

SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES



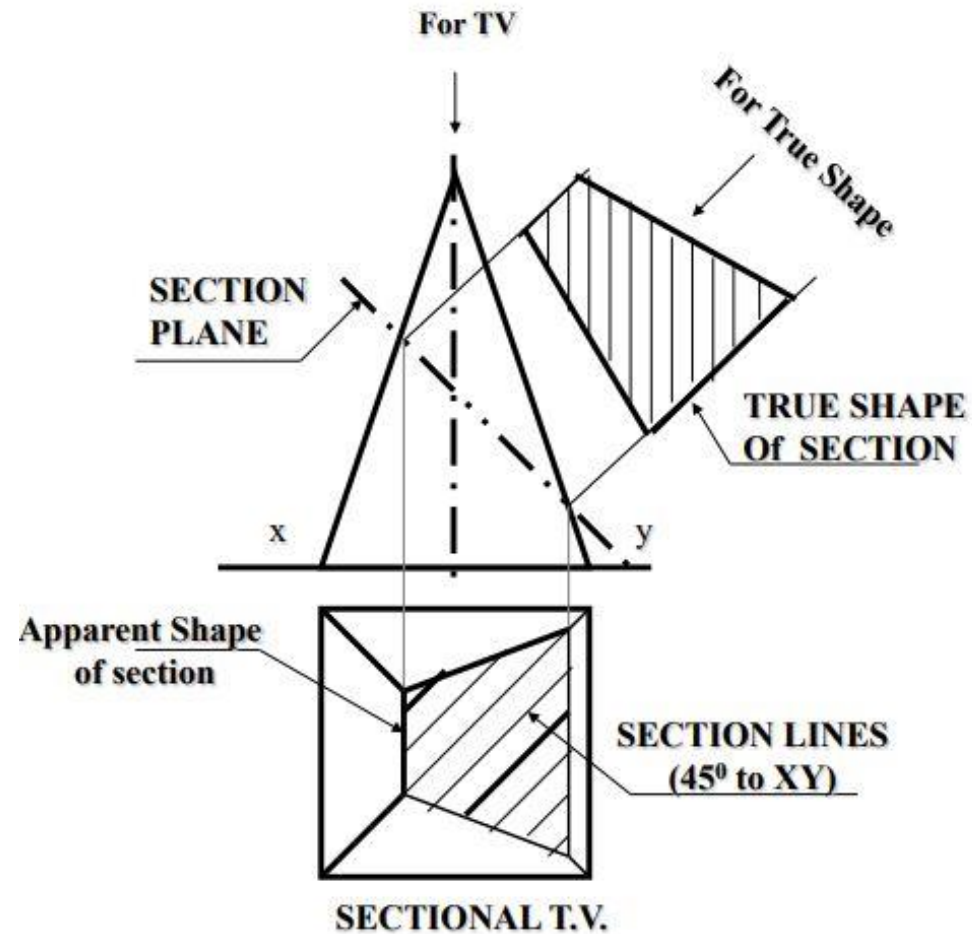
SECTIONAL VIEWS

- Sectional drawings are multi view technical drawings that contain special views of a part or parts, views that reveal interior features. Used to improve clarity and reveal interior features of parts.
- Sectioned technical illustrations are used to describe interior features of complicated assemblies.
- A primary reason for creating a section view is the elimination of hidden lines, so that a drawing can be more easily understood or visualized.
- Traditional section views are based on the use of an imaginary cutting plane that cuts through the object to reveal interior features.

SECTION OF SOLID

- A solid is cut by some imaginary cutting plane to understand internal details of that object.
- The action of cutting is called **SECTIONING** a solid & The plane of cutting is called **SECTION PLANE/CUTTING PLANE**.
- After launching a section plane either in FV or TV, the part towards observer is assumed to be removed, as far as possible the smaller part is assumed to be removed.

