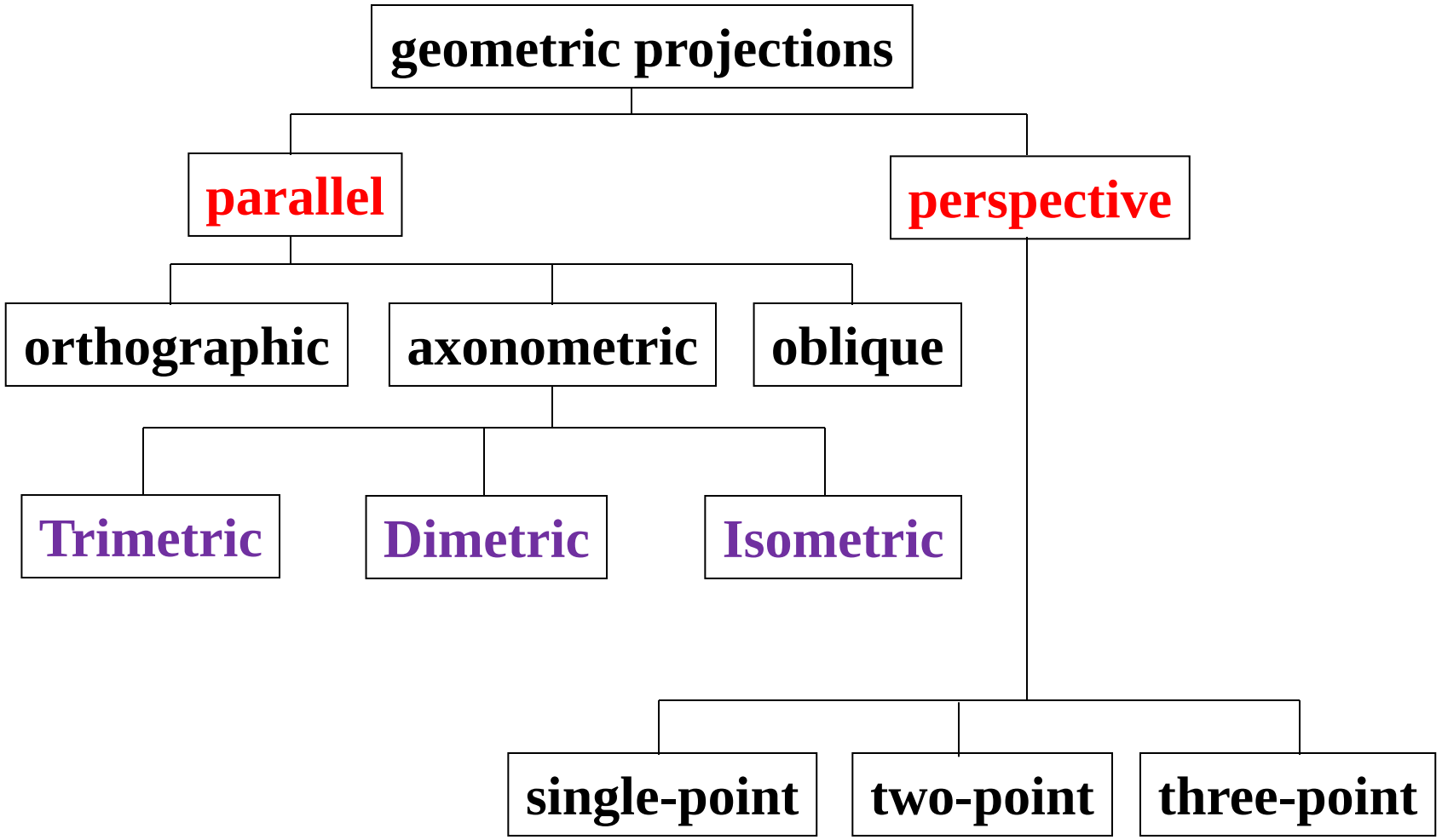
PROJECTIONS

Projections

In drawing practice, a 3-dimensional object is represented on a plane paper. Similarly in computer graphics a 3-dimensional object is viewed on a 2-dimensional display.

A projection is a transformation that performs this conversion. Three types of projections are commonly used in engineering practice: **parallel**, **perspective** and **isometric**.

