

# Module 2

## ORTHOGRAPHIC PROJECTIONS

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**Orthographic Projection** is a technical drawing in which different views of an object are projected on different reference planes observing perpendicular to respective reference plane.

The Different Reference planes are:

Horizontal Plane (**HP**)

Vertical Plane (**VP**)

Side or Profile Plane (**PP**)

The Different views are :

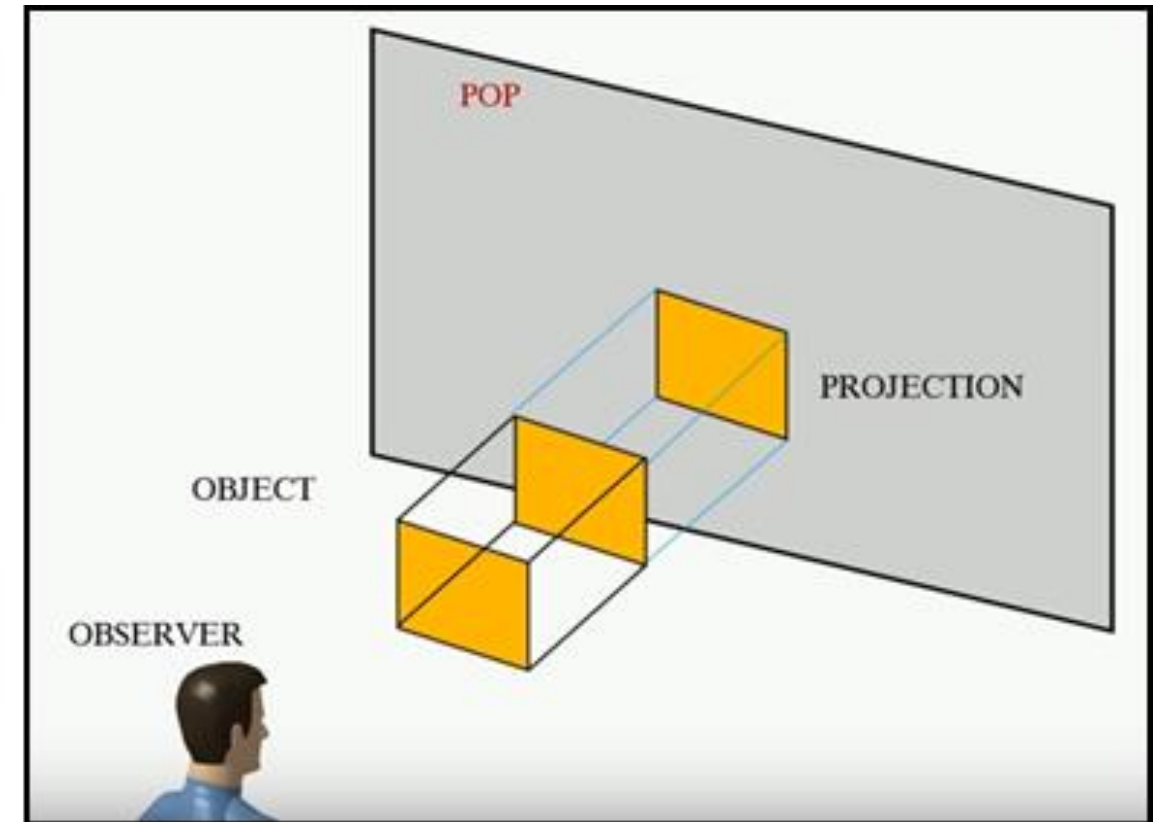
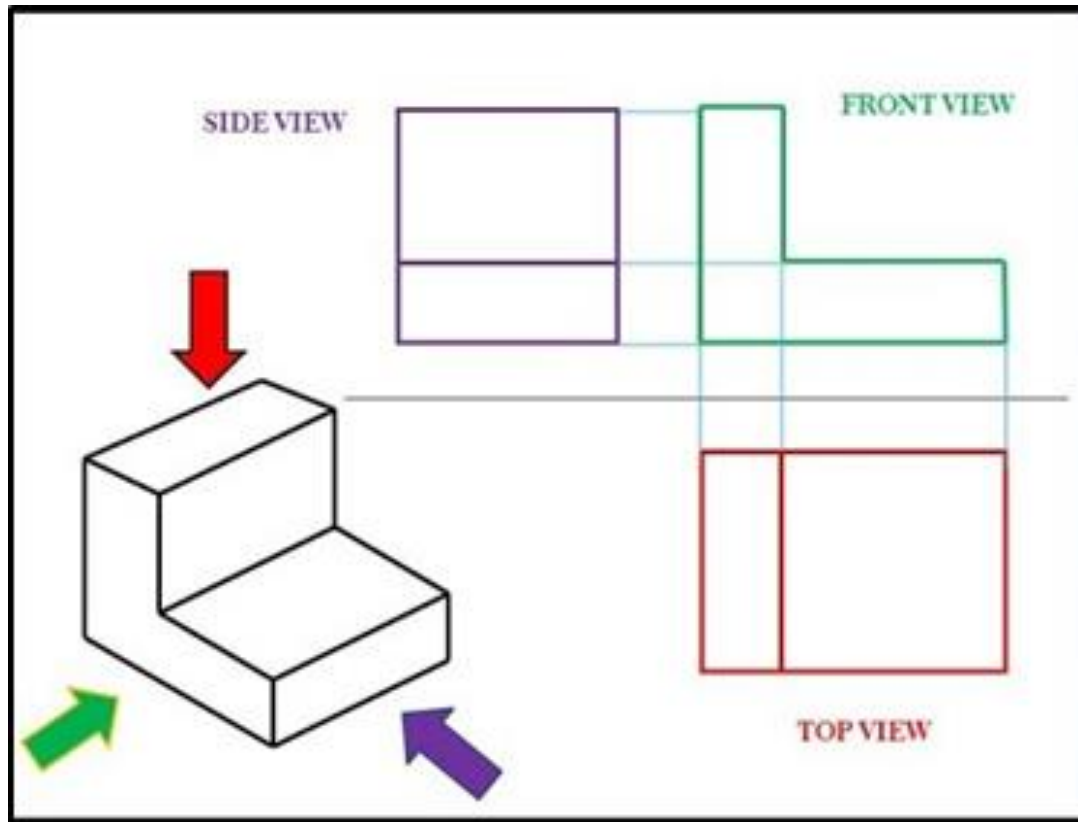
Top View (**TV**) – Projected on HP

Front View (**FV**) – Projected on VP

Side View (**SV**) – Projected on PP

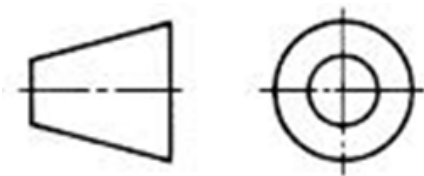
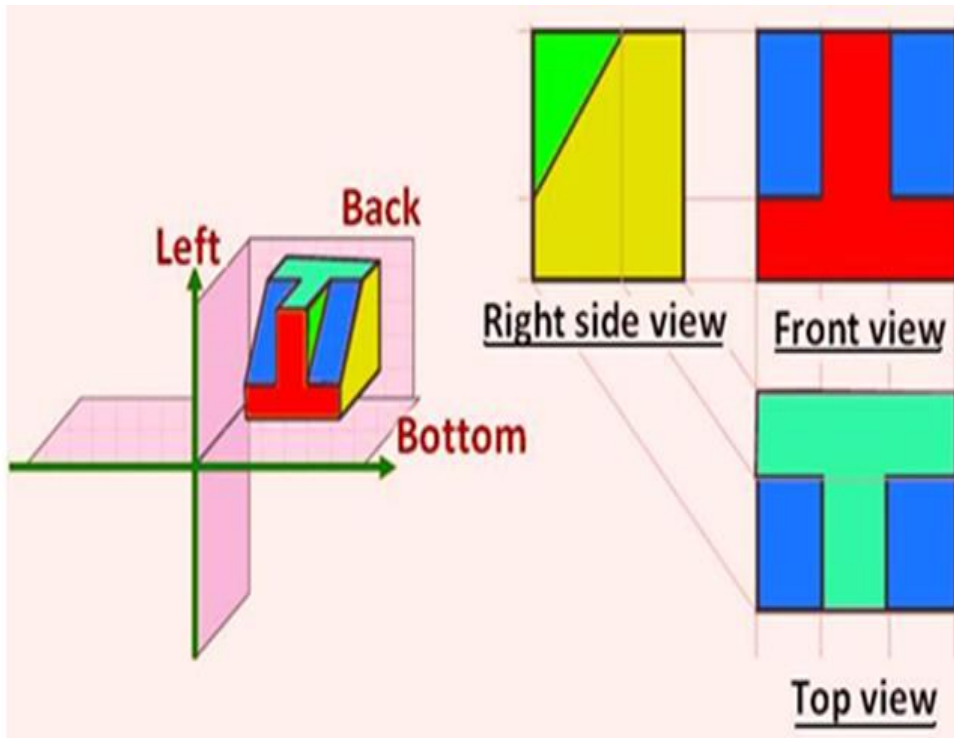
# Orthographic Projection

