Rao Badhur Y Mahabaleshwarappa Engineering College (RYMEC)

(Formerly , Vijayanagara Engineering College (VEC), Ballari)

WELCOME

To

CHITRIKI ACADEMY

On

ENGINEERING DRAWING

By

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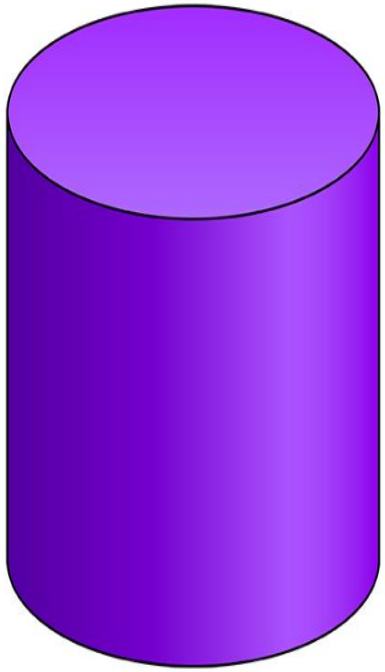
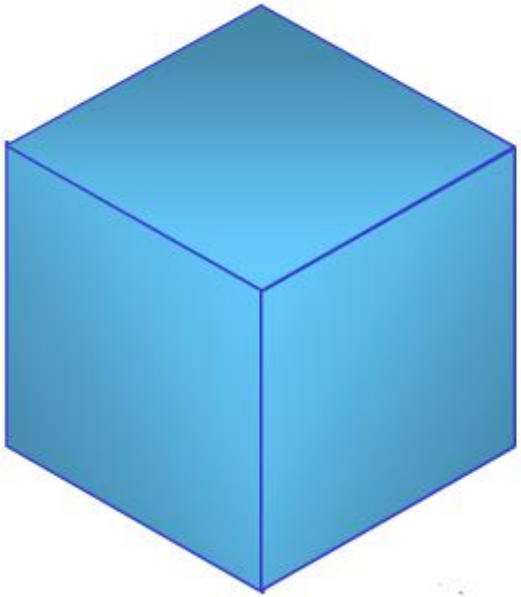
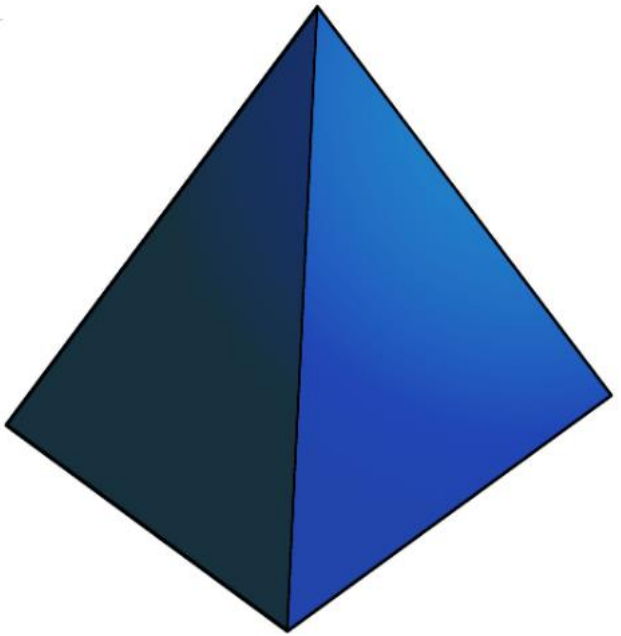
Professor, Department of Mechanical Engineering.

ISOMETRIC PROJECTION

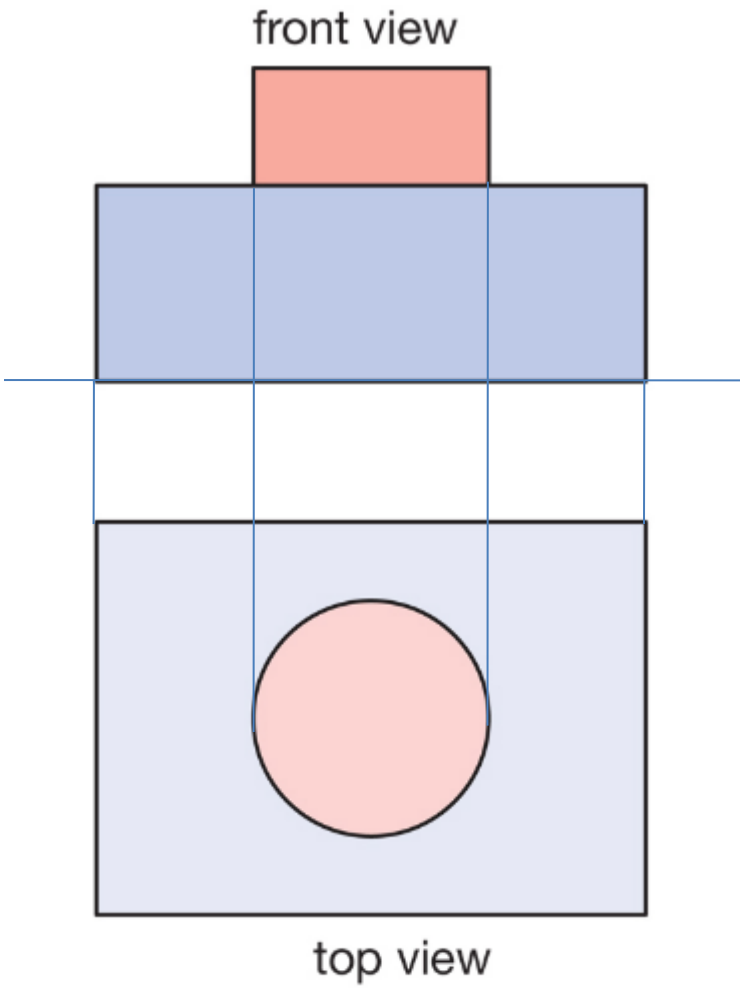


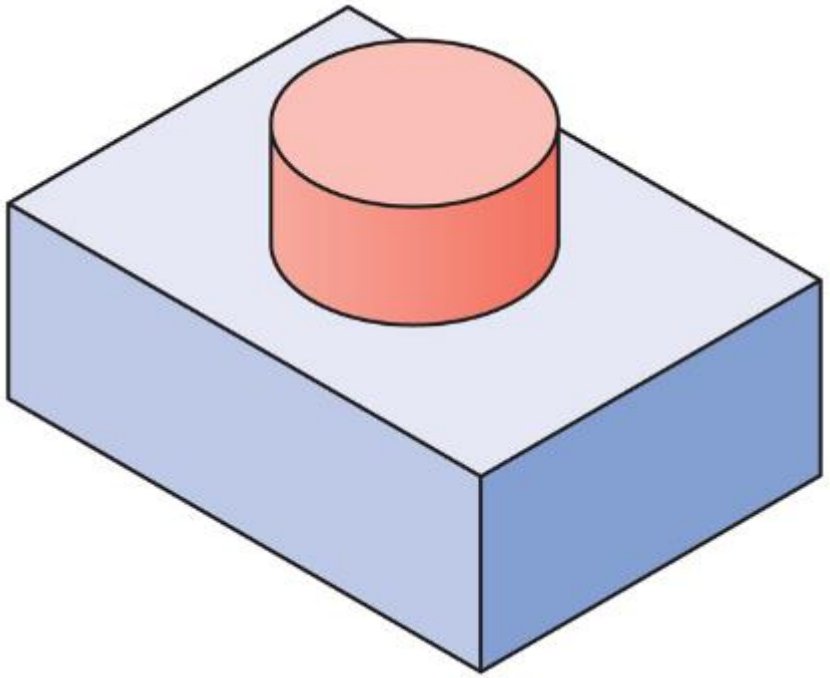




ISOMETRIC PROJECTION

Orthographic and isometric projections of an object

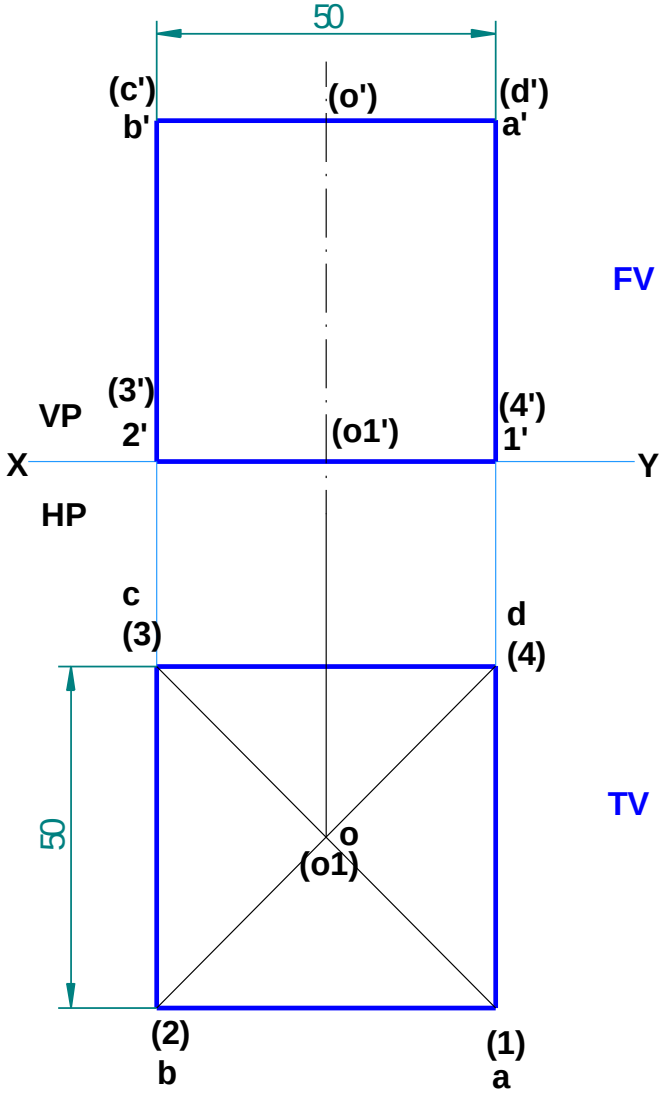


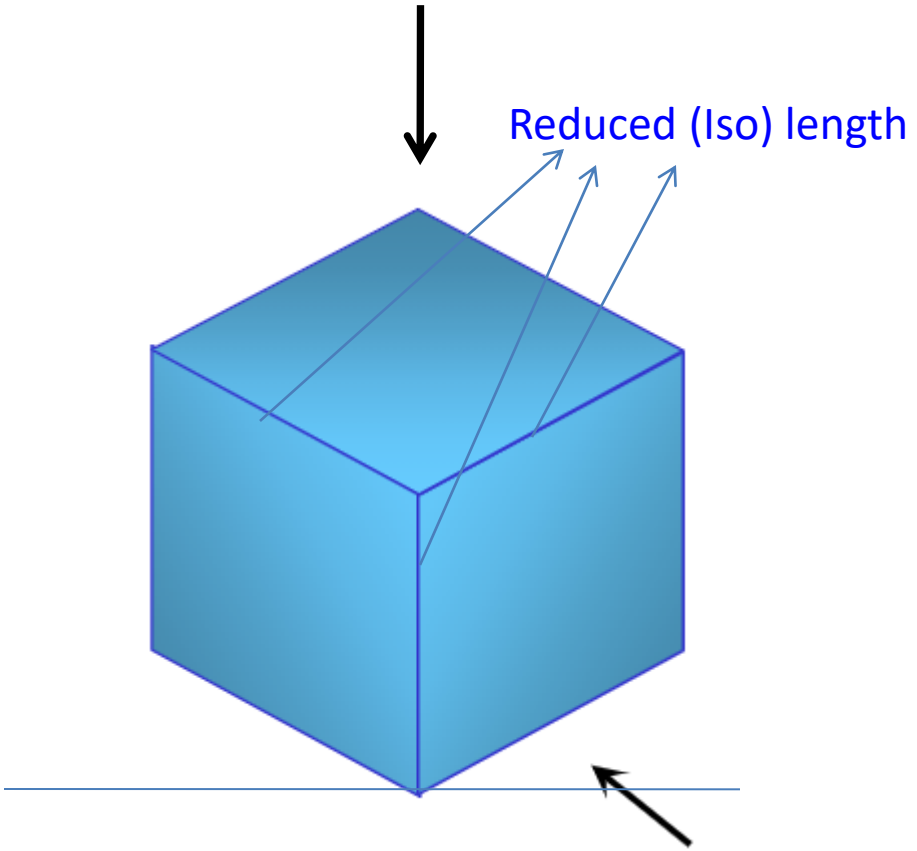


3-dimensional isometric projection

ISOMETRIC PROJECTION

Orthographic projection of Cube (FV & TV)





Isometric Projection of Cube

ISOMETRIC PROJECTION

CONTENT

- 2-D & 3-D Drawings / Views.
- Importance of 2D and 3D drawings.
- Pictorial Projection / Drawing (3D Drawings).
- Types of Pictorial Projection.
- Axonometric Projection.
- Types of Axonometric Projection.
- Isometric Projection.
- Isometric Axes.

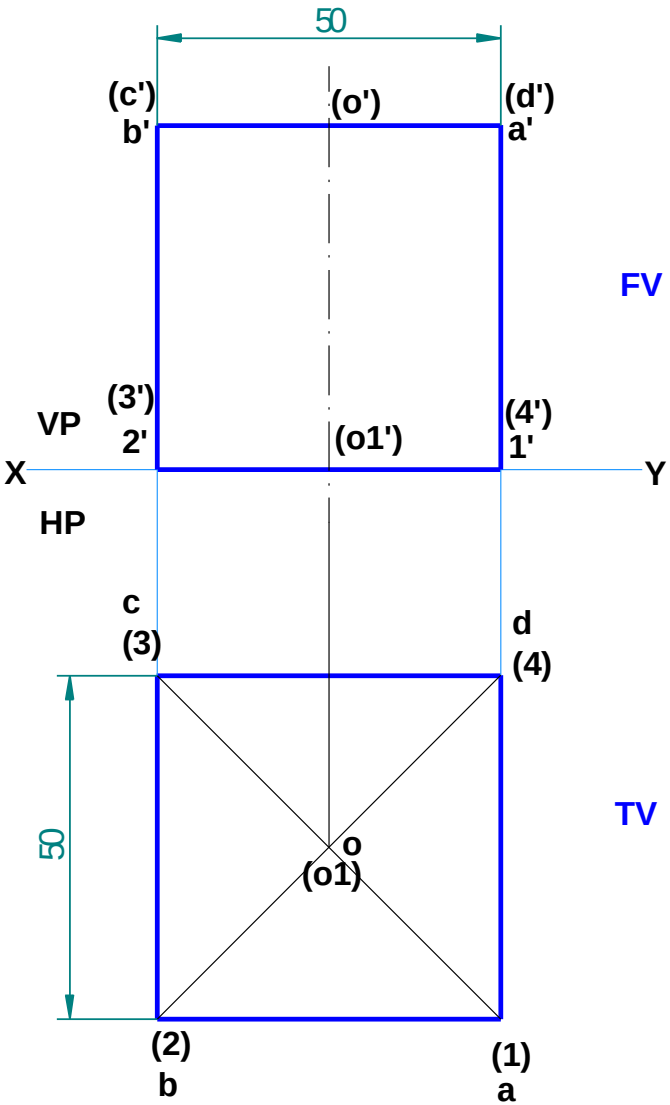
ISOMETRIC PROJECTION

CONTENT

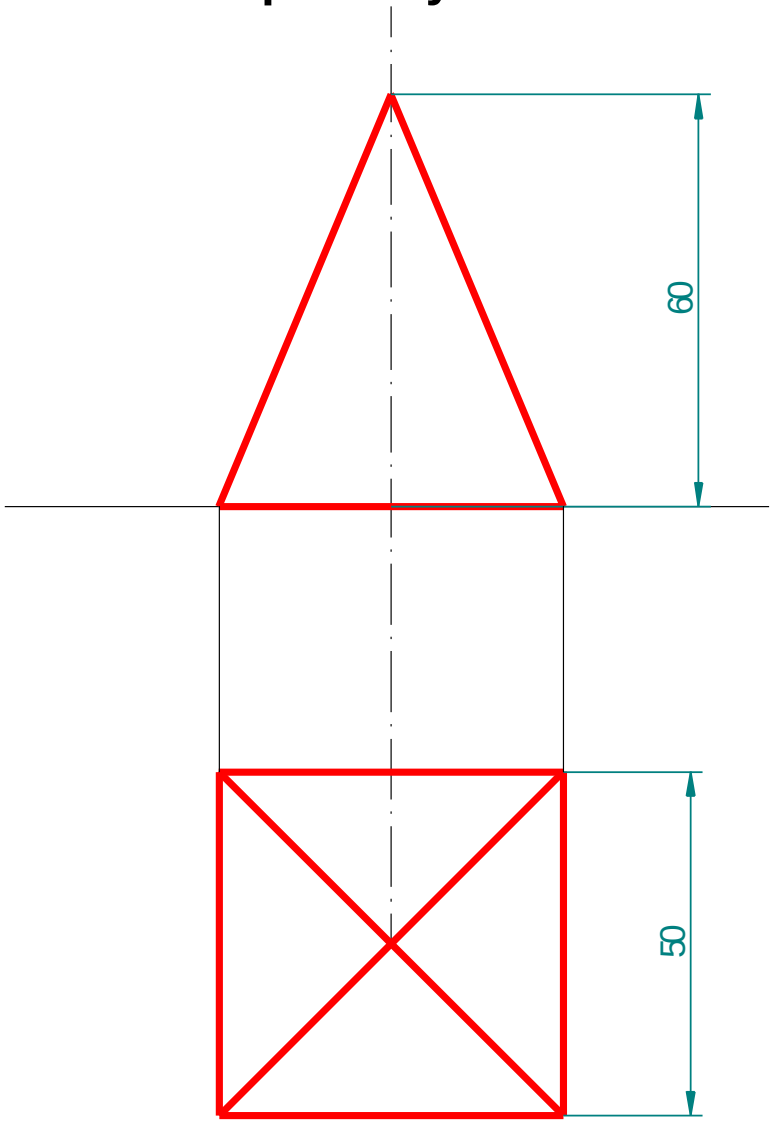
- Isometric Planes.
- Isometric lines and Non-Isometric lines.
- Difference between Isometric Projection & Isometric View
- Isometric Scale.
- Isometric projection of Plane surfaces / Laminas.
- Isometric projection of simple geometrical solids.
- Isometric projection of combination of solids.

