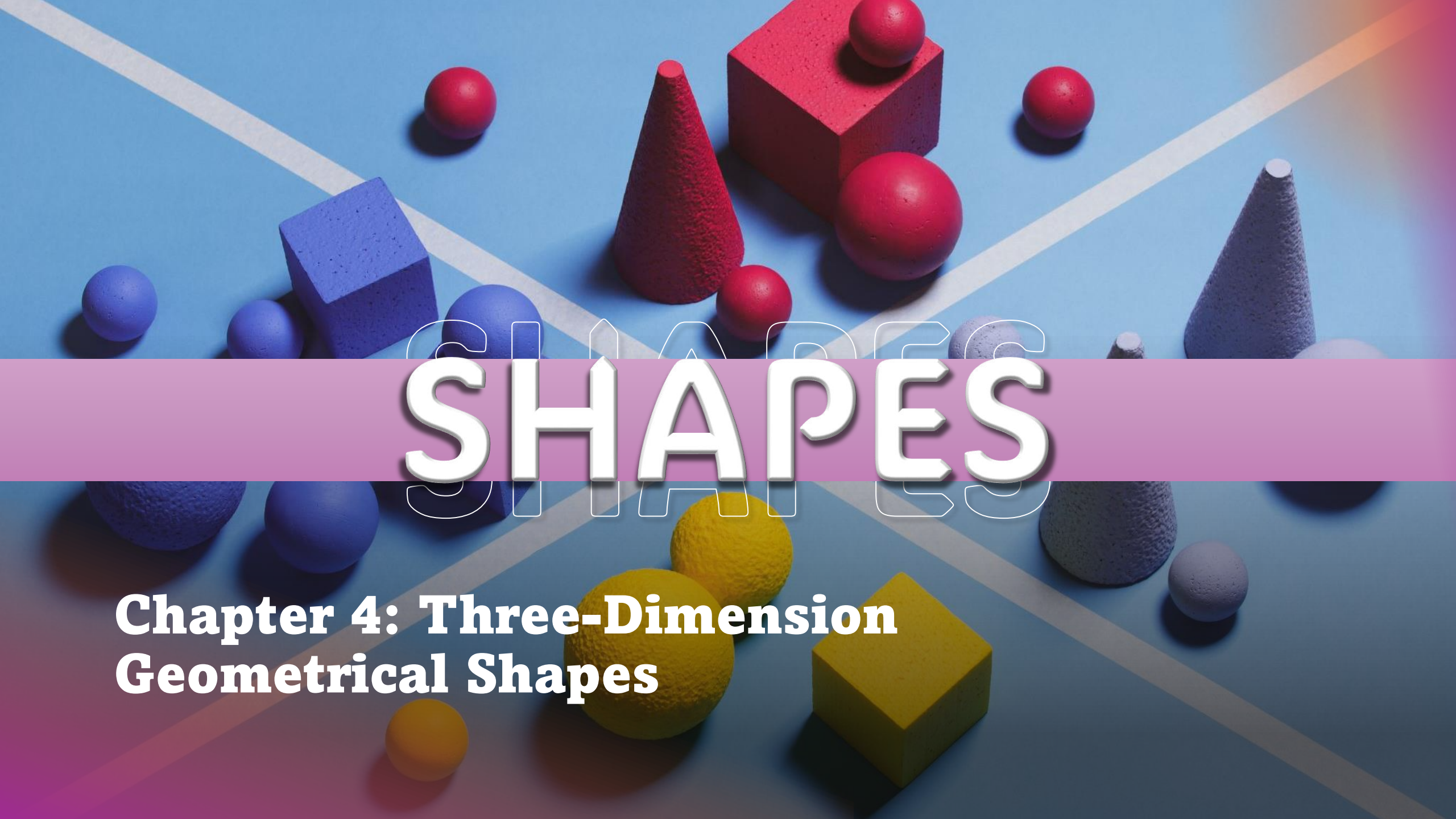


Chapter 4: Three-Dimension Geometrical Shapes

3D Geometrical Shapes

Let’s recap:

Polygons = 2-Dimensional Geometrical Shapes

= Width x Length

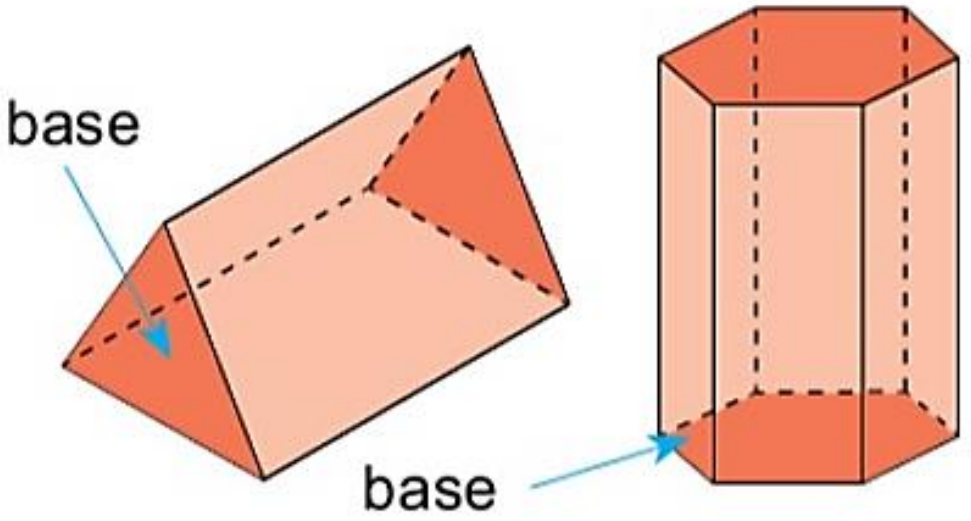
However, this chapter will discuss 3-Dimensional Geometrical Shapes which has Width x Length x ***Height***