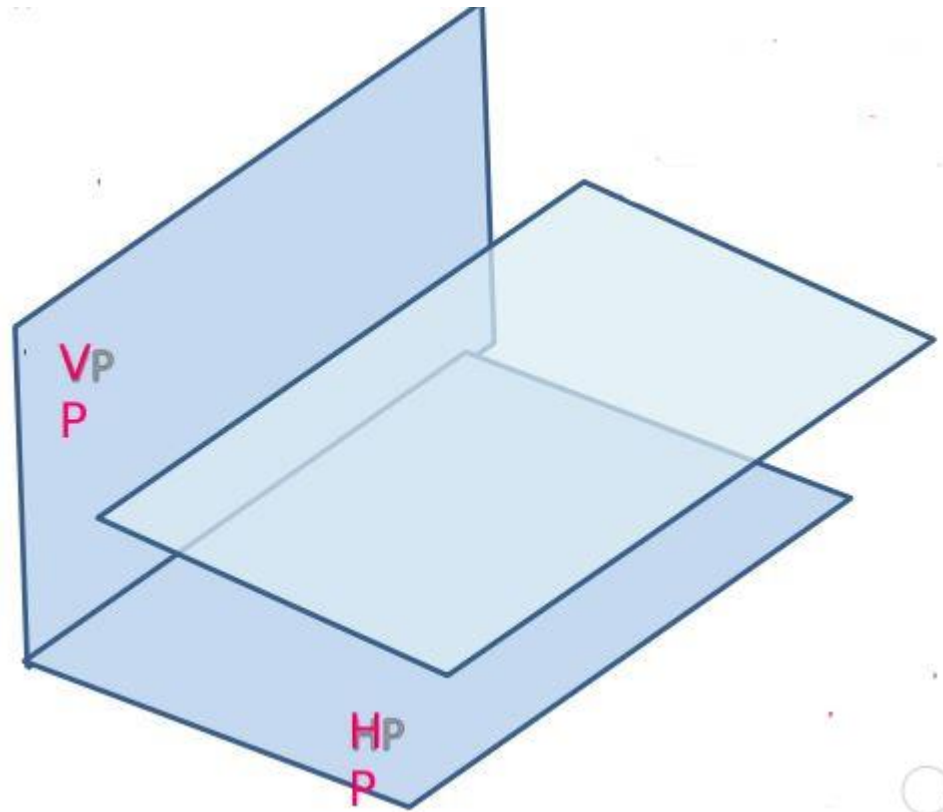
TERMS USED IN SECTION OF SOLID



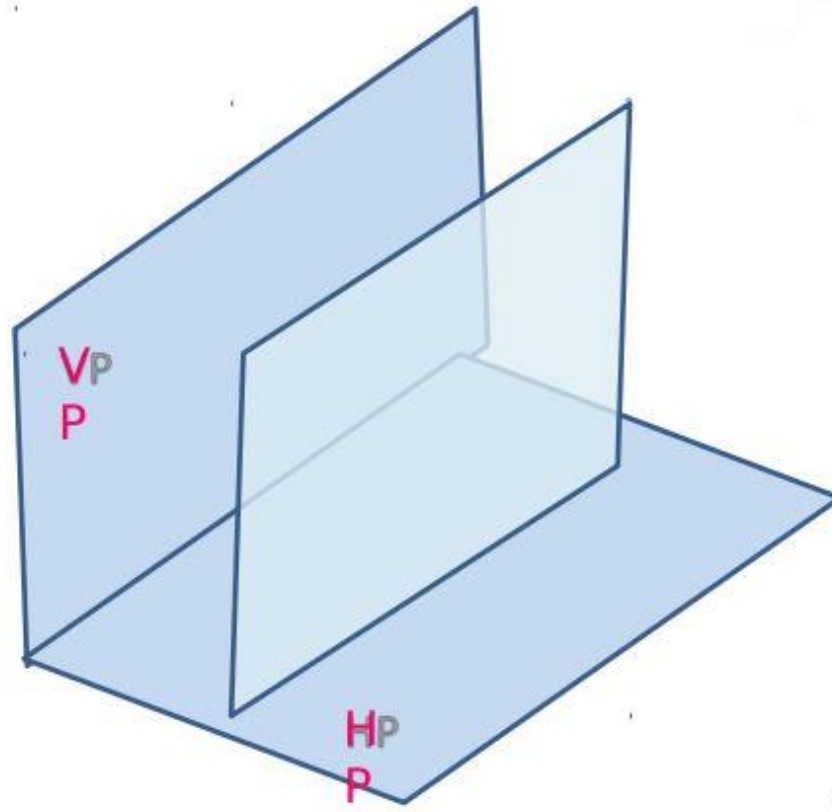
TYPES OF CUTTING PLANES

1. Horizontal Cutting Planes – Parallel to HP and Perpendicular to VP
2. Frontal or Vertical Cutting Plane – Parallel to VP and Perpendicular to HP
3. Profile Cutting Planes – Perpendicular to HP and VP.
4. Auxiliary Inclined Plane (AIP)
5. Auxiliary Vertical Plane (AVP)

