SOMAIYA VIDYAVIHAR UNIVERSITY
K J Somaiya College of Engineering

Somaiya TRUST

Engineering Drawing

Module 4
Projection of Solids

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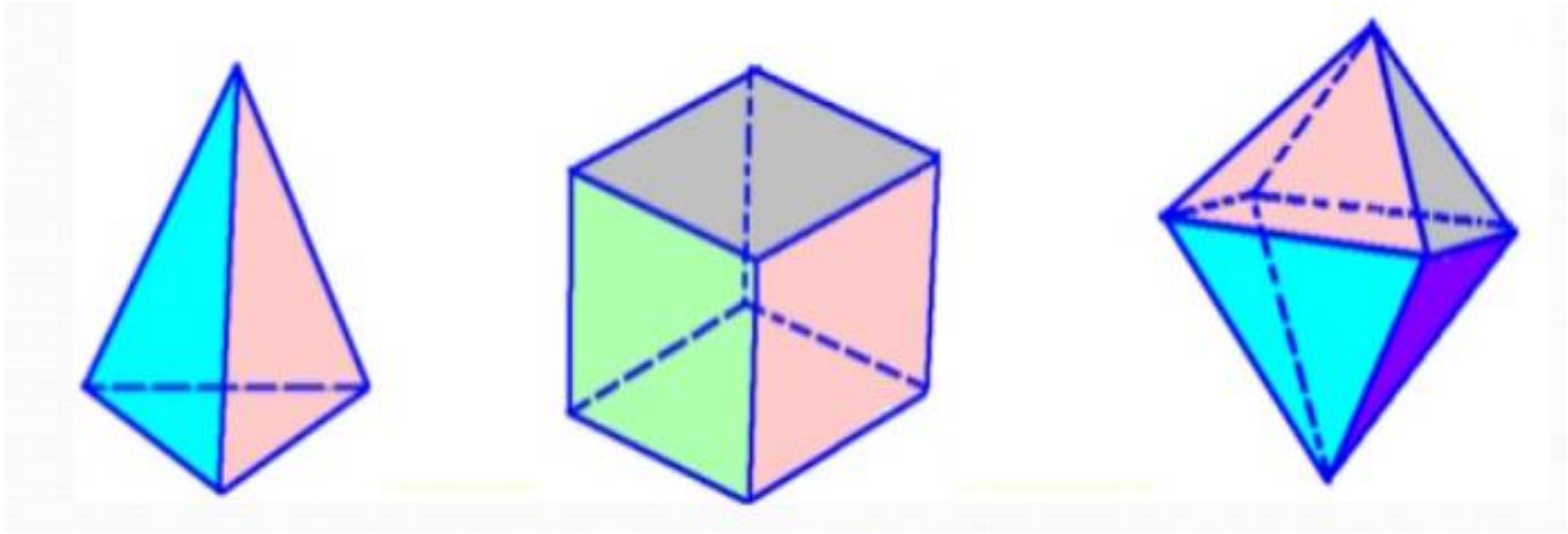
Introduction



Introduction

Solids have 3-dimensions, viz. length, breadth and height. Minimum two views, i.e. front view and top view are necessary to represent the solid in orthographic projection.

6.2 Classification of Solids

Solids are classified into two groups, *Polyhedron* and *Solids of Revolution.*

6.2.1 Polyhedron

When a solid is bounded by plane surfaces, it is called as a *polyhedron*. The plane surfaces are termed as the *faces* of solid and the lines of intersection of faces of solid are termed as the *edges*. The point at which any three faces meet is termed as the *corner*. When the faces are equal and regular polygon, the polyhedron is said to be a *regular polyhedron*.

Prism

A prism *is bounded by the rectangular faces having its end faces (base) equal, similar and parallel to each other.*

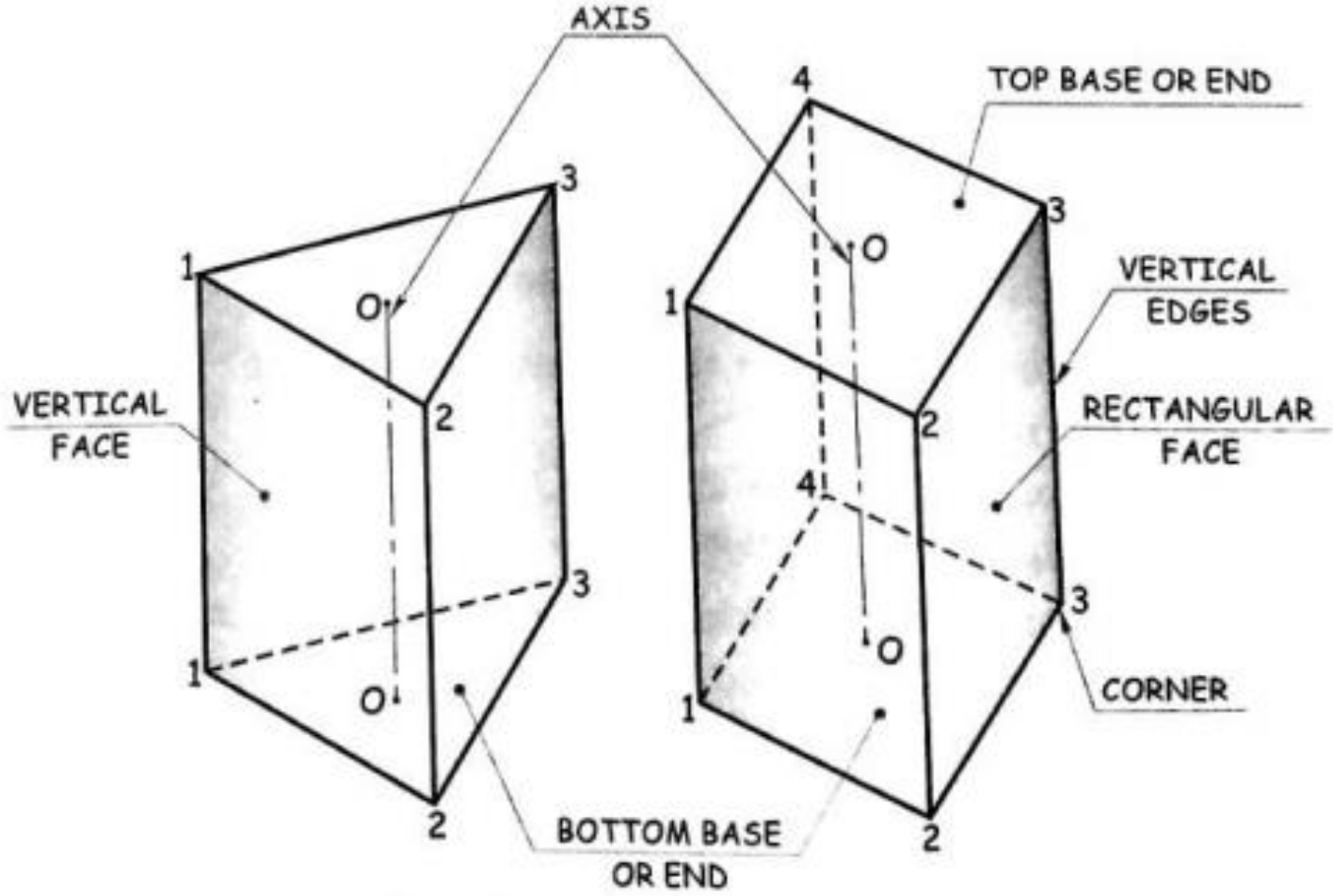
Introduction contd…

Axis : The imaginary straight line passing through the centre of bases is called *axis*.

Vertical Edge : Two rectangular faces meet to form the *vertical edge*. It is also known as *longer edge* or *lateral edge*.

Edge of Base : The rectangular face and end face (base) meets to form the *edge of base*. It is also known as *side of base* or *shorter edge*.

Corner : Three faces meet to form the *corner*.



Introduction contd…

A Right Regular Prism

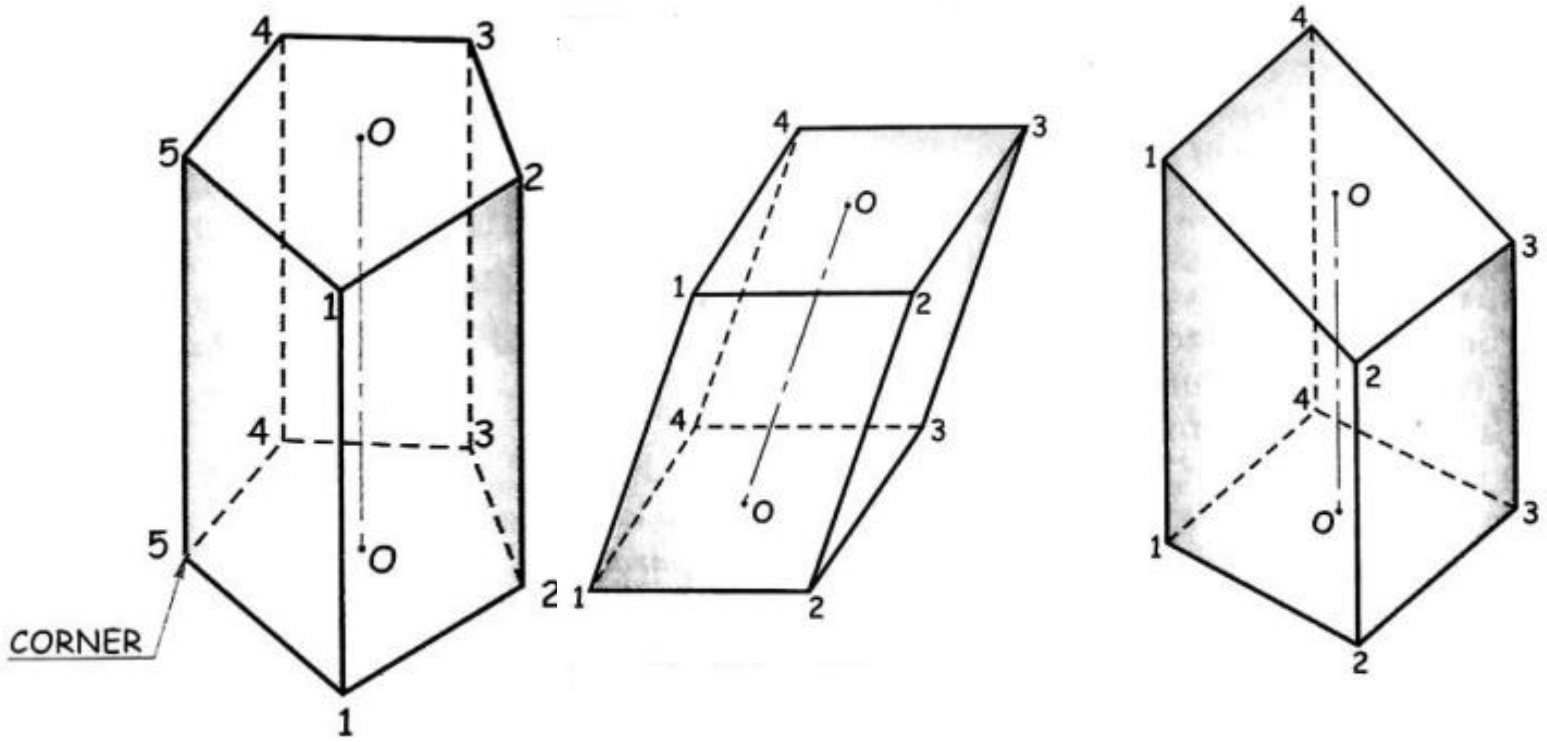
A prism is said to be a right regular prism *if its axis is perpendicular to its base and its faces are regular rectangles.*

