Projections of Solids

Introduction

An object having three dimensions, i.e., length, breadth and height is called as solid. In orthographic projection, minimums of two views are necessary to represent a solid. Front view is used to represent length and height and the top view is used to represent length and breadth. Sometimes the above two views are not sufficient to represent the details. So a third view called as side view either from left or from right is necessary.

Objectives

At the end of this session, you will be able to

- Classify the different types of solids
- Draw the projections of solids in various positions in the given quadrant

Classification of Solids

Solids are classified into two groups. They are

- Polyhedron
- Solids of Revolution

Polyhedron

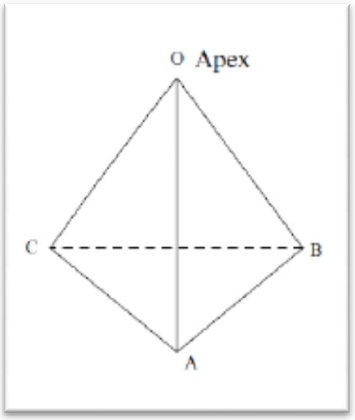
A solid, which is bounded by plane surfaces or faces, is called a polyhedron. Polyhedra are classified into three sub groups; these are

1. Regular Polyhedron
2. Prisms
3. Pyramids

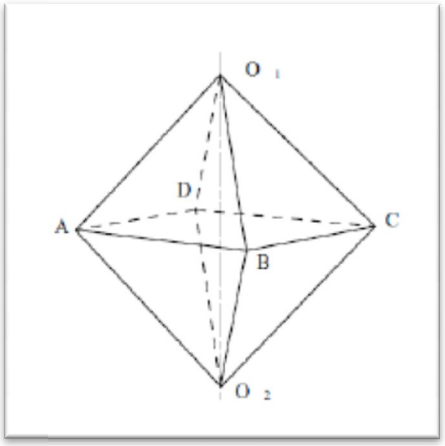
Regular Polyhedron

Polyhedrons are regular if all their plane surfaces are regular polygons of the same shape and size. The regular plane surfaces are called "Faces" and the lines connecting adjacent faces are called "edges".