3D Geometrical Shapes

Prism: Two flat bases that are polygons which are congruent and parallel

Flat rectangular shaped side

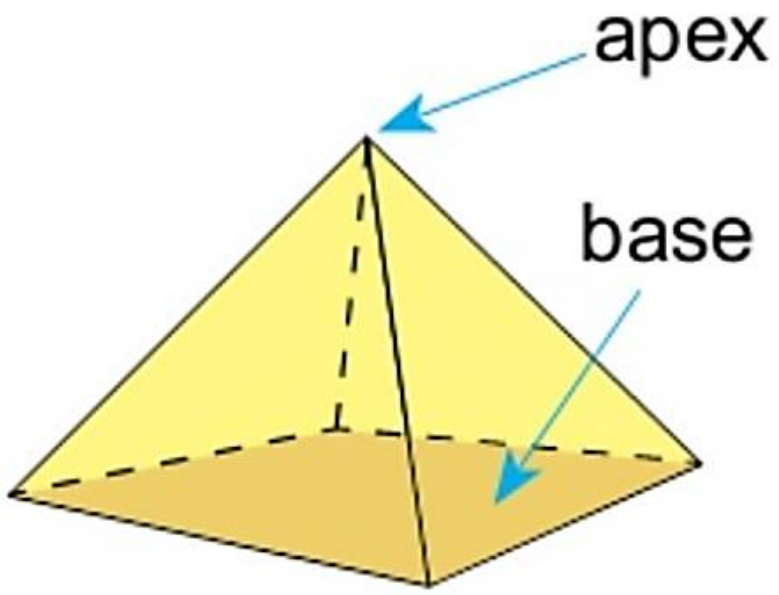
Uniform cross section



3D Geometrical Shapes

Pyramid: One flat base that is polygon shaped

The other sides are triangular shaped that meet at the apex

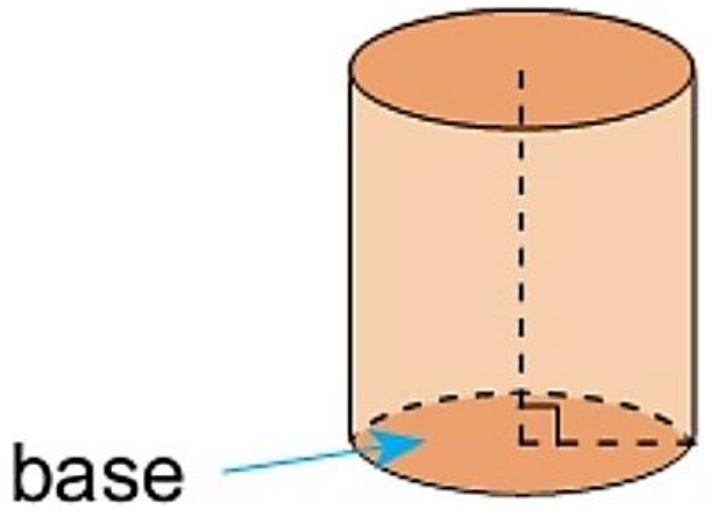


3D Geometrical Shapes

Cylinder:

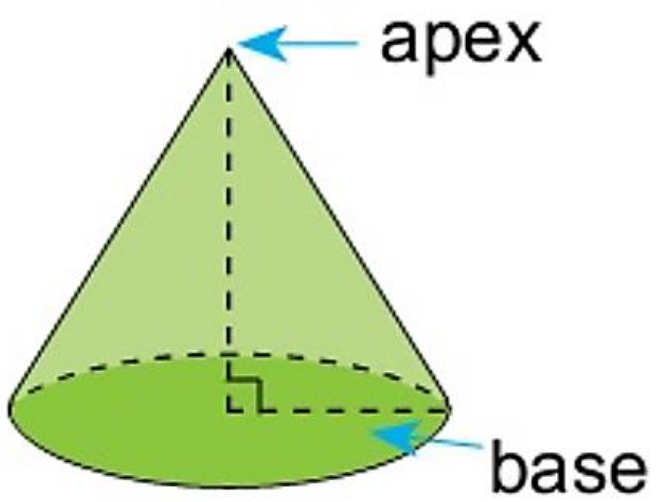
Two circular bases which are congruent and parallel

One curved surface



3D Geometrical Shapes

Cone:	One circular base
	One apex
	One curved surface that merges the base and the apex