An Oblique Prism

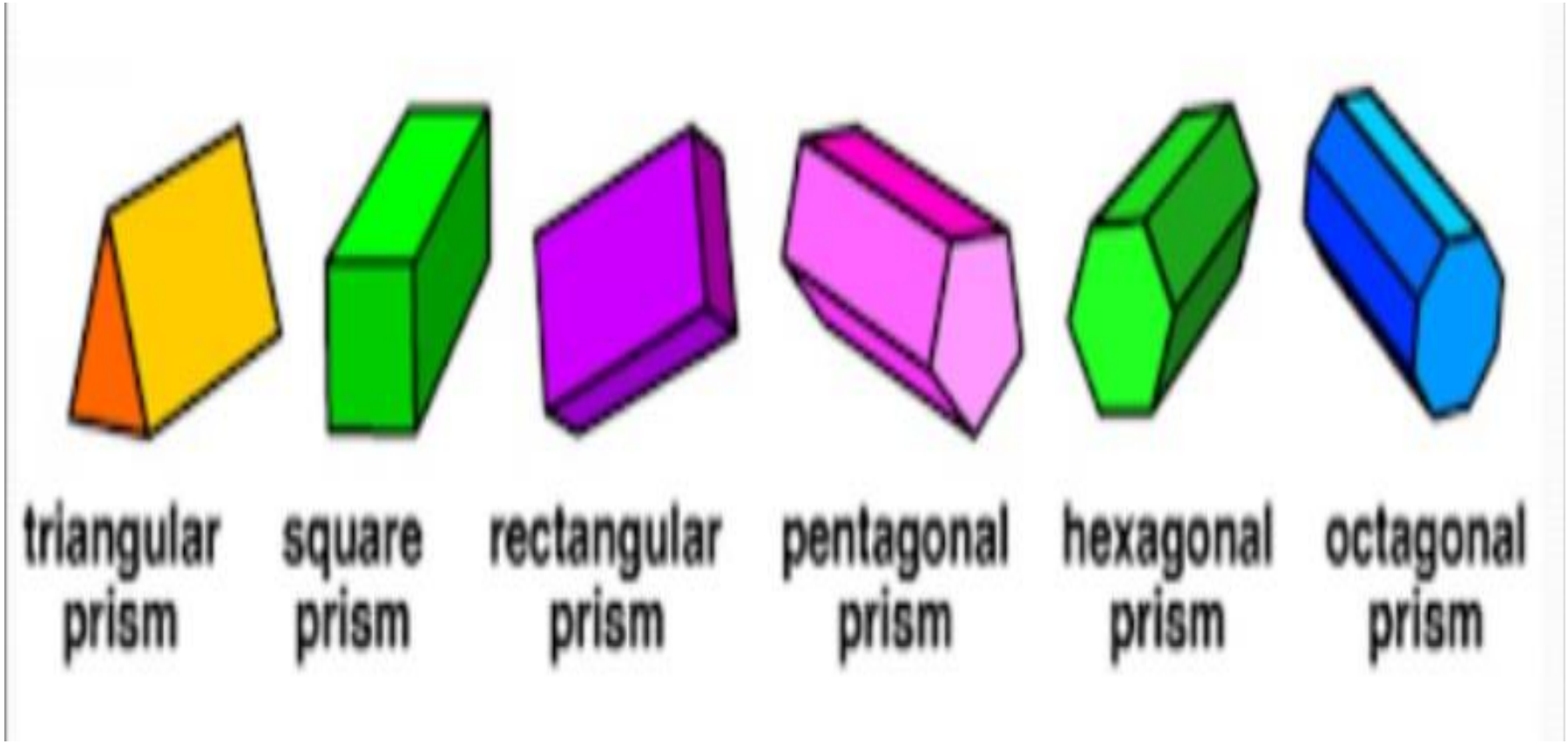
A prism is said to be an oblique prism *if its axis is inclined to its base and its faces are regular parallelogram.*

Truncated Prism

When the prism is cut by a cutting plane inclined to the base and if the top portion is removed, the remaining portion is called as *truncated prism.*



Introduction



Pyramids

A pyramid *is bounded by the triangular faces having one end face (base) as a polygon and other end with all triangular face meeting at a point called as apex (vertex).*

Axis : The imaginary straight line passing through the apex and the centre of base is called an *axis*.

Slant Edge : Two triangular faces meet to form the *slant edge*. It is also known as edge of *triangular face* or *lateral edge* or *inclined edge* or *longer edge*.

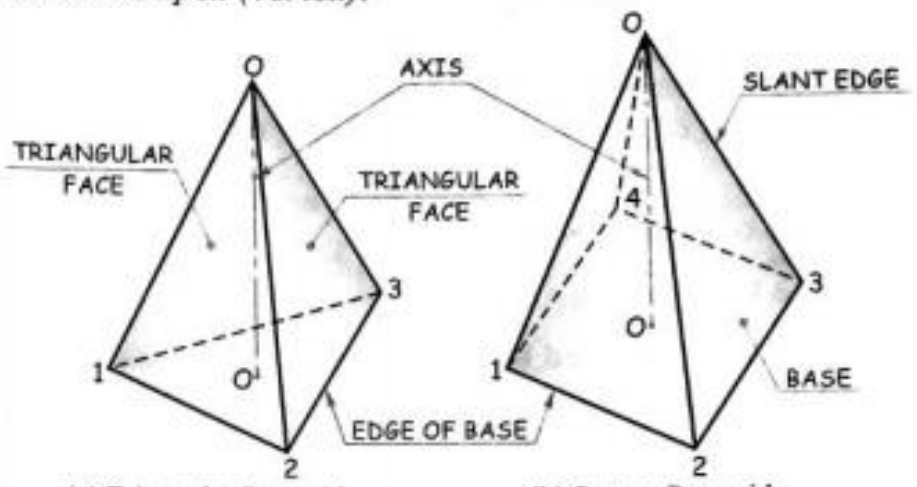
Edge of Base : The triangular face and end face (base) meet to form the *edge of base*. It is also known as the *side of base* or the *shorter edge*.

Corner : Three faces meet to form the *corner*.

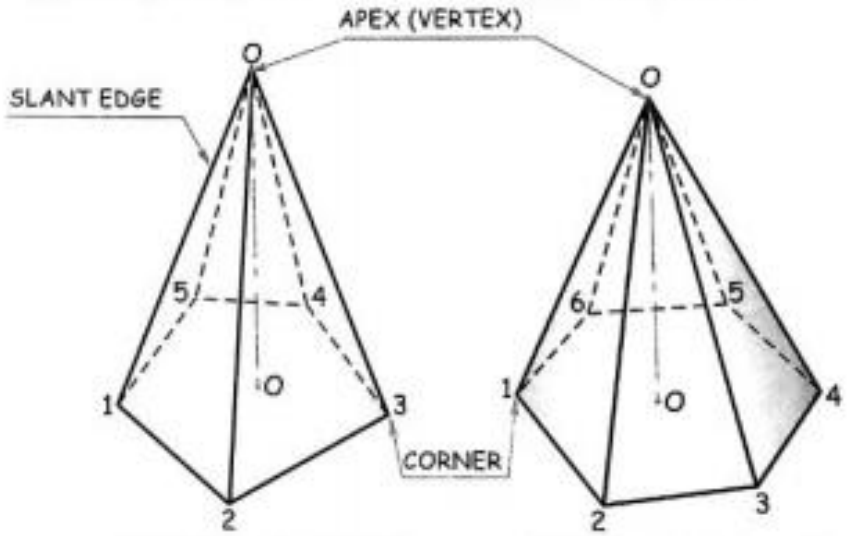
The pyramids are named as per the shape of the base, e.g. triangular, square, pentagonal, hexagonal etc.