**Orthographic Projection:** The projection in which the projectors are parallel to each other and perpendicular to the plane

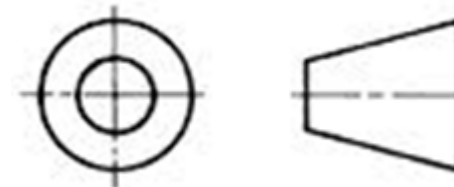
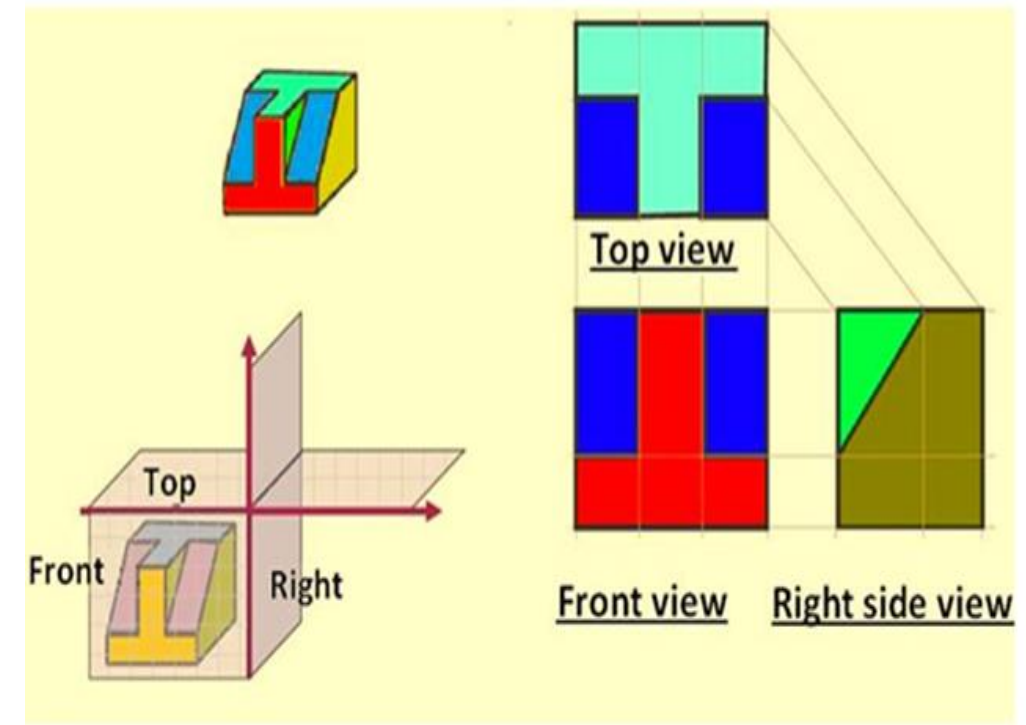