2-Dimensional Orthographic Views of Geometrical Solids

Cube

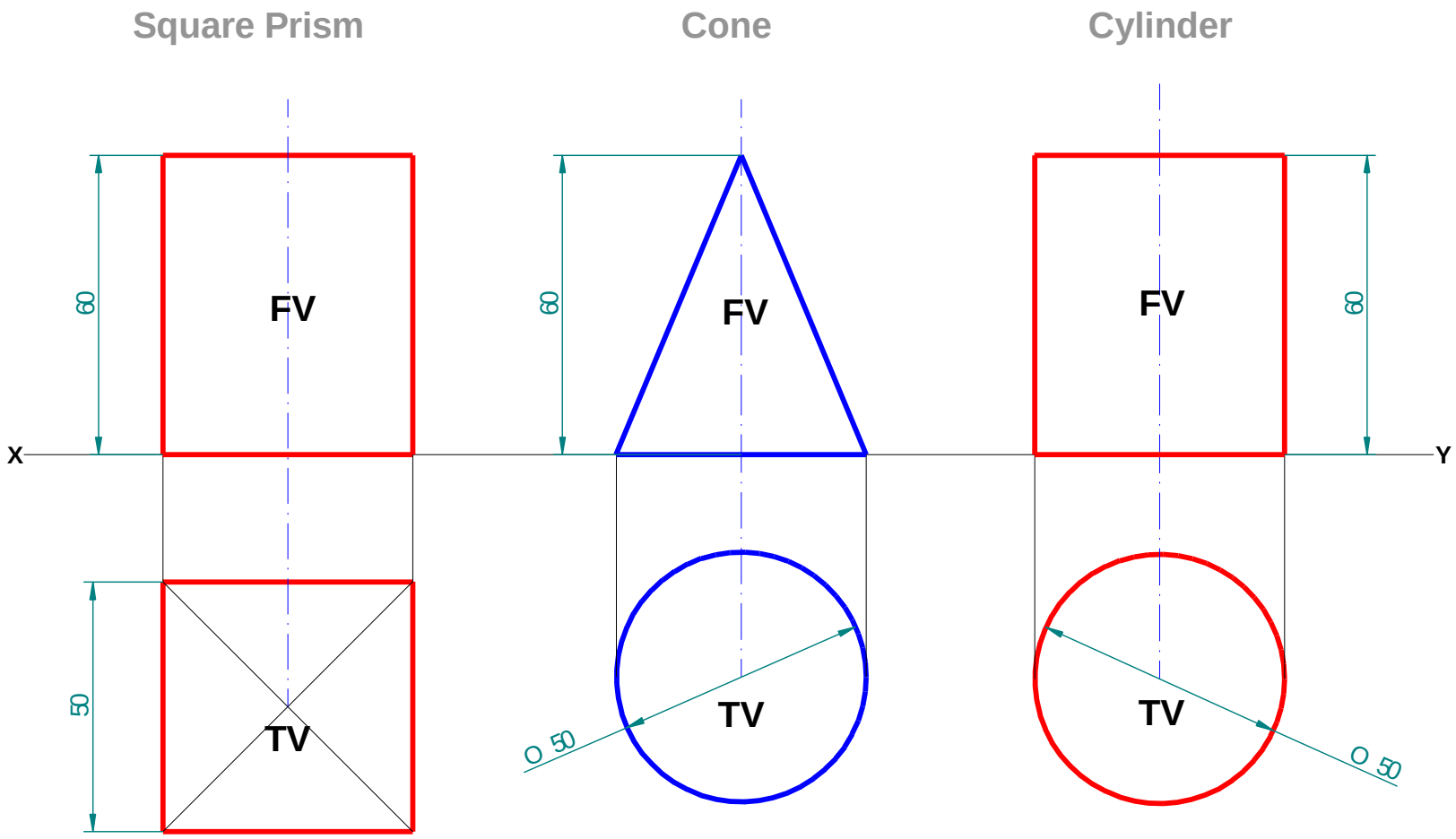


Square Pyramid



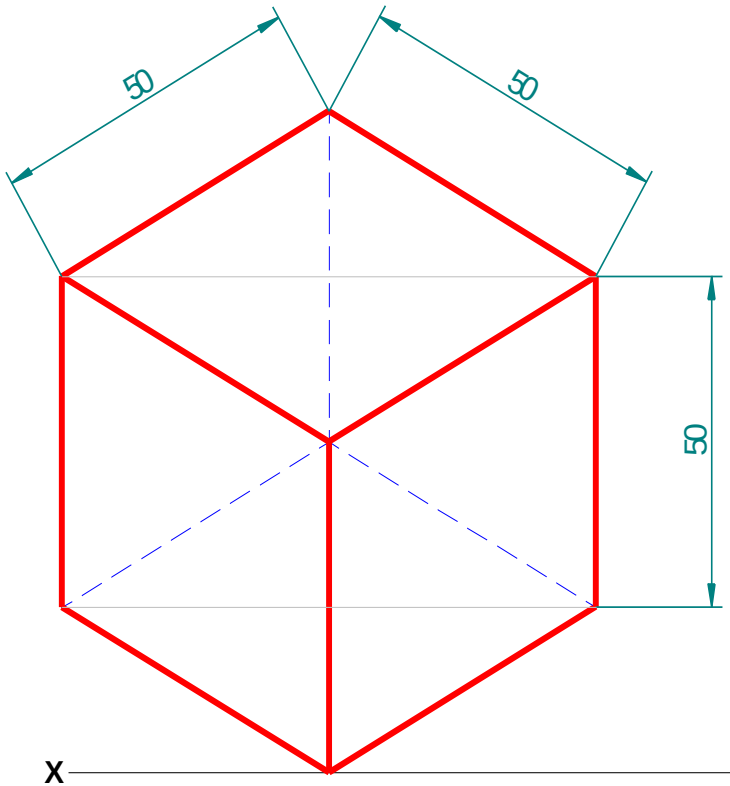
2-D Drawings / Views.

- **2-Dimension drawings / Views are nothing but views of the object where only 2 dimensions of the object are seen in a single view.**

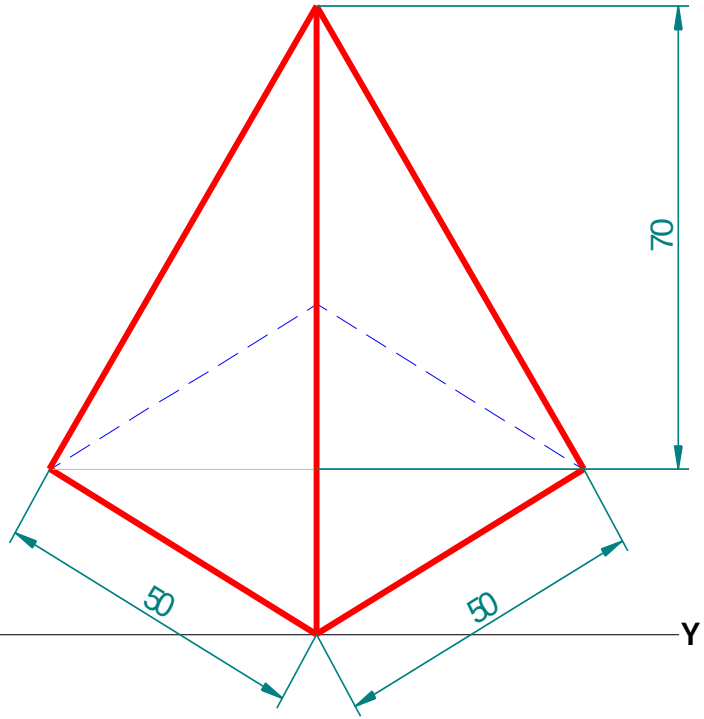


3-D Drawings / Views.

- **3-Dimension drawings / Views are nothing but views of the object where all the 3 dimensions of the object are seen in a single view.**

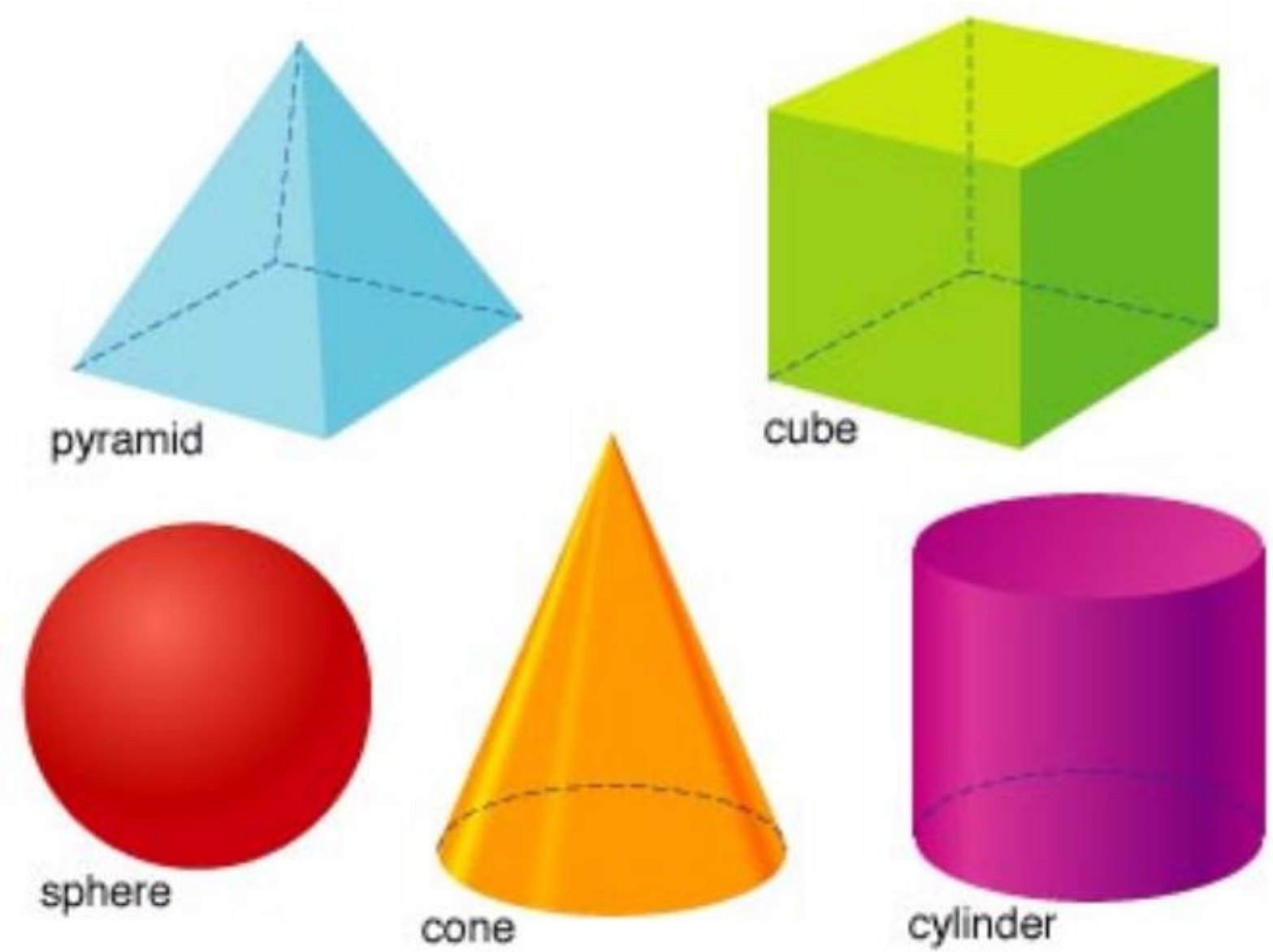


Cube



Pyramid

3-Dimensional (Pictorial) Views of Geometrical Solids

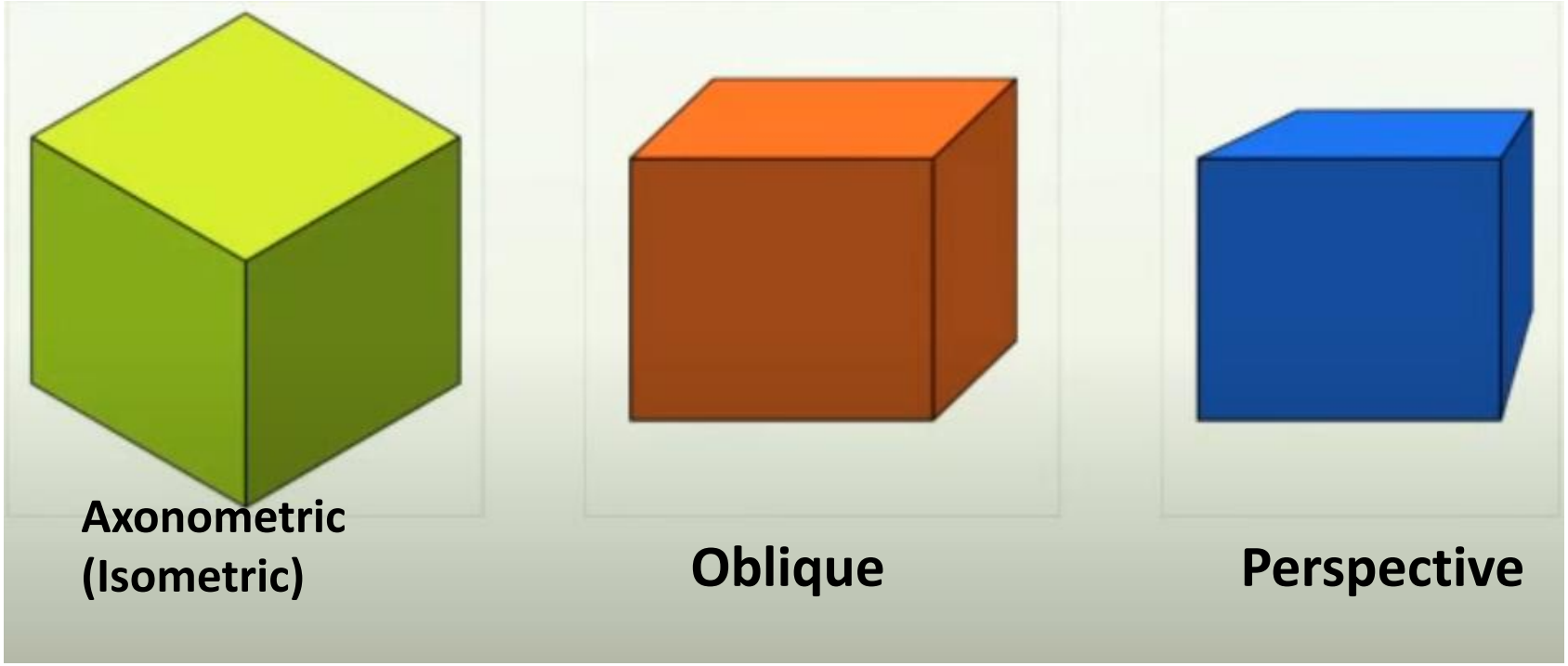


PICTORIAL PROJECTION

Pictorial Projection or Pictorial Drawing : it is a 3-Dimensional view of an object in which all the 3-Dimensions of the object (3-Faces of the object) are seen in a single view.