A Right Regular Pyramid

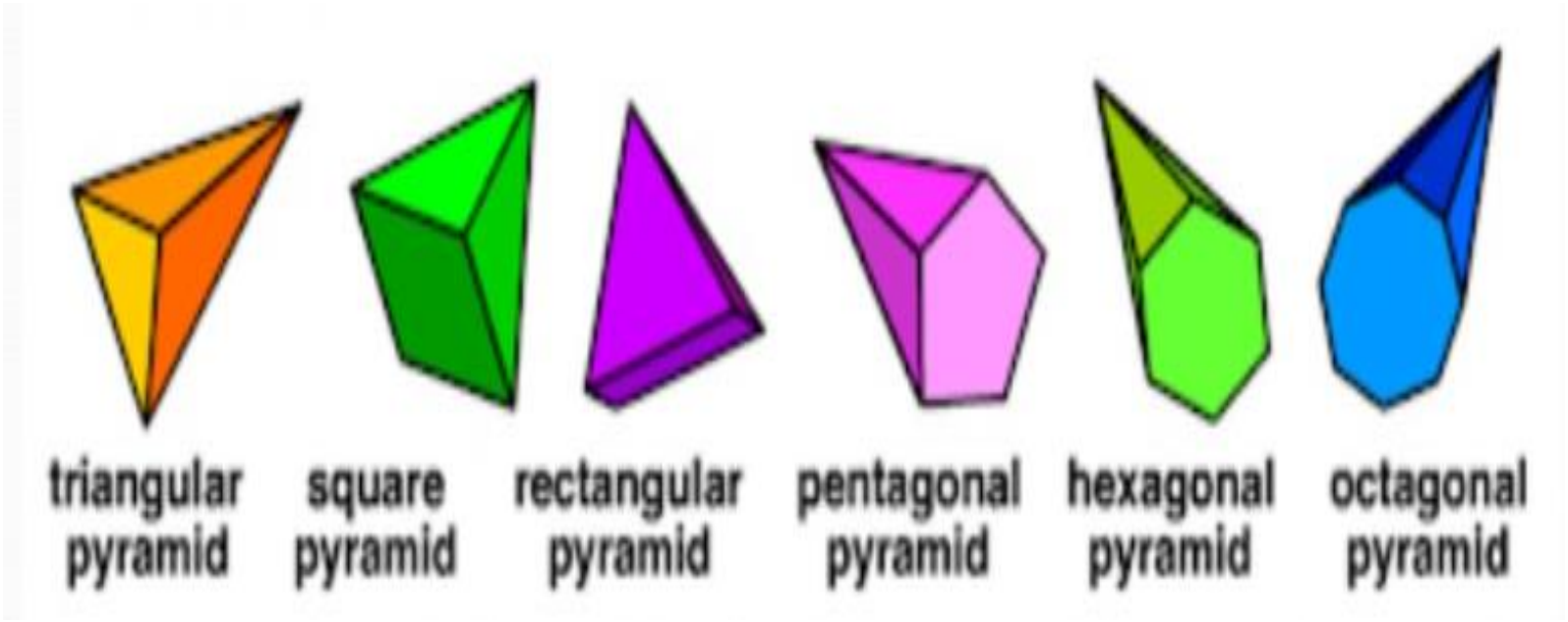
A pyramid is said to be a right regular pyramid *if its axis is perpendicular to its base and its faces are regular triangles.*



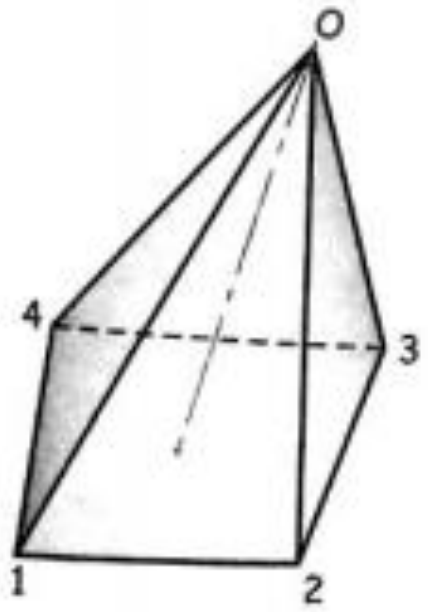
(a) Triangular Pyramid (b) Square Pyramid



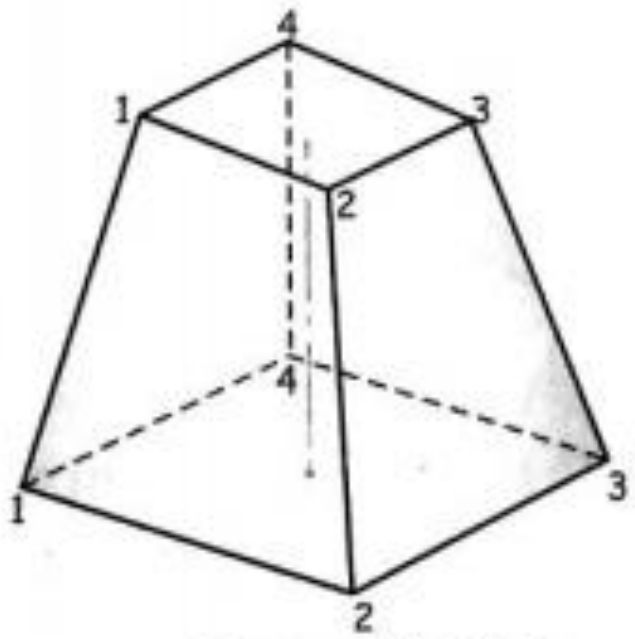
Introduction



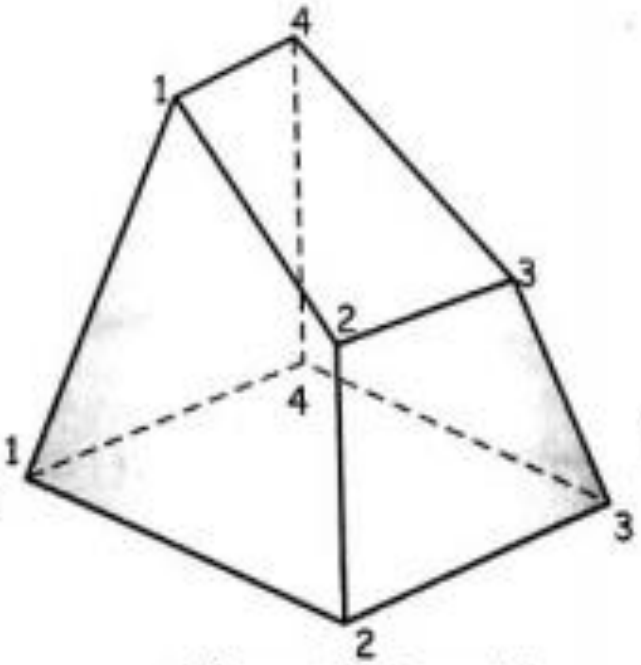
Isometric Drawing



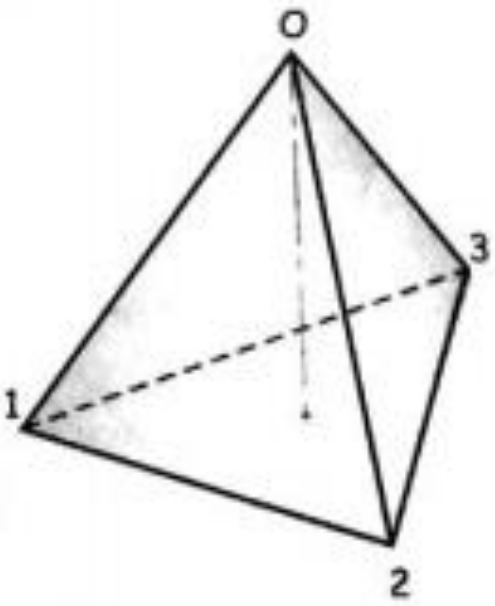
Oblique Pyramid



Frustum of Pyramid



: Truncated Pyramid



Tetrahedron

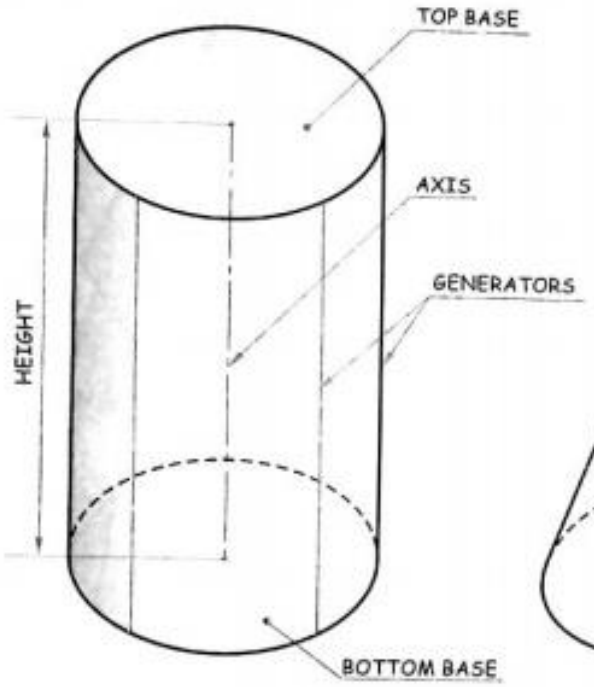
Solids of Revolution

Cylinder

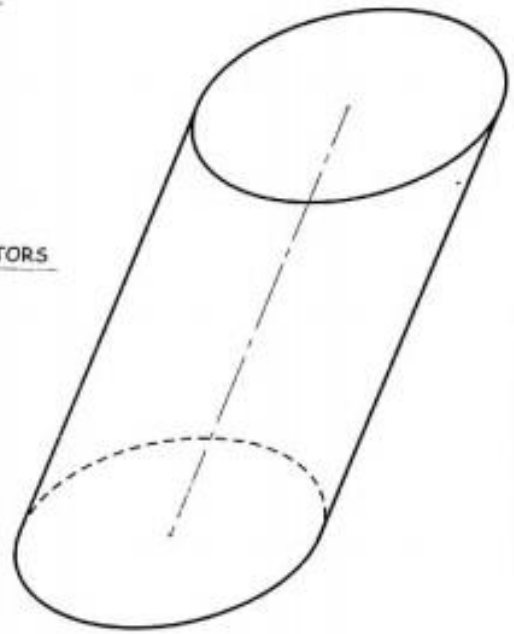
A cylinder is generated by *the revolution of rectangle about one of its side as an axis.* It is bounded by the curved surface having its end faces as a circular base which is parallel to each other.

Axis : The imaginary straight line passing through the centre of bases is called as an *axis*.