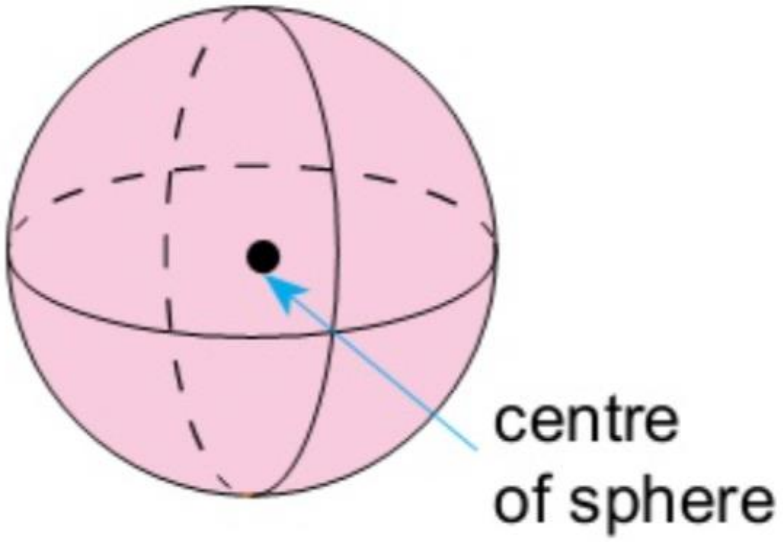


3D Geometrical Shapes

Sphere:

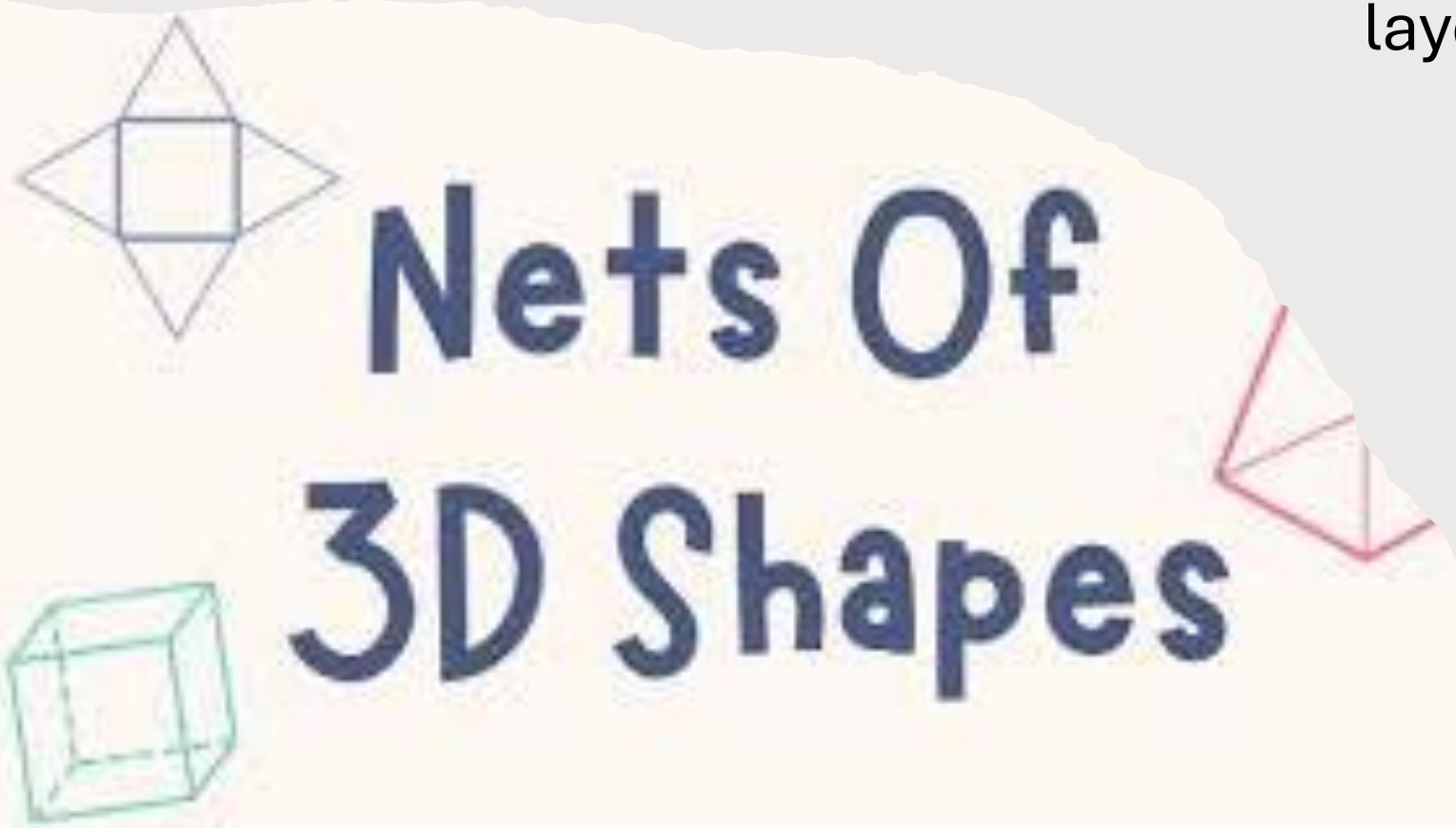
All points on the surface are equidistant from the centre of the sphere