Types of Pictorial Projection:

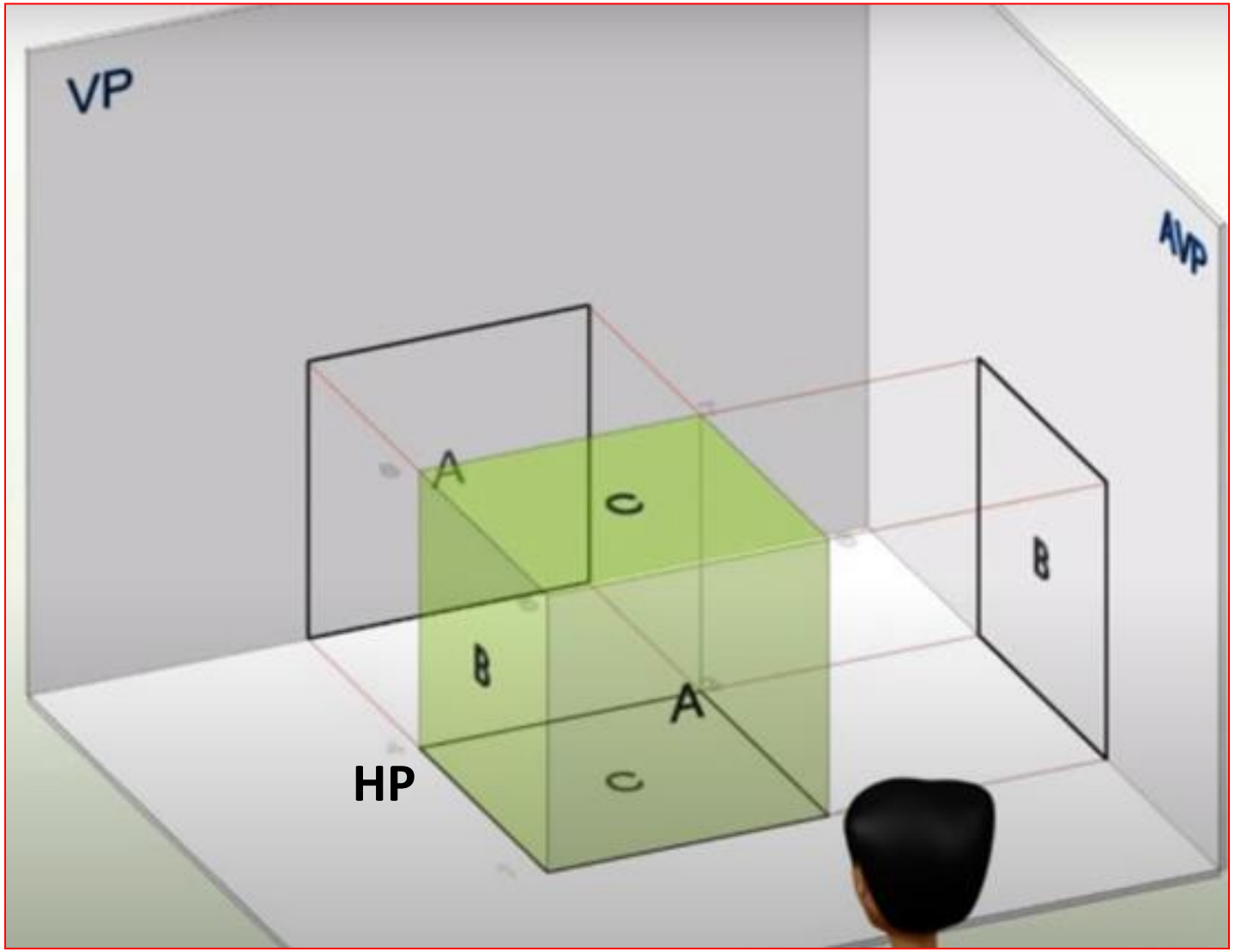
1. Axonometric Projection. 2. Oblique Projection. 3. Perspective Projections.



2 – D Drawing

Orthographic Projection of Cube in simple position (Edge Position)

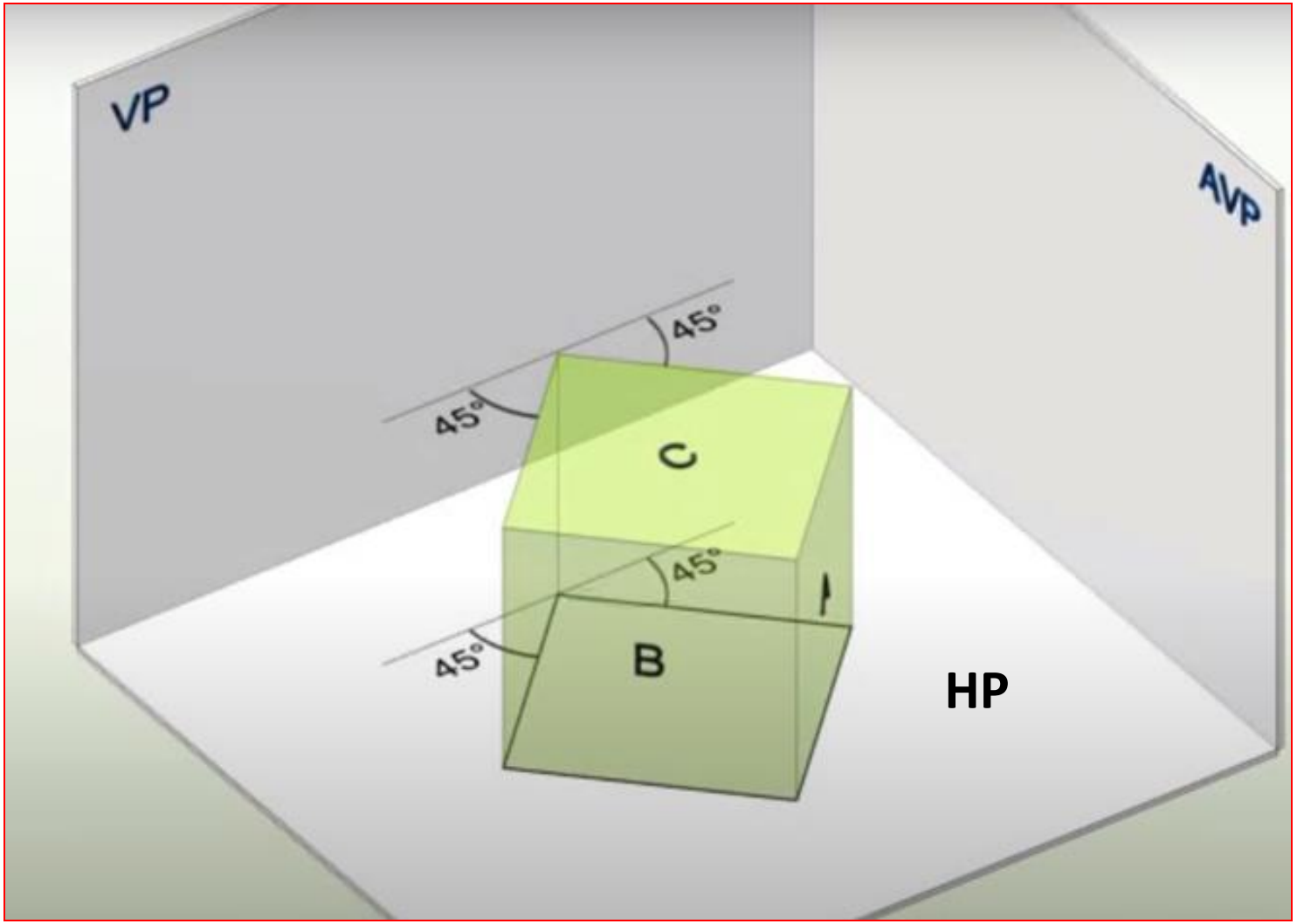
2-D (Case – 1 : Axis Perpendicular to HP and Parallel to VP)



2 – D Drawing

Orthographic Projection of Cube in simple position (Corner Position)

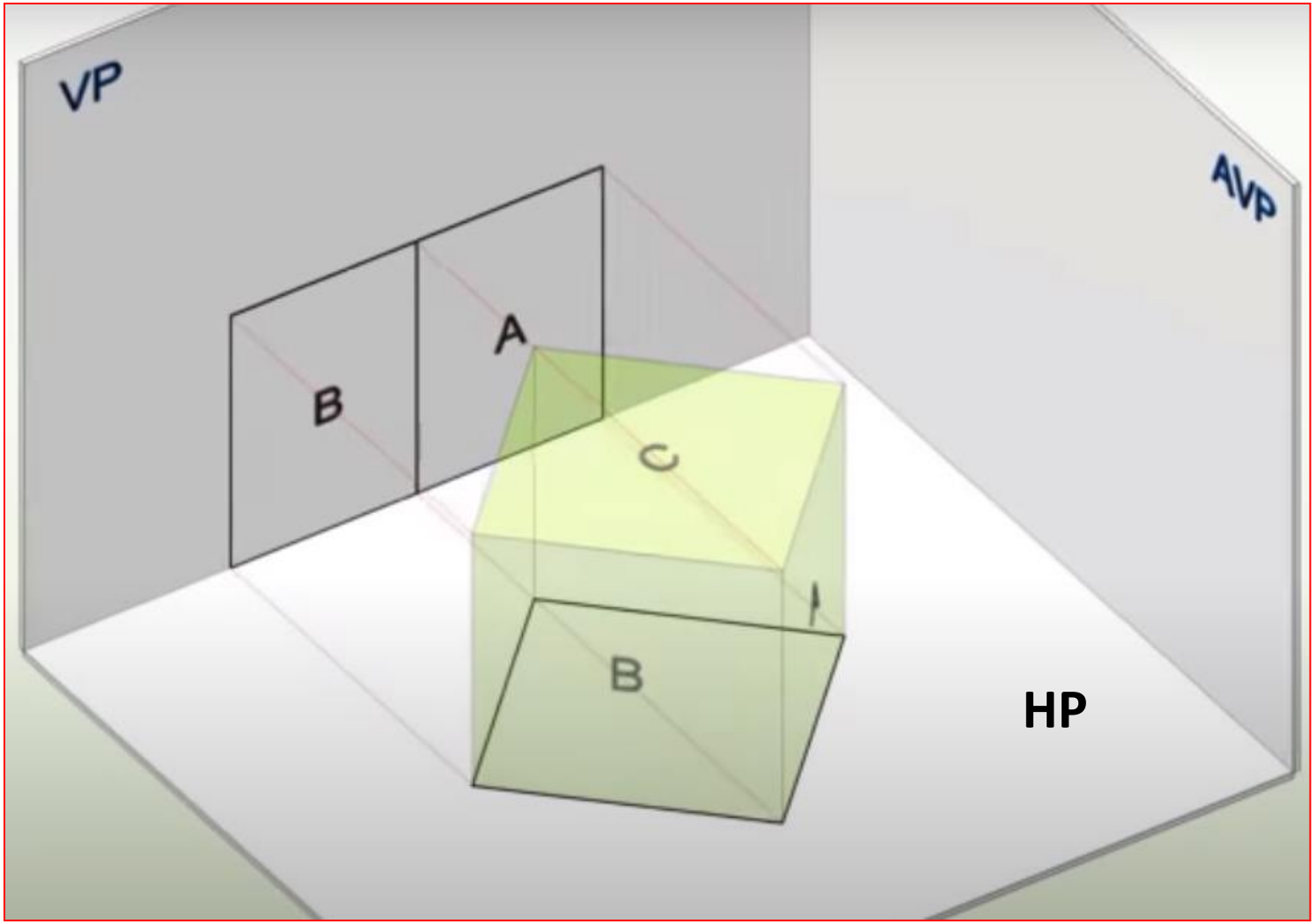
2-D (Case – 1 : Axis Perpendicular to HP and Parallel to VP)



2 – D Drawing

Orthographic Projection of Cube in simple position (Corner Position)

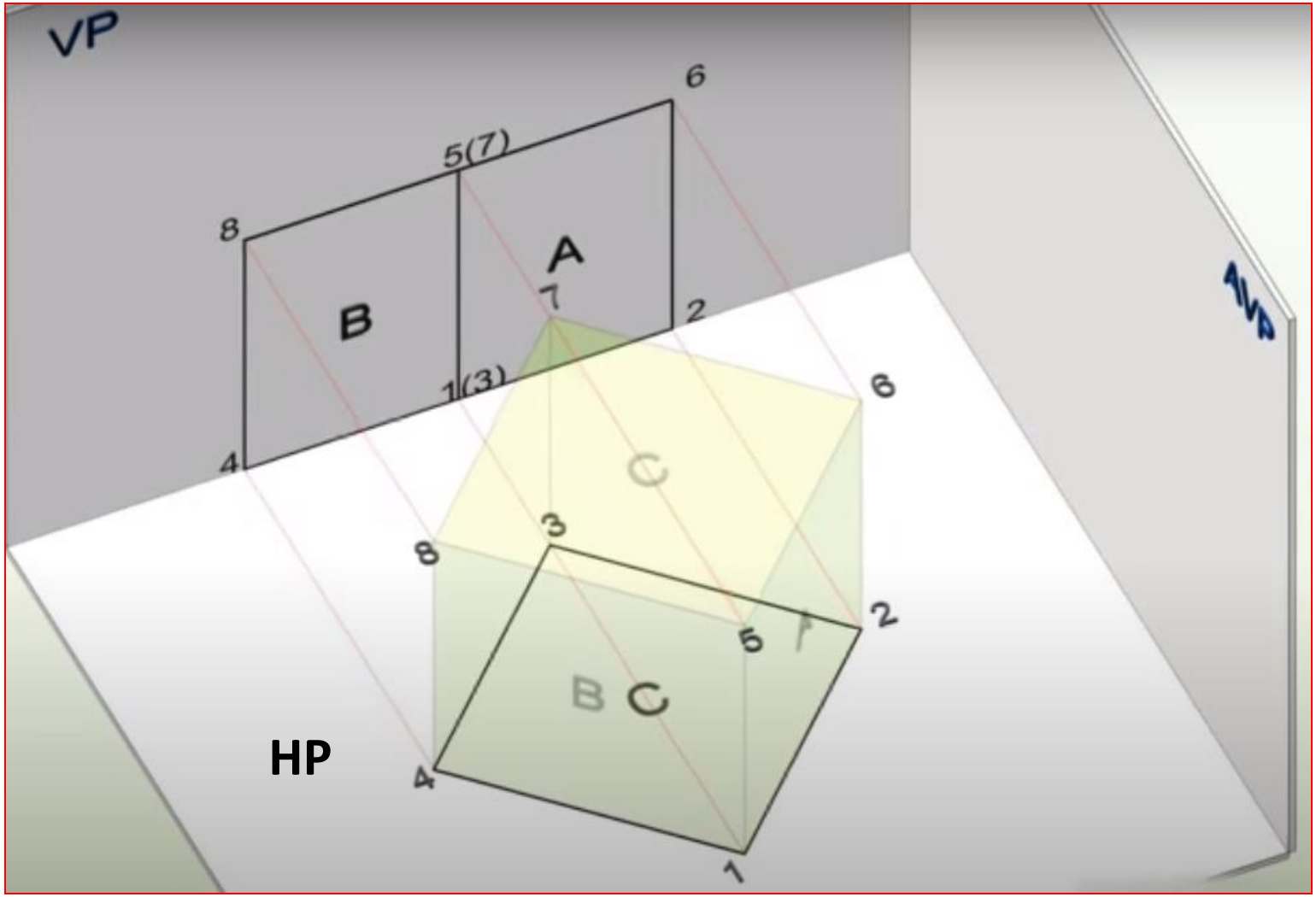
2-D (Case – 1 : Axis Perpendicular to HP and Parallel to VP)



2 – D Drawing

Orthographic Projection of Cube in simple position (Corner Position)