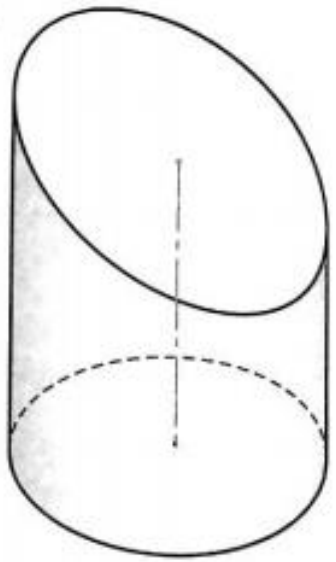
Generator of Cylinder : A straight line drawn on the curve surface of the cylinder which is parallel to its axis is called as *generator of cylinder*.



: Right Circular Cylinder



: Oblique Cylinder



: Truncated Cylinder

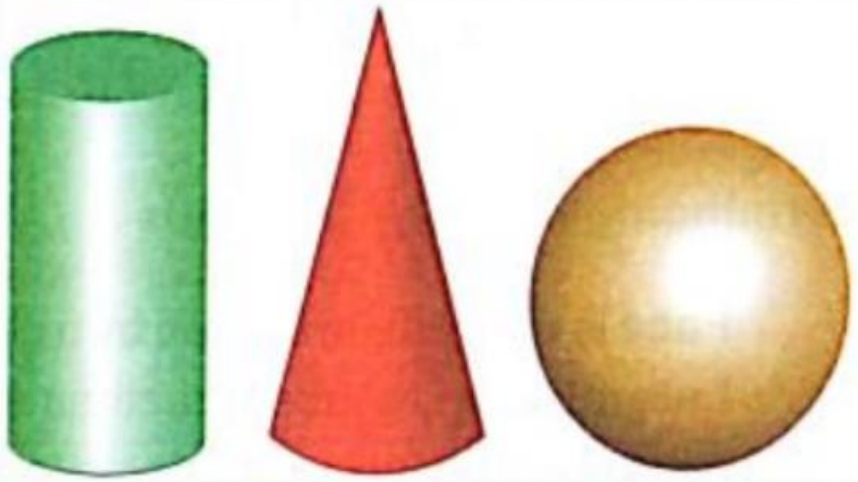
Introduction

II.Solid of Revolution-If a plane surface is revolved about one of its edges, the solid generated is called a Solid of Revolution

1.Cylinder ,

2.Cone ,

3.Sphere



Cone

A cone is generated by the revolution of right angle triangle about one of its perpendicular side as an axis. The other side containing the right angle by revolving forms a circle is called as *circular base*. The hypotenuse of the right angle triangle, which generates the conical curved surface is called as *genertor*. One end of the cone is circular base and opposite end which is a point is called as an *apex* (*vertex*).

Axis : The imaginary straight line passing through the apex and centre of base is called as an *axis*.

Generator of Cone : A straight line drawn from an apex to the circumference of circular base is called as *generator of cone*.

A Right Circular Cone

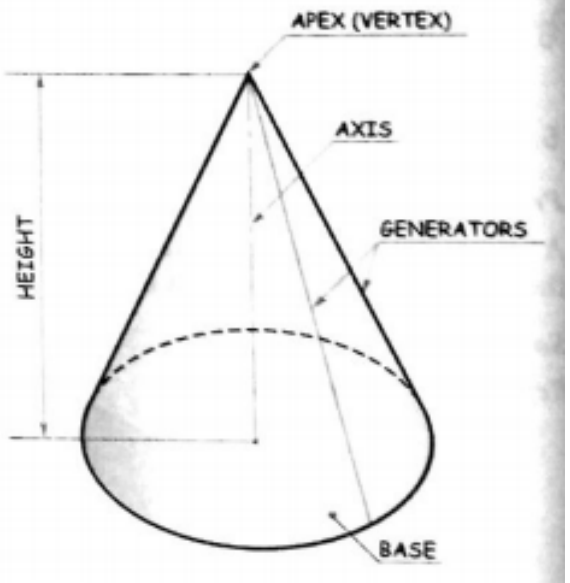
A cone is said to be a right circular cone *if its axis is perpendicular to its base.*

An Oblique Cone

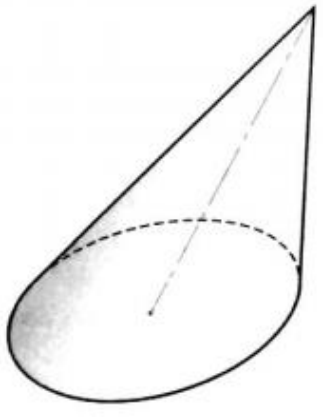
A cone is said to be an oblique cone *if its axis is inclined to its base.*

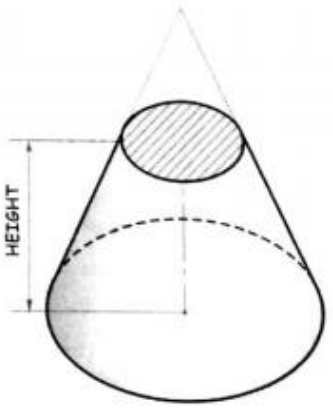
Frustum of Cone

When the cone is cut by a cutting plane parallel to its base and if the top portion is removed, the remaining portion is called as *frustum of cone.*

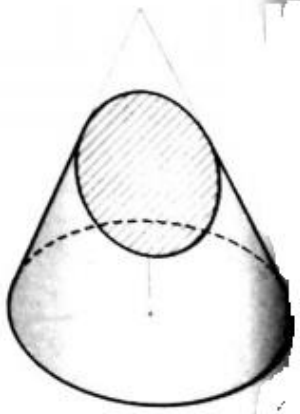


Right Circular Cone


Oblique Cone



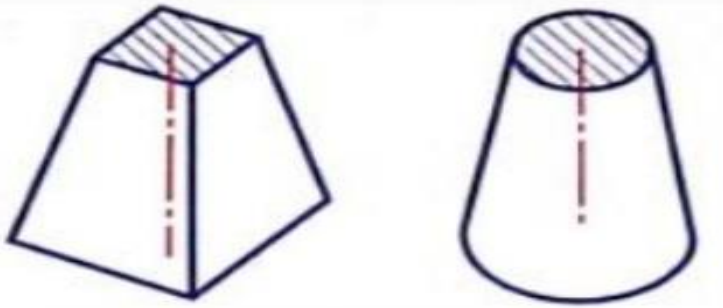
: Frustum of Cone


: Truncated Cone

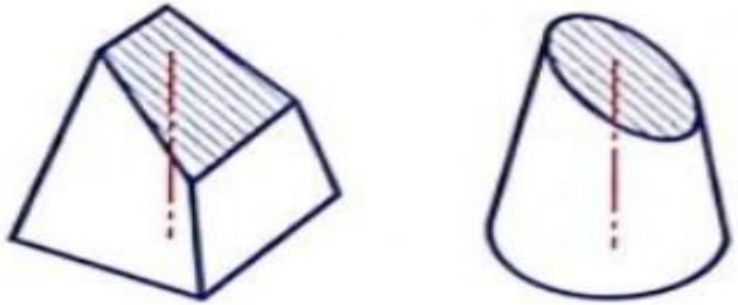
Introduction

FRUSTUMS AND TRUNCATED SOLIDS

When a solid is cut by a plane parallel to its base, thus removing the top portion, the remaining lower portion is called frustum. When a solid is cut by a plane inclined to its base, thus removing the top cut portion, the remaining lower portion of the solid is called truncated.