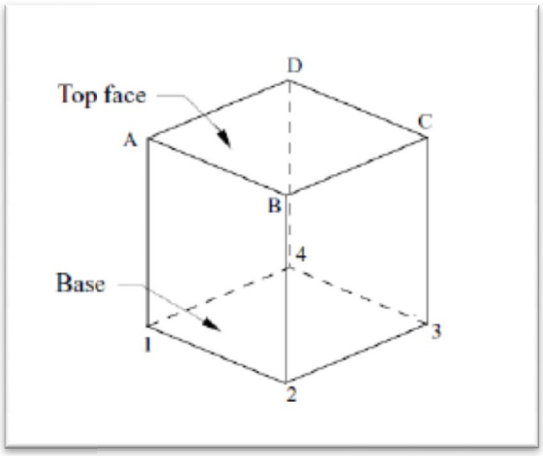
Tetrahedron



Octahedron



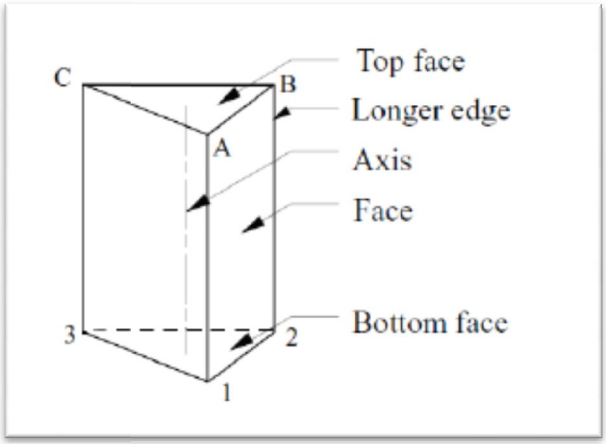
Hexahedran



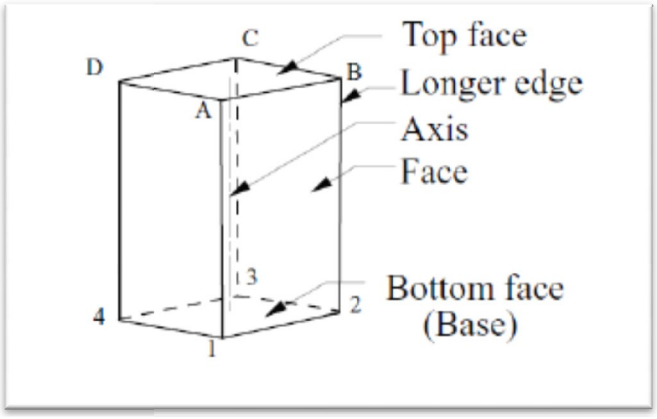
Prisms:

A prism has two equal and similar end faces called the top face and the bottom face or (base) joined by the other faces, which may be rectangles or parallelograms.