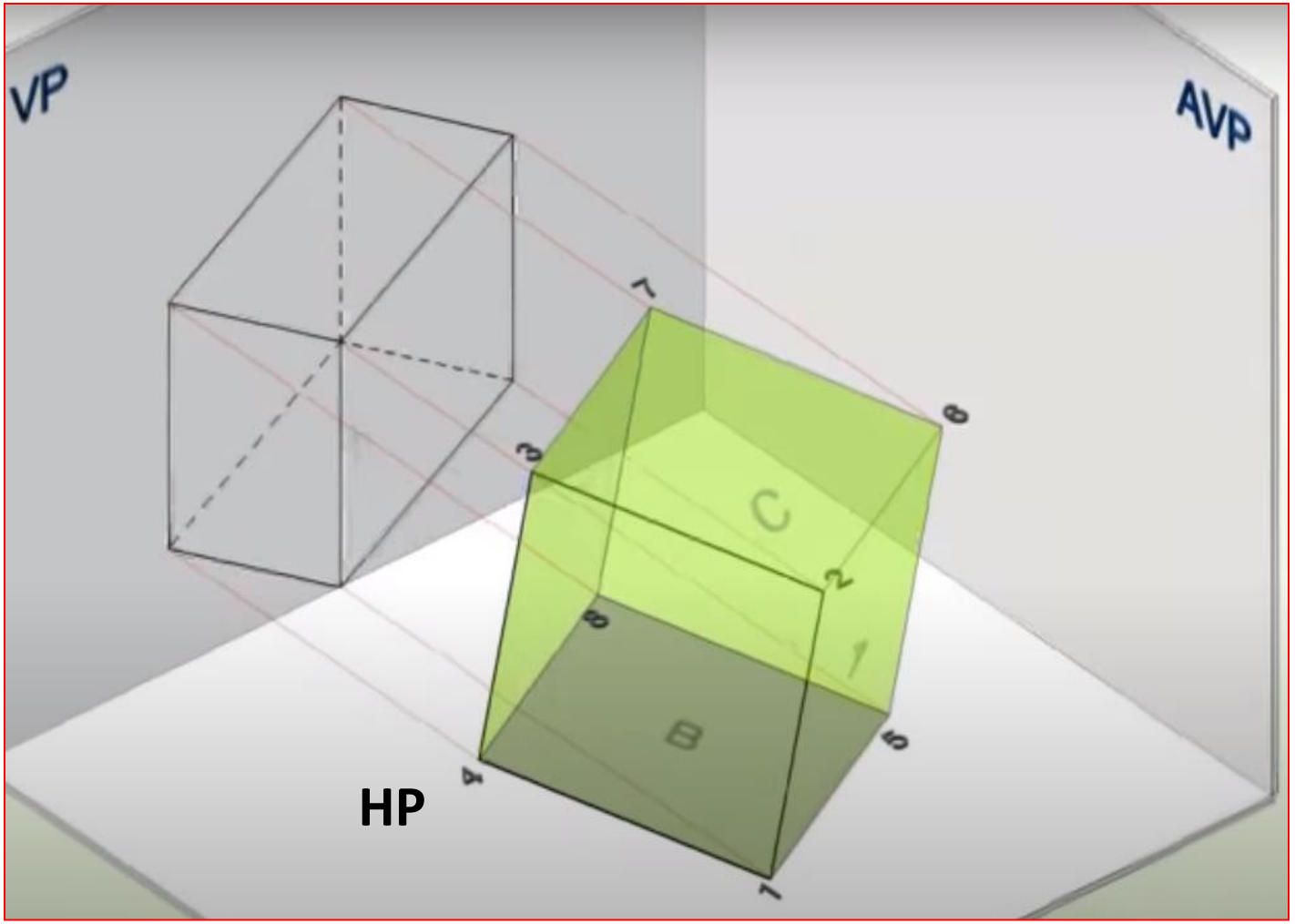
2-D (Case – 1 : Axis Perpendicular to HP and Parallel to VP)



3-D (PICTORIAL PROJECTION) AXONOMETRIC PROJECTION

Orthographic Projection of Cube (Case – 3) (Corner Position)

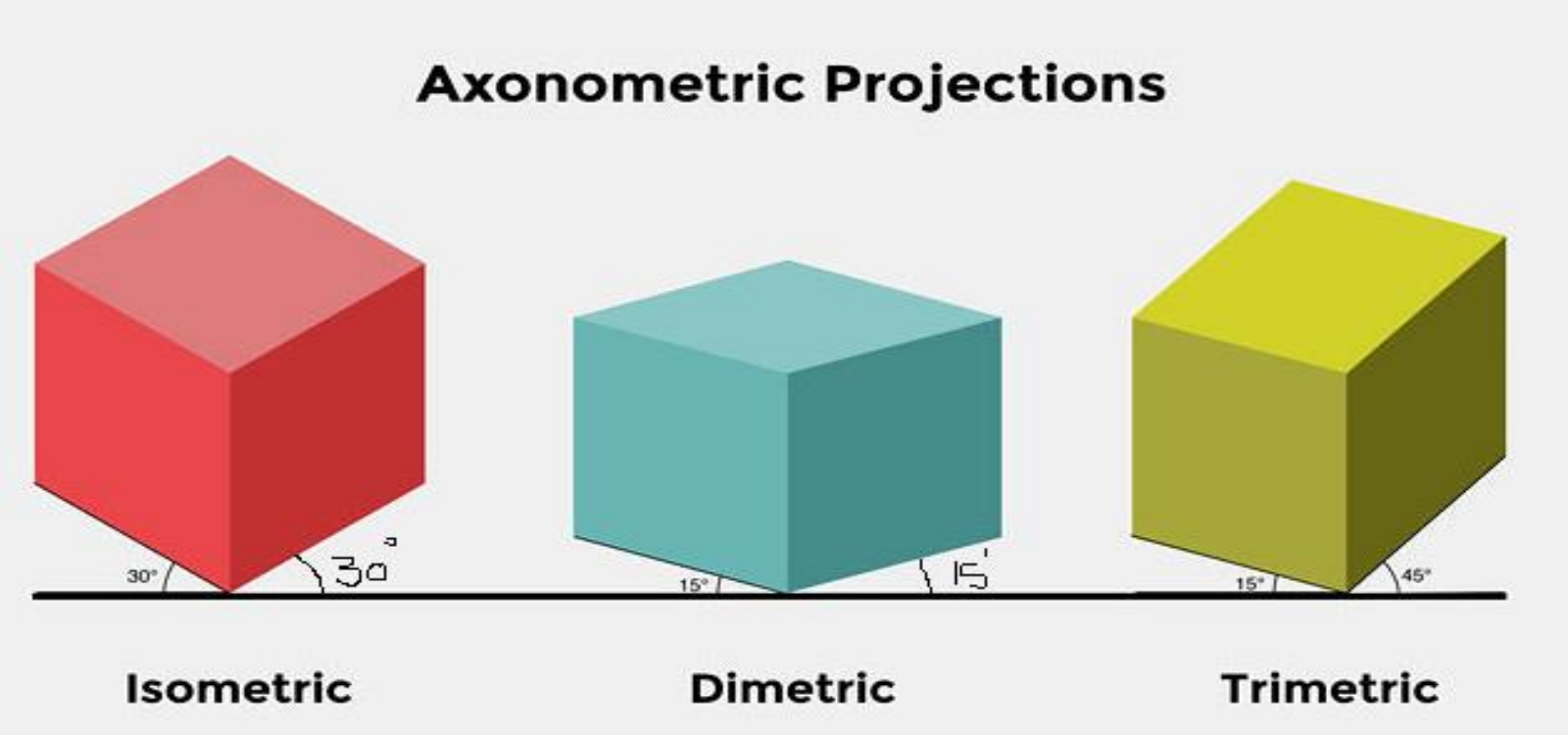
(Axis Inclined to VP & HP (3 Mutually perpendicular edges are inclined to VP))



AXONOMETRIC PROJECTION

Axonometric Projection: It is a type of **Pictorial view (3-D View)** of an object projected of VP, when the object (Cube) is placed with its **3 mutually perpendicular edges or Surfaces/Faces Are inclined to VP.**

Types of Axonometric Projection: 1. Isometric 2. Dimetric 3. Trimetric



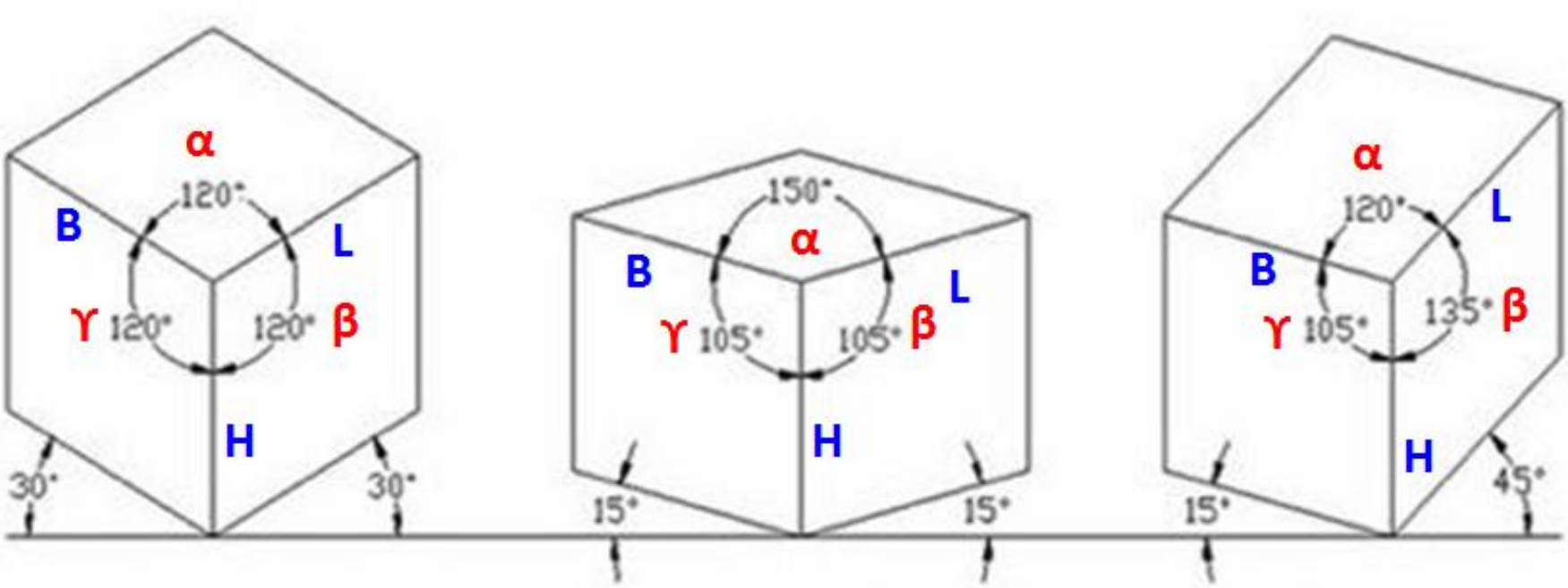
AXONOMETRIC PROJECTION

Types of Axonometric Projection: 1. Isometric 2. Dimetric 3. Trimetric

In Isometric : $\alpha = \beta = \gamma = 120$ & $L = B = H$

In Dimetric : $\beta = \gamma = 105$ & $L = B$

In Trimetric : $\alpha \neq \beta \neq \gamma$ & $L \neq B \neq H$



Isometric Dimetric Trimetric

ISOMETRIC PROJECTION

Why Isometric Projection is preferred over Dimetric and Trimetric Projections ?

In Isometric projection, since all the edges are reduced equally and the shape of the object obtained in the view is proportionate to the actual shape of an object compared to other two projections (i.e. Dimetric and Trimetric Projection), hence Isometric Projections is preferred.

Isometric length & True length

Always Isometric length is LESS than the True/Actual length.

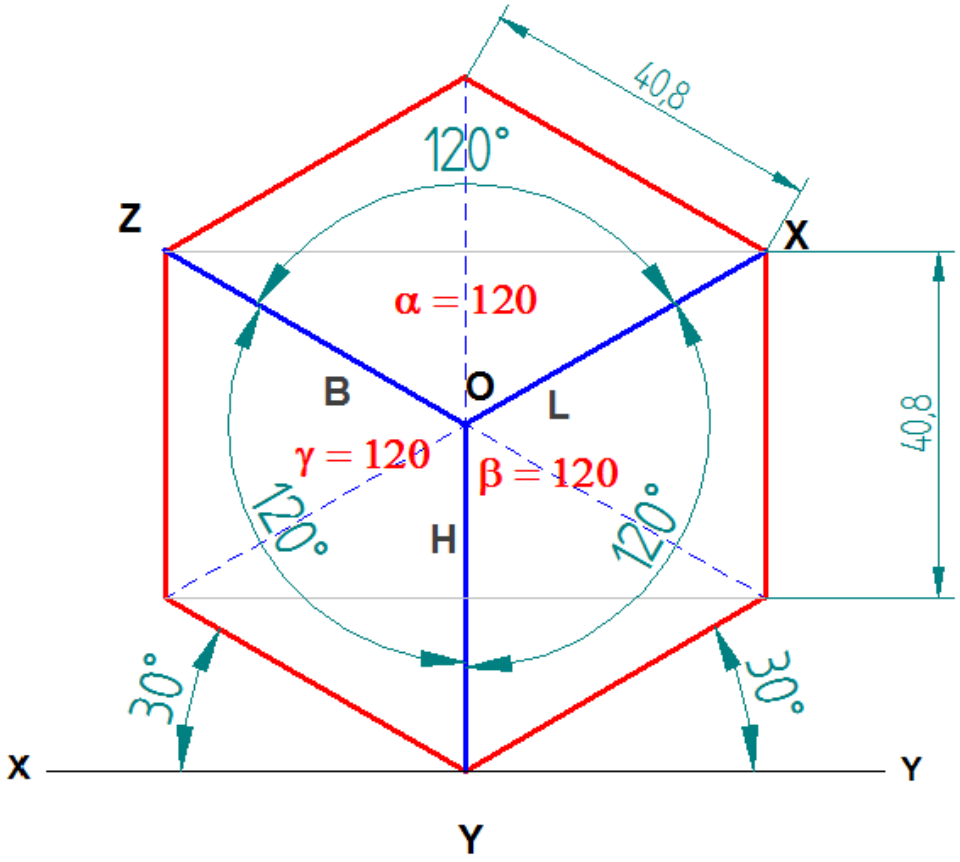
$$\frac{\text{Isometric length}}{\text{True length}} = 0.816$$

If, True length = 100 mm

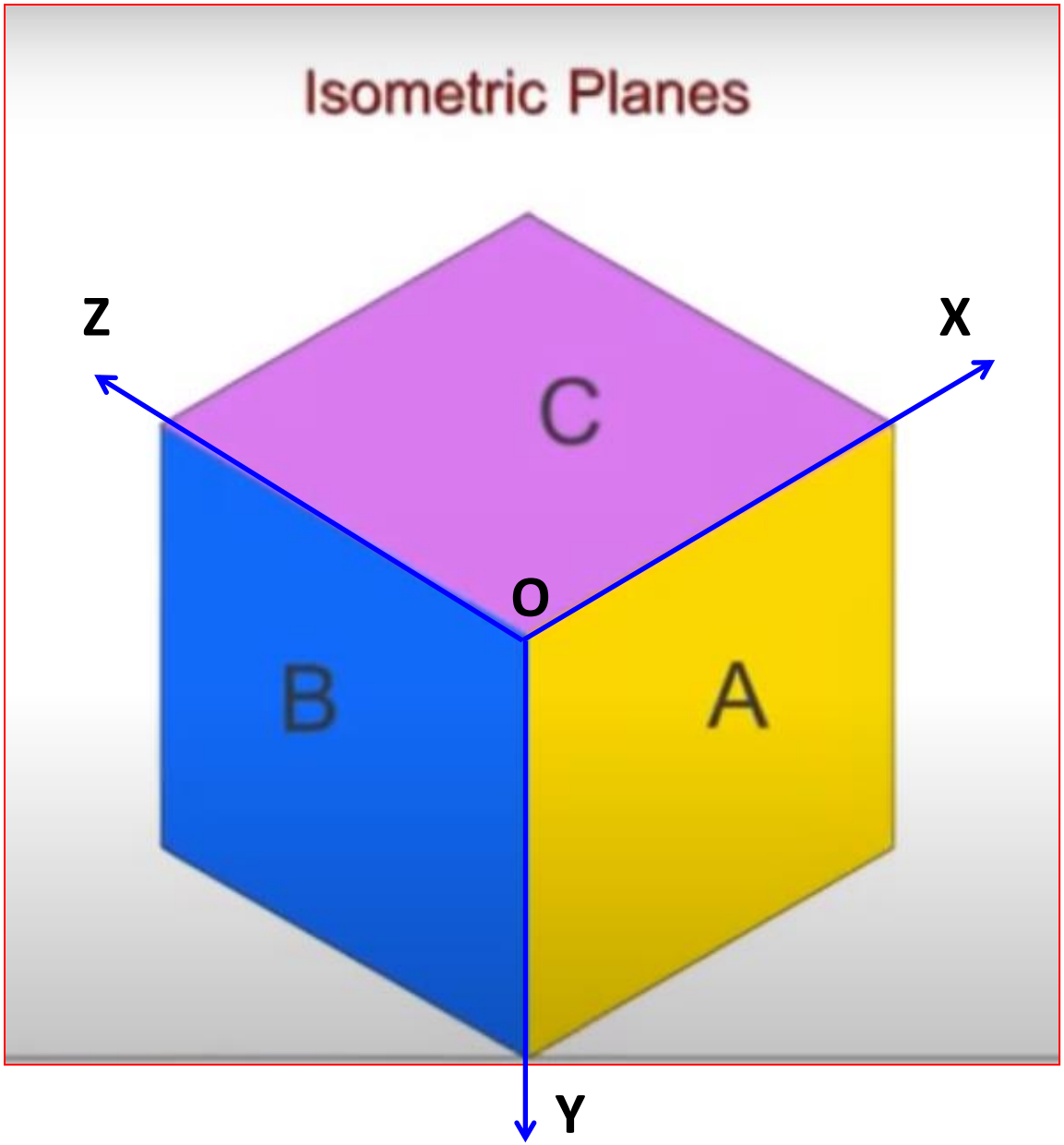
Then, its Isometric length = 100 x 0.816
= 81.6 mm