# First & Third angle Projection Method

## First Angle Projection Method

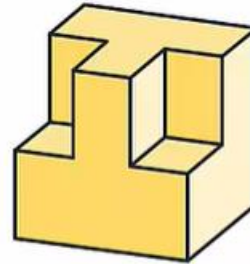


## Third Angle Projection Method

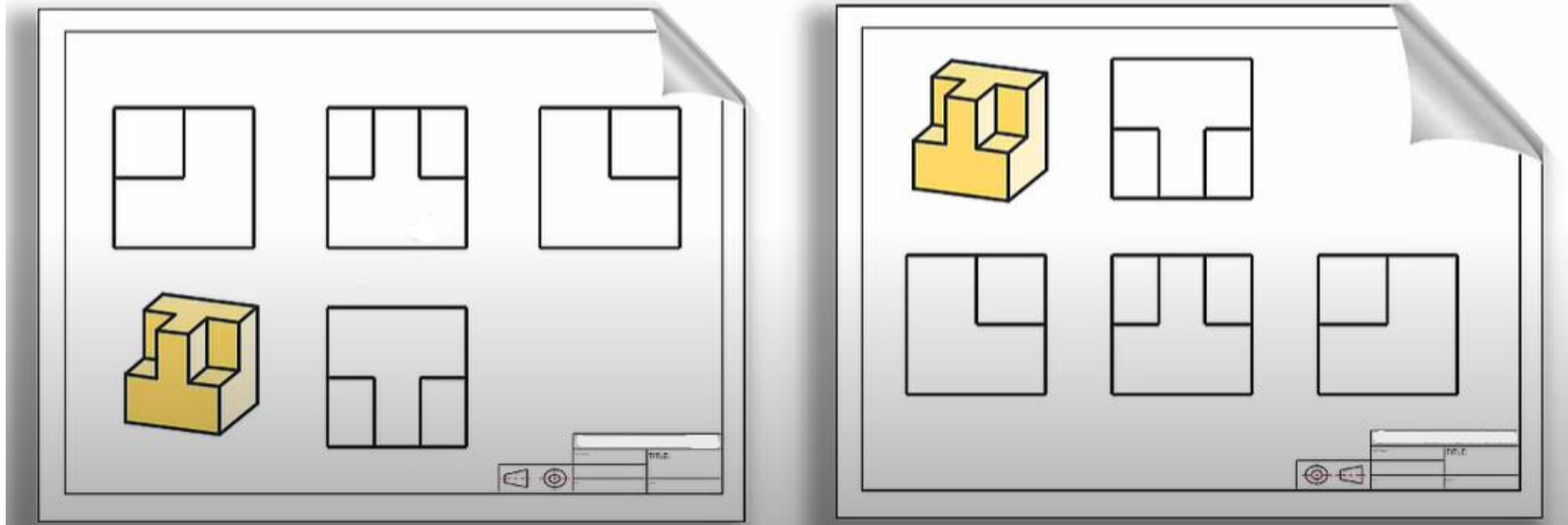


# First angle & Third angle projection

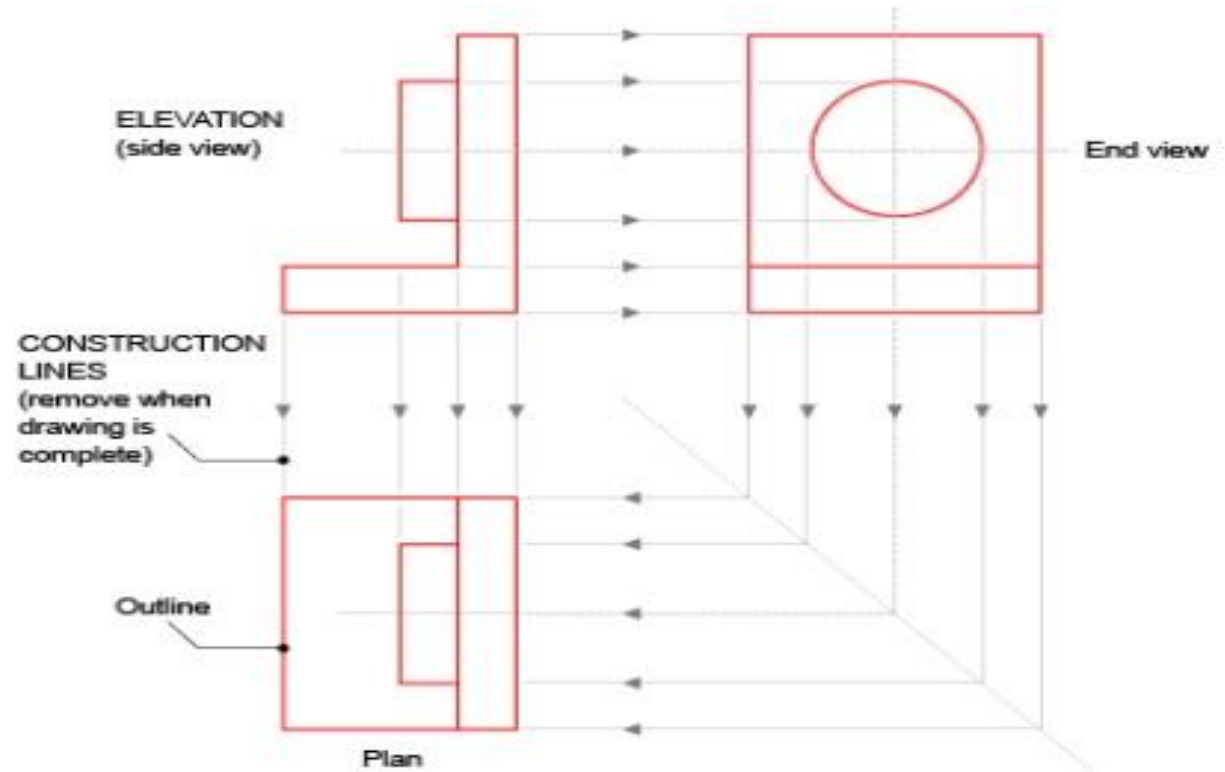
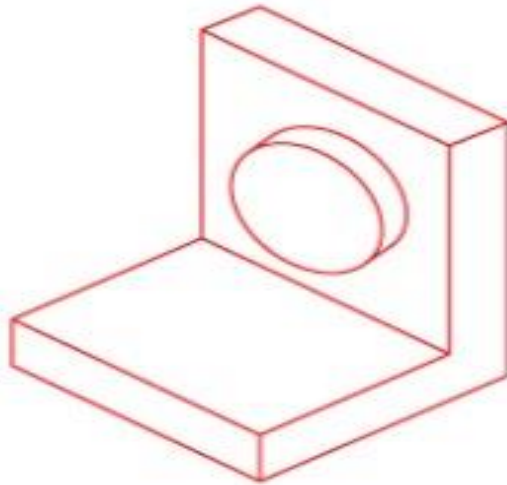
1<sup>st</sup> Angle