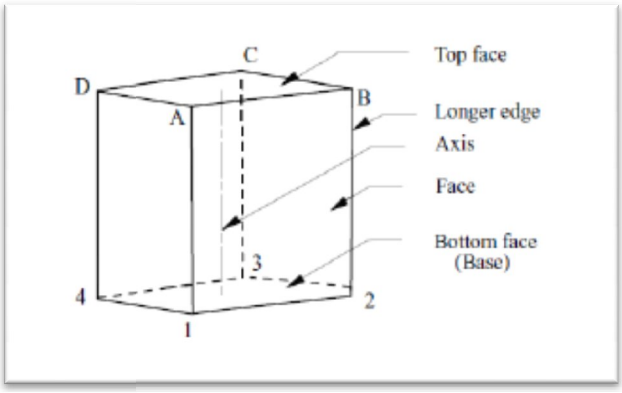
Triangular prism



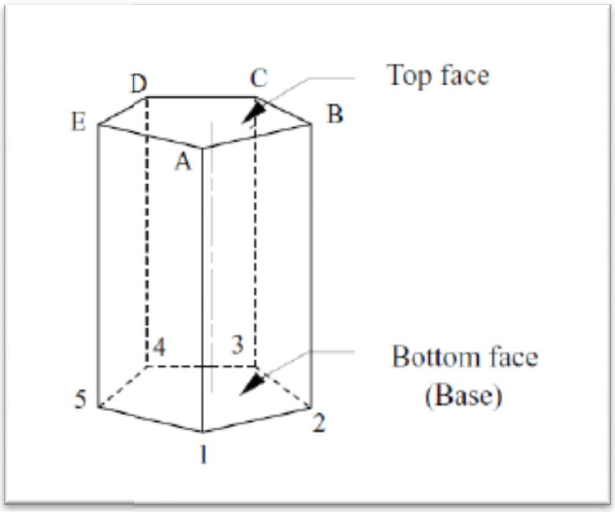
Square Prism



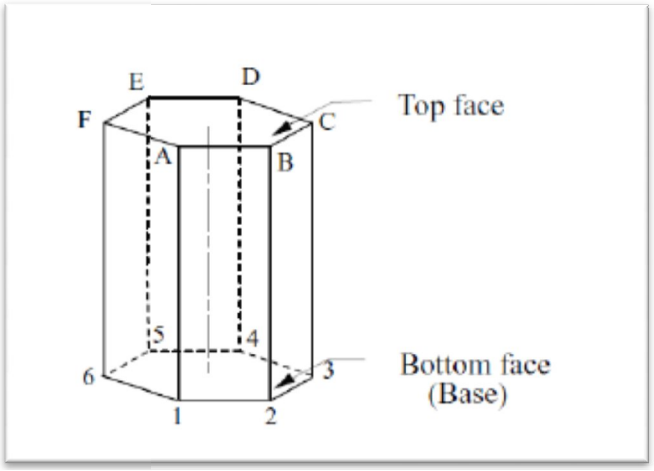
Rectangular Prism



Pentagonal Prism



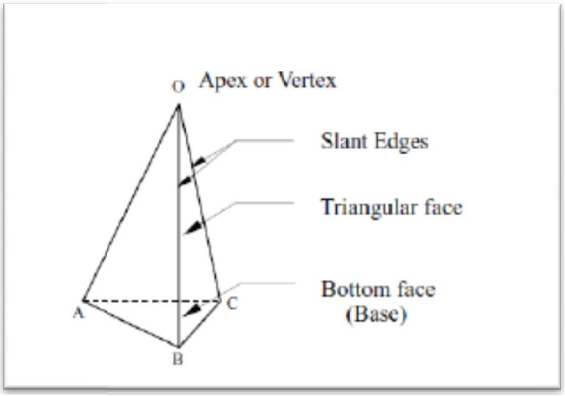
Hexagonal Prism



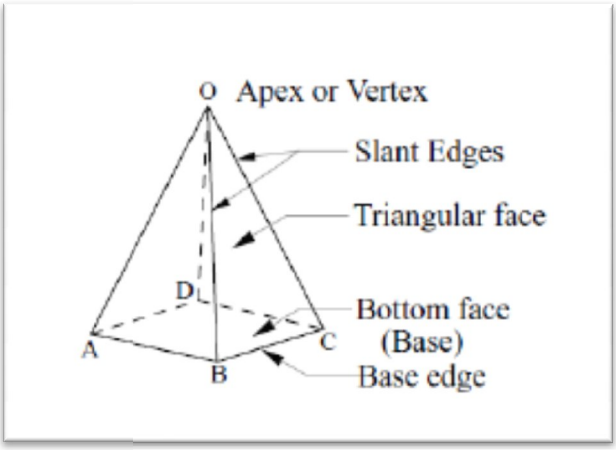
Pyramid

A pyramid has a plane figure as at its base and an equal number of isosceles triangular faces that meet at a common point called the vertex or apex. The line joining the apex and a corner of its base is called the slant edge. Pyramids are named according to the shapes of their bases.