ISOMETRIC PROJECTION of CUBE (50 mm)

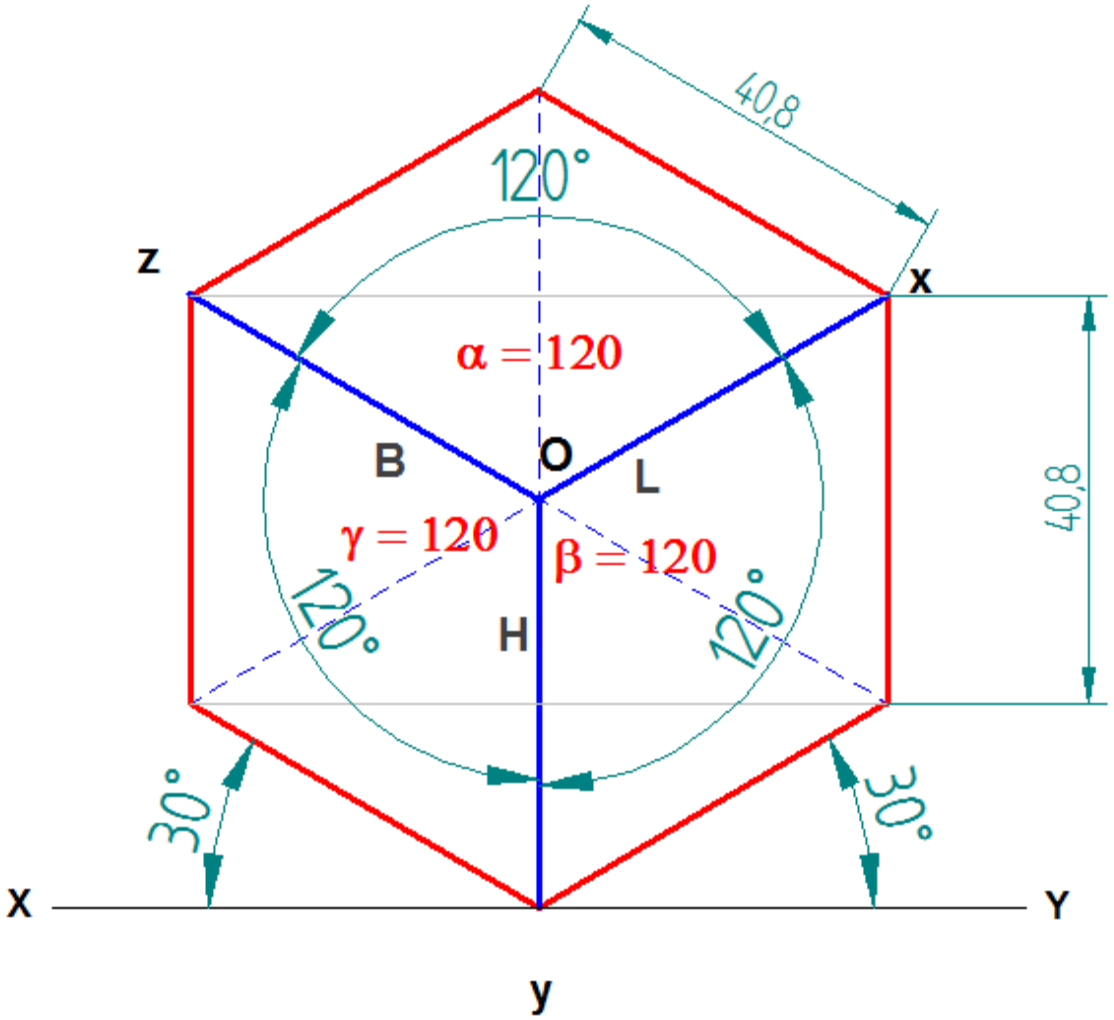
ISOMETRIC PROJECTION is a type of **Axonometric projection** when all the three mutually perpendicular edges of a cube makes an equal inclinations with VP, all edges are equally foreshortened or reduced and angle between 2 Axonometric axis make an angle of 120* each.



ISOMETRIC PLANES



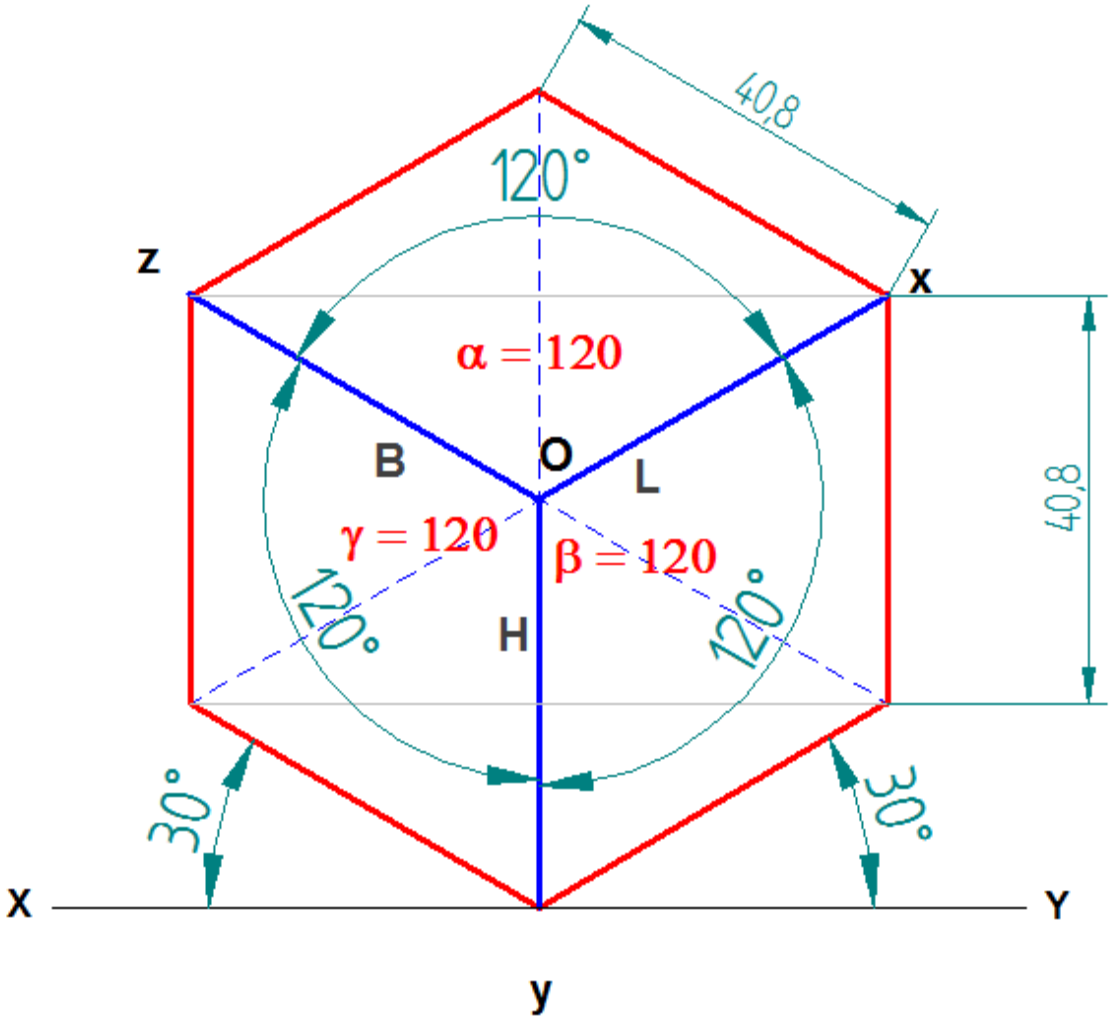
ISOMETRIC PROJECTION



NOTE:

- OX, OY & OZ are 3 mutually Perpendicular edges of a cube (Object), Which are true length.
- Angles / Inclinations ∟A, ∟B, ∟C are Actual / True inclinations of 3 mutually Perpendicular edges of a cube OX, OY, OZ with VP (which are
- not shown in Fig.

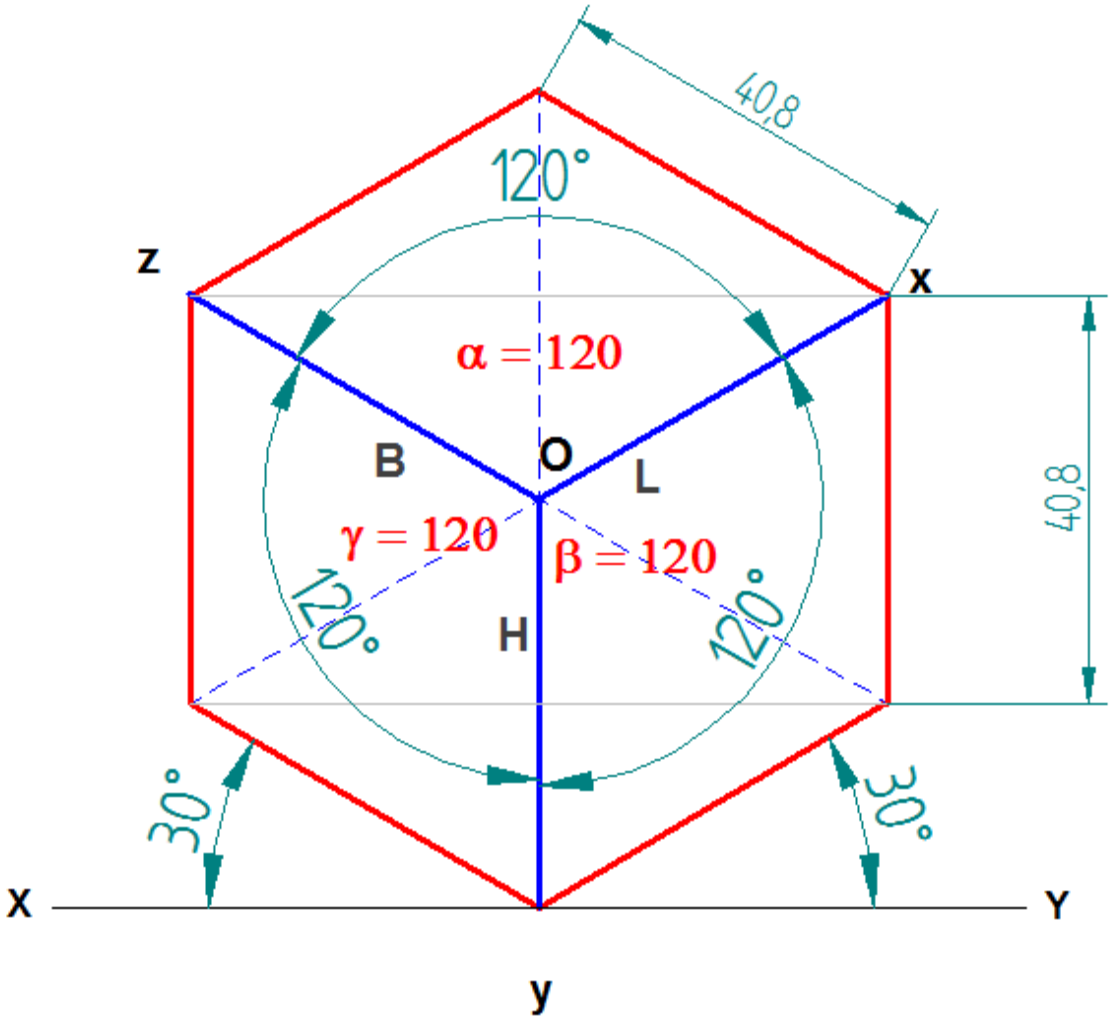
ISOMETRIC PROJECTION



NOTE:

- ox, oy & oz are Apparent / Reduced lengths of 3 mutually perpendicular edges of a cube (i.e. OX, OY & OZ) which are called Axonometric Axes.
- If ox = oy = oz then they are called Isometric axes.
- Angles ∟α, ∟β, ∟ϒ Apparent inclinations between Axonometric Axes and these angles are called Axonometric Angles.

ISOMETRIC PROJECTION

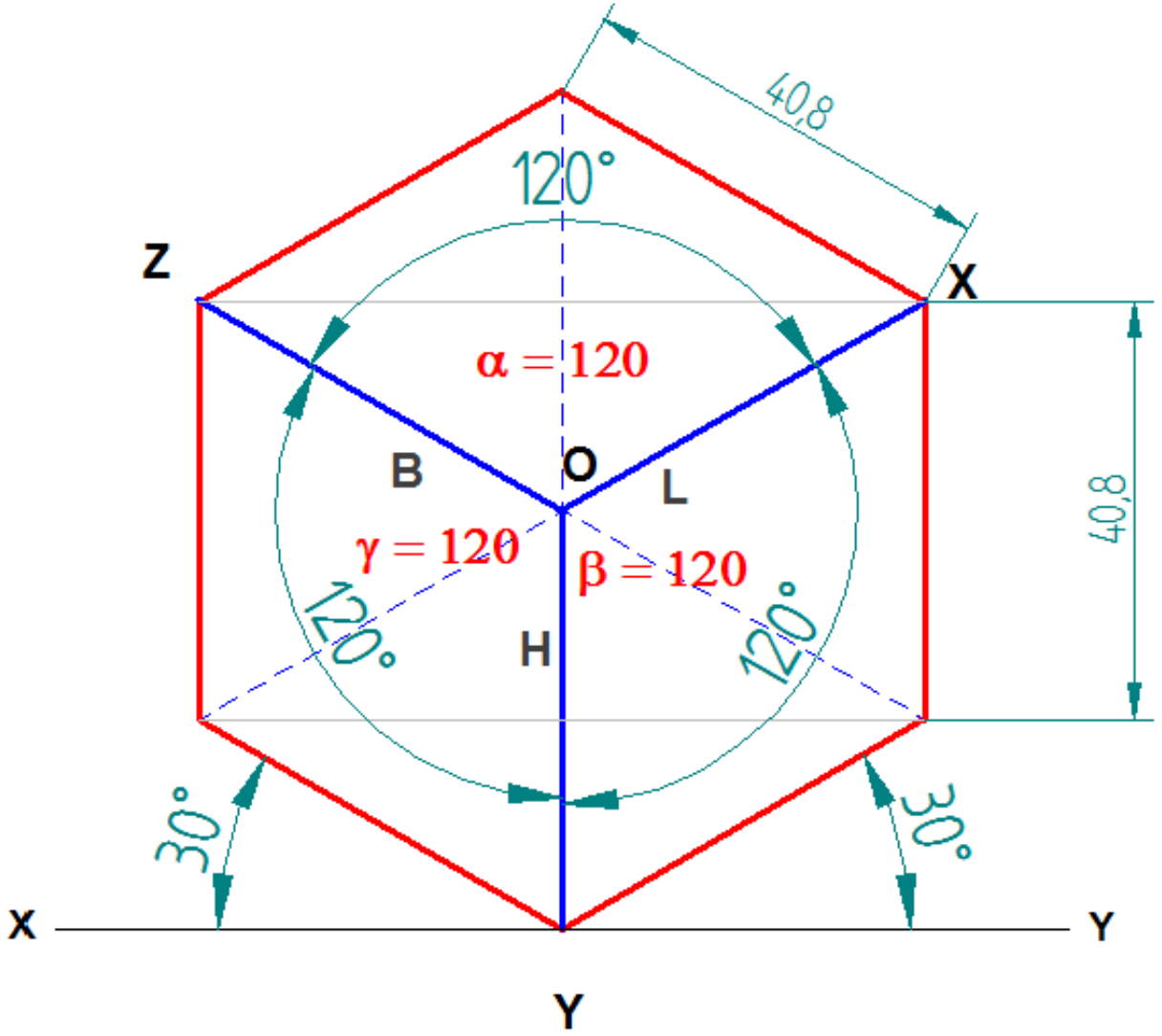


NOTE:

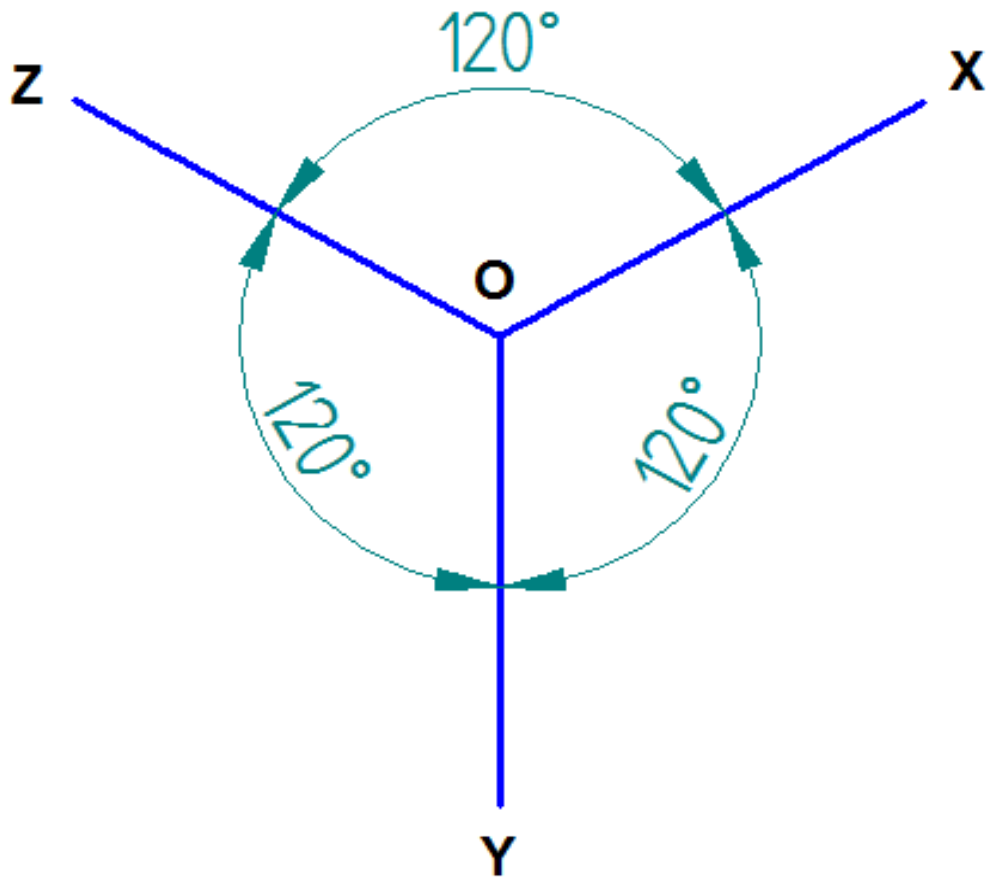
- If ∟α = ∟β = ∟Ɣ = 120, then they are called as Isometric angles.

ISOMETRIC PROJECTION of CUBE (50 mm)

In Isometric projection all Isometric lines are reduced or foreshortened equally to Iso length (i.e. Approx. 82% of True length)

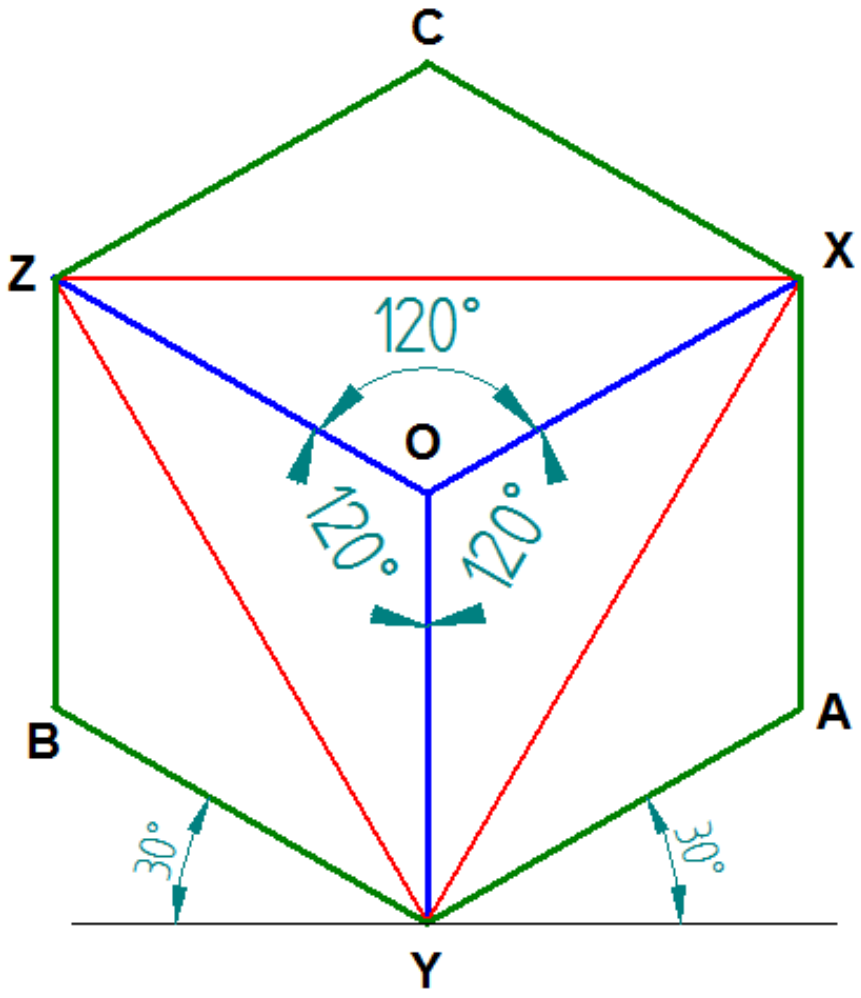


ISOMETRIC AXIS



ISOMETRIC LINES & NON-ISOMETRIC LINES

(Identification of Isometric & Non-Isometric lines by referring Isometric Axes.)

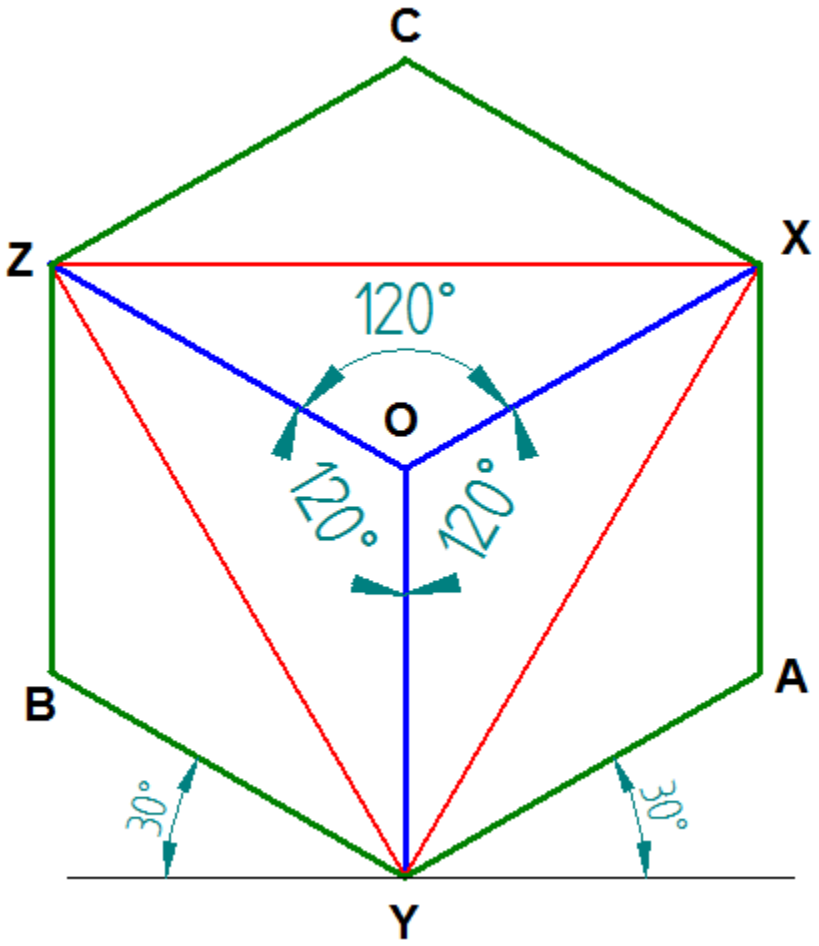


- **OX, OY,OZ are Isometric Axes.**
- **Lines Parallel to Isometric Axes are called ISOMETRIC LINES.**
- **Lines which are not Parallel to any of the Isometric Axes are called NON-ISOMETRIC LINES.**

- **ISOMETRIC LINES: AX, AY, YB, BZ, ZC, CX.**
- **NON-ISOMETRIC LINES: ZX, XY, YZ.**

ISOMETRIC LINES & NON-ISOMETRIC LINES

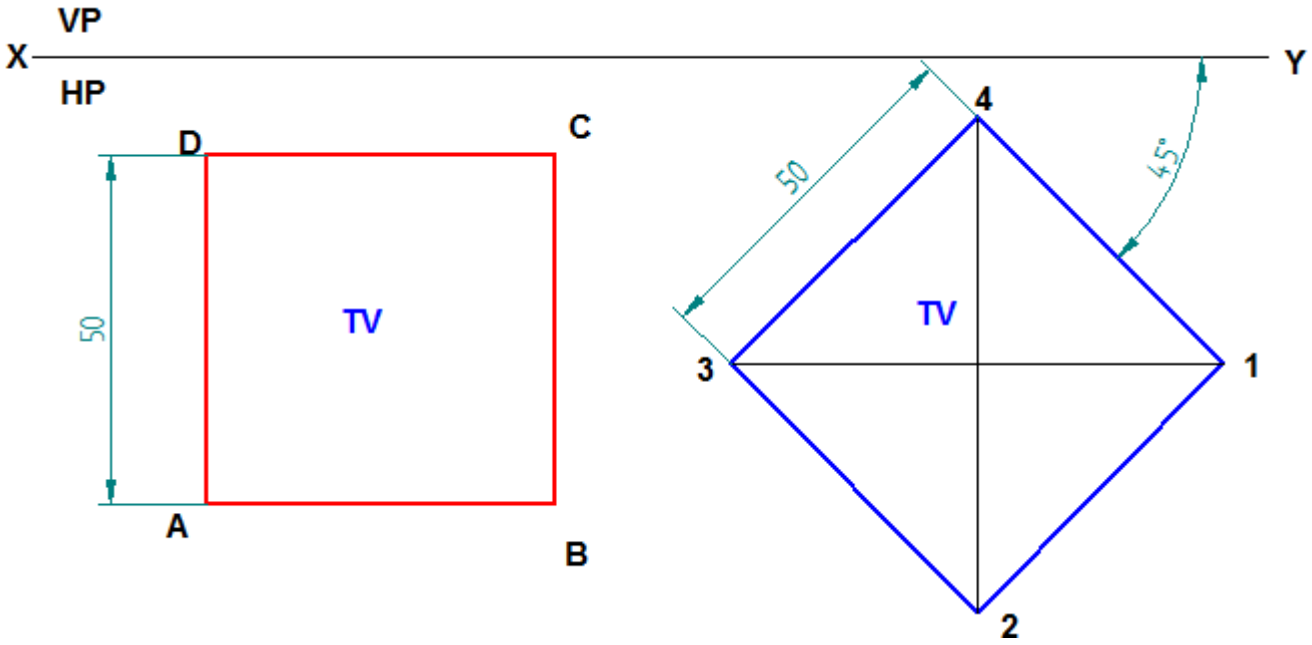
(Identification of Isometric & Non-Isometric lines by referring Isometric Axes.)



- All 30* lines and Vertical lines in Isometric projection are ISOMETRIC LINES.
- All horizontal lines are represented as 30* lines in Isometric projection.
- Vertical lines are represented as vertical lines only Isometric projection.

ISOMETRIC LINES & NON-ISOMETRIC LINES

(Identification of Isometric & Non-Isometric lines by referring Orthographic Views.)

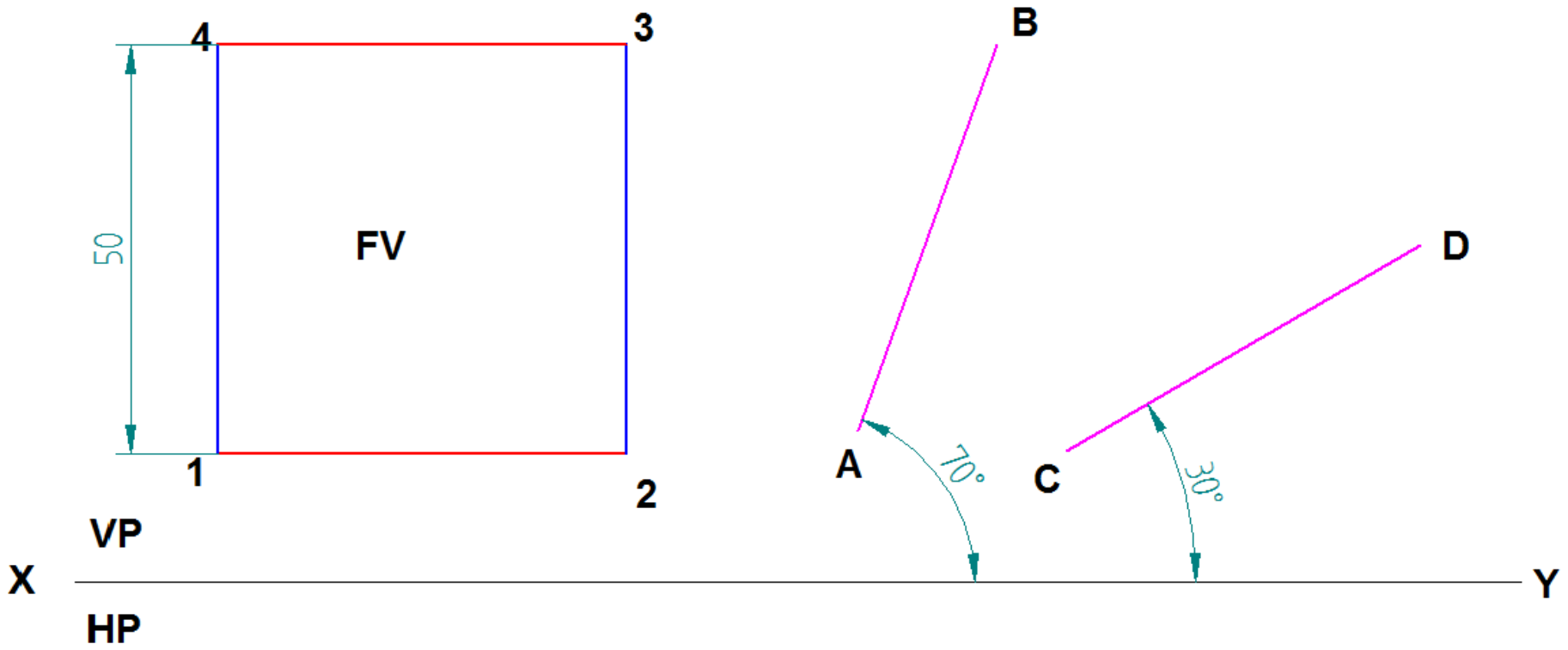


In Orthographic Views, any line Parallel or Perpendicular to XY line, then they are called as Isometric lines. In the above Fig. Line AB, BC, CD, DA are Isometric lines).

If Lines are not Parallel or Perpendicular to XY line, then they are called Non-Isometric Lines. (Lines 12, 23, 34, 41 are Non-Isometric Lines).