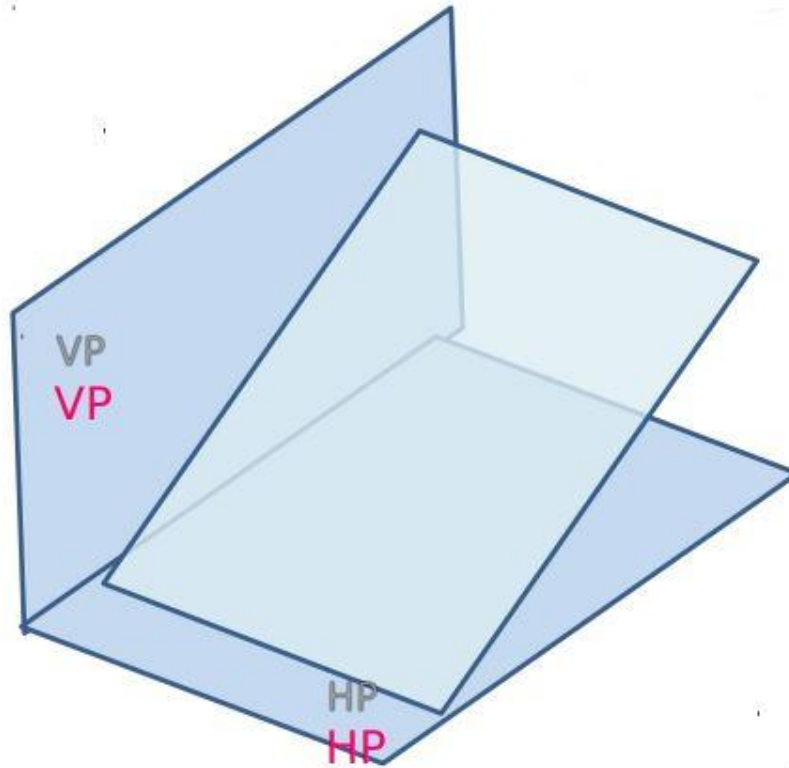
HORIZONTAL CUTTING PLANE



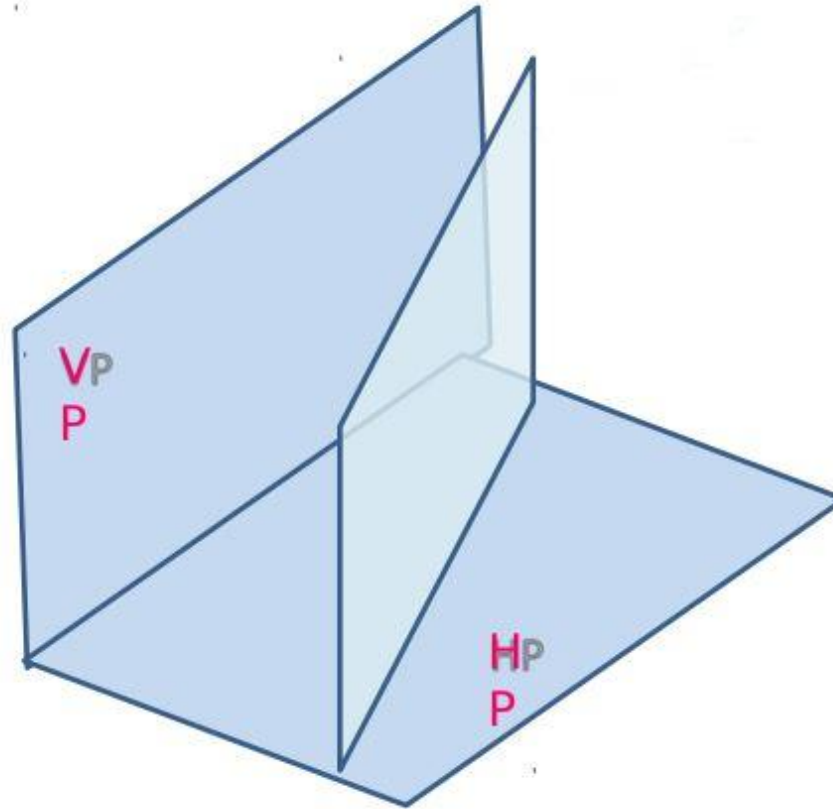
VERTICAL CUTTING PLANE



AUXILIARY INCLINED PLANE (AIP)



AUXILIARY VERTICAL PLANE (AVP)



DEVELOPMENT OF SURFACES OF SOLIDS

- If all surfaces of the solid are opened out on a plane surface the figure which is obtained called the **development of the surface**.
- In other words the development of surfaces is “process of unfolding all surfaces on a plane of a object having three dimensions”.
- Application point of view, development of lateral surfaces is very useful in fabricating industries like
 1. Sheet metal work such as funnel
 2. Construction of storage vessels and containers
 3. Boiler and Chimney, packaging boxes etc.
- Above object are constructed from the play which are cut according to the development when fold it will create the desired objects