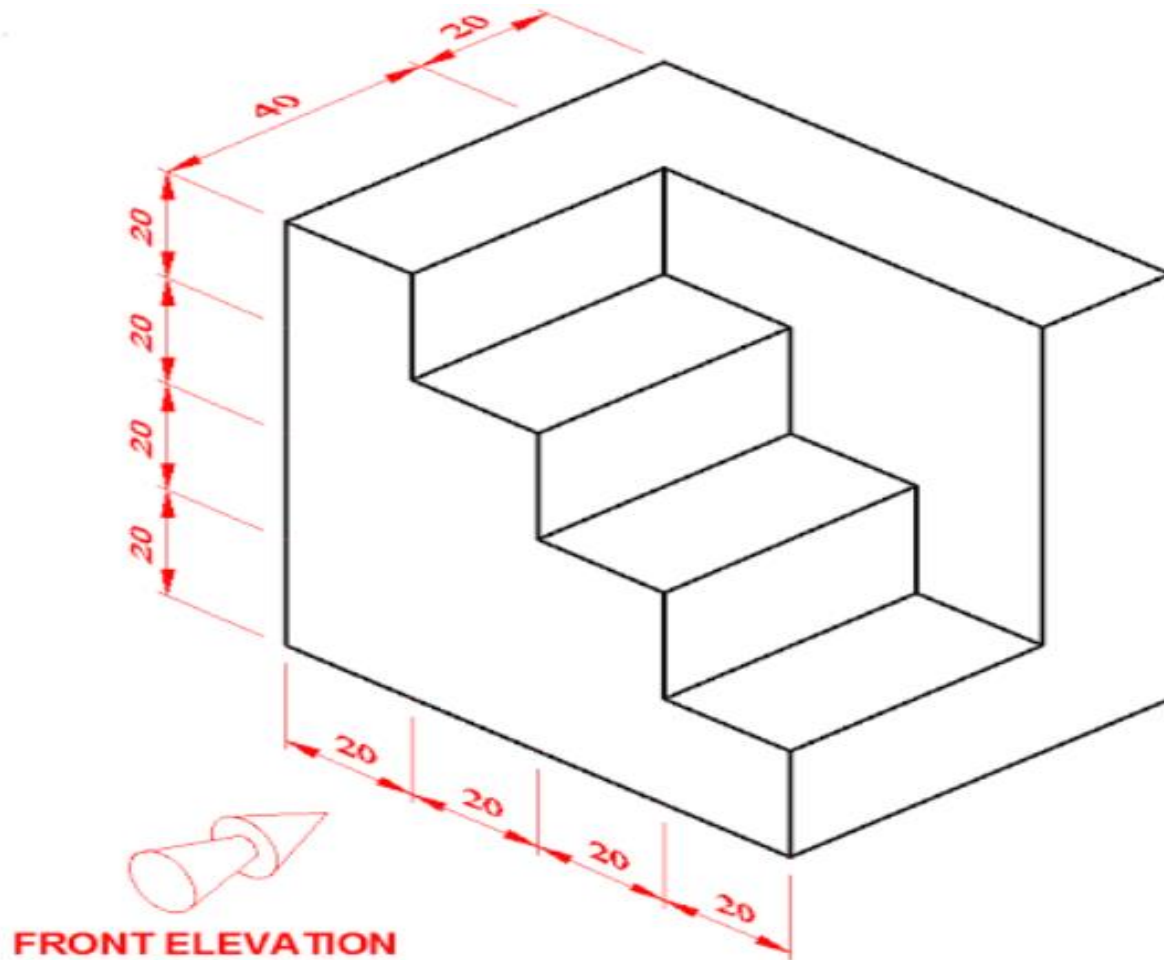
3rd Angle



# Practice



# Practice

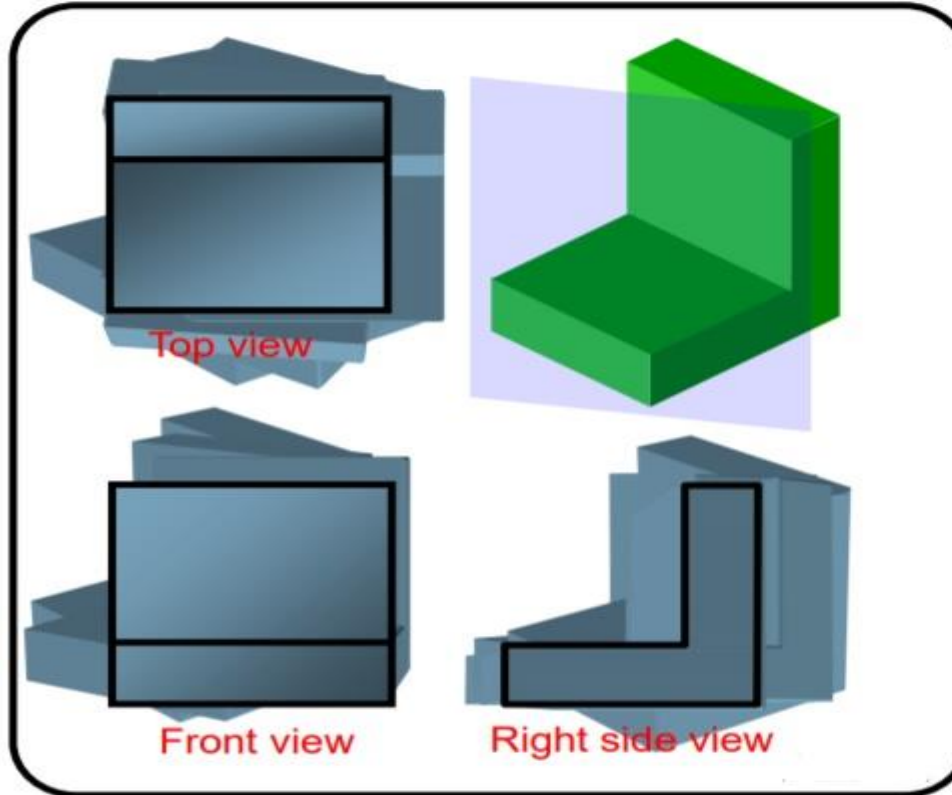




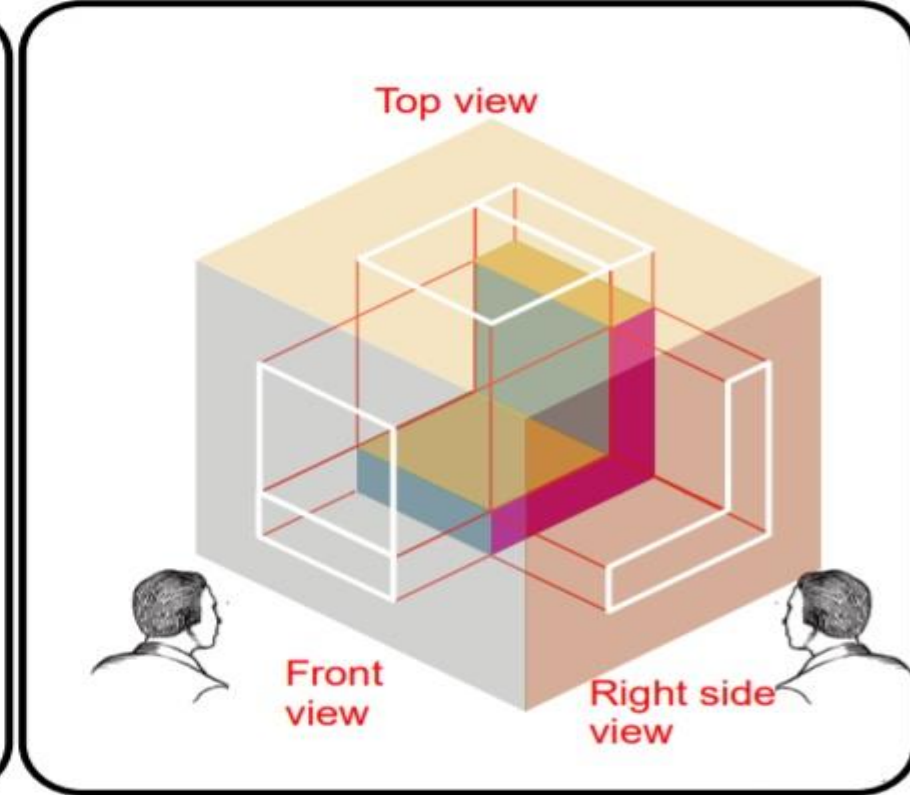
# Methods of Orthogonal Projections

1. Natural Method : Revolves the object with respect to the observer.
2. Glass Box Method / Transparent Method : The observer moves around the object.

1.



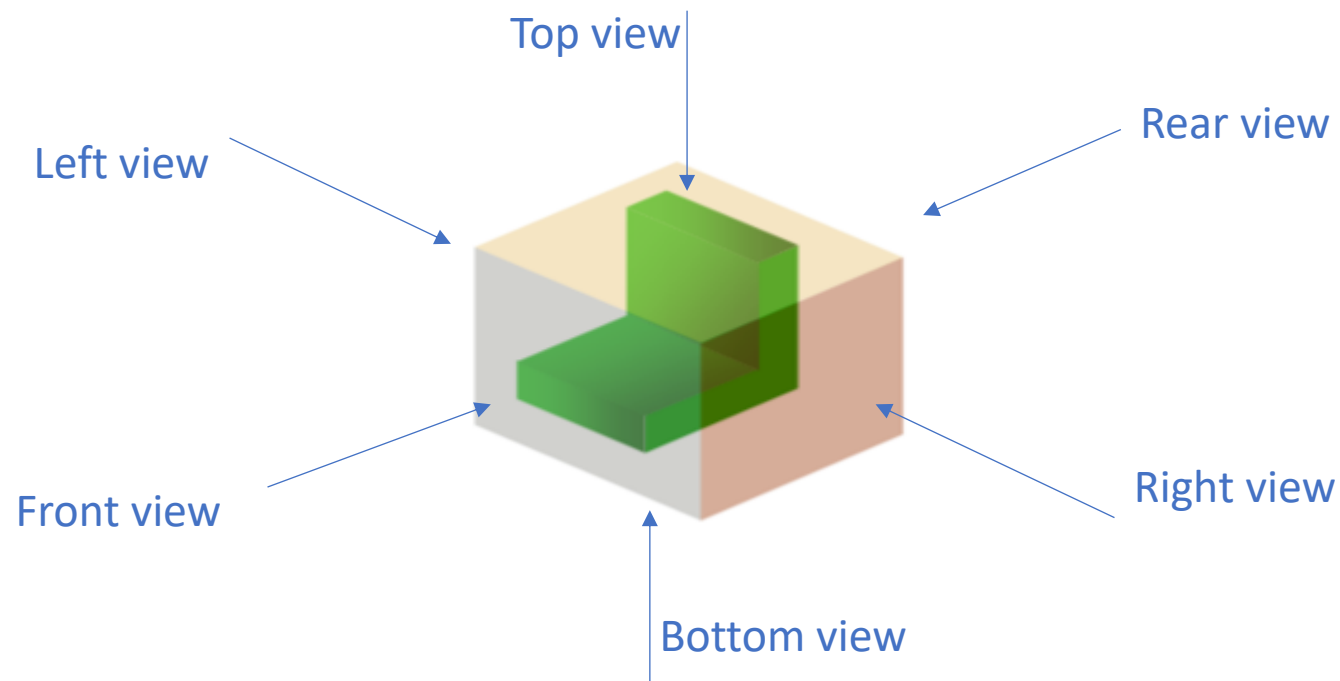
2.



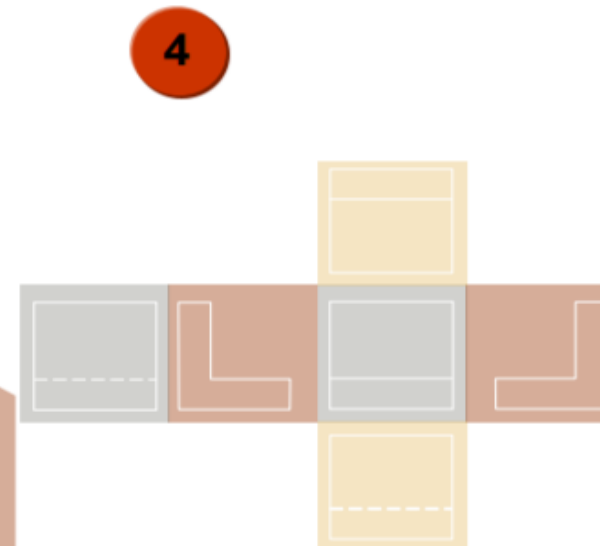
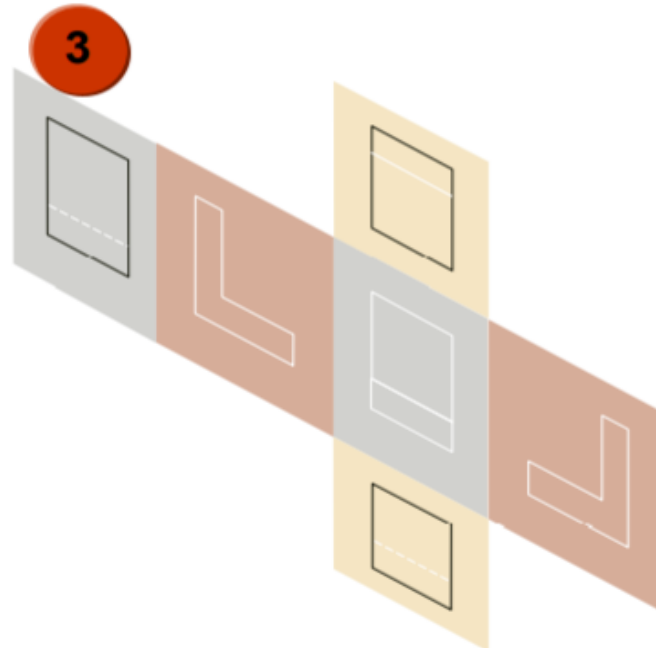
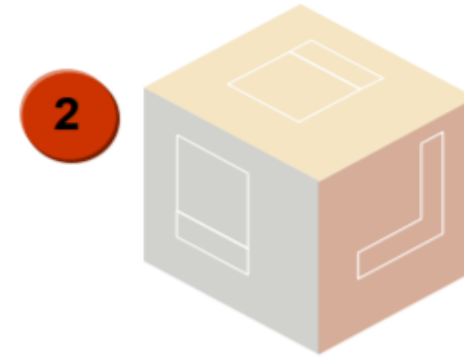
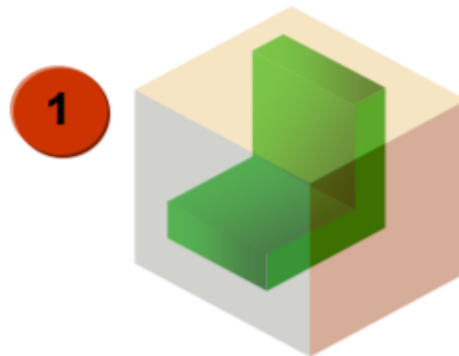