ISOMETRIC LINES & NON-ISOMETRIC LINES

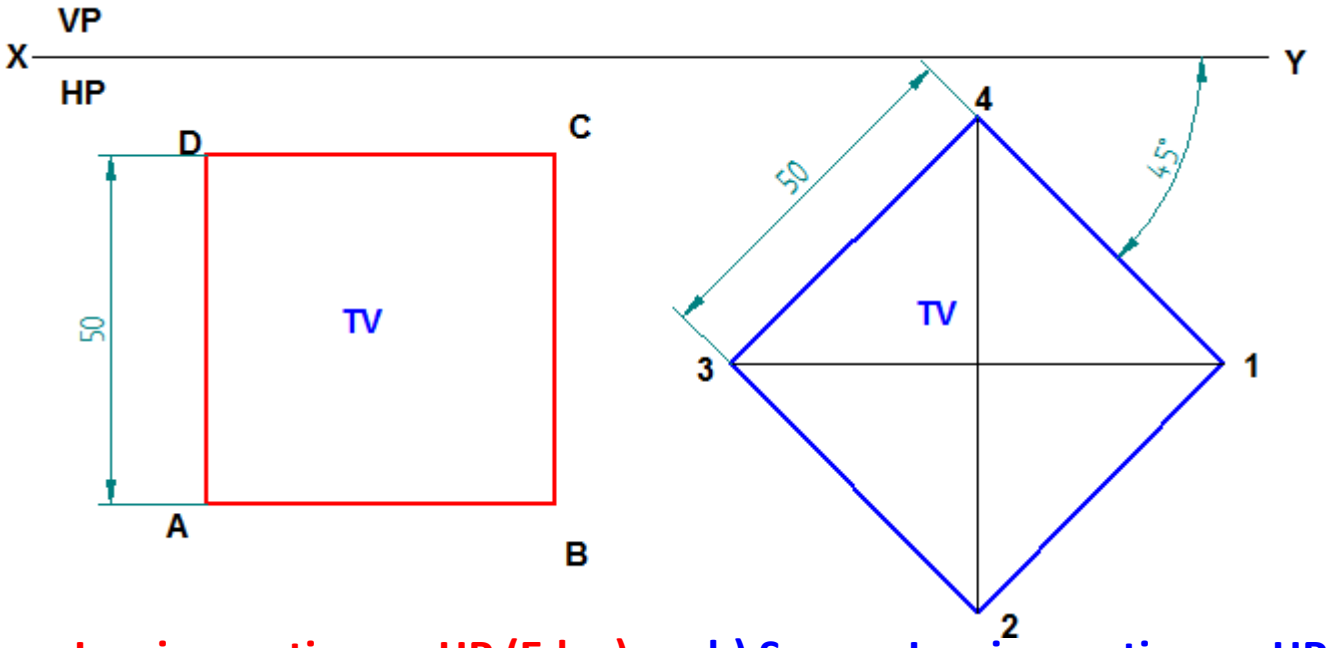
(Identification of Isometric & Non-Isometric lines by referring Orthographic Views.)



In Fig. Lines 12, 23, 34, 41 are Isometric lines, because they are either parallel to XY line or Perpendicular XY line. And Lines AB & CD are Non-Isometric lines because they are Inclined to XY line.

HORIZONTAL & VERTICAL LINES

(Identification of Horizontal & Vertical lines by referring Orthographic Views.)



a) Square Lamina resting on HP (Edge)

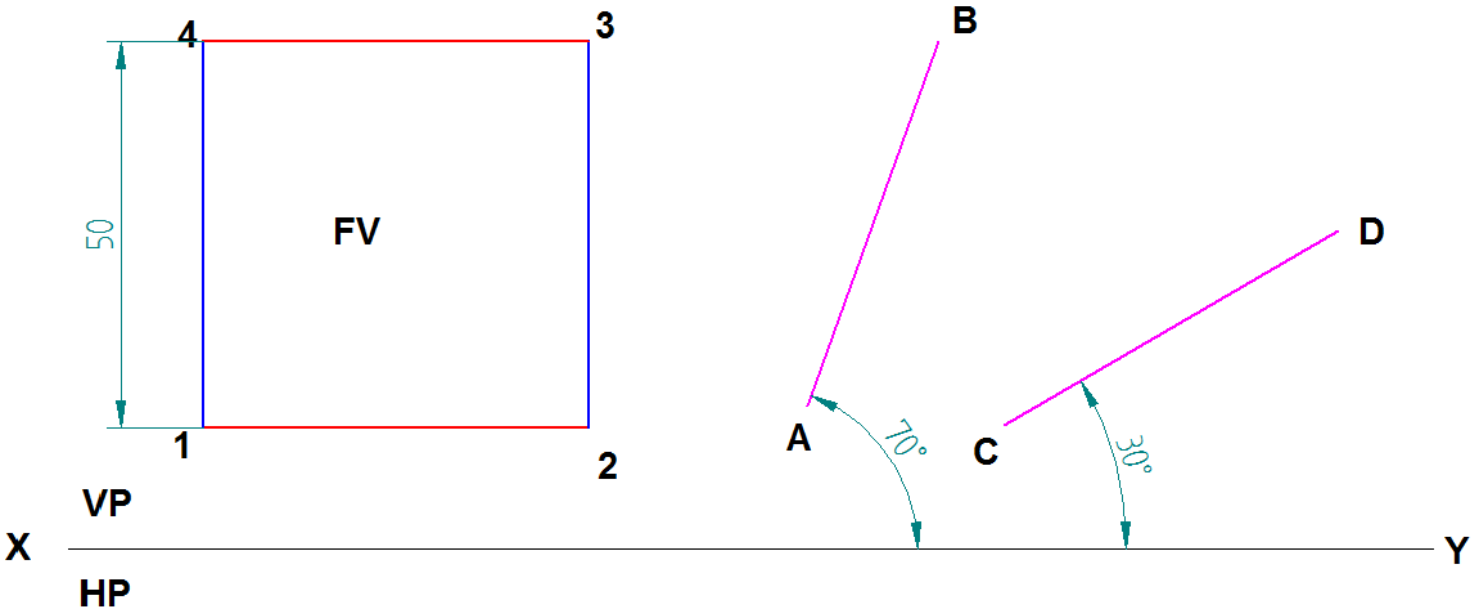
b) Square Lamina resting on HP (Corner)

- Horizontal lines are always parallel to HP (Ground).
- Vertical lines are always perpendicular to HP (Ground).

- In the above Fig. All lines are Horizontal lines. But Lines AB, BC, CD, DA are Isometric lines, Whereas Lines 12, 23, 34, 41 are Non-Isometric lines

HORIZONTAL & VERTICAL LINES

(Identification of Horizontal & Vertical lines by referring Orthographic Views.)

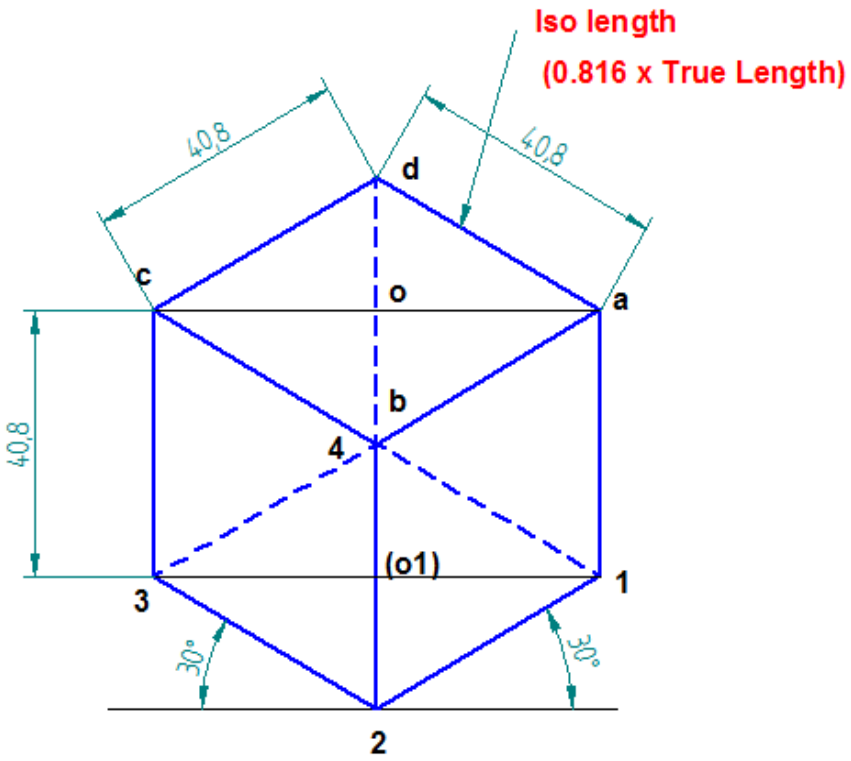


a) Square Lamina resting on VP (Edge)

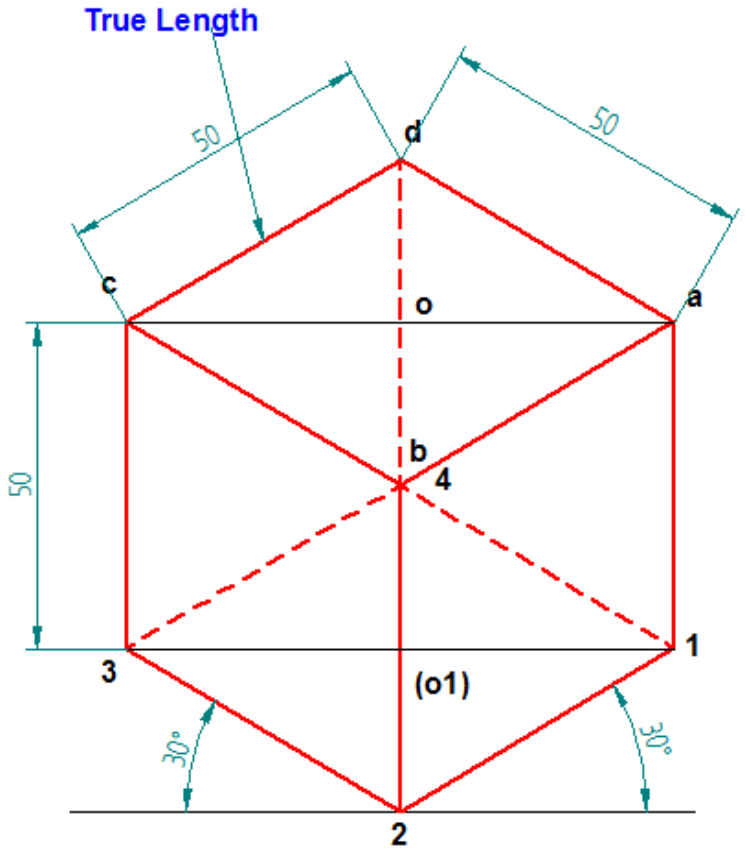
b) Lines are inclined to HP

- In the above Figs. Lines 12, 34 are Horizontal lines.
- But Lines 14, 23 are Vertical lines.
- And Lines 12, 23, 34, 41 are Isometric lines.
- Whereas Lines AB, CD are Non-Isometric lines and either Horizontal nor Vertical to HP

ISOMETRIC VIEW & ISOMETRIC PROJECTION



Isometric Projection

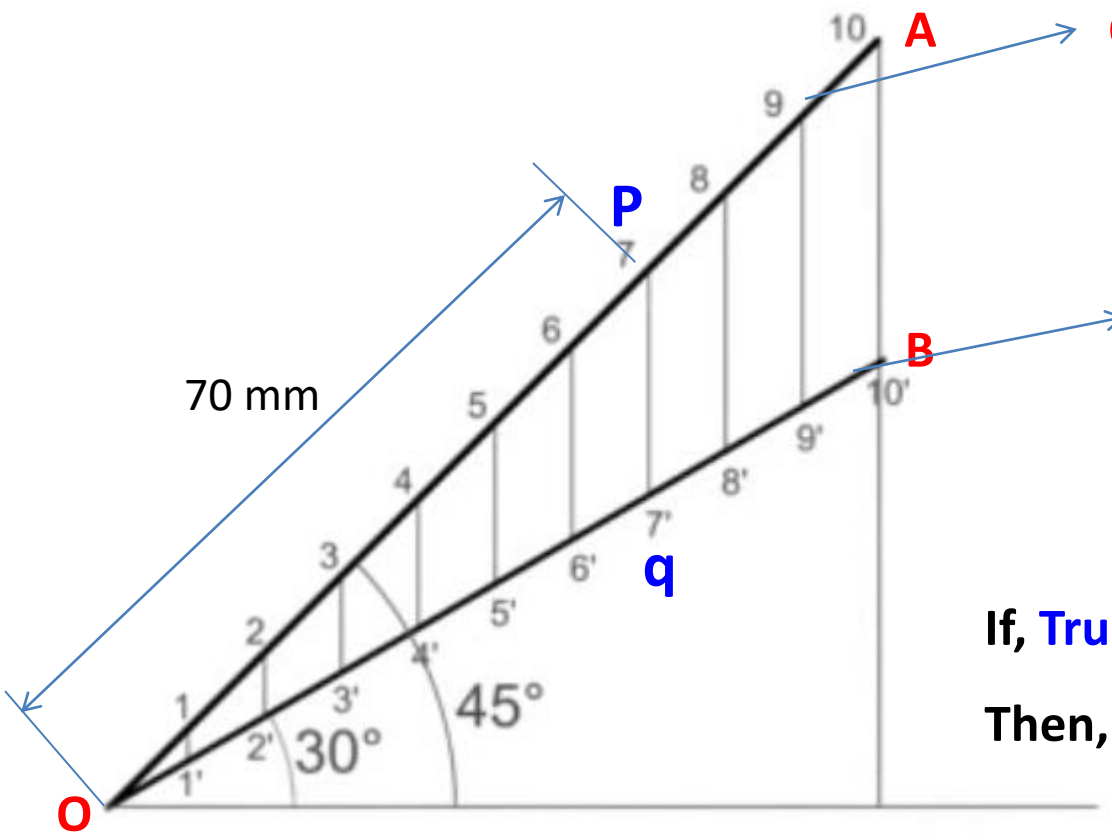


Isometric View

ISOMETRIC PROJECTIONS: Drawn in reduced / Iso length. (Looks smaller in size)

ISOMETRIC VIEWS: Drawn in True length. (For easy purpose) (Looks bigger in size)