Taxonomy of Planar Geometric Projections

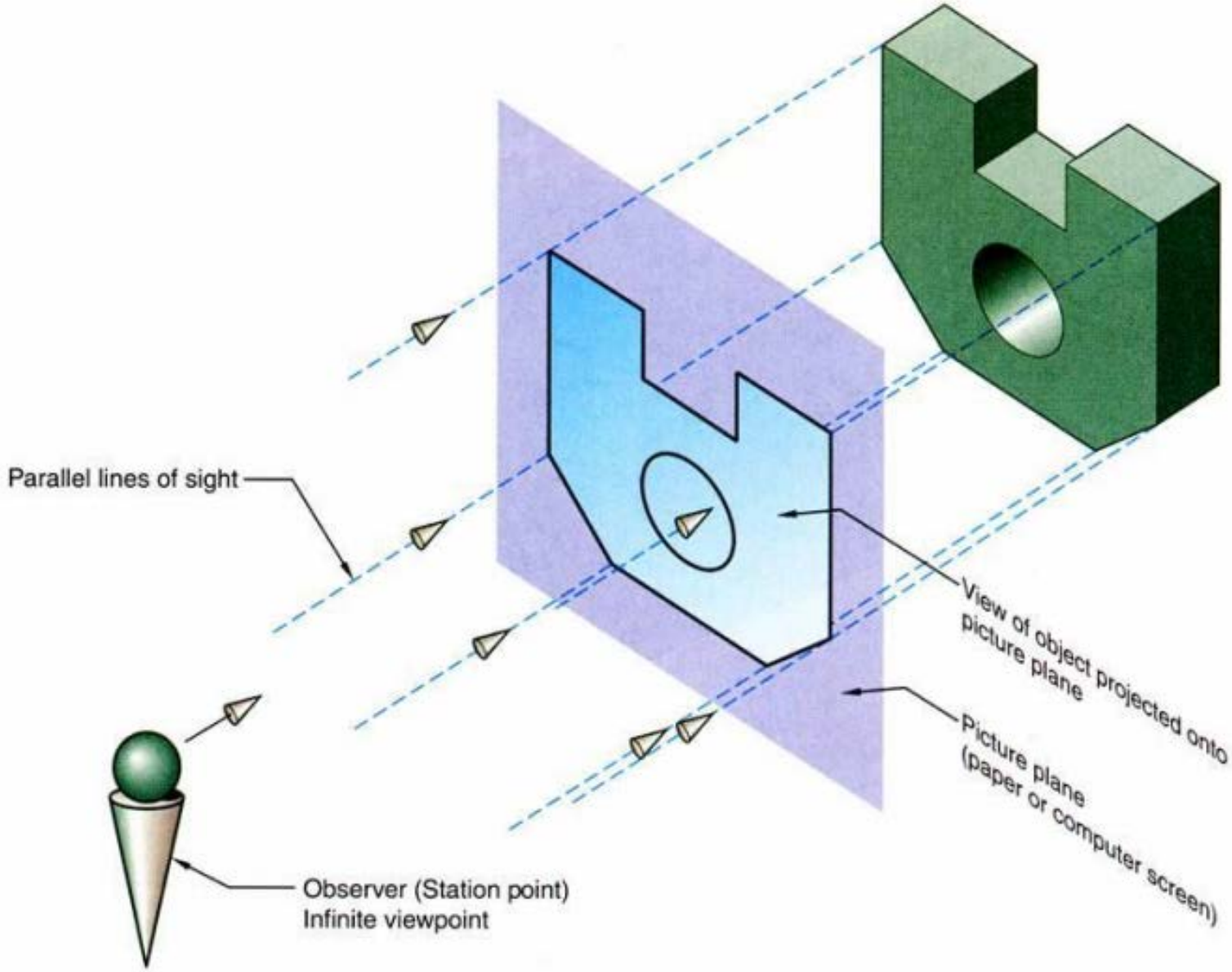


Tri : means there are none sets of axes.

Di : means there are two sets of axes.