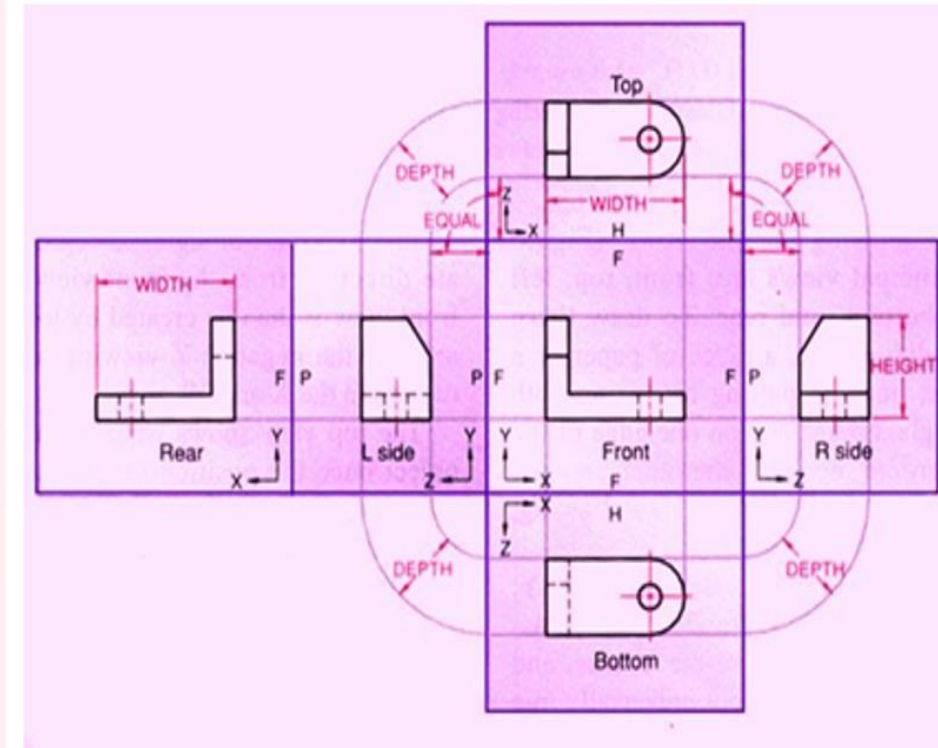
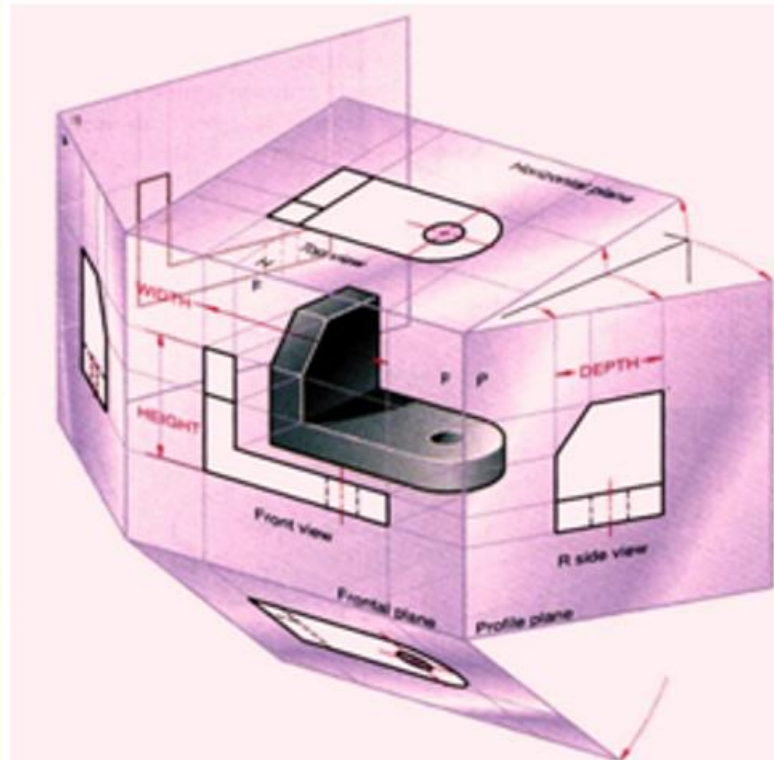
# Glass Box Method

- The object is assumed to be placed in a glass box.
- The 6 sides of the box will be made by the 6 mutually perpendicular planes of projection that are located around the object. Each views will be projected on those planes.
- Unfolding the box produces an arrangement of the six views.