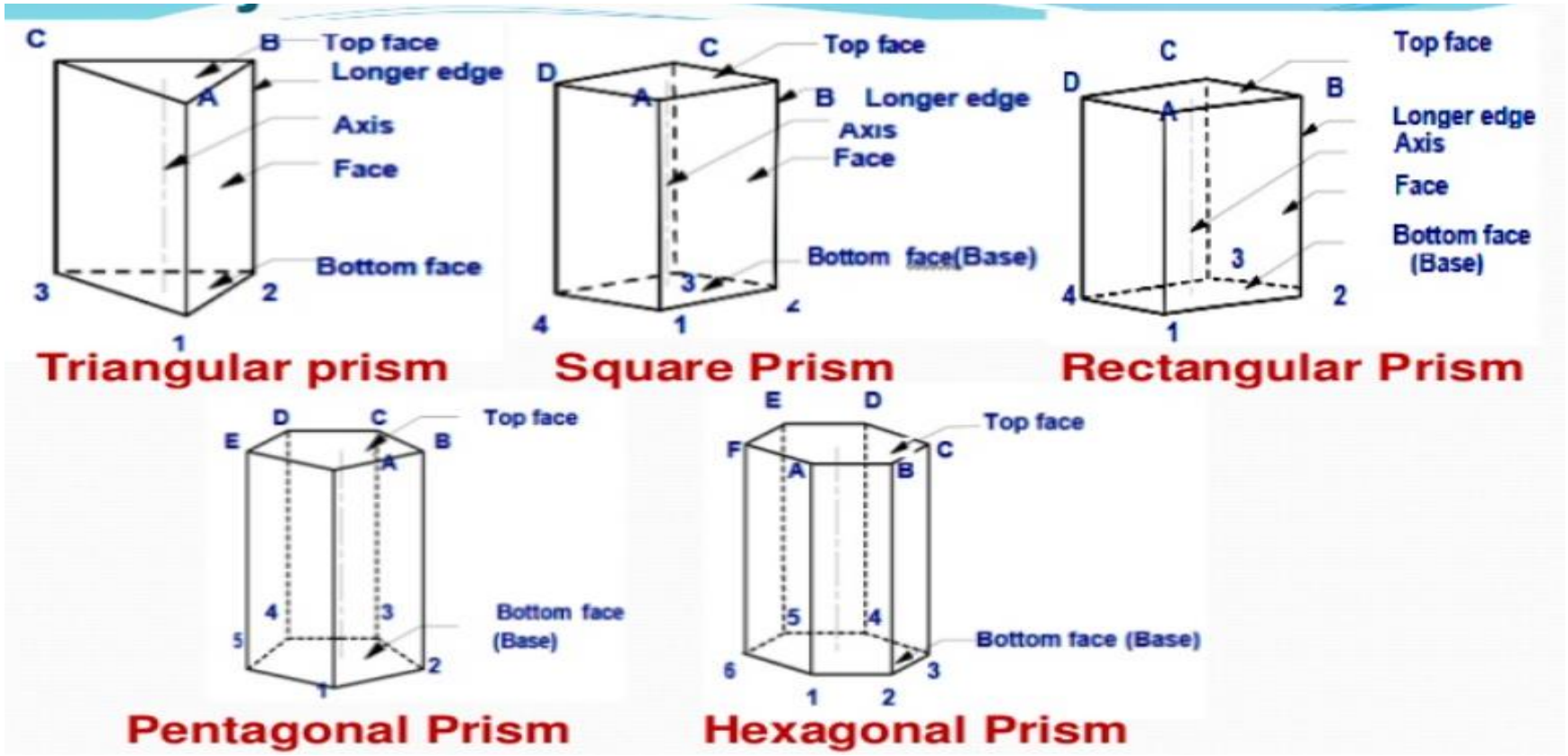


(a) Frustum of Solids

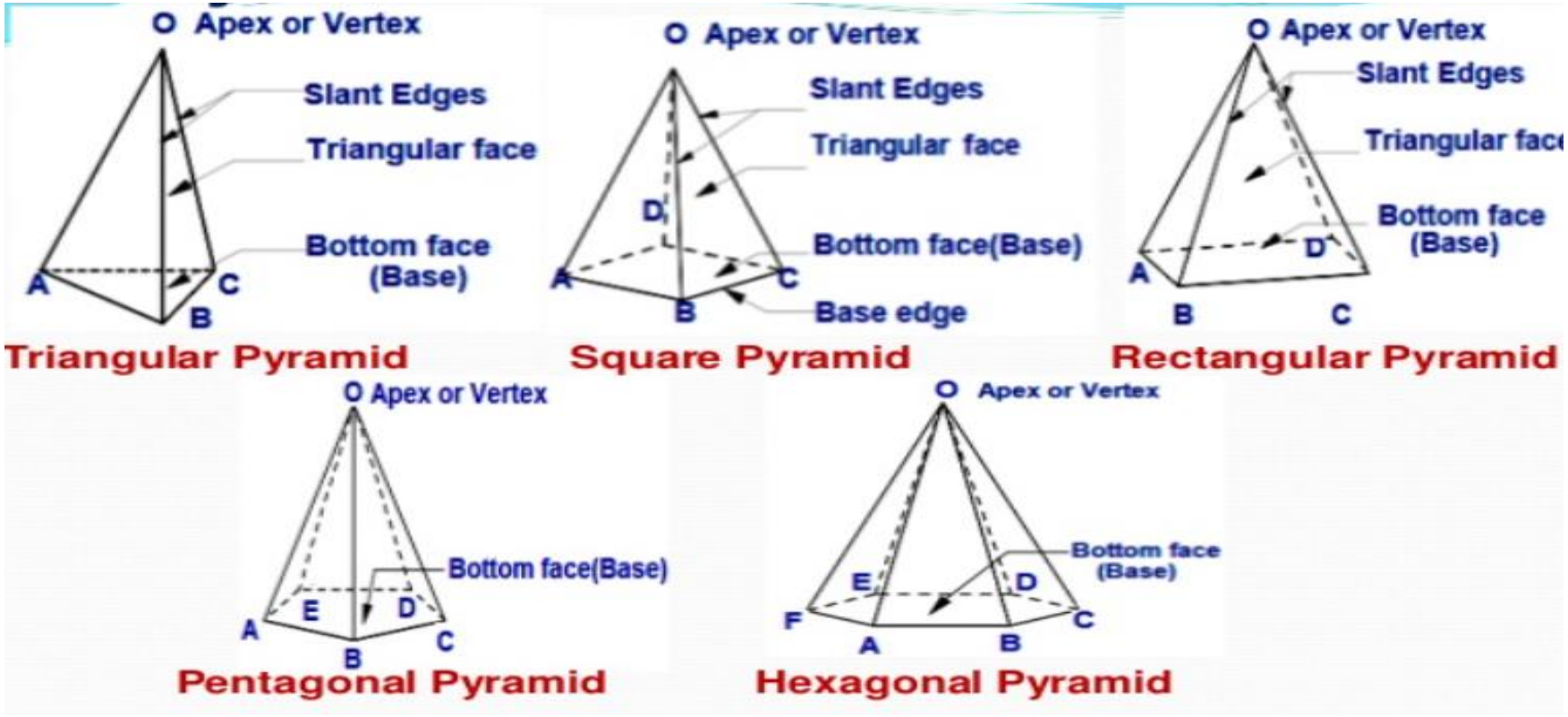


(b) Truncated Solids

Introduction

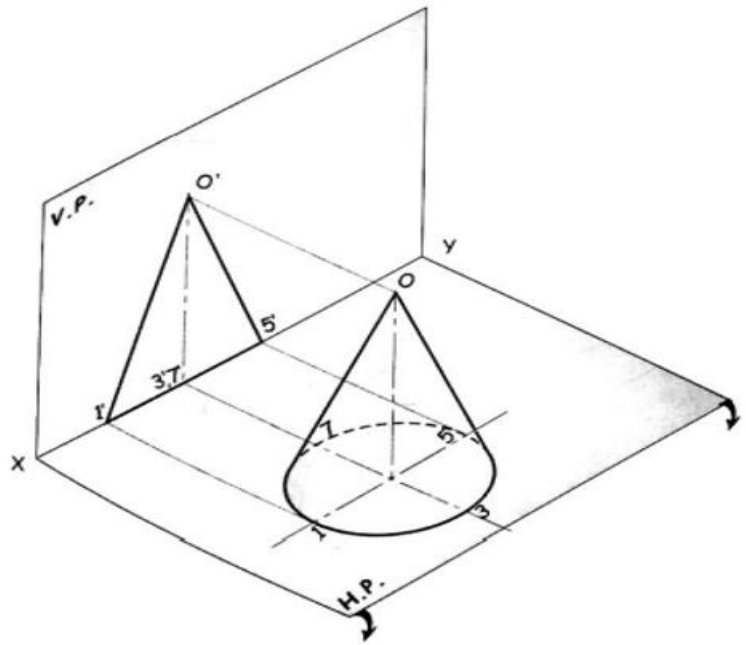


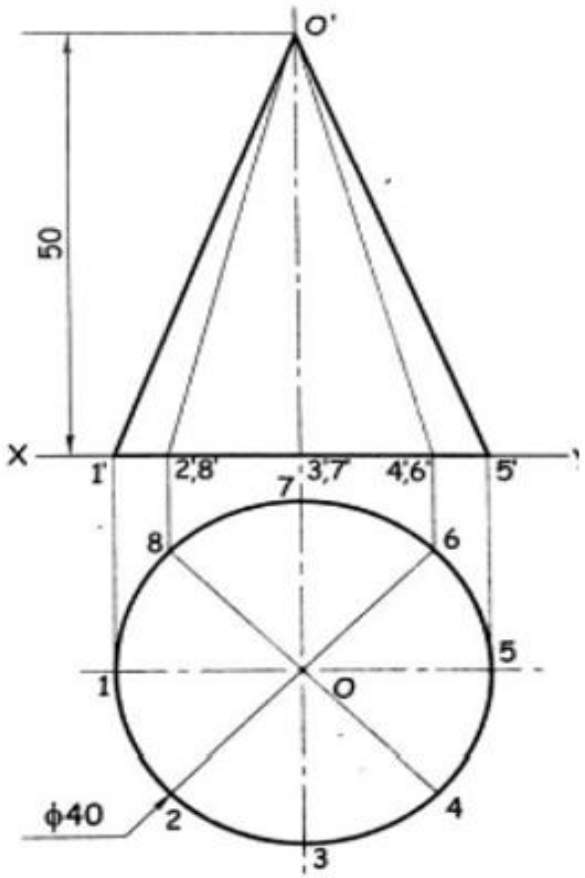
Introduction



A right circular cone with base diameter 40 mm and axis height 50 mm long, stands vertically on base on the H.P. Draw its projections.

Solution

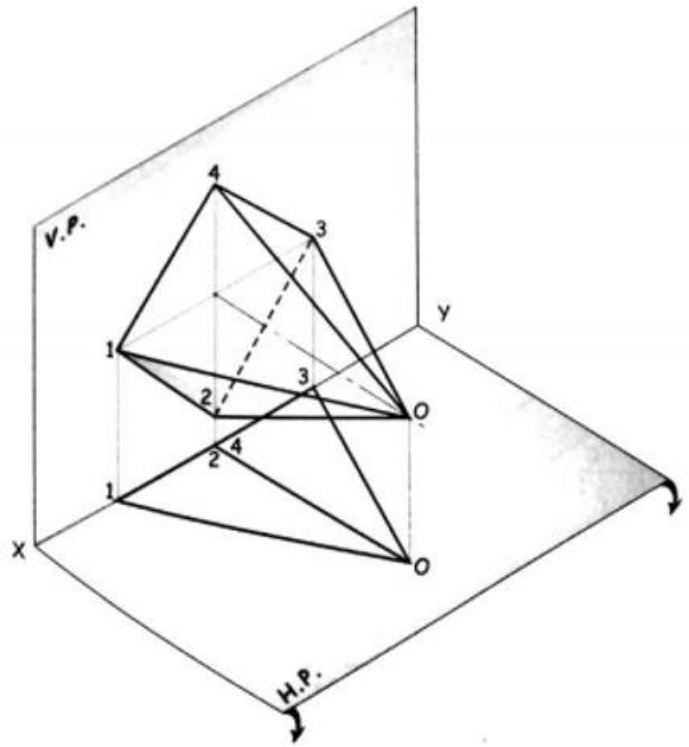


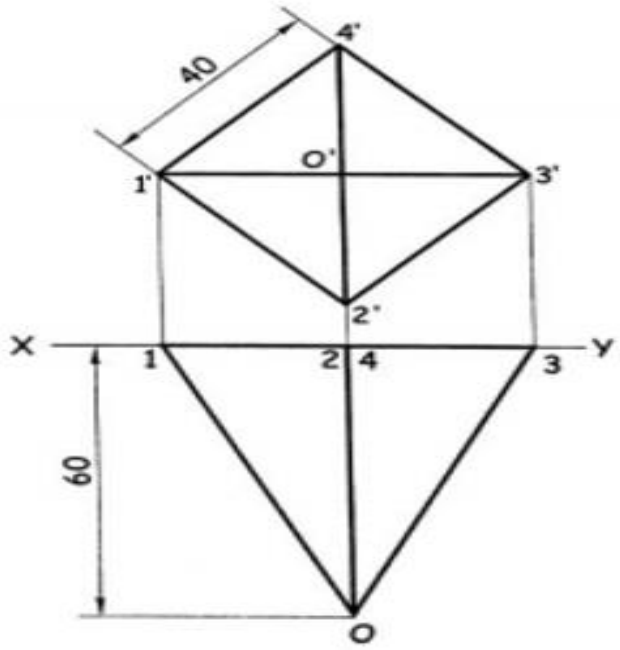


A square pyramid having edge of base 40 mm, axis 60 mm long has its base in the V.P. such that its edges of base are equally inclined to the H.P. Draw the projection.