Iso : means similar

1- Parallel Projection



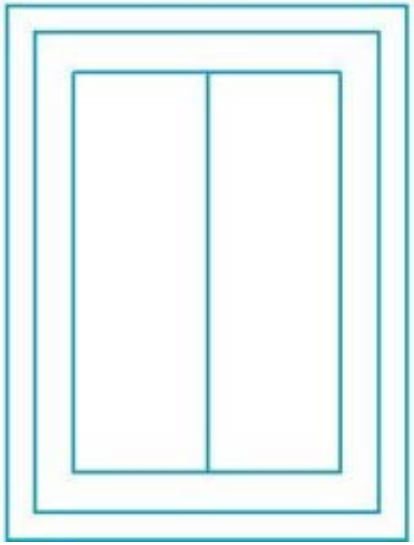
❖ **Parallel projection is lack of depth information.**

1-1 Orthographic (Correct Drawing) Projection

Multiview Orthographic Projection

Front

Top



Side

Advantage

Preserves both distances and angles.

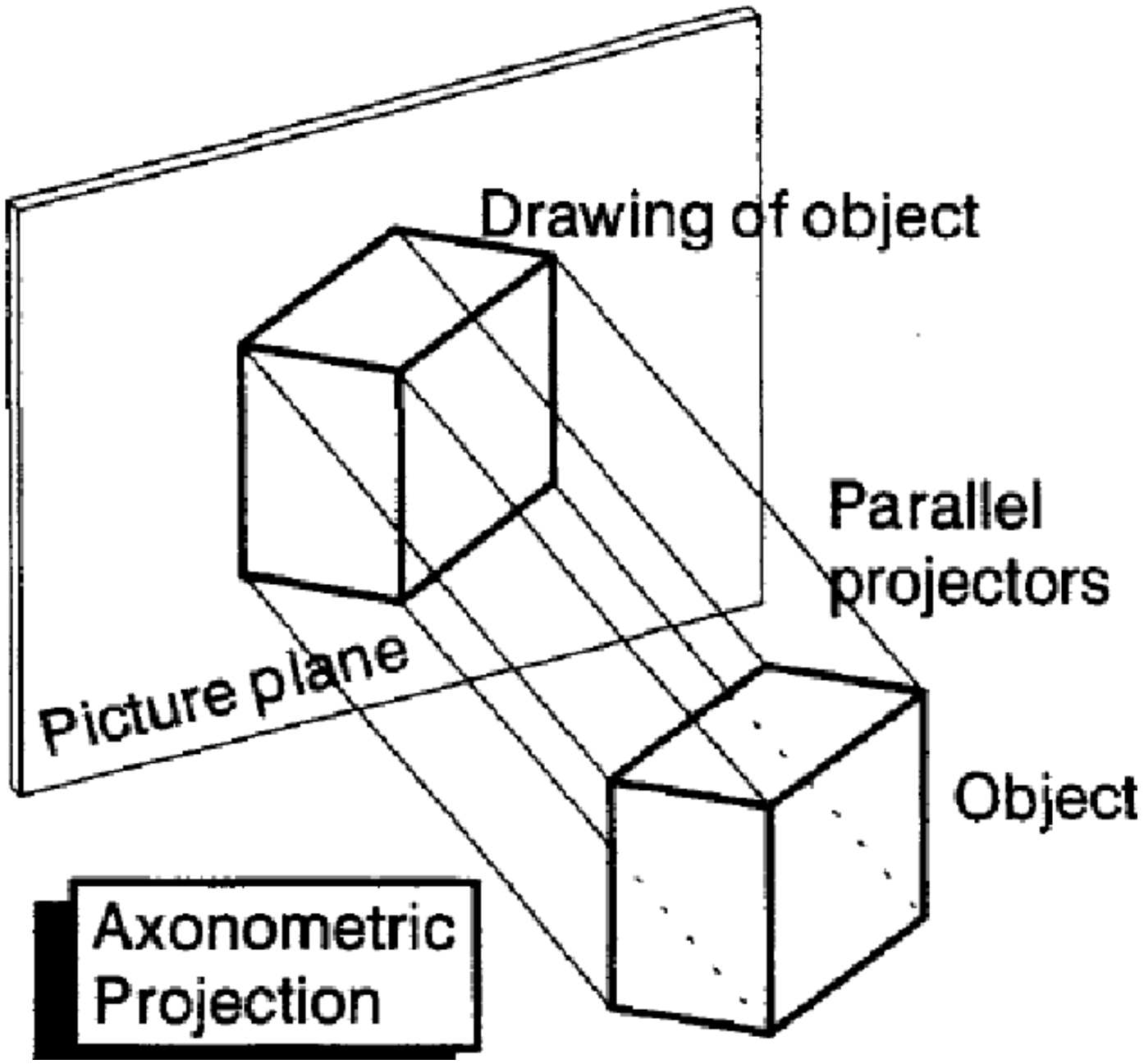
Disadvantage

Cannot see what object really looks like because many surfaces hidden from view, Often we add the isometric.