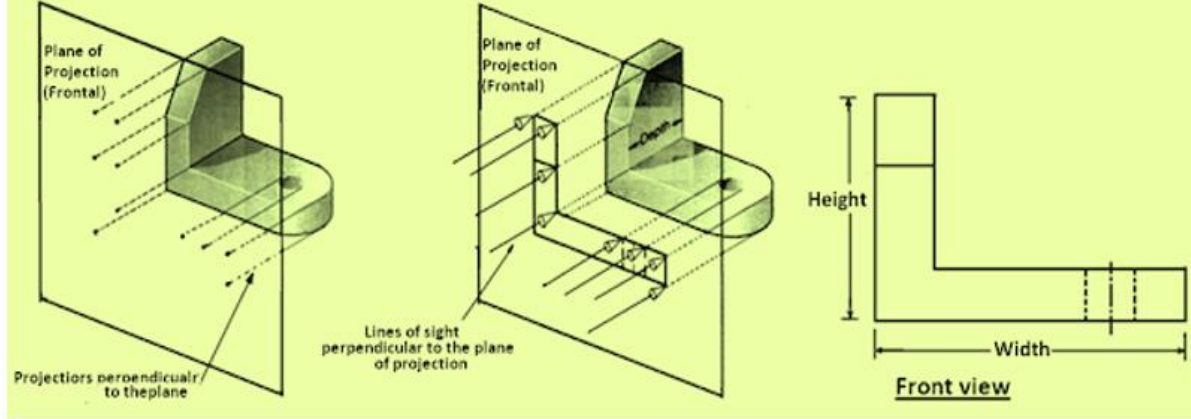
# Problem solving Steps



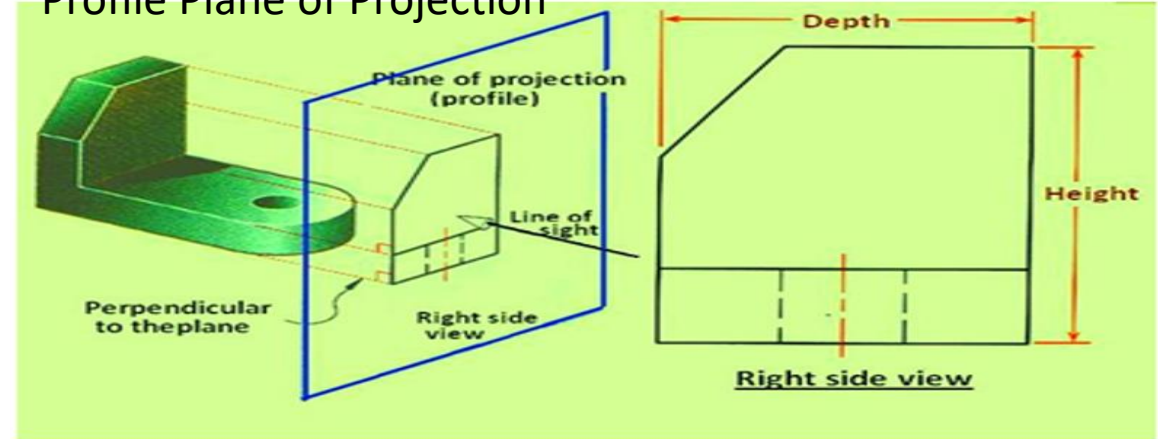


# Method of Orthographic Projection

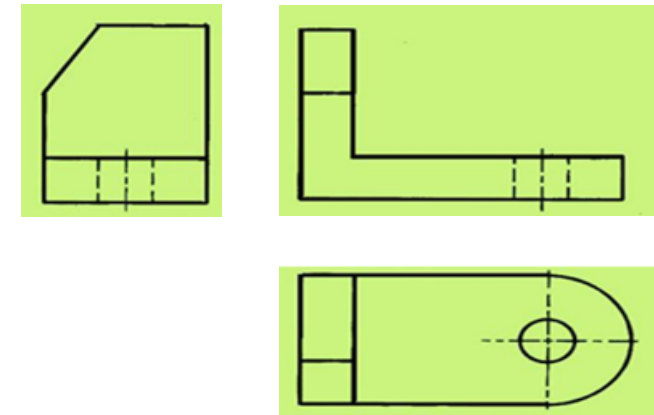
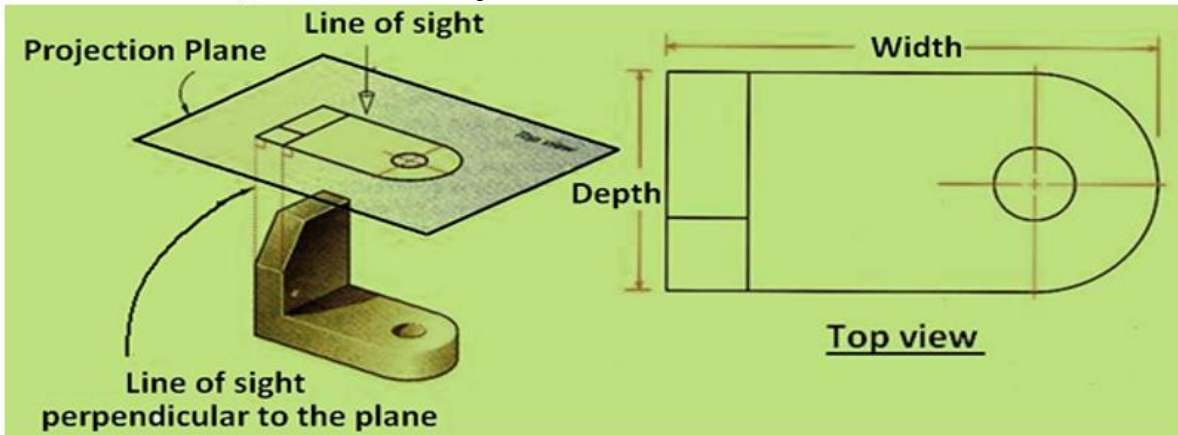
## Frontal Plane of Projection



## Profile Plane of Projection

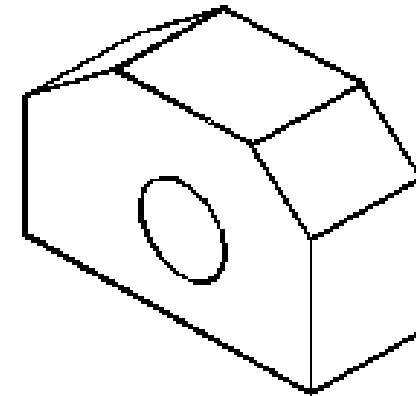
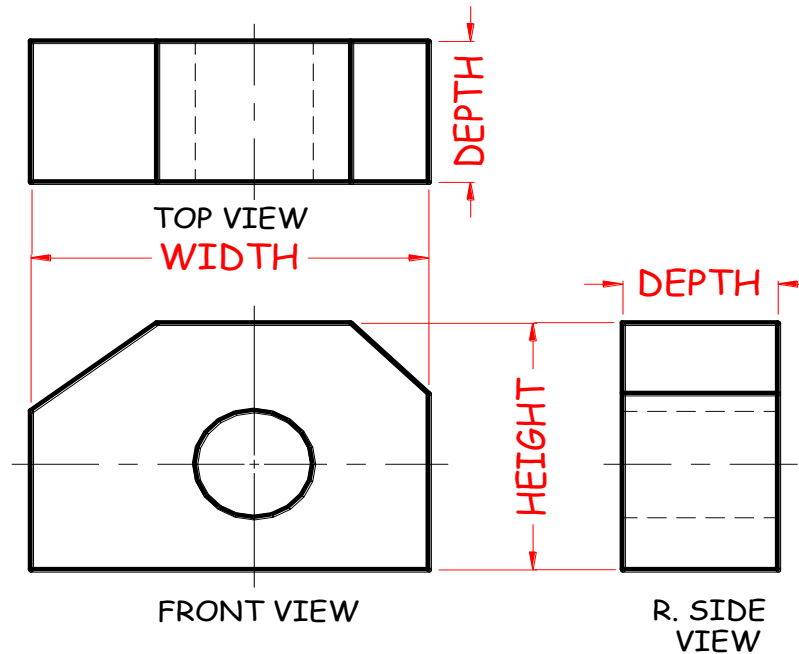


## Horizontal Plane of Projection



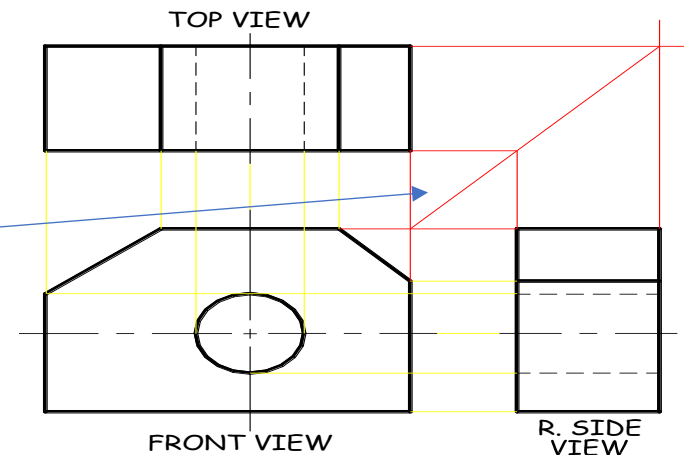
# Object Dimensions

- Top View  
Shows width & depth
- Front View  
Shows width & height
- Side View  
Shows height & depth



*(Third angle projection)*

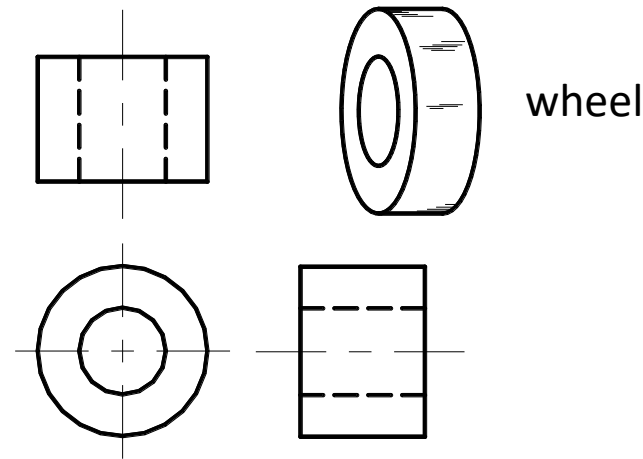
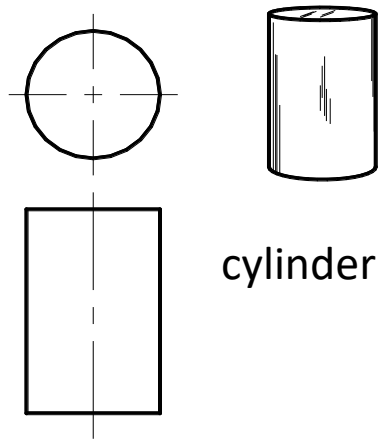
- Depth can be projected between views by using a 45° line





# Choosing Views








- Views should be visually balanced within the working space.
- Complex objects require 3 views describe its shape fully.
- Simple objects require only two views. Third view would add nothing to the description.
- Some curved surfaces do not show as curves in all views.



# Line Types

Lines signify more than just the geometry of the object so its important to use the **appropriate** line type.

- Is the feature visible or hidden from view?
- Is the line part of the object or part of a dimension?
- Is the line indicating symmetry?