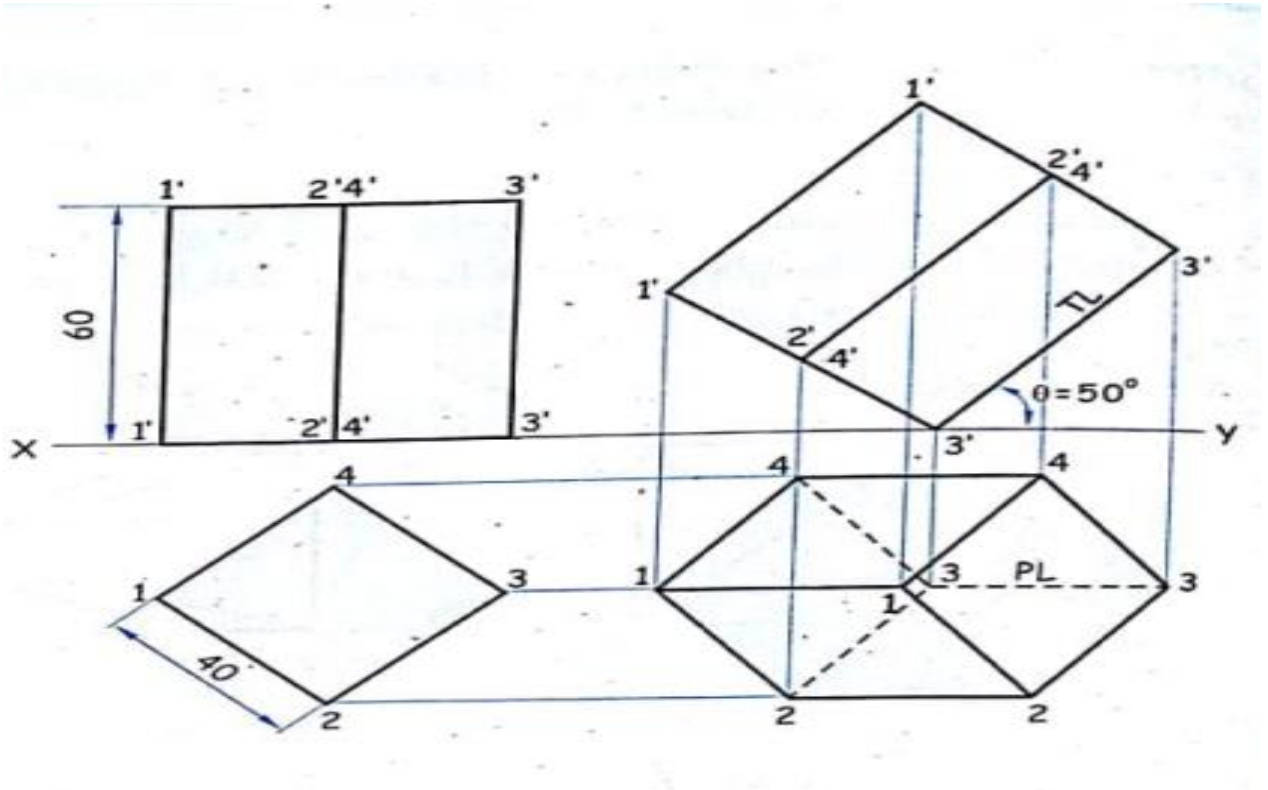
Solution

When base is in the V.P., axis becomes perpendicular to the V.P.

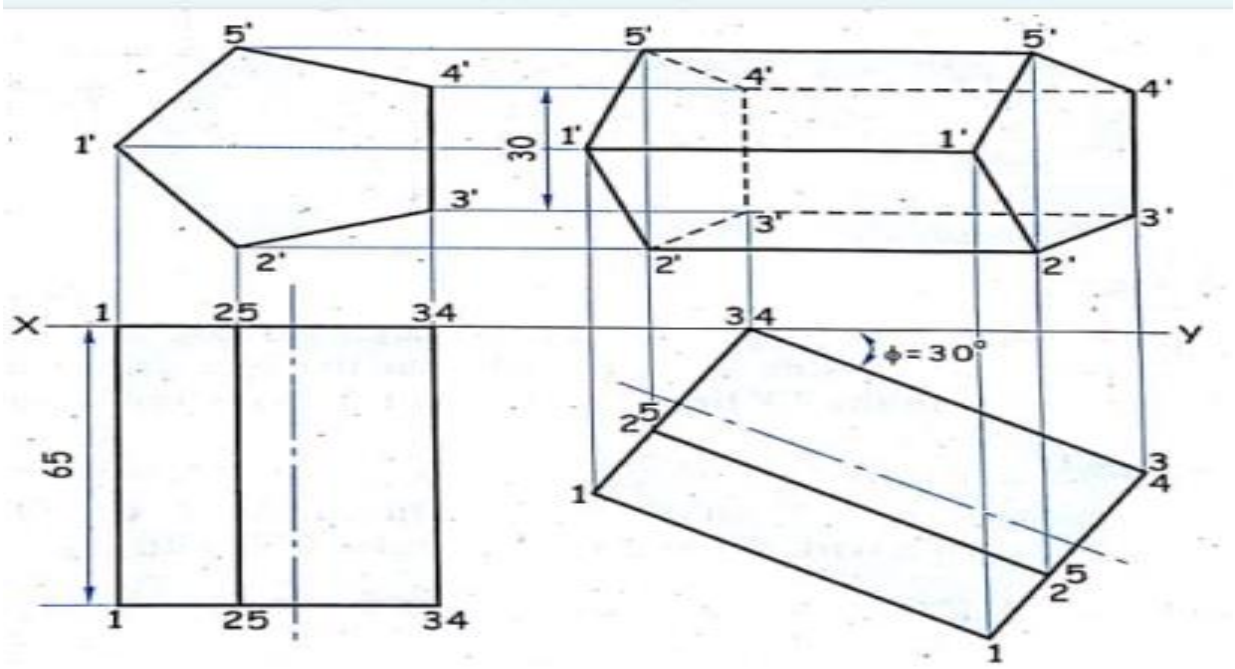




A square prism, side of base 40 mm and height 60 mm is resting on one of the corner of the base on the H.P. The longer edge containing the corner is inclined at 50° to the H.P.

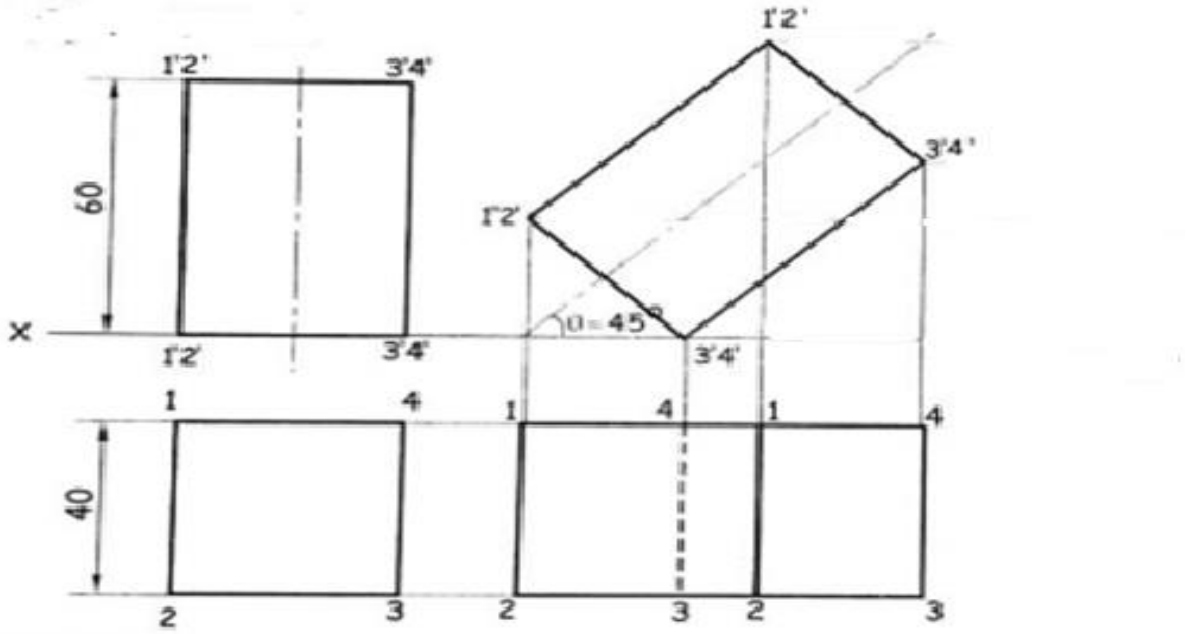


A pentagonal prism of 30 mm edge of a base and 65 mm length of an axis is having an edge of a base in the V.P. Draw the projections of a prism if the rectangular side face containing that edge is inclined at 30° to the V.P.



