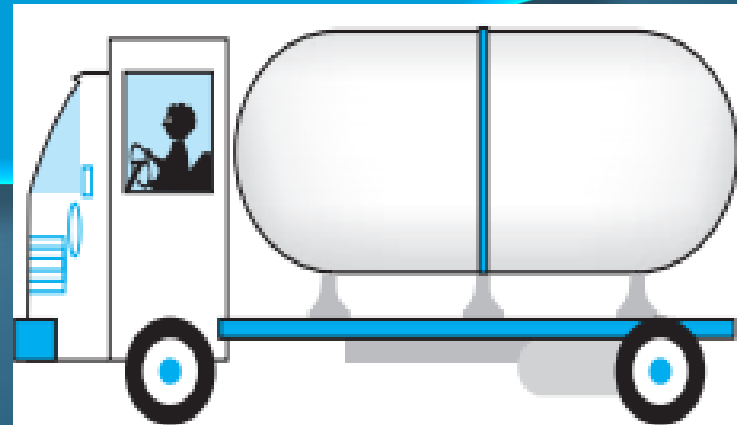


SURFACE AREA
&
VOLUME
Class- X

SURFACE AREA AND VOLUME OF COMBINATION OF FIGURES



Surface area of a combination of figures is the sum of the curved surface areas of the individual figures.

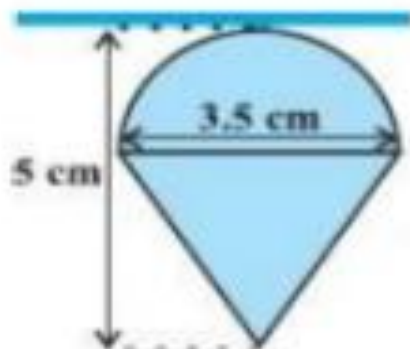
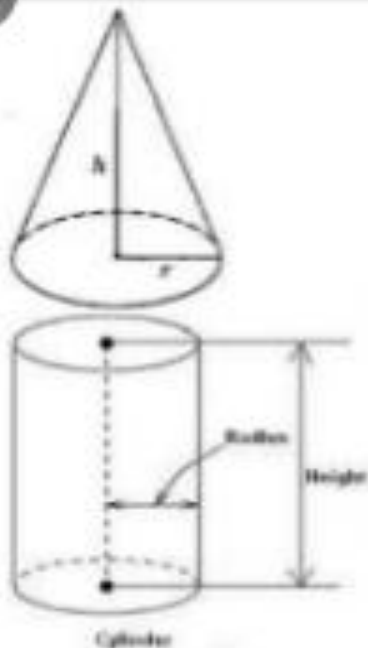




In calculating the surface area, the surface areas of the two constituents are not to be added, because some part of the surface area disappeared in the process of joining them