Illustration	Application
<b>Thick</b> 	<b>Outlines, visible edges, surface boundaries of objects, margin lines</b>
<b>Continuous thin</b> 	<b>Dimension lines, extension lines, section lines leader or pointer lines, construction lines, boarder lines</b>
<b>Continuous thin wavy</b> 	<b>Short break lines or irregular boundary lines – drawn freehand</b>
<b>Continuous thin with zig-zag</b> 	<b>Long break lines</b>
<b>Short dashes, gap 1, length 3 mm</b> 	<b>Invisible or interior surfaces</b>
<b>Short dashes</b> 	<b>Center lines, locus lines</b> <b>Alternate long and short dashes in a proportion of 6:1,</b>
<b>Long chain thick at end and thin elsewhere</b> 	<b>Cutting plane lines</b>



# Precedence of Lines

- Visible lines takes precedence over all other lines.
- Hidden lines and cutting plane lines take precedence over center lines
- Center lines have lowest precedence
- **NOTE:**

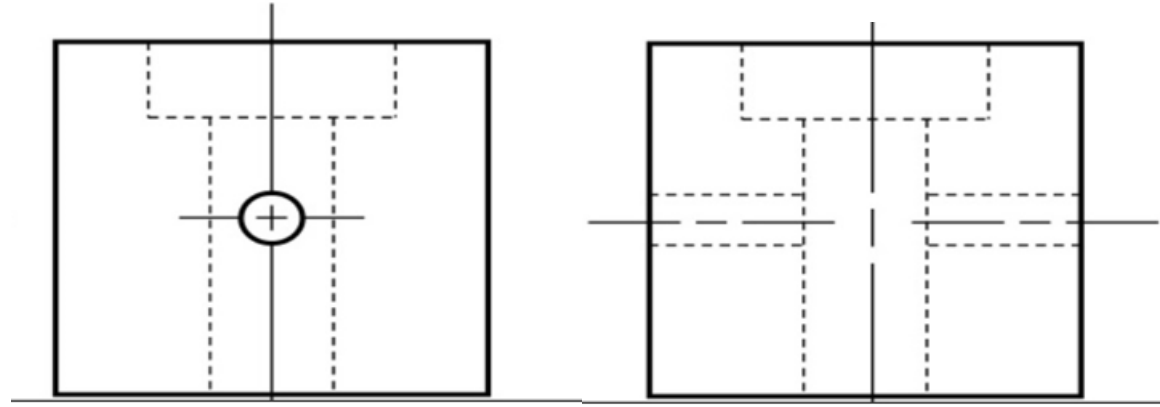
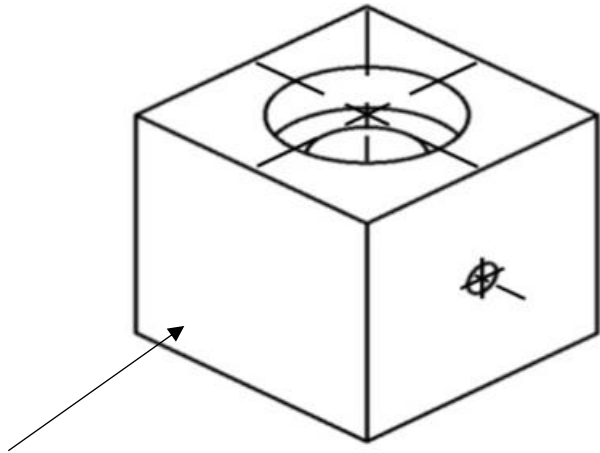
*When the Visible line coincides with hidden or center line*

- Visible line is shown

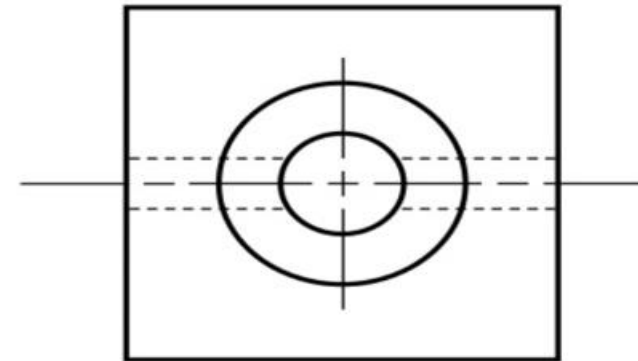
*Hidden line coincides with center line*

- Hidden line is shown

# Precedence of Lines

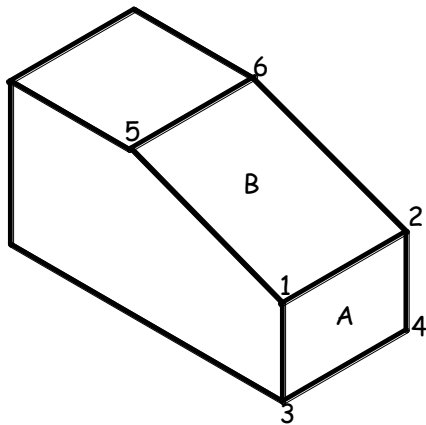


1. Visible
2. Hidden
3. Center

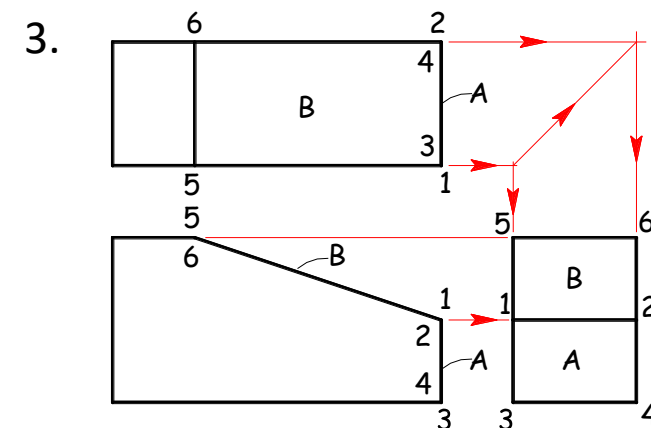
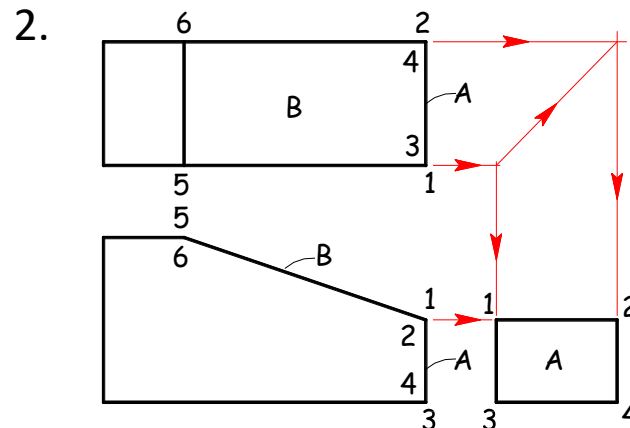
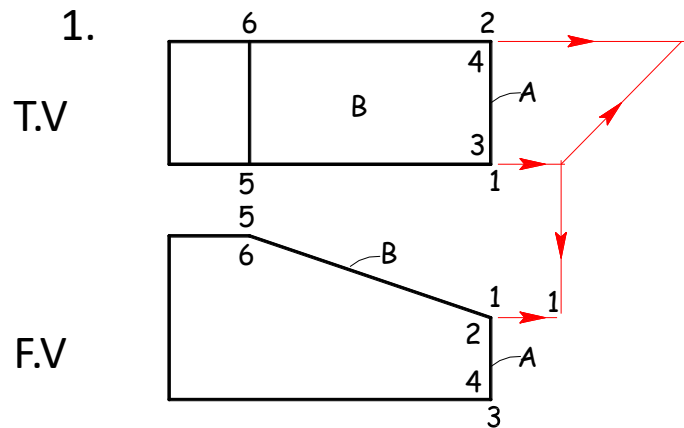


# Straight Edges

- Edges that are perpendicular to a plane of projection appear as a point.