One curved surface



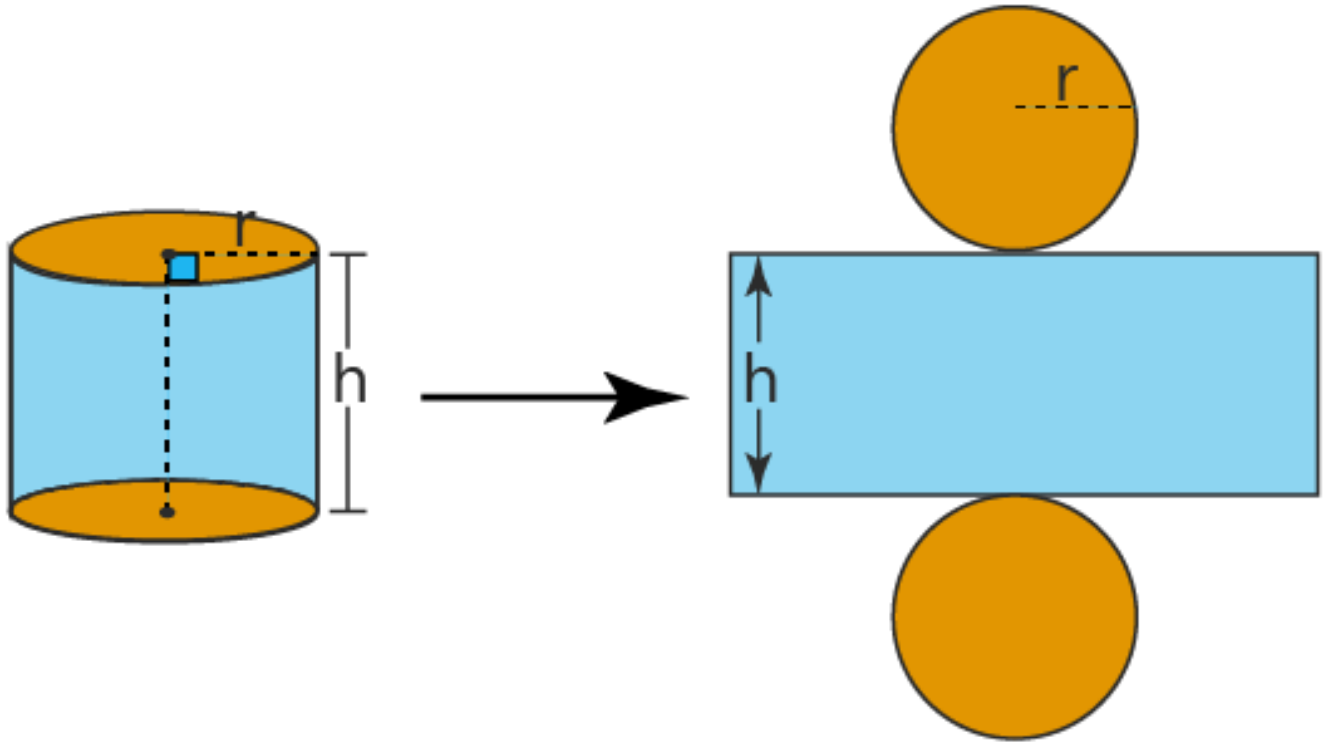
Nets

Nets of a 3D shape is the opening and laying out each surface to become 2D layouts.