Combination of Solids



Combination of figures



Ice Cream



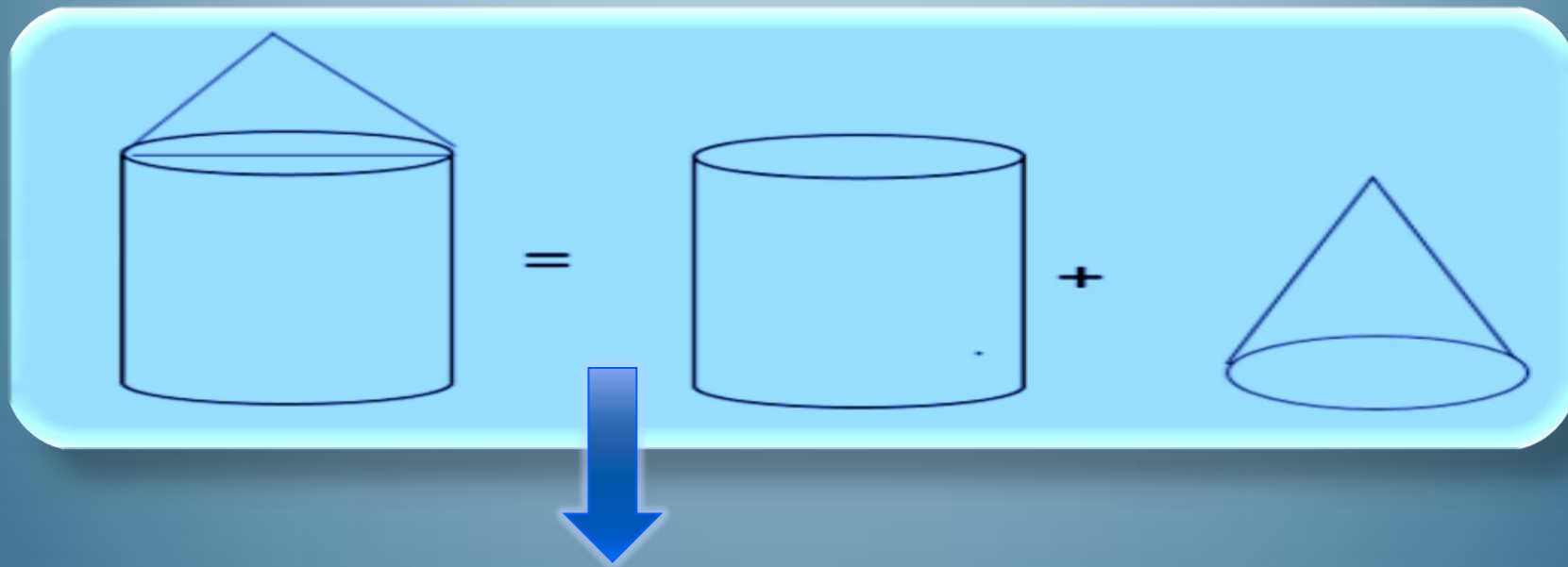
Tent



Capsule

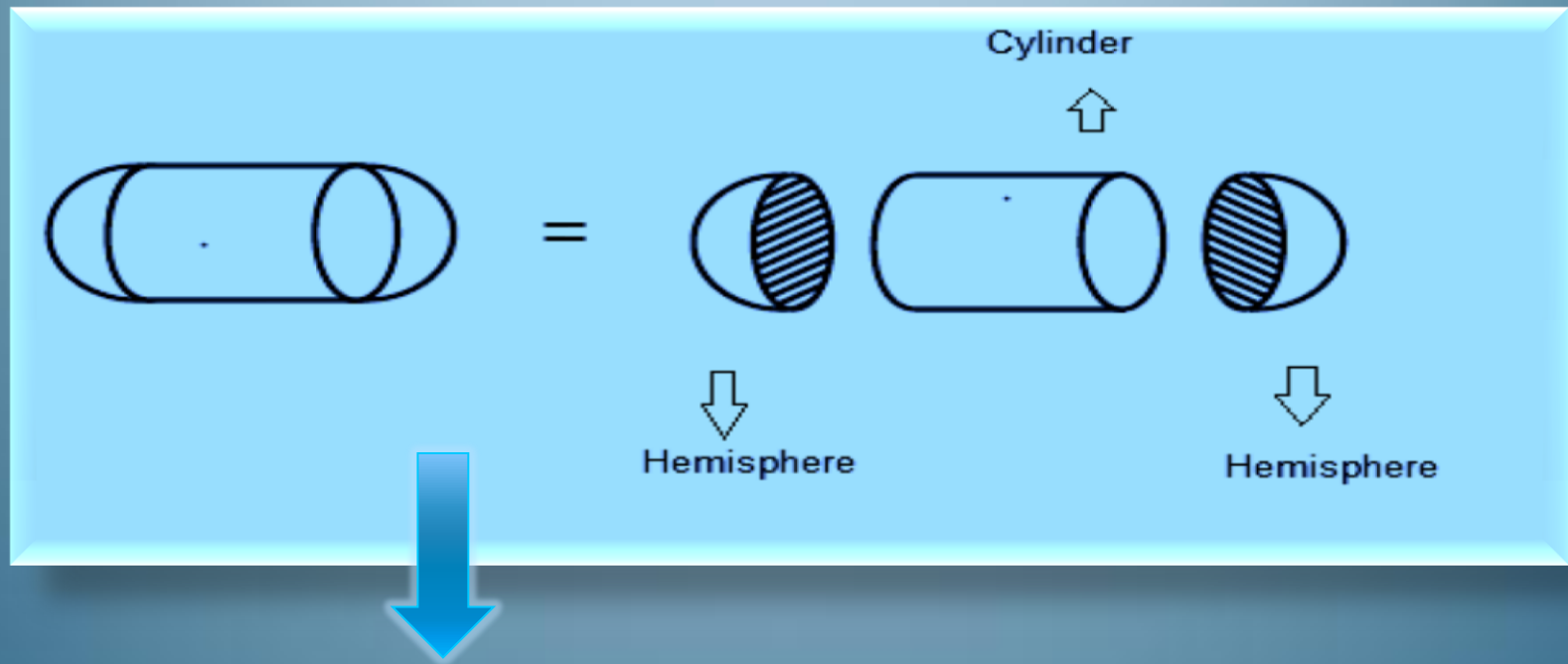