DEVELOPMENT OF SURFACES OF SOLIDS

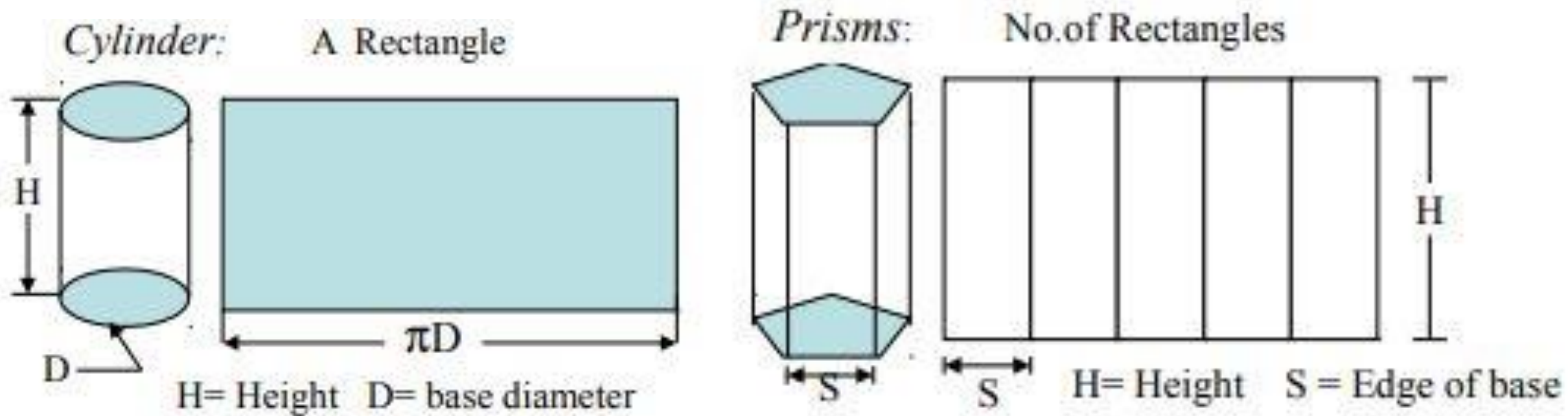
- There are basically two methods for constructing the development of surfaces of any solid,
- **Parallel line method** – This method of development is highly applicable for cubes, all types of Prisms and Cylinders.

Two parallel lines spaced at a distance equal to the height of the object are drawn at the side of the front view called stretch out lines. The length of the stretch out lines which is equal to the perimeter of the object is drawn at the top and bottom sides of the lateral surface respectively.

- **Radial line method** – This method is used for the Pyramids and Cone.

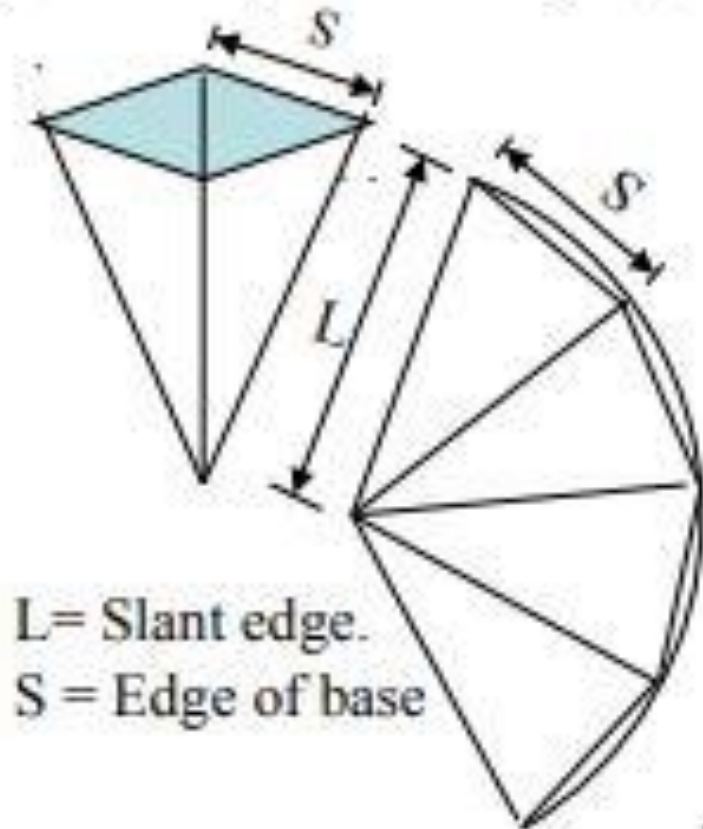
In this method arc of radius which is equal to the true length of the slant edge of the pyramid or extreme generator of the cone is required to develop the surfaces of the solids.