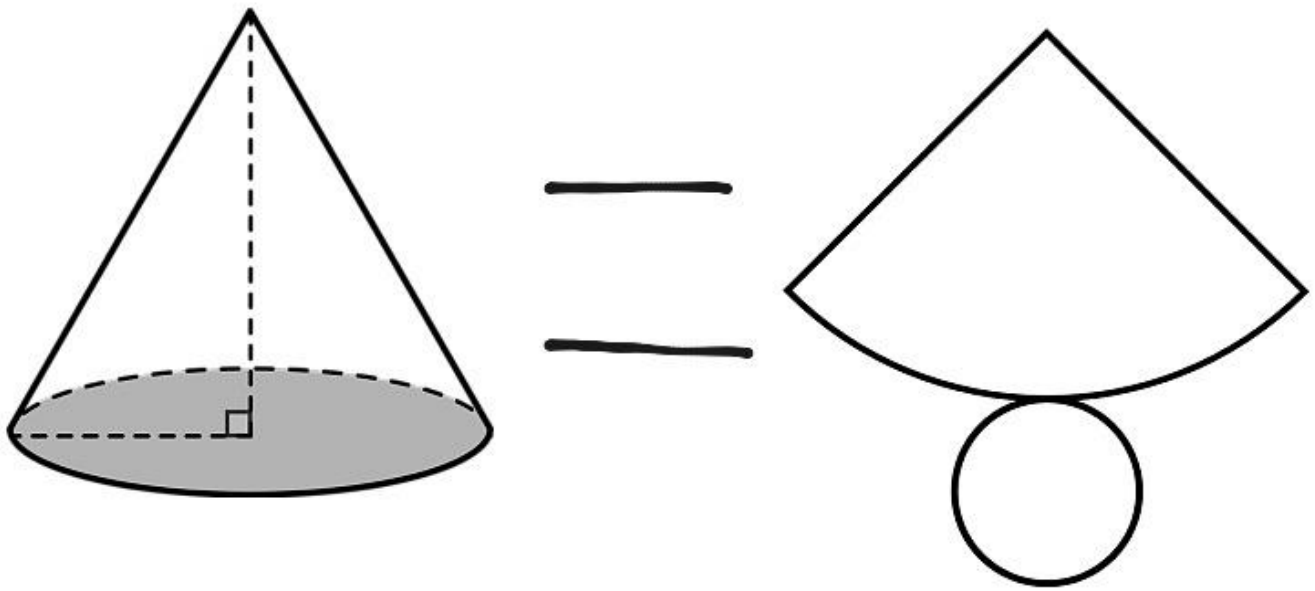
Nets

Cylinder



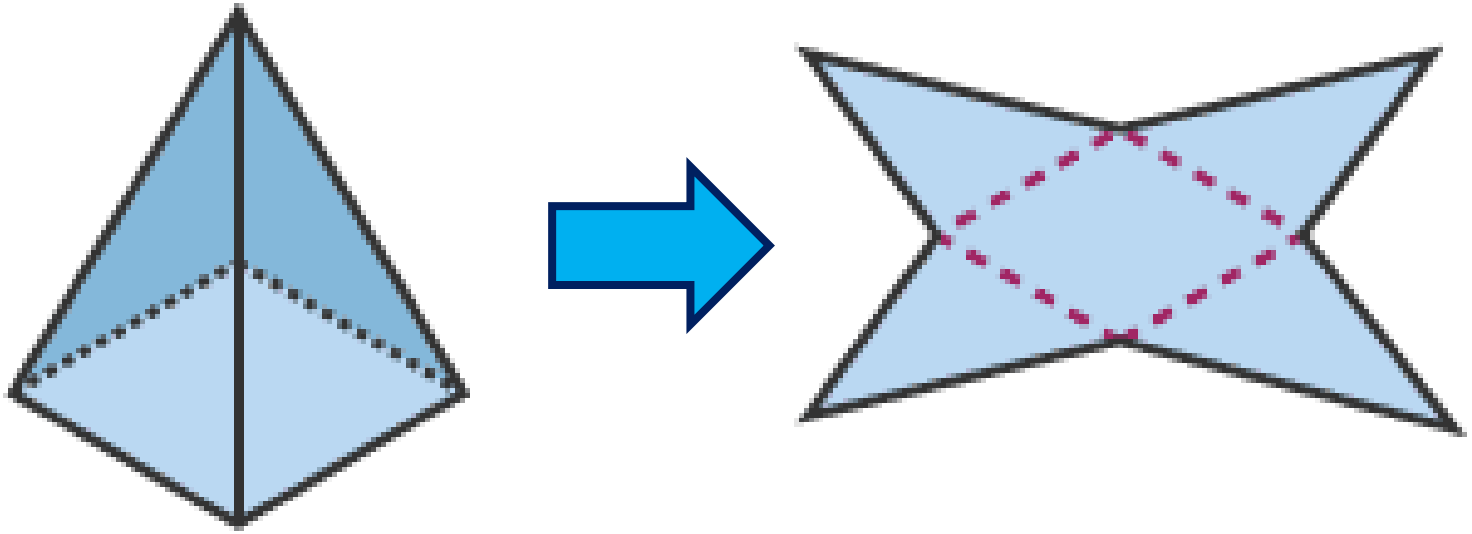
Nets

Cone



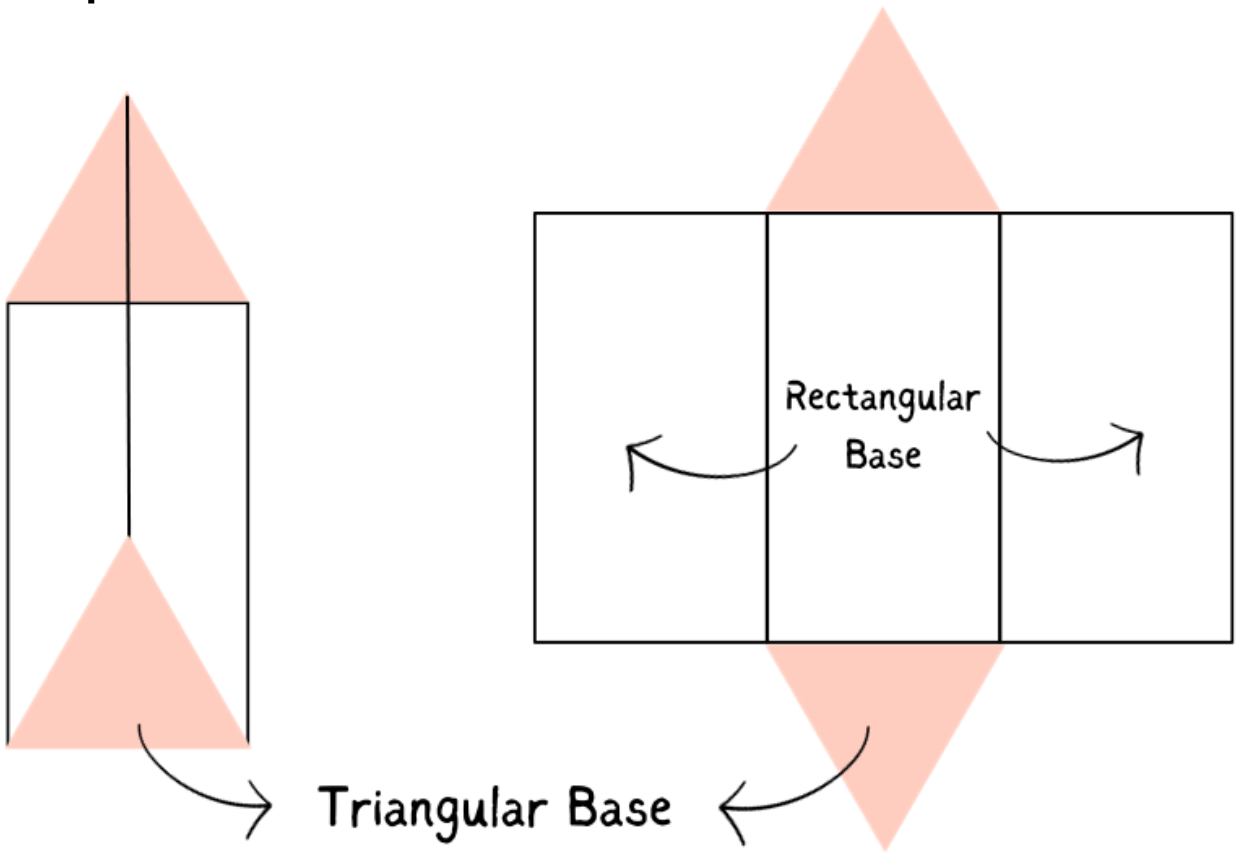
Nets

Square based Pyramid

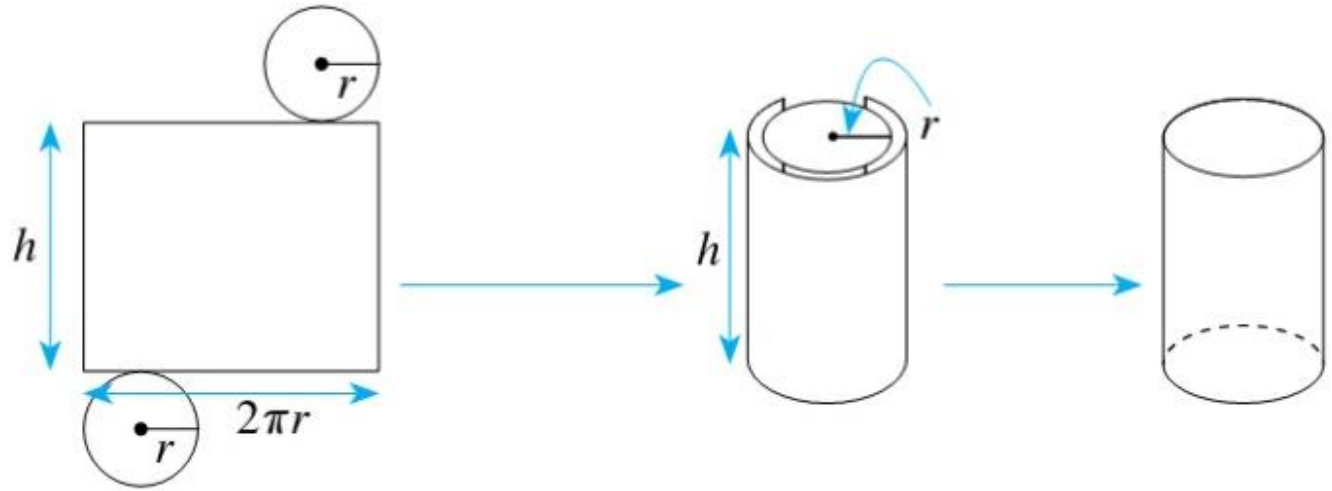


Nets

Triangular based prism



