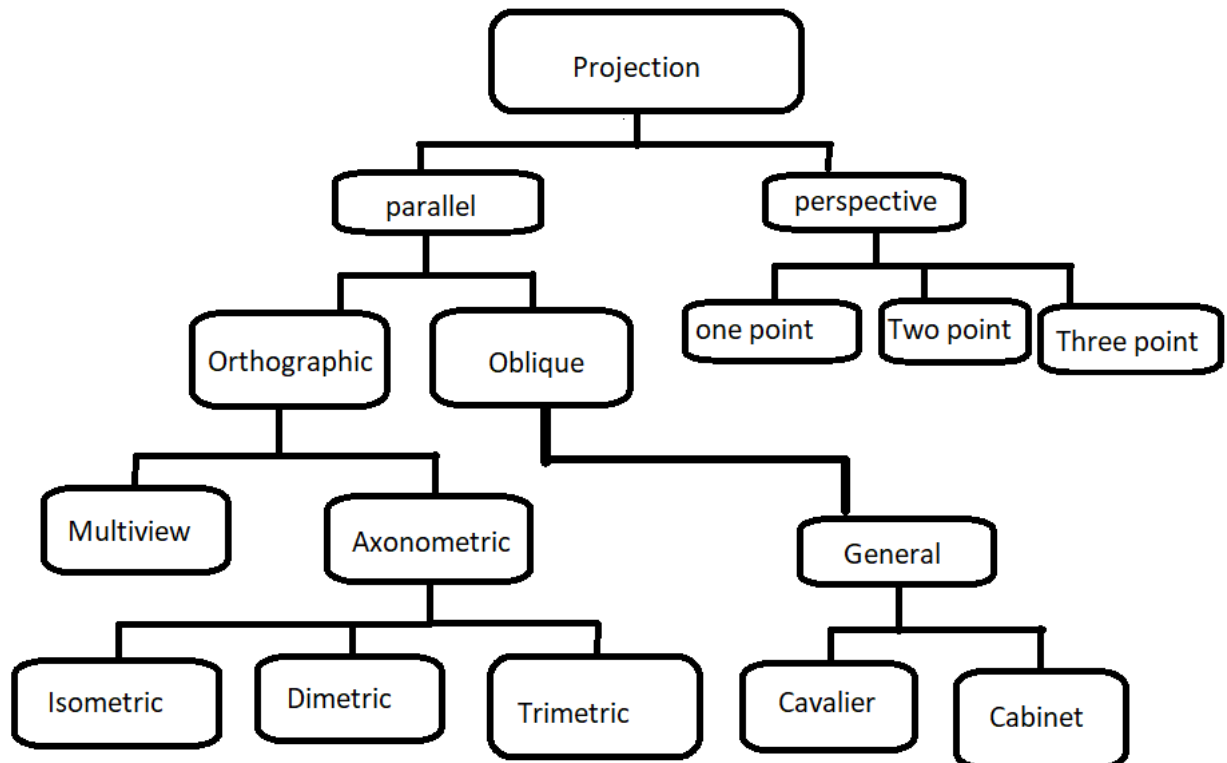


## PROJECTIONS:

3D Projection is a design technic used to display a three-dimensional object on a two-dimensional (2D) surface. It is process of converting a 3D object into 2D object. It is also defined as mapping or transforming of the object in projection plane or view plane.

### Types of Projections:

1. Parallel projections
2. Perspective projections



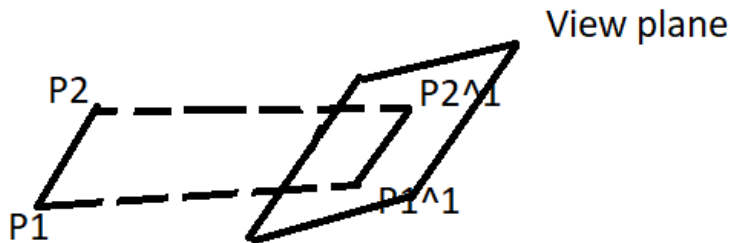
### Center of Projection:

It is an arbitrary point from where the lines are drawn on each point of an object.

- If cop is located at a finite point in 3D space, Perspective projection is the result
- If the cop is located at infinity, all the lines are parallel and the result is a parallel projection.

## Parallel Projection:

A projection is said to be parallel, if center of projection is at an infinite distance from the projected plane. The projection lines are parallel to each other and extended from the object and intersect the view plane. It preserves relative proportions of objects, and it is used in drafting to produce scale drawings of 3D objects. This is not a realistic representation; the point of intersection is the projection of the vertex.