CONSTRUCTION OF ISOMETRIC SCALE



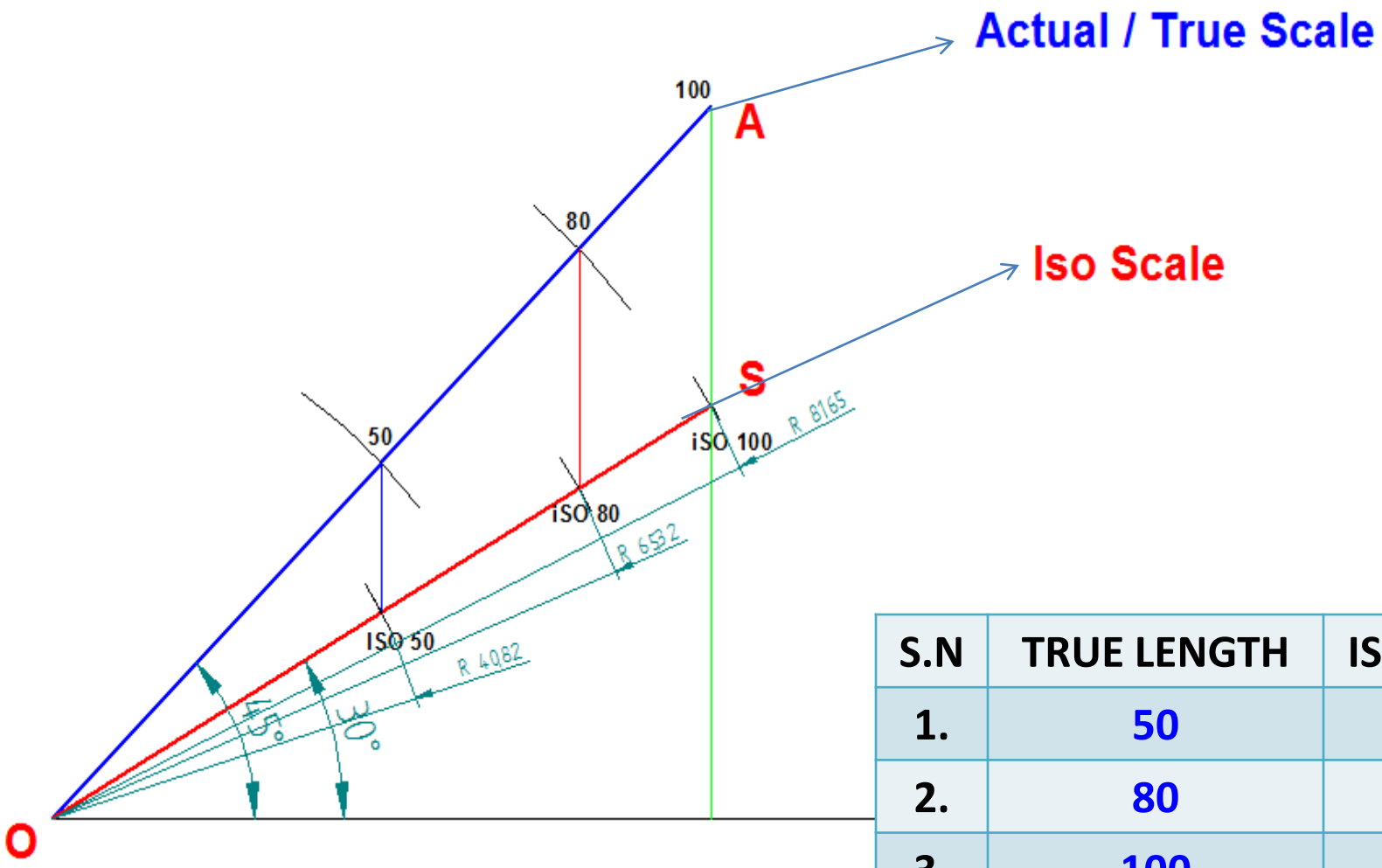
OA ---- Actual / True Scale

OB ---- Iso Scale

If, True length "OP" = 70 mm

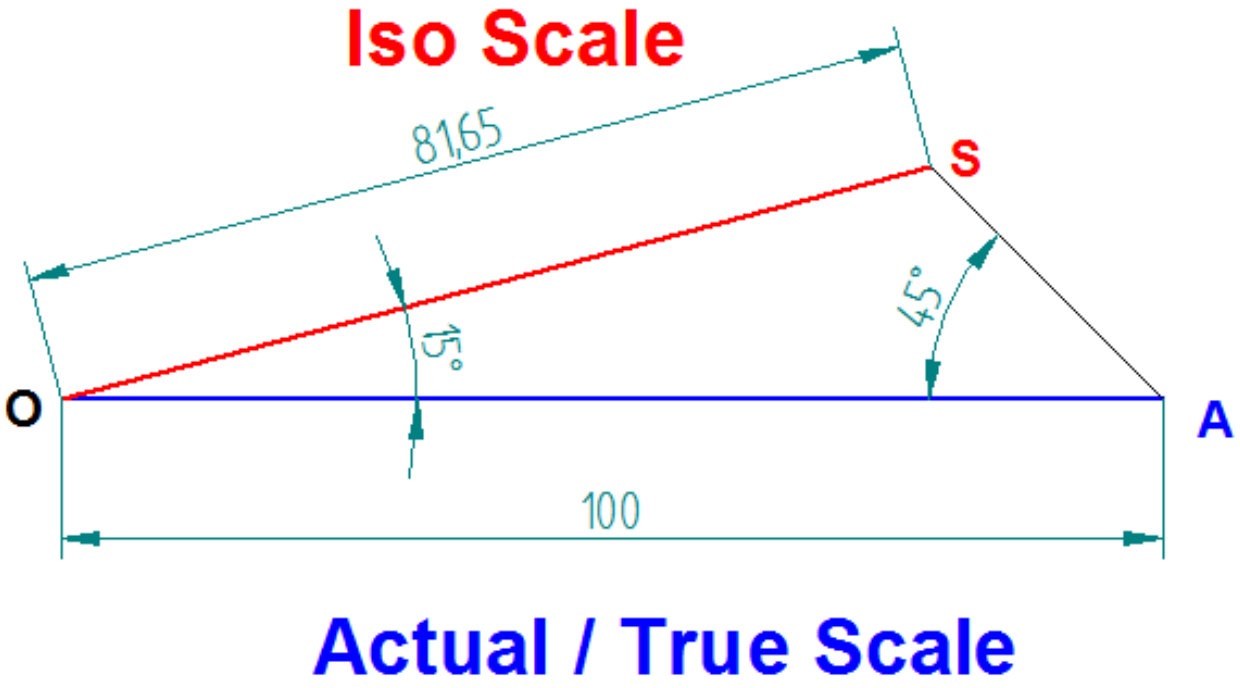
Then, Iso length "oq" = 57.1 mm

CONSTRUCTION OF ISOMETRIC SCALE



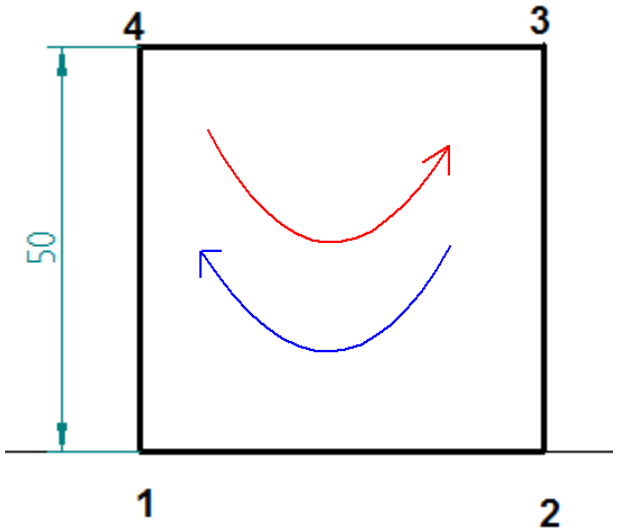
S.N	TRUE LENGTH	ISO LENGTH
1.	50	40.82
2.	80	65.32
3.	100	81.65

CONSTRUCTION OF ISOMETRIC SCALE

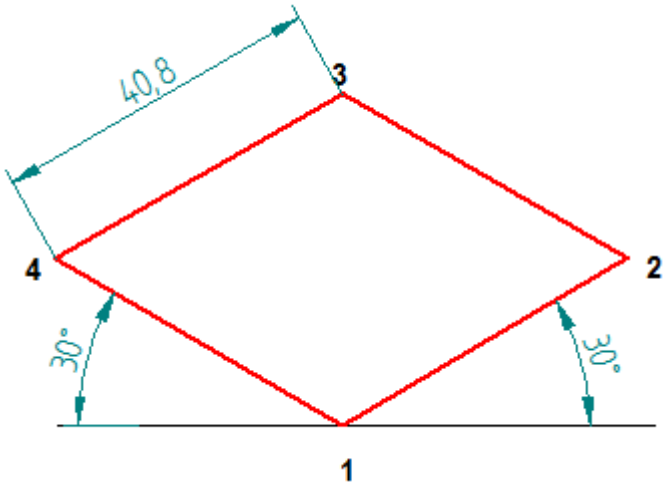


ISOMETRIC PROJECTION OF PLANES / LAMINAS

1. Draw the Isometric Projection of Square lamina of side 50mm, which is placed in Horizontal position. (Assume edge position)



Lamina in Horizontal Position



Isometric Projection of Lamina

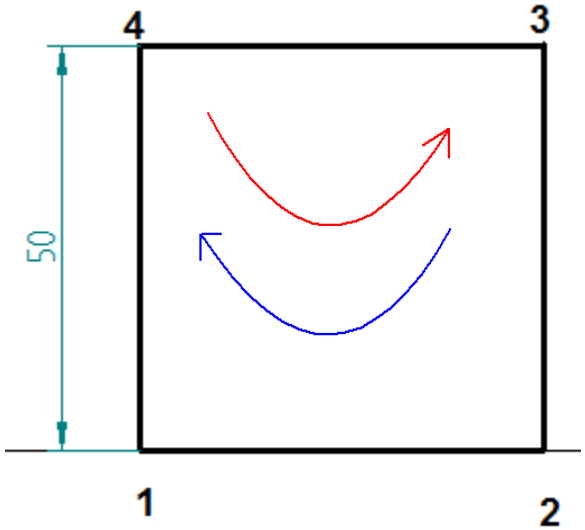
For any Lamina one can draw 3 Isometric views or Isometric Projection.

Lamina in Vertical position – 2 Isometric projections can be drawn:
1. Towards right side, 2. Towards left side.

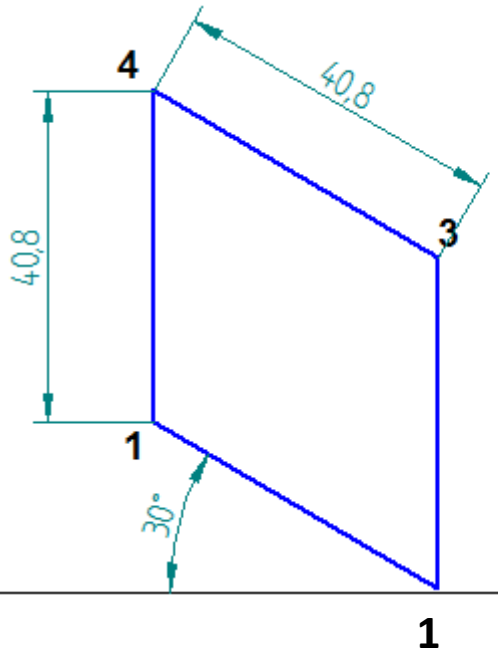
Lamina in Horizontal position.

ISOMETRIC PROJECTION OF PLANES / LAMINAS

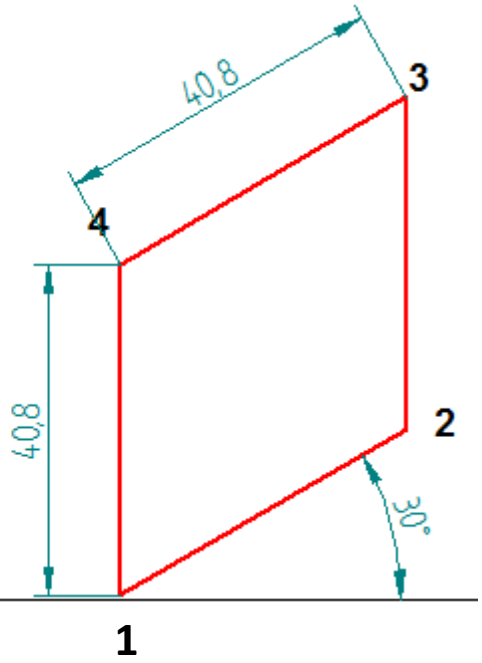
1. Draw the Isometric Projection of Square lamina of side 50mm which is placed in vertical position. (Assume edge position)



Lamina in Vertical Position



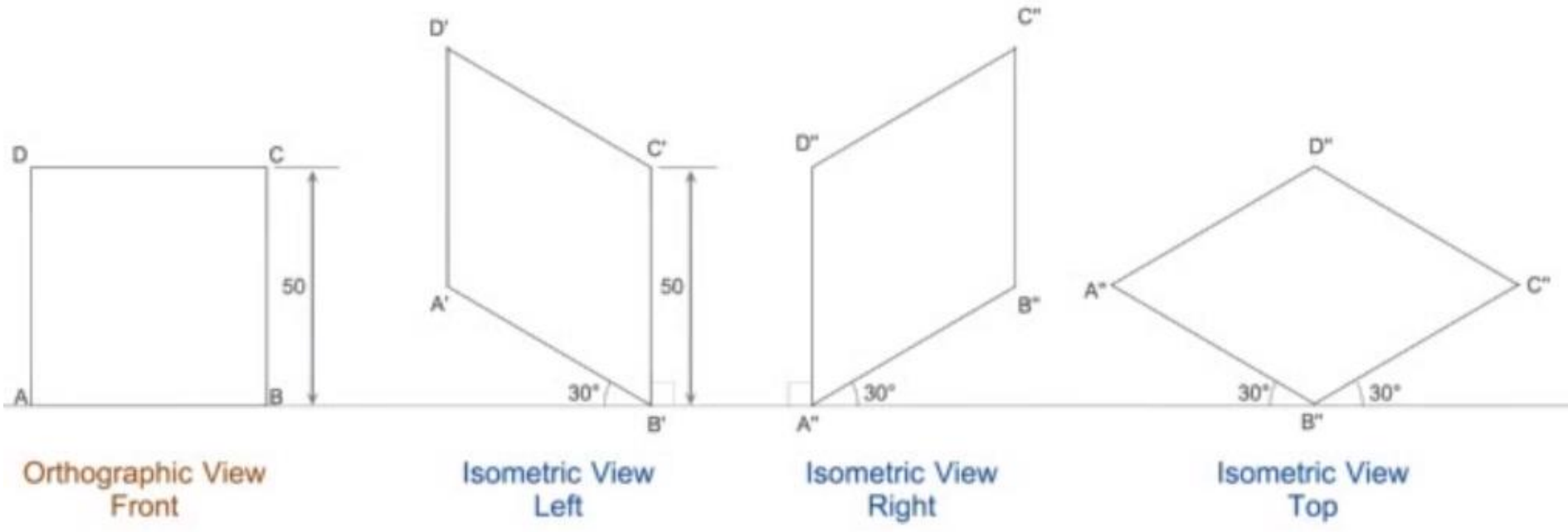
Left



Right

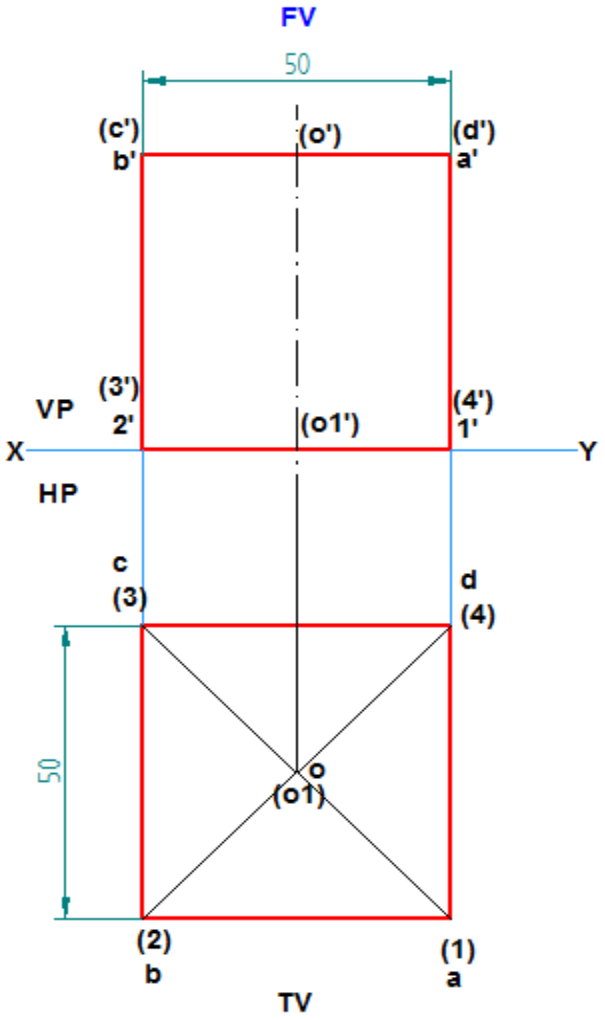
ISOMETRIC PROJECTION OF PLANES / LAMINAS

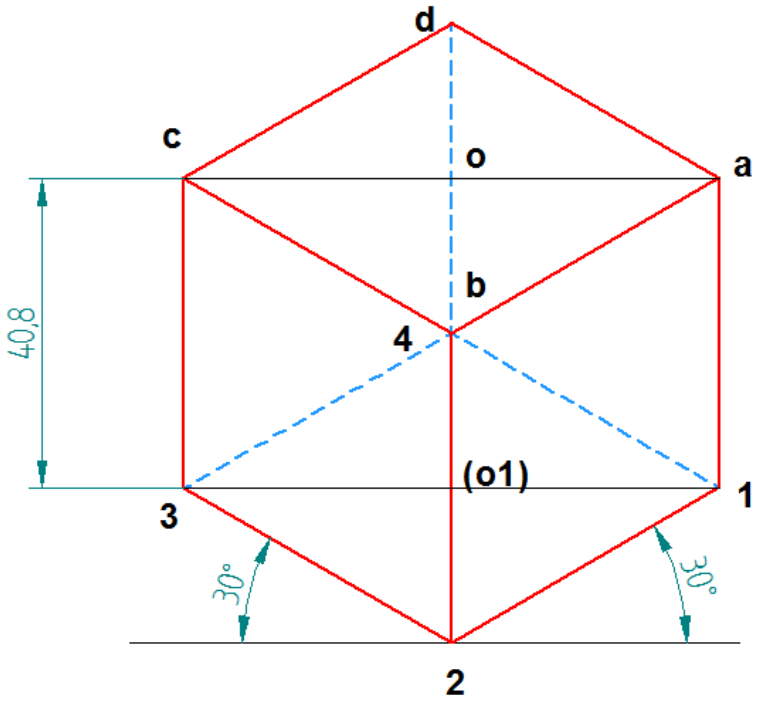
1. Draw the Isometric View of Square lamina of side 50mm. (Assume edge position)



ISOMETRIC PROJECTION OF SIMPLE SOLIDS

1. Draw the Isometric Projection of cube of side 50mm (Assume edge position)





Isometric Projection of Cube

Orthographic projection of Cube (FV & TV)

Isometric Projection of solids