Tanjore Doll

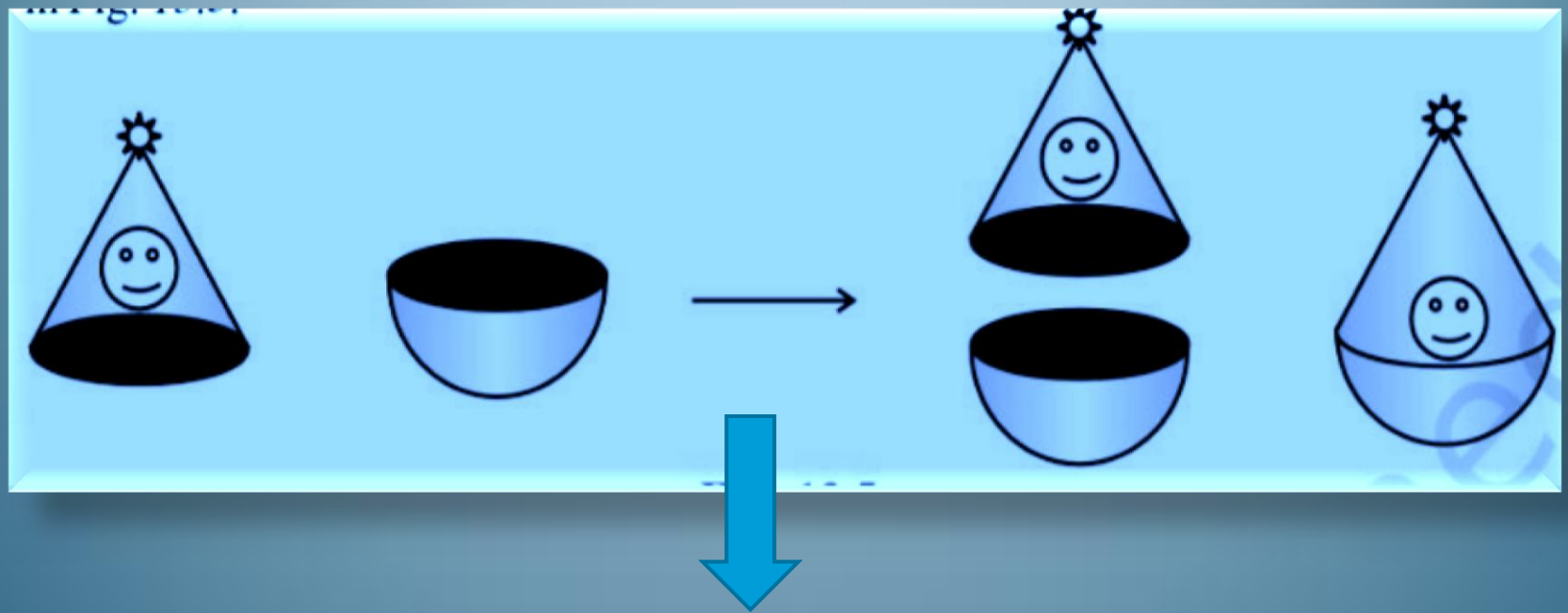


Surface Area of the Solid = Curved Surface Area
of Cylinder + Curved Surface area of the cone +
area of the base