PARALLEL LINE METHOD



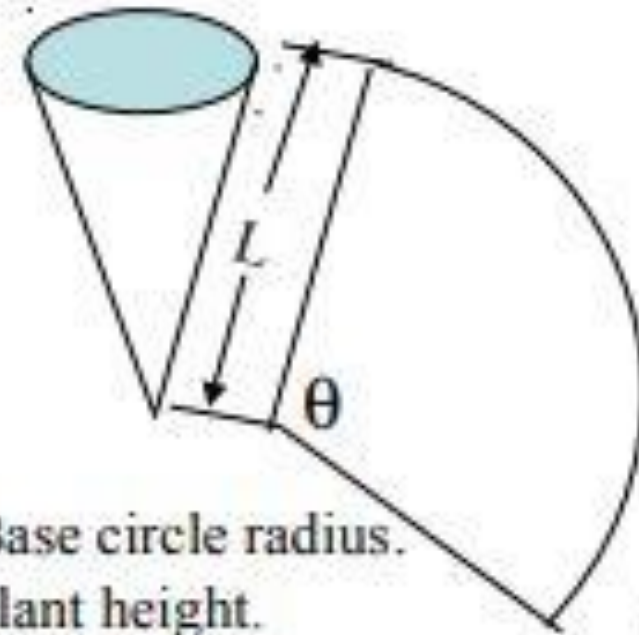
RADIAL LINE METHOD

Pyramids: (No. of triangles)