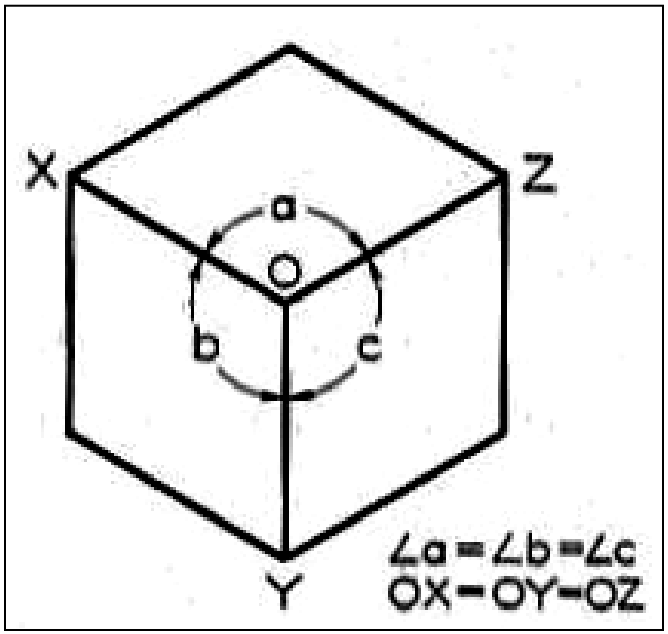
1-2 Axonometric projection

- Same as perspective projection except that the projectors are parallel. This means that there are no vanishing points.
- Depending on the orientation of the object, Axonometric projection can be divided into three classes:

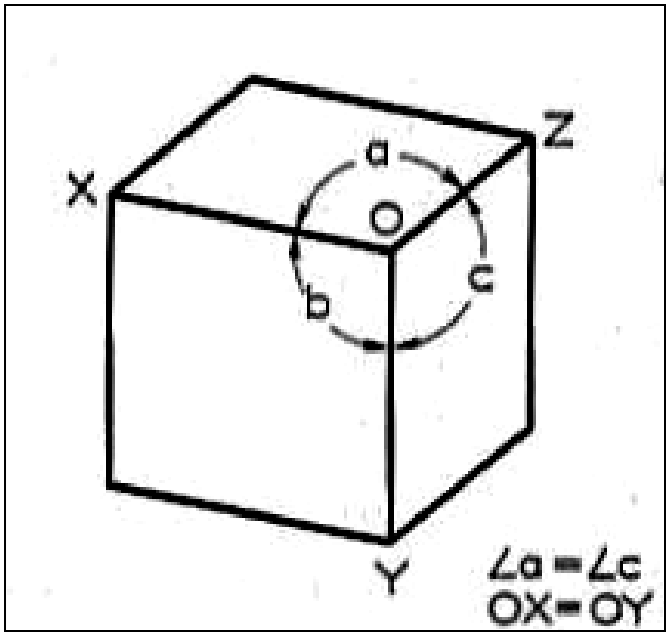
1. Trimetric.
2. Dimetric.
3. Isometric.


Drawing of object
Parallel projectors
Picture plane
Object
Axonometric Projection