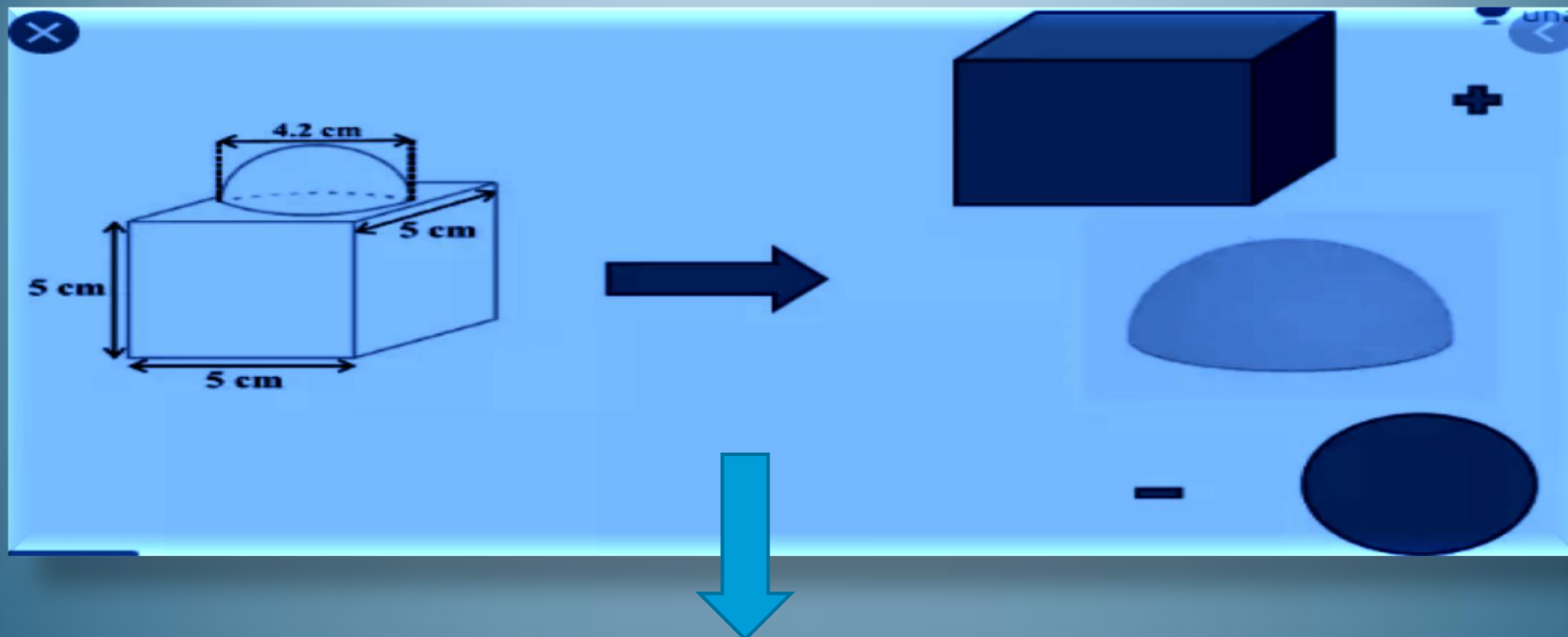
$$= 2\pi rh + \pi rl + \pi r^2$$



$$\begin{aligned}
 \text{Surface Area of the Solid} &= \text{Curved Surface Area of Cylinder} + \text{Curved Surface area of two hemispheres} \\
 &= 2\pi rh + 2 \times 2\pi r^2 \\
 &= 2\pi rh + 4\pi r^2
 \end{aligned}$$



$$\begin{aligned}\text{Surface Area of the Solid} &= \text{Curved Surface Area of} \\ &\text{Cone} + \text{Curved Surface area of hemisphere} \\ &= \pi r l + 2\pi r^2\end{aligned}$$



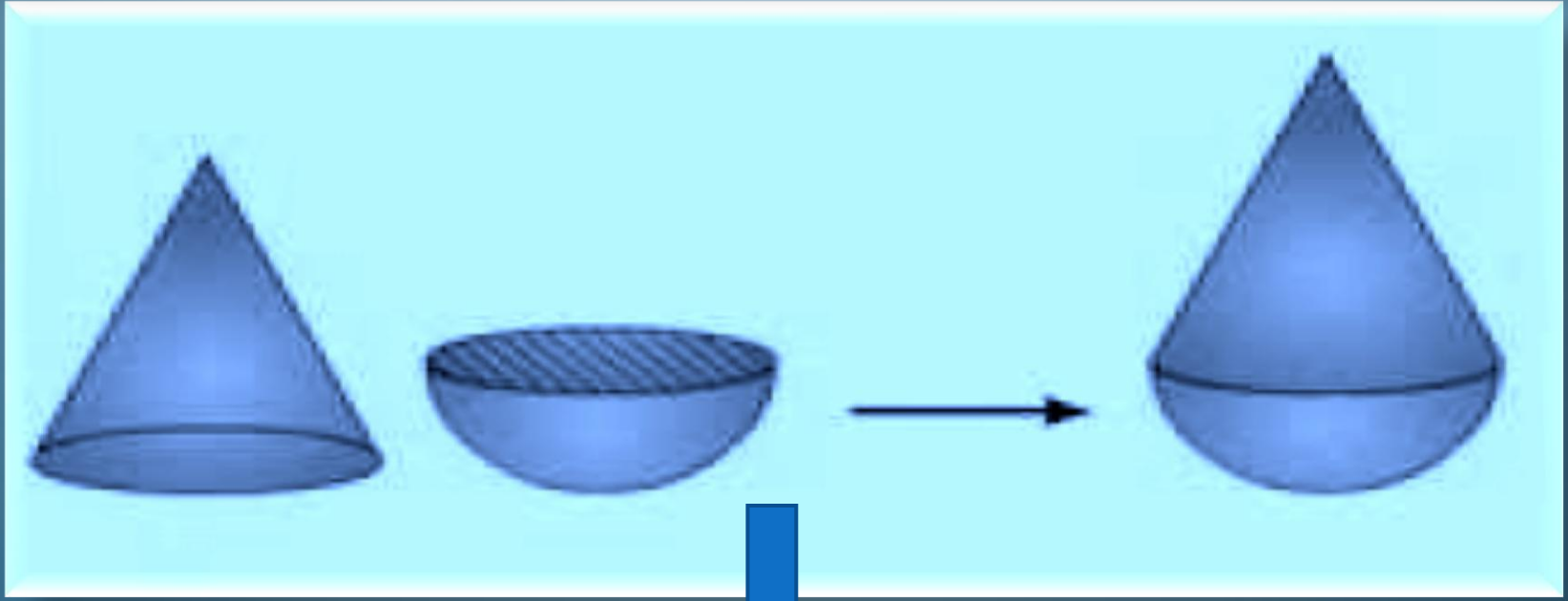
Surface Area of the solid = Total Surface Area of the cube + Curved Surface area of hemisphere – Area of Circle