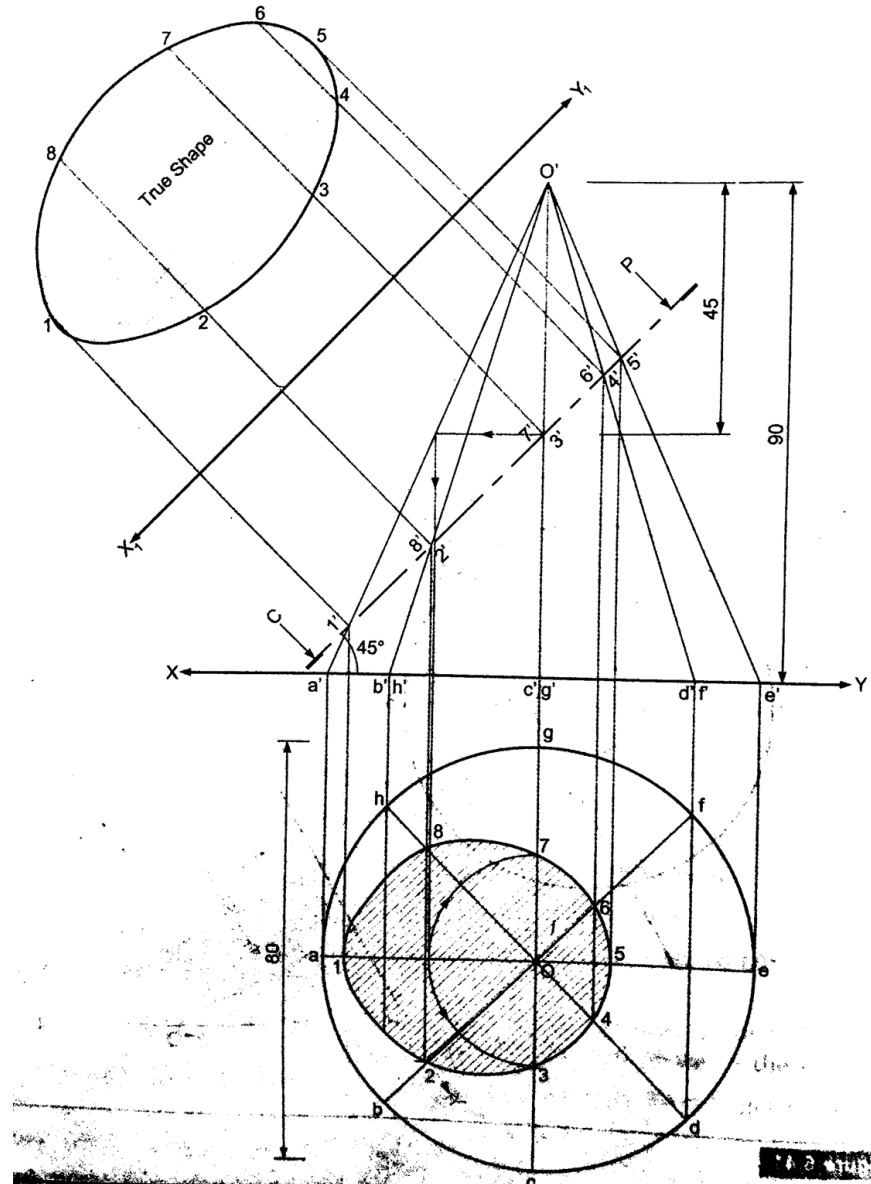
L = Slant edge.
 S = Edge of base

Cone: (Sector of circle)

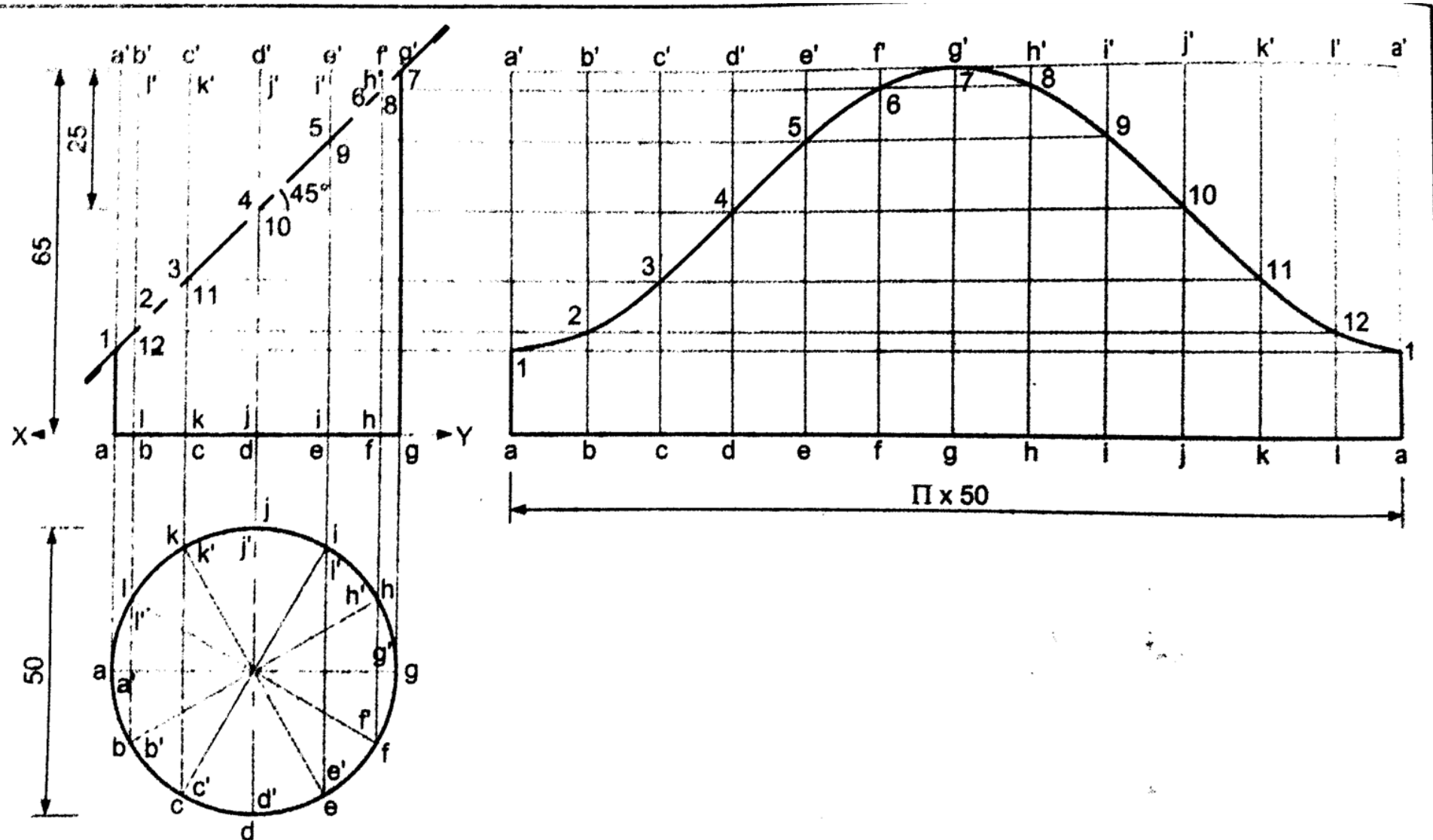


R = Base circle radius.
 L = Slant height.
 $\theta = \frac{R}{L} \times 360^\circ$