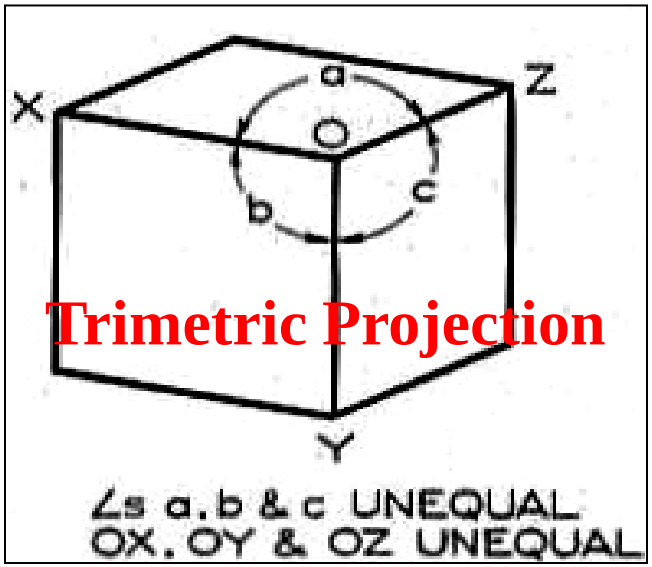
Types of Axonometric Projections



Isometric Projection



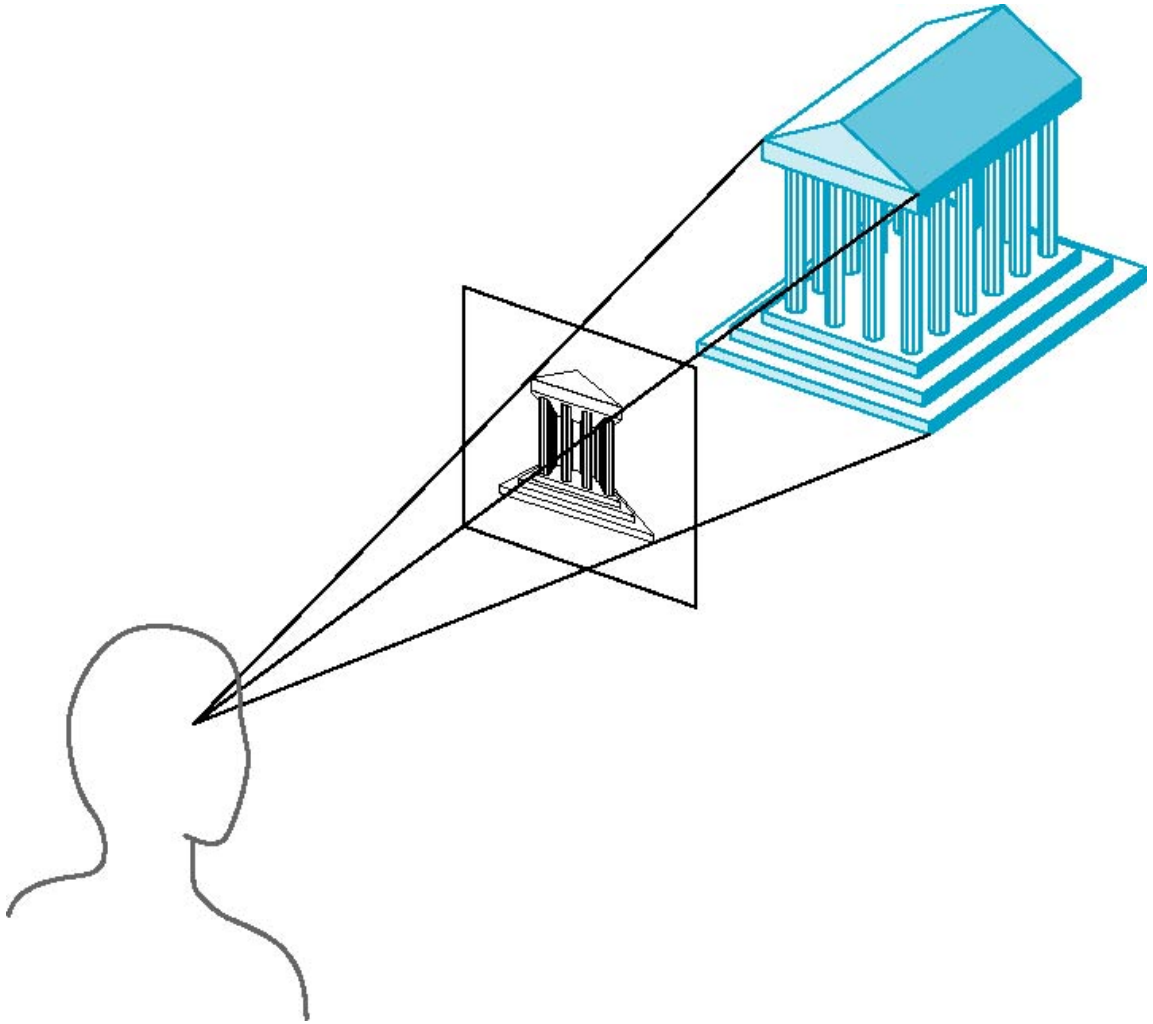
Dimetric Projection



Trimetric Projection

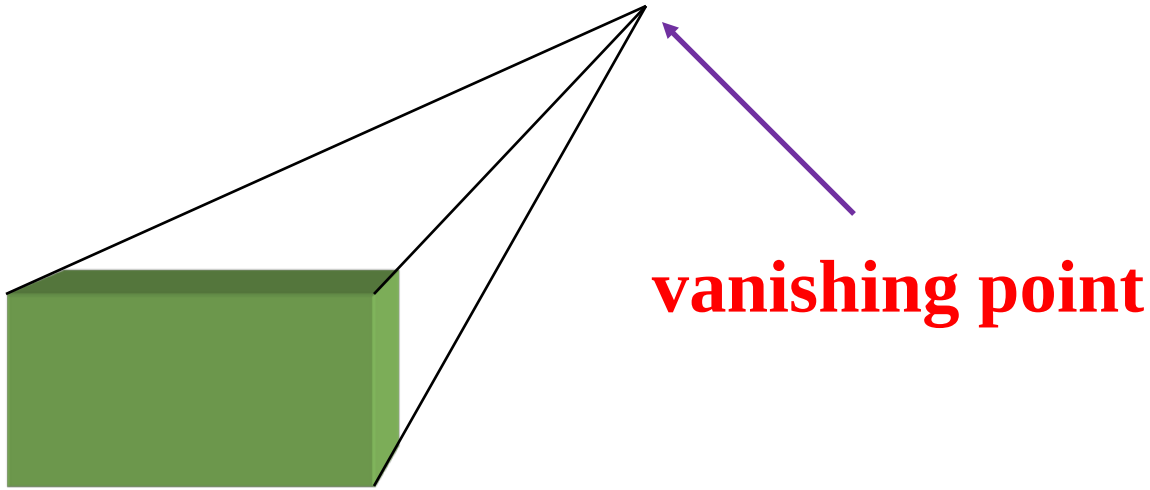
2- Perspective Projection

- Projectors coverge at center of projection



Vanishing Points

- Parallel lines (not parallel to the projection plan) on the object converge at a single point in the projection (the *vanishing point*).
- Drawing simple perspectives by hand uses these vanishing point(s).

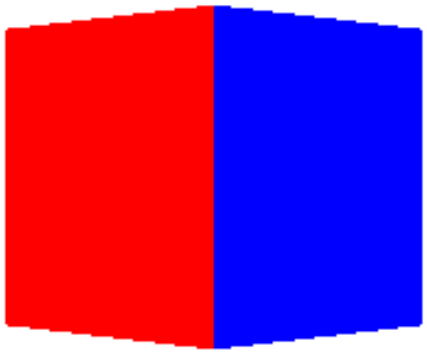


2-1 One-Point Perspective

- One principal face parallel to projection plane.
- One vanishing point for cube.

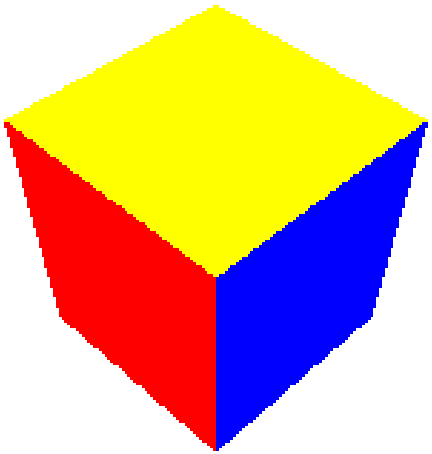
2-2 Two-Point Perspective

- On principal direction parallel to projection plane.
- Two vanishing points for cube.



2-3 Three-Point Perspective

- No principal face parallel to projection plane.
- Three vanishing points for cube.



Advantages and Disadvantages

- Objects further from viewer are projected smaller than the same sized objects closer to the viewer.
- Angles preserved only in planes parallel to the projection plane.
- More difficult to construct by hand than parallel projections (but not more difficult by computer).