Surface Area (Closed Cylinder)

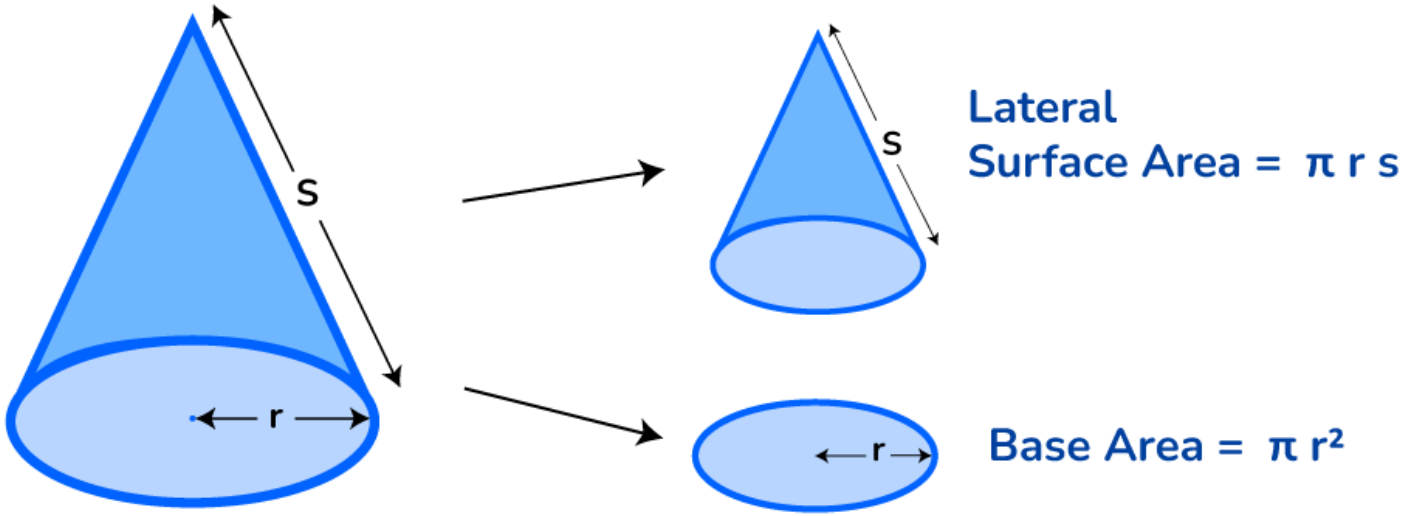


Surface area of a closed cylinder = (2 × area of circle) + area of rectangle

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

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

Surface Area (Cone)