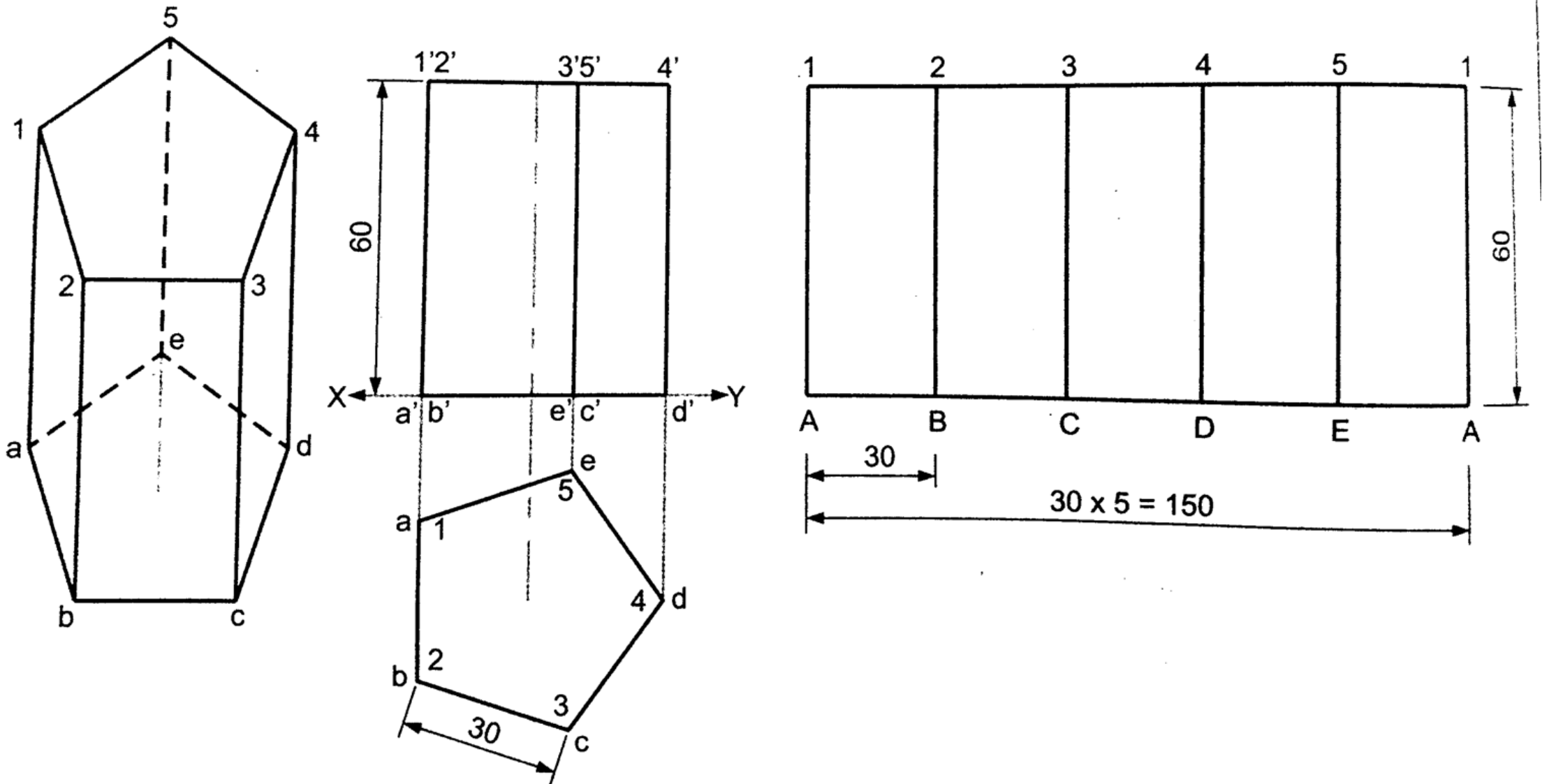
- A cone having the diameter of the base 80 mm and the height 90 mm is resting with its base on the HP. It is cut by AIP inclined at 45° to the HP. The cutting plane passes through the mid point of the axis of the cone. Draw the elevation, the sectional plan and the true shape of the section.