$$= 6l^2 + 2\pi r^2 - \pi r^2 = 6l^2 + \pi r^2$$

VOLUME OF COMBINATION OF FIGURES

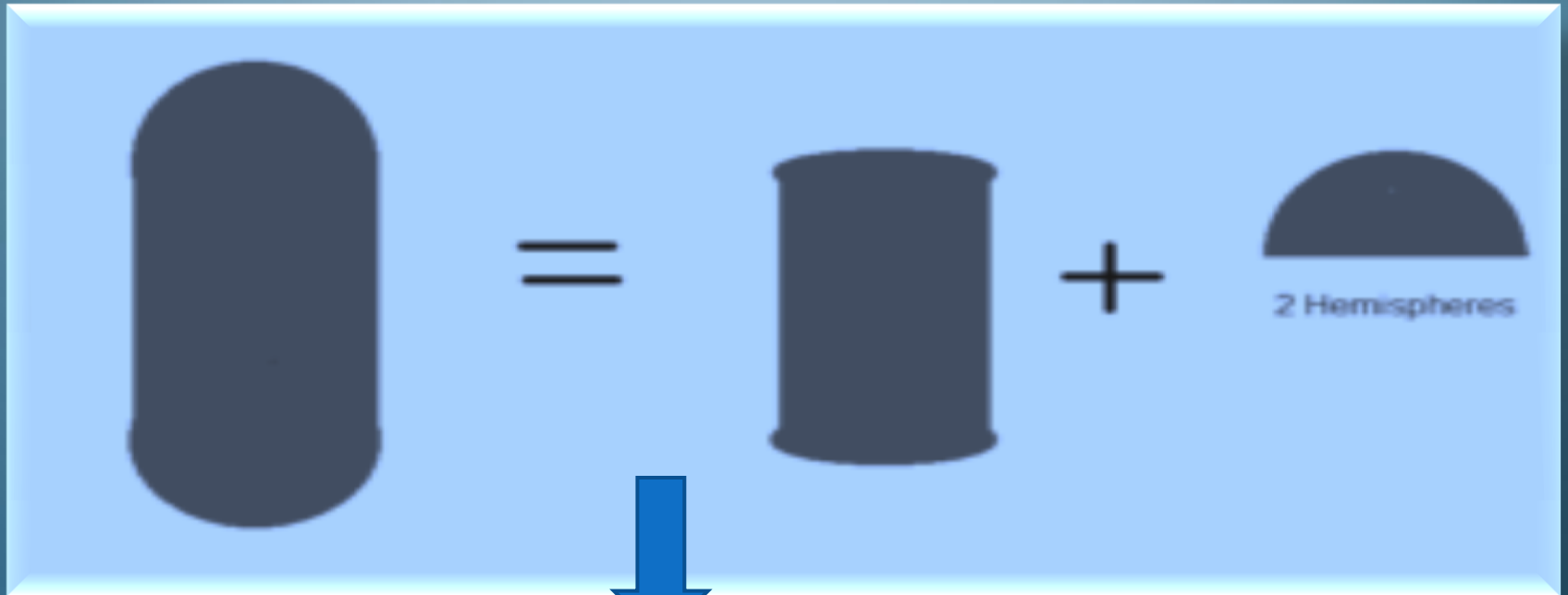
Volume of the solid formed by joining two basic solids will actually be the sum of the volumes of the constituents.