Lateral
Surface Area = $\pi r s$

Base Area = πr^2

Formula:

$$SA = \pi r^2 + \pi r s$$

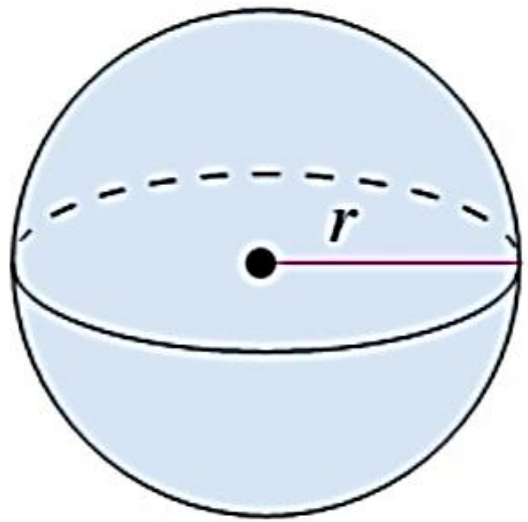
here, $\pi = \frac{22}{7}$

r = radius , s = slant height

Surface Area of a Sphere

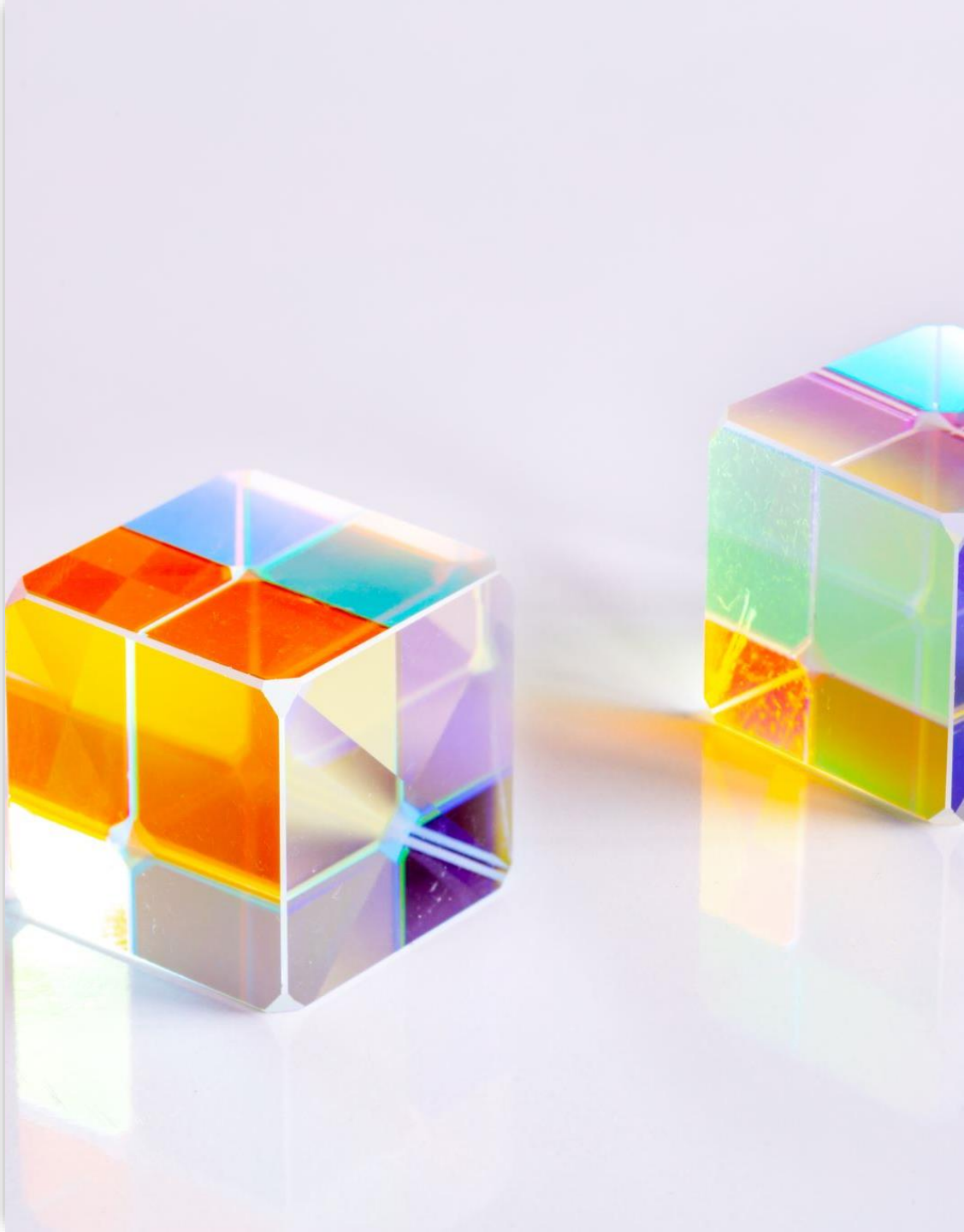
The surface area of a sphere with radius r cm can be determined by using the formula:

Surface area of a sphere $= 4\pi r^2$



Volume of 3D Shapes

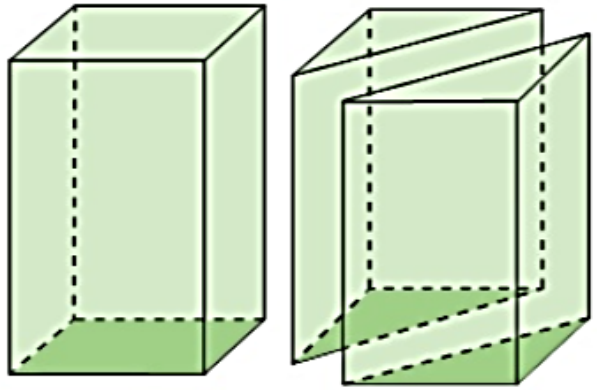
The volume of an object is the amount of space occupied by the object or shape, which is in three-dimensional space. It is usually measured in terms of cubic units. In other words, the volume of any object or container is the capacity of the container to hold the amount of fluid (gas or liquid).



Volume of Prism

Volume of a cuboid = length × width × height
= area of base × height

The cuboid is divided into two equal parts. Two triangular prisms are formed. The relationship between the volume of cuboid and the volume of prism is



$$\text{Volume of a prism} = \frac{1}{2} \times \text{cuboid volume}$$

$$= \frac{1}{2} \times \text{area of base} \times \text{height}$$

area of triangle

$$= \boxed{\frac{1}{2} \times \text{length} \times \text{width}} \times \text{height}$$

Therefore, Volume of triangular prism = area of cross section × height

Volume of Cylinder

The diagram above shows a coin in the shape of circle. If 10 coins are arranged upright it will produce a cylinder.

Therefore, volume of cylinder = area of base × height

$$= \pi r^2 \times h$$

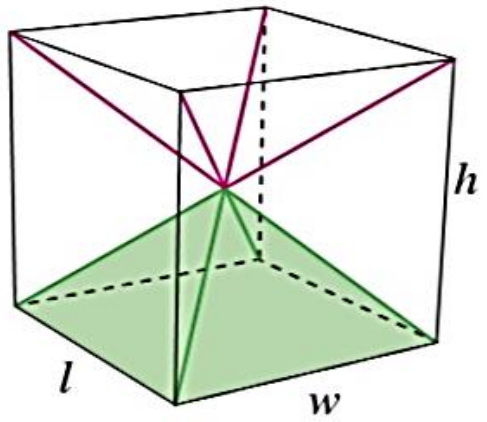
Volume of a cylinder = $\pi r^2 h$

Volume of Pyramid

Area of base of the pyramid $= l \times w$

Height of pyramid $= \frac{h}{2}$

Height of cube, h $= 2 \times$ height of pyramid



$$\text{Volume of pyramid} = \frac{\text{Volume of pyramid}}{6}$$

$$= \frac{l \times w \times h}{6}$$

$$= \frac{l \times w \times (2 \times \text{height of pyramid})}{6}$$

$$= \frac{l \times w \times \text{height of pyramid}}{3}$$

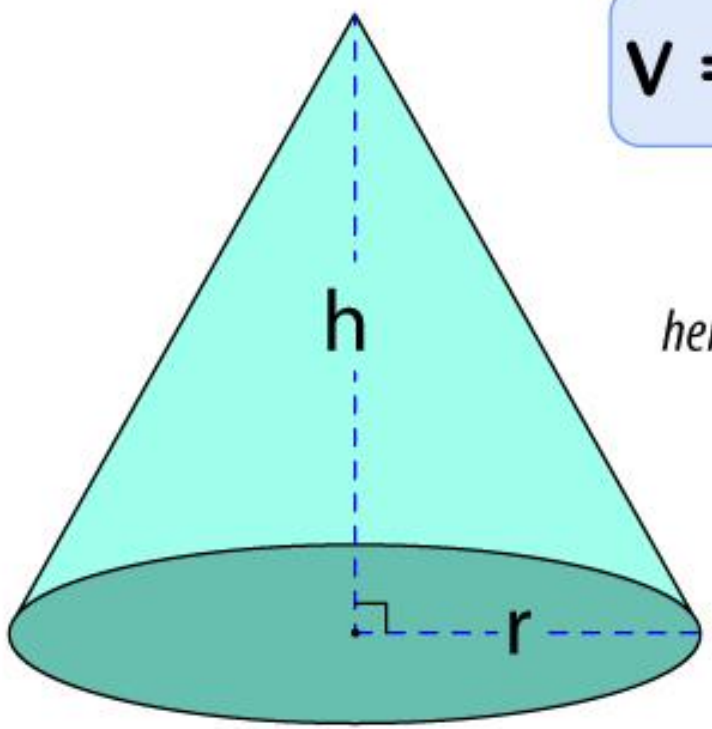
$$= \frac{\text{area of base of pyramid} \times \text{height of pyramid}}{3}$$

Therefore,

Volume of pyramid,

$= \frac{1}{3} \times$ base area $\times$ height

Volume of Cone



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

here, $\pi = \frac{22}{7} = 3.141$

r = radius

h = height

Volume of Sphere

Sphere is a three-dimensional geometrical shape that has one point known as centre of the sphere. All the points are equidistant from the centre. Volume of the sphere with radius, r is

$$\text{Volume of sphere} = \frac{4}{3}\pi r^3$$