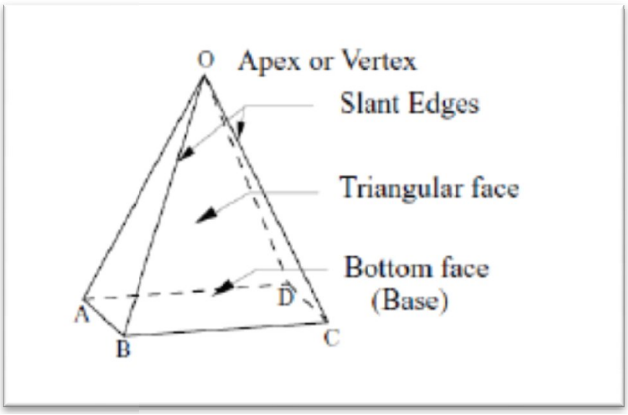
Triangular pyramid



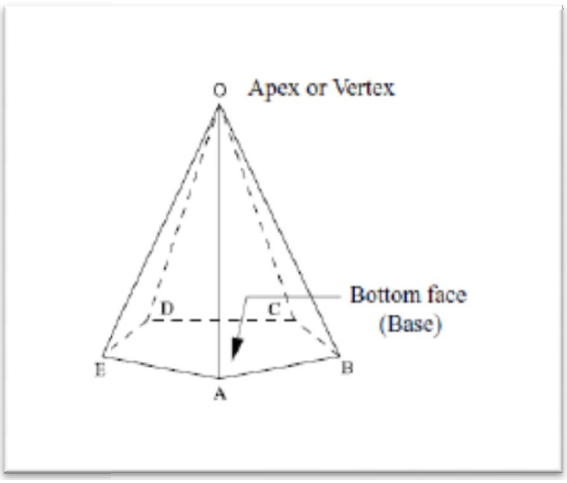
Square pyramid



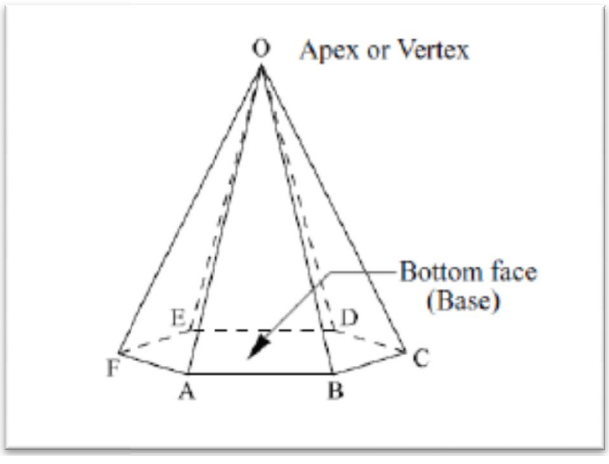
Rectangular pyramid



Pentagonal Pyramid



Hexagonal Pyramid

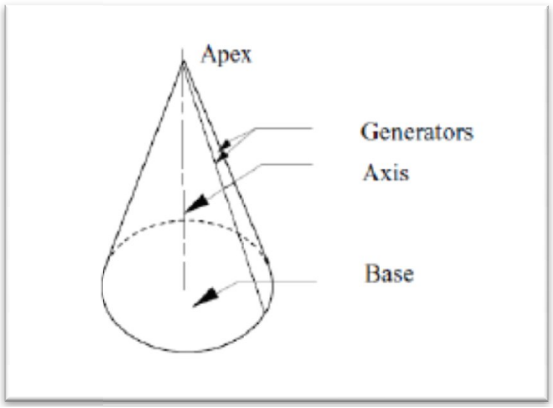


Solids of Revolution

If a plane surface is revolved about one of its edges, the solid generated is called a Solid of revolution

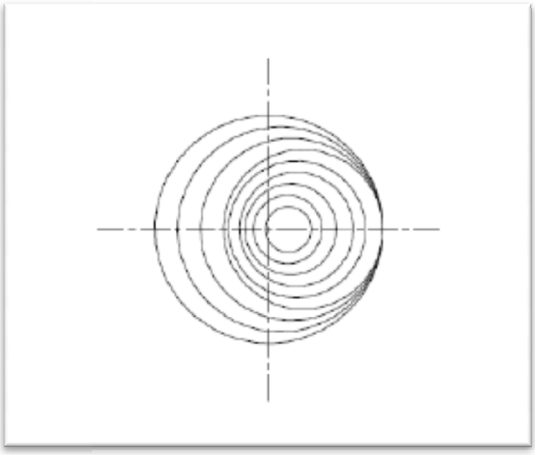
Cone

A cone can be generated by the revolution of a right angled triangle about one of its perpendicular sides, which remains fixed. A cone has a circular base and an apex. The line joining apex and the centre of the base is called the axis of the cone



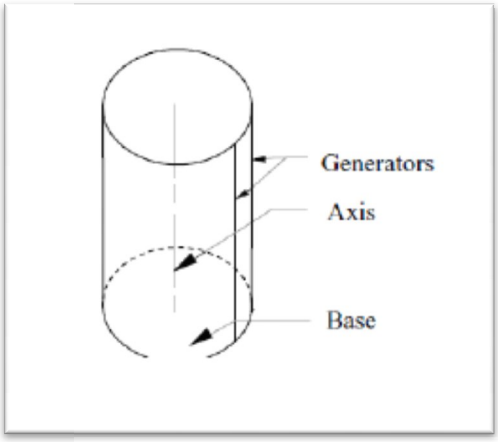
Sphere

A sphere can be generated by the revolution of a semi circle about its diameter that remains fixed.



Cylinder

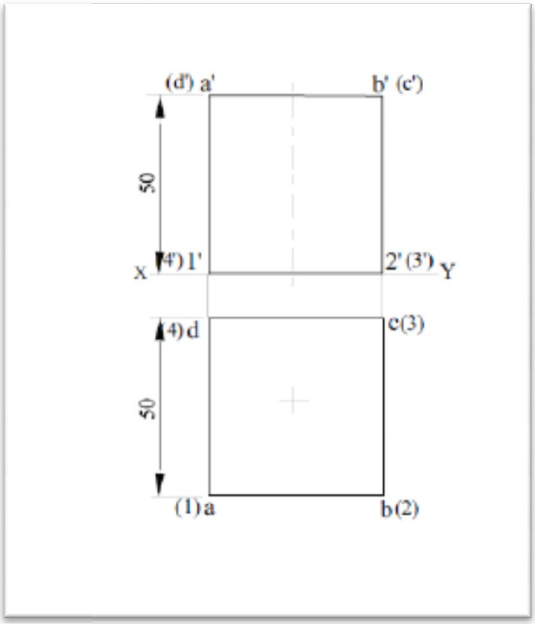
A cylinder can be generated by the revolution of a rectangle about one of its sides, which remains fixed. A cylinder has two circular faces. The line joining the centers of the top and bottom faces is called the axis



Projection of Solids
Perpendicular to HP

Let us imagine that a cube of 50mm side is resting with one of its a square faces on the HP.