VOLUME OF COMBINATION OF FIGURES



$$\begin{aligned}\text{Volume of the solid} &= \text{Volume of the cone} + \\ &\quad \text{volume of the hemi sphere} \\ &= \frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3\end{aligned}$$

VOLUME OF COMBINATION OF FIGURES

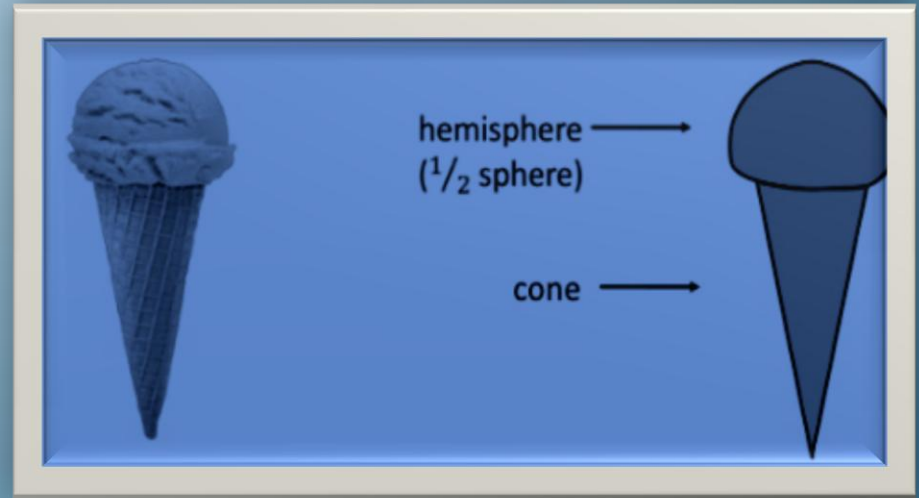
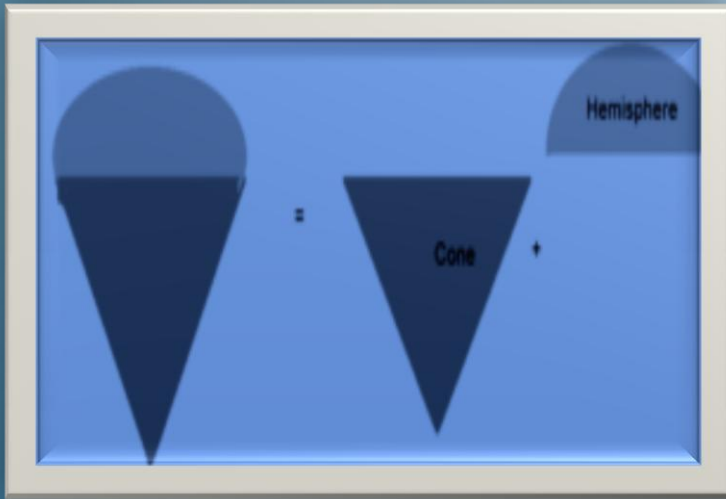