A square prism, side of base 40 mm and axis length 60 mm has one of the side of base in the H.P., which makes an angle of 45° with the H.P. Draw its projections.

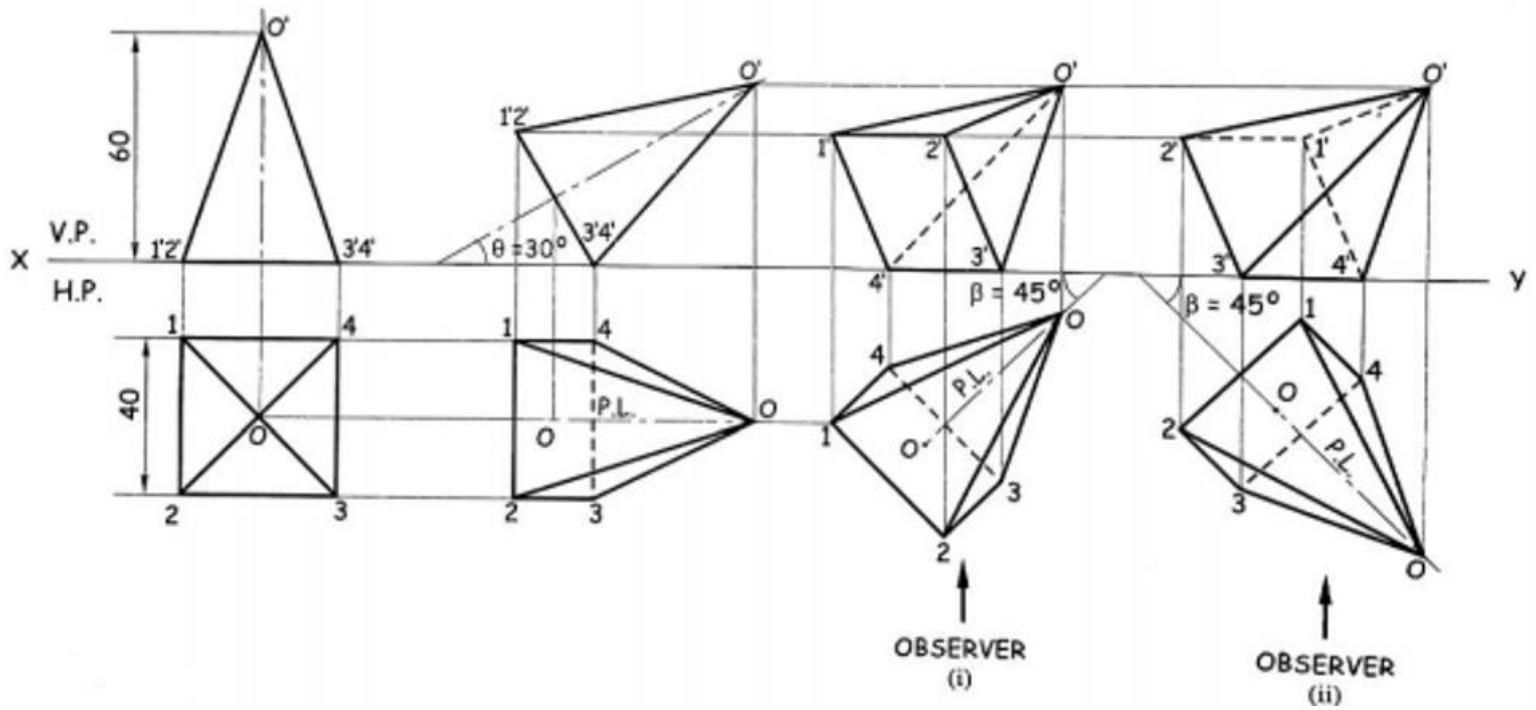
Solution



As per the Syllabus , You have only solids **inclined to one plane.**
The questions in the following slides have solids inclined to both the planes.
Each questions can be considered separately one with H.P and the second with V.P or vice versa..

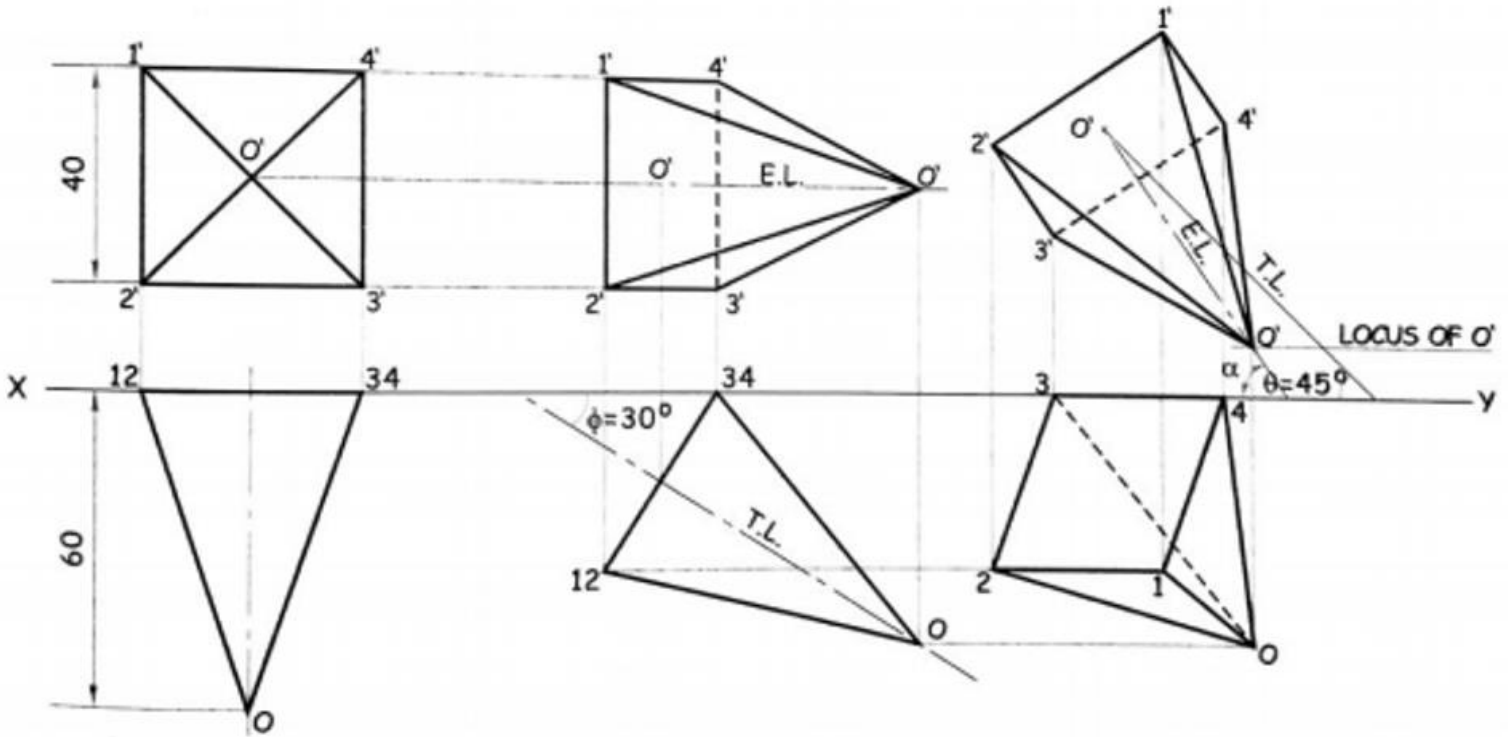
A square pyramid side of base 40 mm and axis length 60 mm has one of the side of base in the H.P. The axis of solid is inclined to the H.P. at an angle 30° (θ) and the T.V. of axis is inclined at an angle 45° with the V.P. Draw its projections. (i) Apex away from the observer. (ii) Apex nearer to the