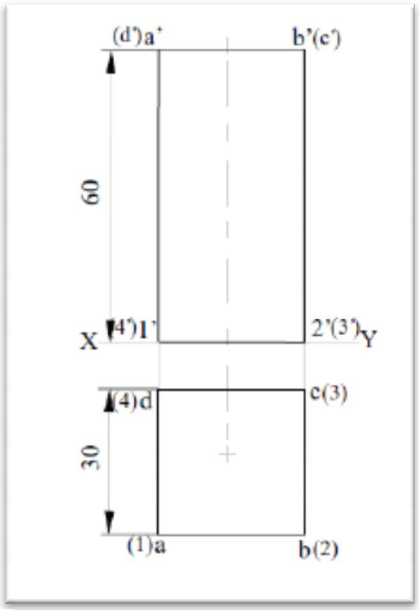
1. Draw the Line XY.
2. Draw the Top view as a Square (Side 50mm) and name its corners.
3. Draw projections at each corner of the top view through line XY.
4. Draw the front view as a square (Side 50mm) and name its corners.
5. Dimension the completed drawing.



Perpendicular to VP

Let us imagine that a square prism of base 30mm and height 60mm is resting with its base on the HP and one of its vertical faces perpendicular to the VP

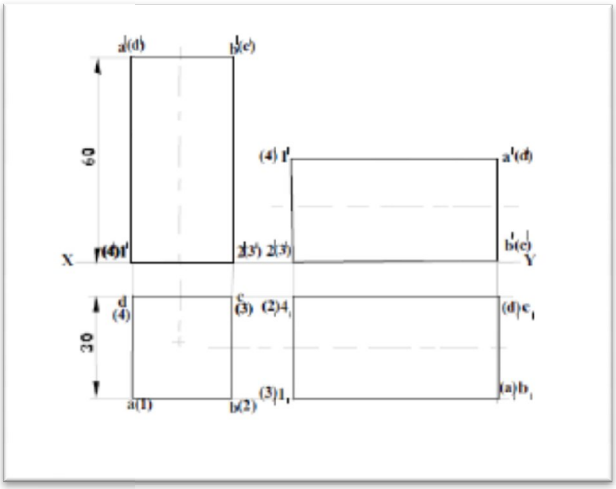
1. Draw the line XY.
2. Draw the top view as a square and name its corners.
3. Draw the projectors from each corner of the top view through XY.
4. Draw the front view as shown and name its corners.
5. Dimension the completed drawing.



Parallel to the HP and the VP

Let us imagine that a square prism of base 30mm and axis 60mm long lies on the HP, such that its axis is parallel to both the HP and VP.