Volume of the solid = Volume of the cylinder
+ volume of two hemi spheres

$$= \pi r^2 h + 2 \times \left(\frac{2}{3}\pi r^3\right)$$

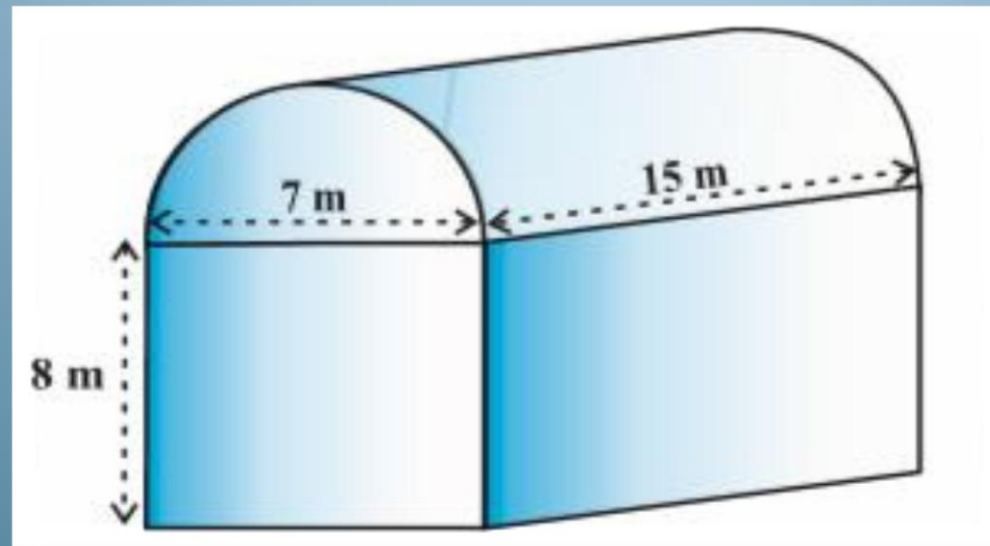
$$= \pi r^2 h + \frac{4}{3}\pi r^3$$

VOLUME OF COMBINATION OF FIGURES



**Total volume = volume of the cone +
volume of the hemisphere**

$$= \frac{1}{3} \pi r^2 h + \frac{2}{3} \pi r^3$$



Total Volume = Volume of cuboid + Volume of half cylinder

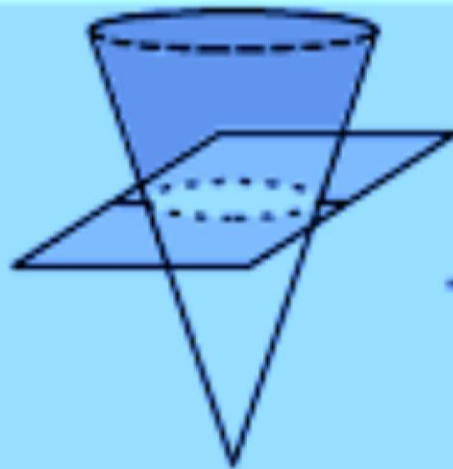
$$\text{Total Volume} = lbh + \frac{1}{2} \pi r^2 h$$

FRUSTUM OF A CONE

Frustum of a cone is a solid obtained by removing a smaller cone from a given cone by cutting it through a plane parallel to its base. The left over the part is called a frustum of the cone.