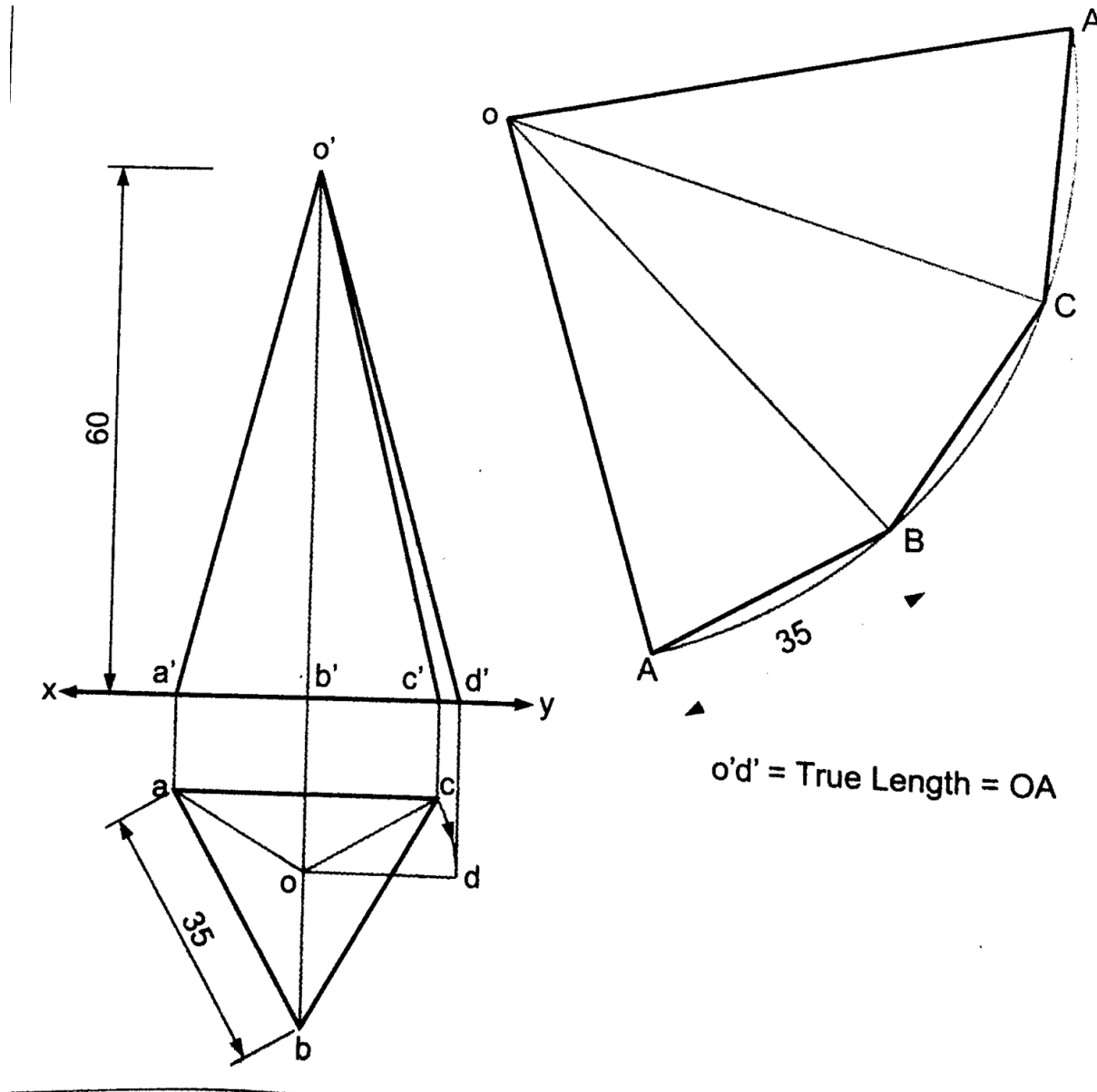
- A cylinder of diameter 50 mm and length of the axis 65 mm rests on its base on the HP. It is cut by a cutting plane perpendicular to the VP and inclined at 45° to HP and passing through a point on axis 25 mm from the top. Draw the front view, the sectional top view and development of the lateral surface of the cylinder.



- Draw the development of the pentagonal prism of side 30 mm and height 60 mm, when one of the edges of the base perpendicular to VP.



- Draw the lateral development of a triangular pyramid of base edge 35 mm lying with its base on the HP. Its apex is vertically 60 mm above its base and one of the edges of the base is parallel to the VP.



- Draw the lateral development of a cone of base radius 20 mm and height 60 mm.