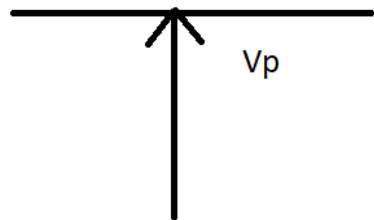


Parallel projection is divided into two parts and these two-parts sub divided into many.

## Orthographic Projections:

In orthographic projection the direction of projection is normal to the projection of the plane. In orthographic lines are parallel to each other making an angle 90 with view plane. Orthographic parallel projections are done by projecting points along parallel lines that are perpendicular to the projection line. Orthographic projections are most often used to procedure the front, side, and top views of an object are called evaluations.

**EXAMPLE:** Engineering and architectural drawings commonly employ these orthographic projections.



Orthographic is subdivided into two types and those are been divided in sub types.

## **Axonometric Orthographic Projections:**

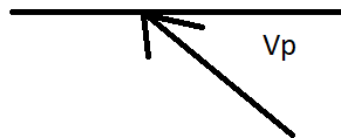
Orthographic projections that show more than one side of an object are called axonometric orthographic projections.

This is divided into three types:

- **Isometric Projections:** The most common axonometric projection is an isometric projection. In this projection parallelism of lines are preserved but angles are not preserved.
- **Dimetric projections:** In these two projectors have equal angles with respect to two principal axes.
- **Trimetric projections:** The direction of projection makes unequal angle with their principal axis.

## **Oblique Projections:**

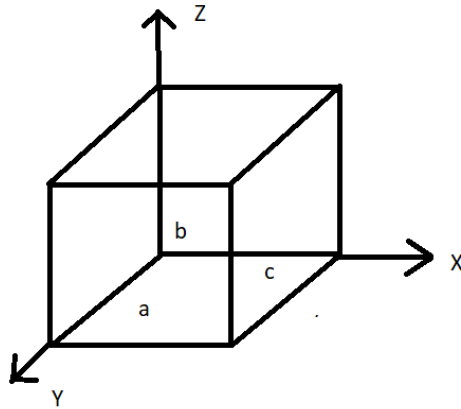
Oblique projections are obtained by projectors along parallel lines that are not perpendicular to the projection plane. An oblique projection shows the front and top surfaces that include the three dimensions of height, width and depth.



Oblique is sub divided two types they are:

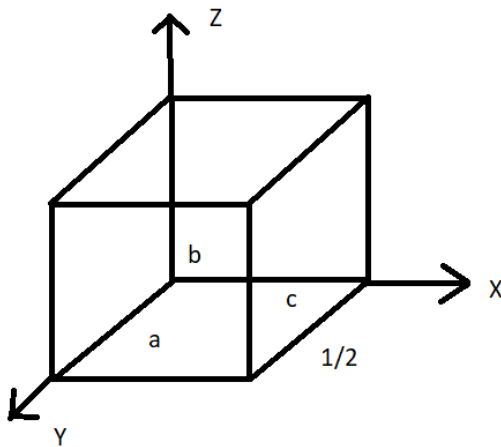
### **Cavalier Projections:**

All lines perpendicular to the projection plane are projected with no change in length. If the projected line making an angle 45 degrees with the projected plane, as a result the line of the object length will not change.



### Cabinet Projections:

All lines perpendicular to the projection plane are projected to one half of their length. This gives a realistic appearance of object. It makes 63.4 degrees angle with the projection plane. Here lines perpendicular to the viewing surface are projected at half their actual length.

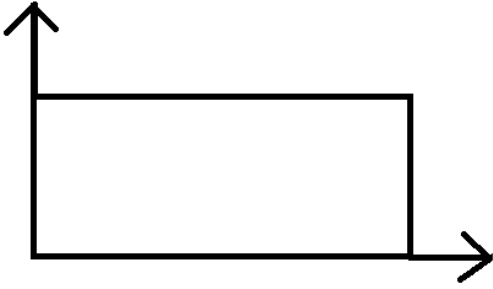


### Perspective Projections:

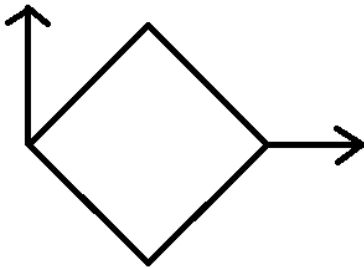
A perspective projection is the one produced by straight lines radiating from a common point and passing through point on the sphere to the plane of projection. Perspective projection is a geometric technique used to produce a three-dimensional graphic image on a plane, corresponding to what person sees.

Different types of perspective projections:

- **One point perspective projections:** In this, principal axis has a finite vanishing point. Perspective projection is simple to draw.



- **Two-point perspective projections:** Exactly 2 principals have vanishing points. Perspective projection gives better impression of depth.



- **Three-point perspective projections:** All the three principal axes have finite vanishing point. Perspective projection is most difficult to draw.