Solution

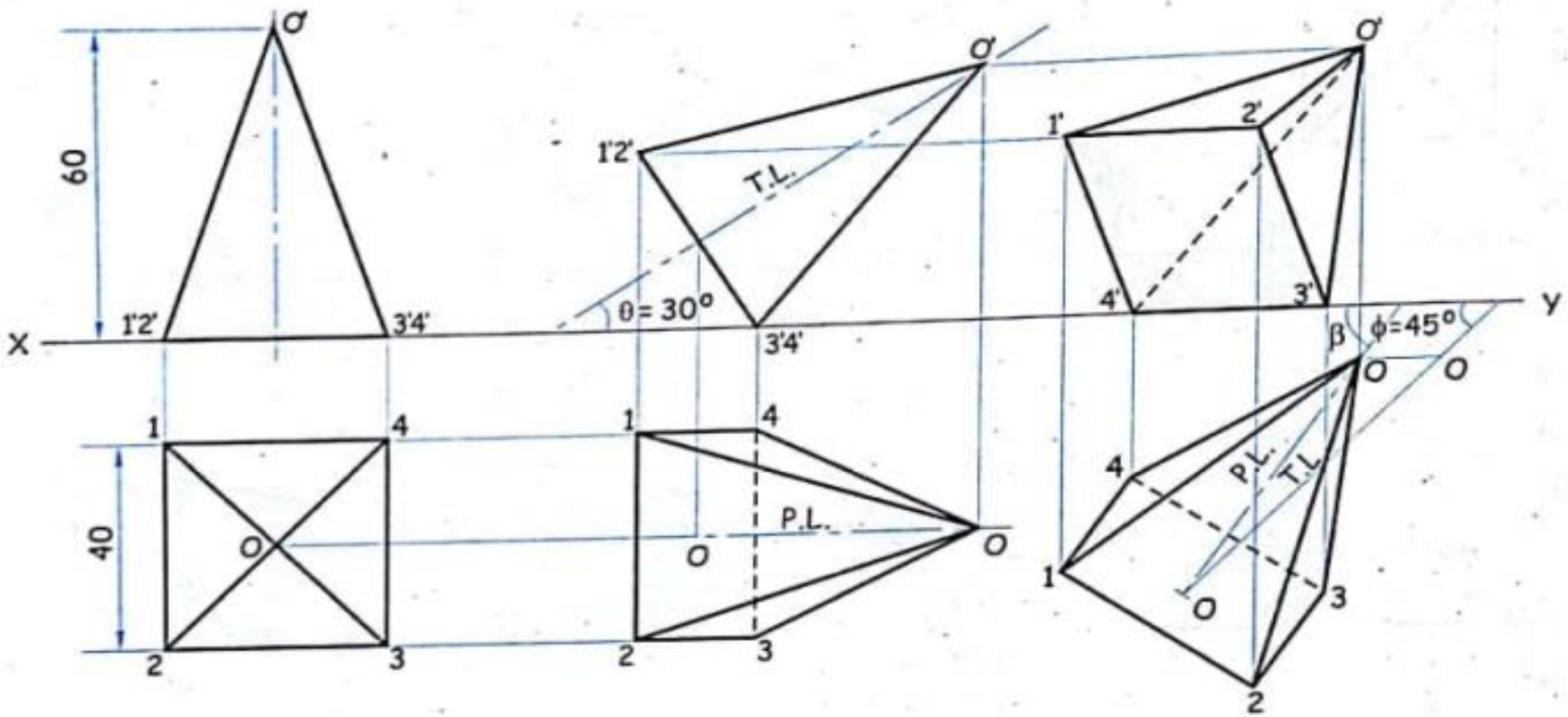


A square pyramid side of base 40 mm, axis length 60 mm has one of the side of base in the V.P. Th
axis of a solid is inclined to the V.P. and the H.P. at an angle 30° (ϕ) and 45° (θ) respectively. Dra
its projections.

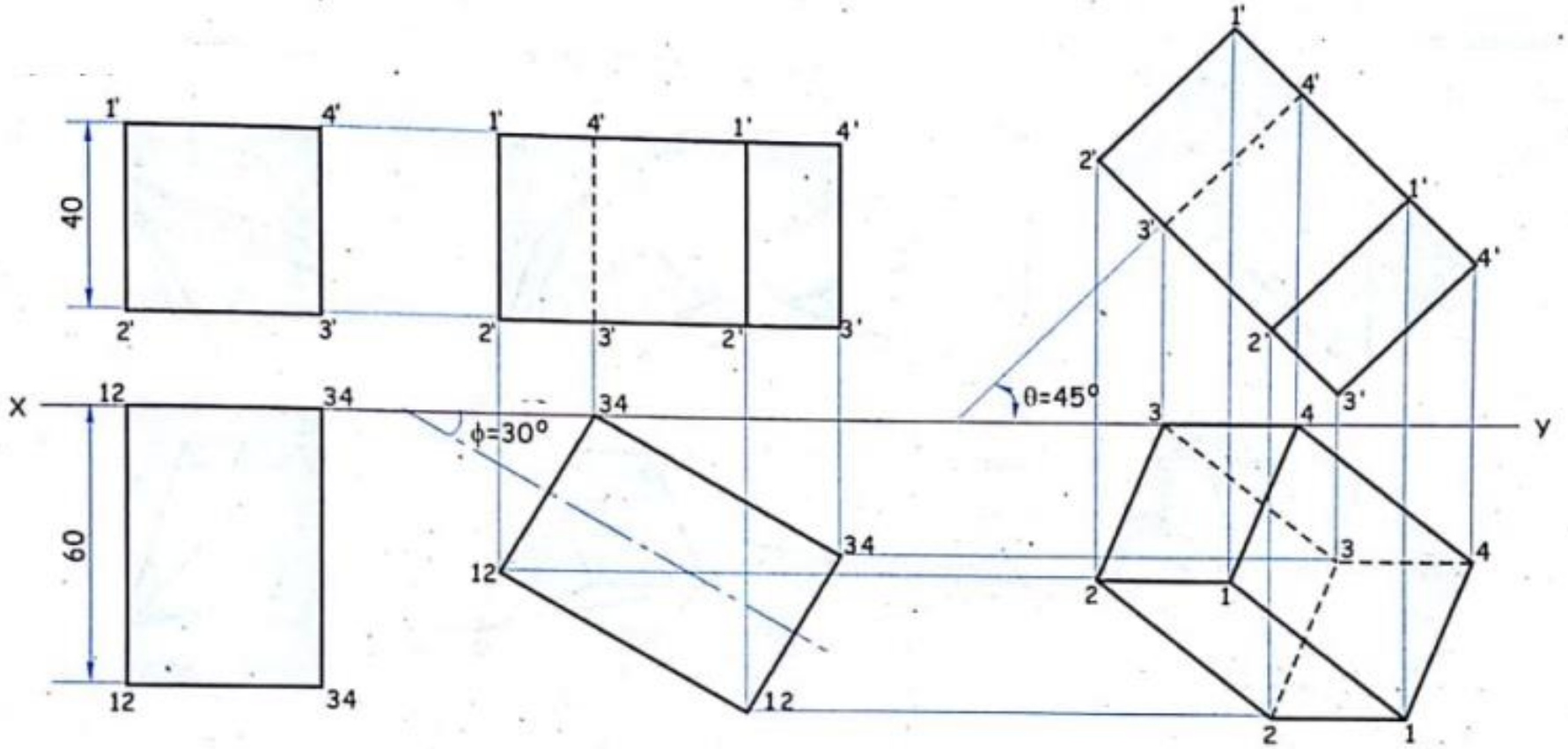
Solution



A square pyramid side of base 40 mm, axis length 60 mm has one of the side of base in the H.P. The axis of a solid is inclined to the H.P. and the V.P. at an angle 30° (θ) and 45° (ϕ) respectively. Draw its projections.

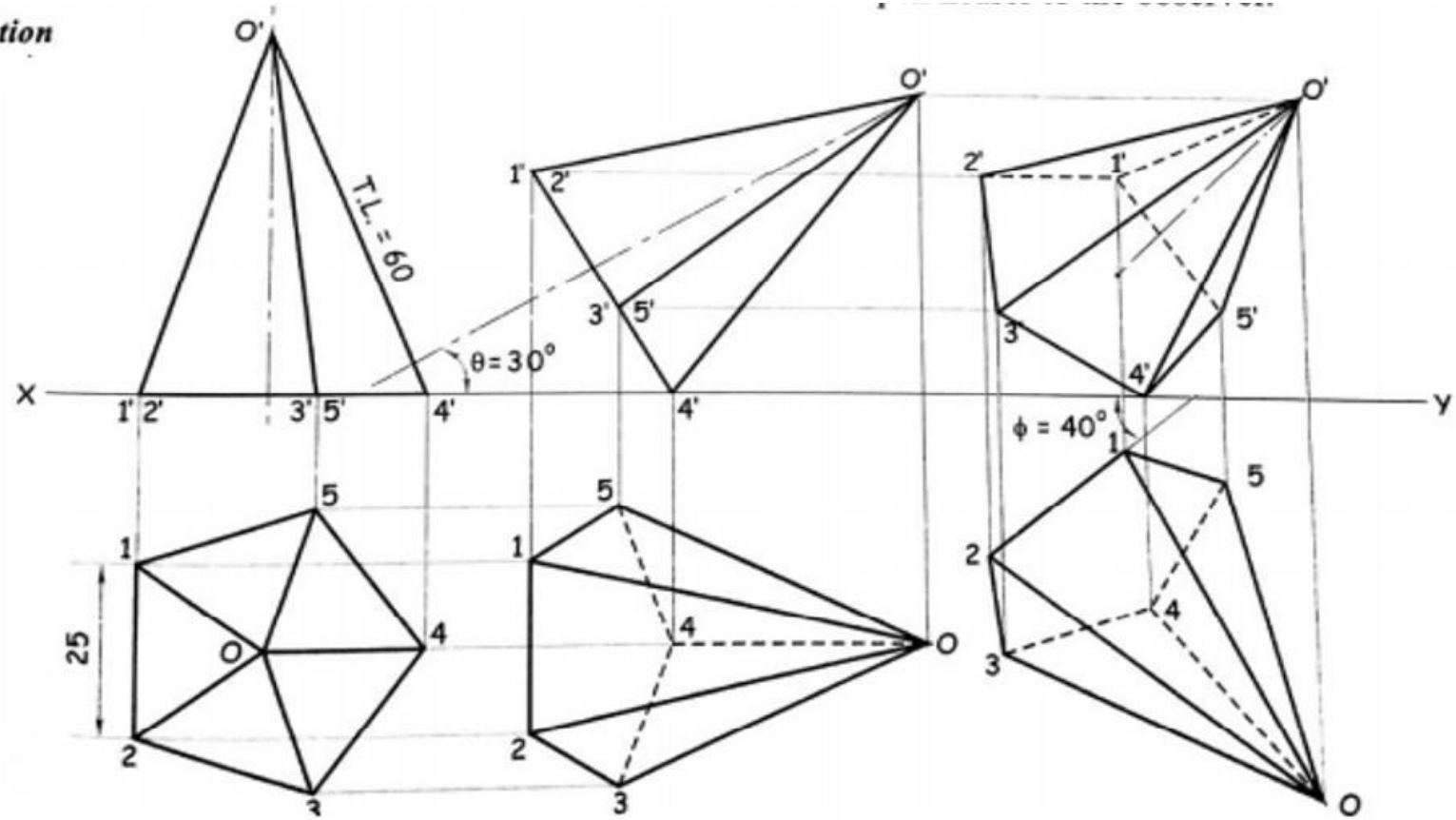


A square prism with side of base 40 mm and axis length 60 mm has one of its side of base in the V.P., which makes an angle 45° (θ) with the H.P. and axis inclined at an angle 30° (ϕ) with the V.P. Draw its projections.



A pentagonal pyramid base edge 25 mm and slant edges 60 mm long is resting on one of its base corners with its axis inclined at 30° to the H.P. Draw its projections if the base side opposite to the base corner on the H.P. makes an angle of 40° to the V.P. and apex nearer to the observer.

Solution



A cone of 70 mm length of the axis is resting on one of its generators in the H.P., while its axis is inclined at 40° to the V.P. and the apex is nearer to the observer. Draw the projections of this cone if the generators of the cone are inclined at 60° to the base.

Solution