FRUSTUM OF A CONE



**A cone sliced
by a plane
parallel to base**

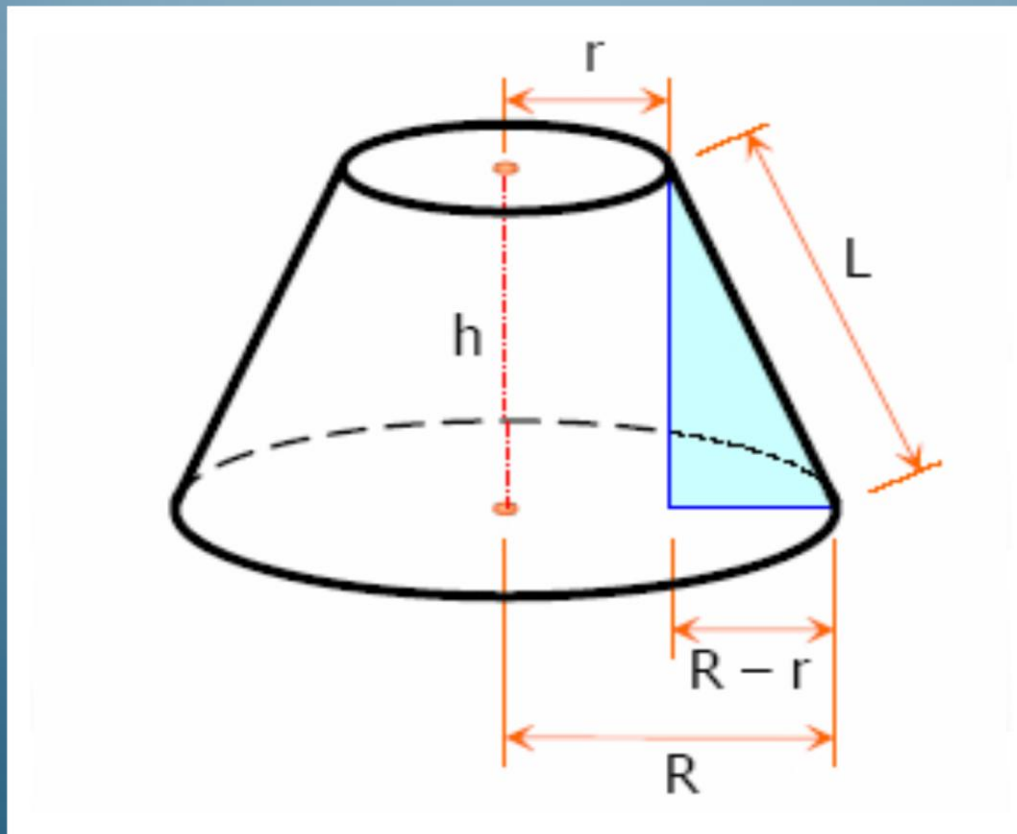


**The two parts
separated**



Frustum of a cone

FRUSTUM OF A CONE



Curved surface area of a Frustum

Curved surface area of a frustum of the cone = $\pi(r_1 + r_2) l$,

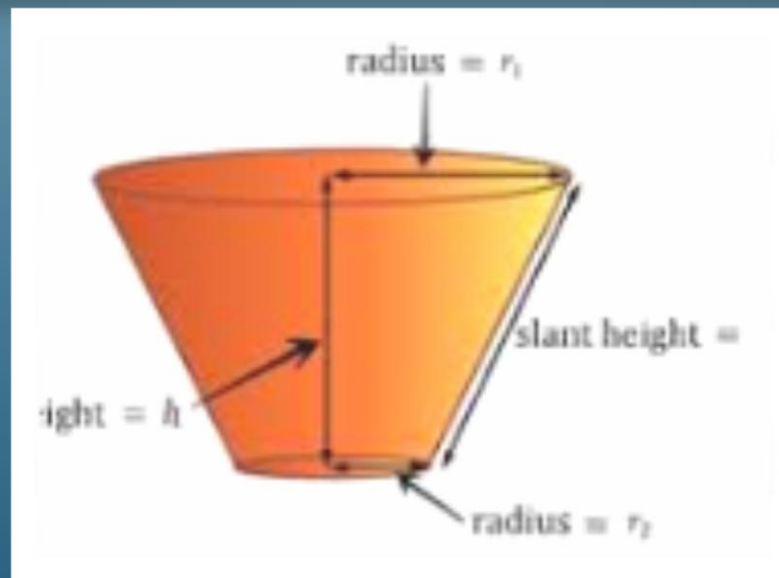
l the slant height and r_1 and r_2 the radii of the ends ($r_1 > r_2$)

where $l = \sqrt{h^2 + (r_1 - r_2)^2}$.

Total surface area of a Frustum

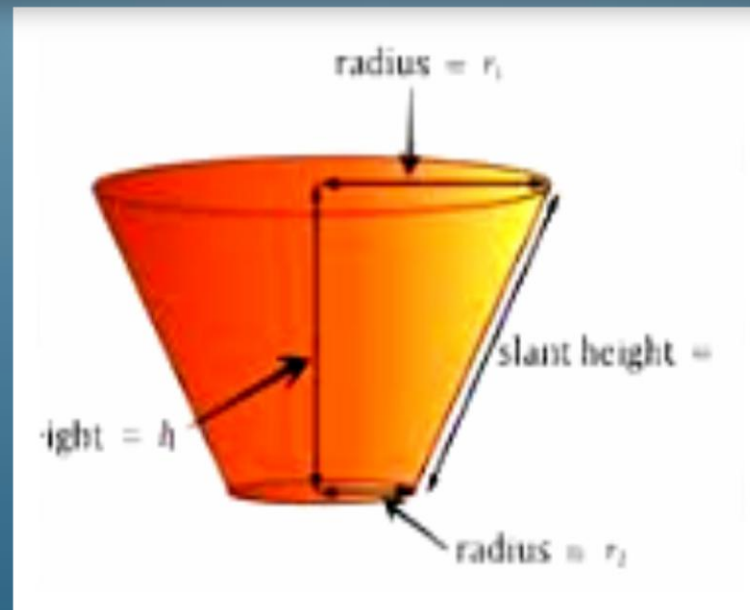
Total surface area of the frustum of the cone = $\pi l (r_1 + r_2) + \pi r_1^2 + \pi r_2^2$,

where $l = \sqrt{h^2 + (r_1 - r_2)^2}$.



Volume of a Frustum

$$\text{Volume of the frustum of the cone} = \frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1r_2).$$



Reference:

- Ncert book and Google images for content and images.

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