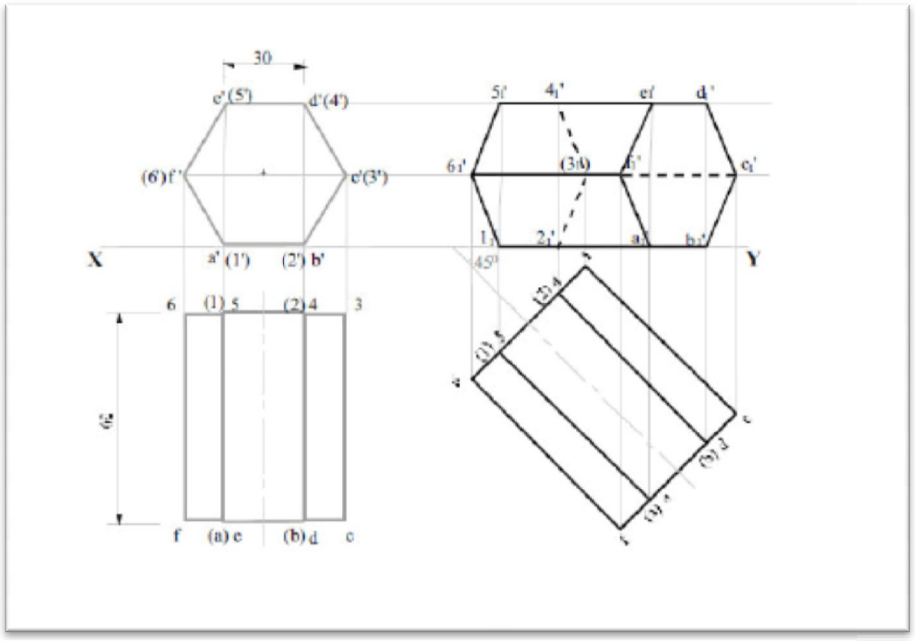
1. Draw the line XY.
2. Draw the projections (Top view and Front Views) of the solids in simple position (an edge of its base is perpendicular to the VP).
3. Rotate the front view through 90°
4. Draw projectors from the rotated front view and the initial top view and name the points of intersection.
5. Join the points correspondingly to get the final top view.



Parallel to the HP and Inclined to the VP

Let us imagine that a hexagonal prism of base 30mm and height 60mm lies on one of its rectangular faces lies on the HP, such that its axis is inclined at 45° to the VP.

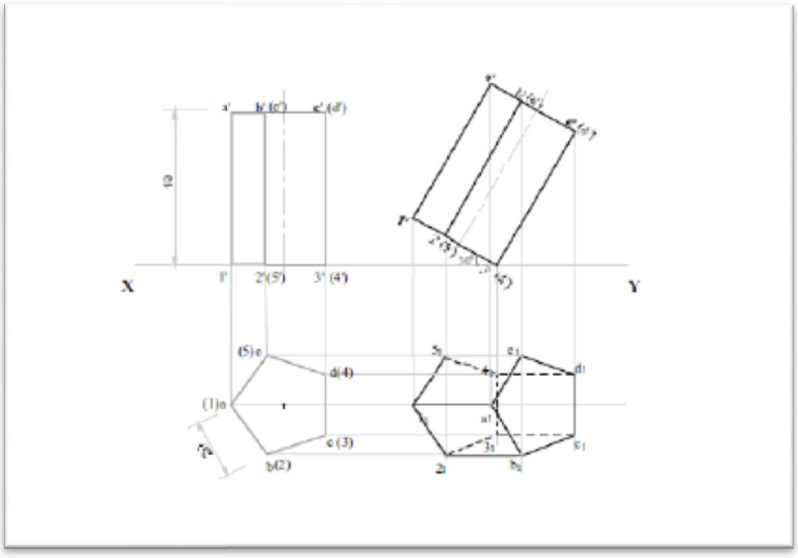
1. Draw the line XY
2. Draw the projections of the prism in simple position.
3. Rotate the axis of the top view through 45° with respect to XY.
4. Draw projectors from the rotate top view and the initial front view and name the points of intersection.
5. Join all the points correspondingly to get the final front view.



Parallel to the VP and Inclined to the HP

Let us imagine that a pentagonal prism of base 20mm and axis 40mm long rests on one of the edges of its base on the HP. The edge makes an angel of 30° to the HP and the axis of prism is parallel to the VP.

1. Draw the line XY
2. Draw the projection of the prism in simple position.
3. Rotate the base of the front view through 30° with respect to XY so teht only the edge(3',4') rests on the HP
4. Draw projectors from the rotated front view and the initial top view and name the points of intersections.
5. Join the points correspondingly to get the final top view.



Let us imagine that a pentagonal pyramid of base 25mm and axis 55mm long lies on one of its longer edges on the HP and its axis is parallel to the VP.

1. Draw the line XY
2. Draw the projections of solid in simple position.
3. Rotate the front view such that one of the slant edge o'd' will lie on XY line.
4. Draw projectors from the rotated front view and the initial top view and name it.
5. Join the points correspondingly to get the final top view.