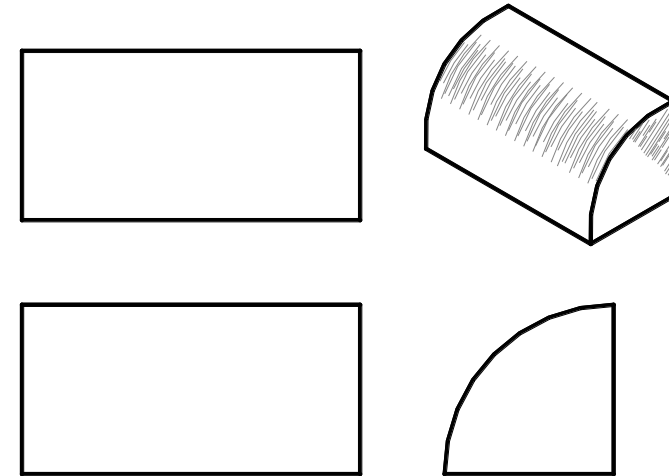
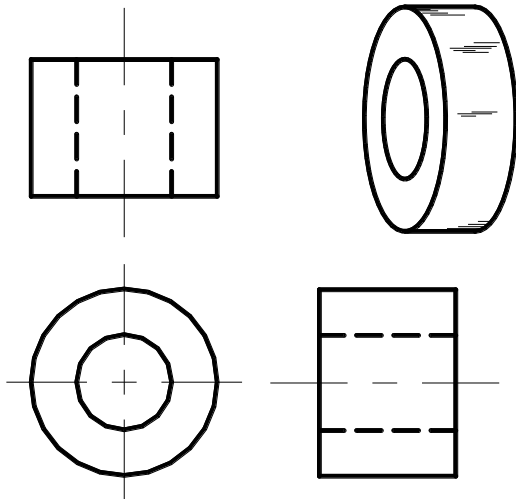


- Edges that are parallel to a plane of projection appear as lines
- Edges that are inclined to a plane of projection appear as foreshortened lines



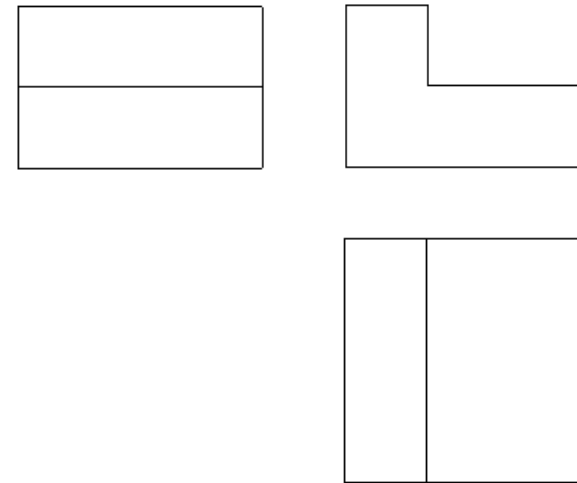
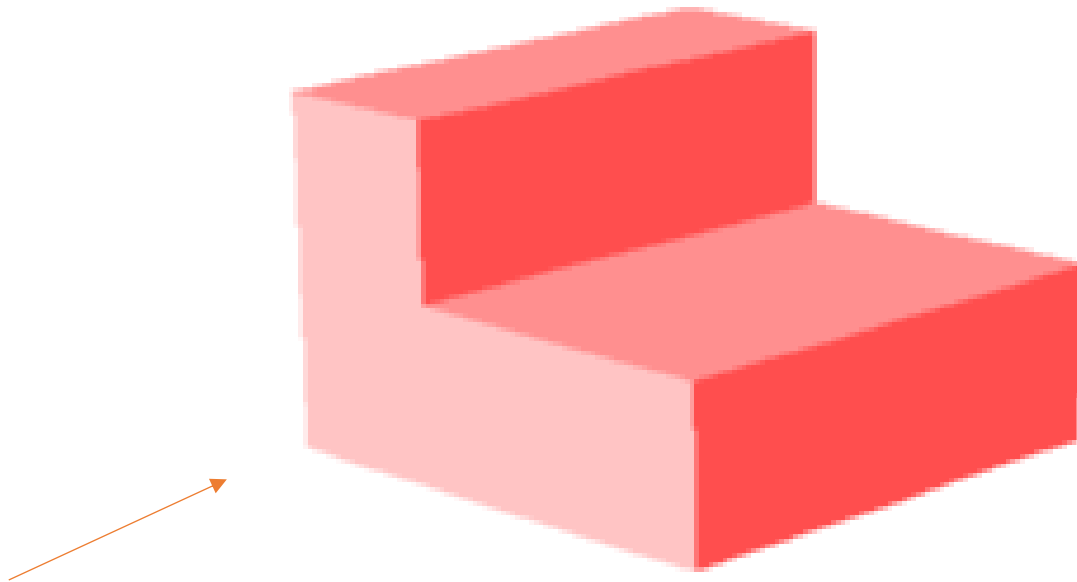
# Curved Edges

- Curved edges project as straight lines on the plane to which they are perpendicular
- Curved edges project as curved lines on the planes to which they are parallel or inclined



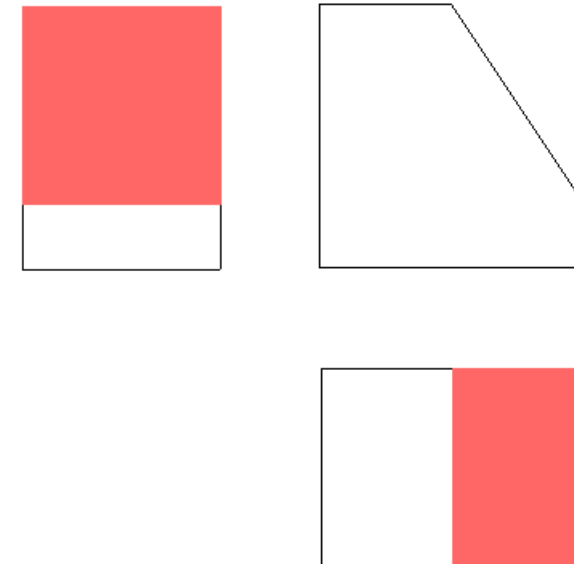
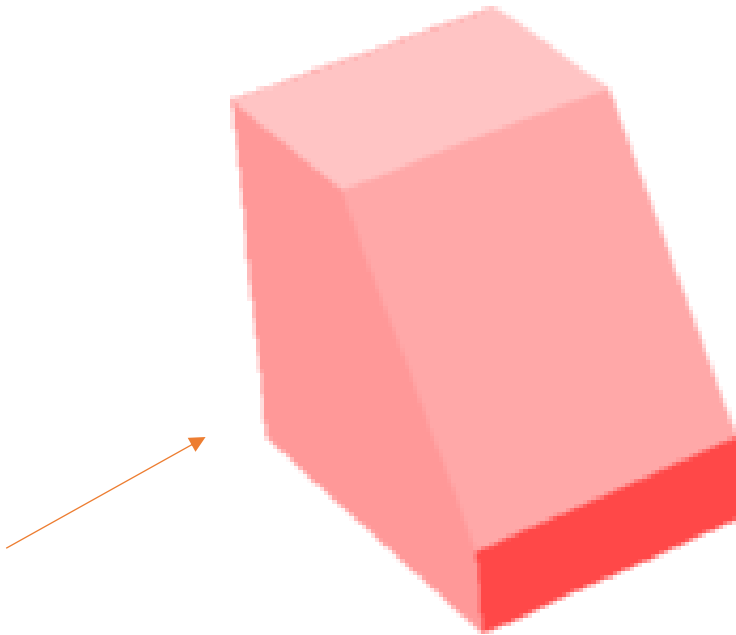
# Normal Surfaces

- Normal surfaces appear as an edge in two opposite principal views, and appear a surface in all other principal views.



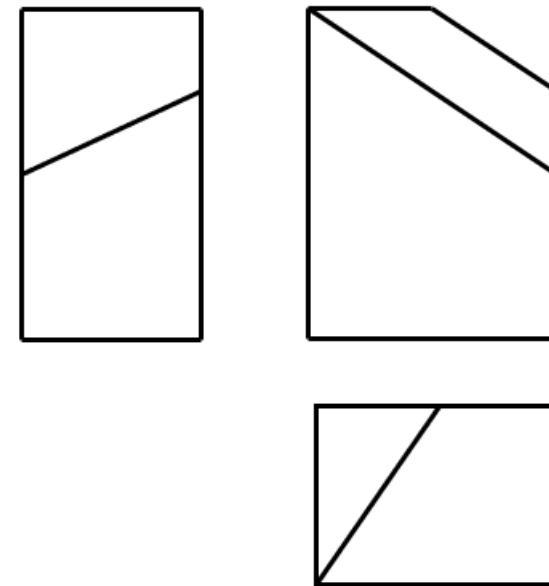
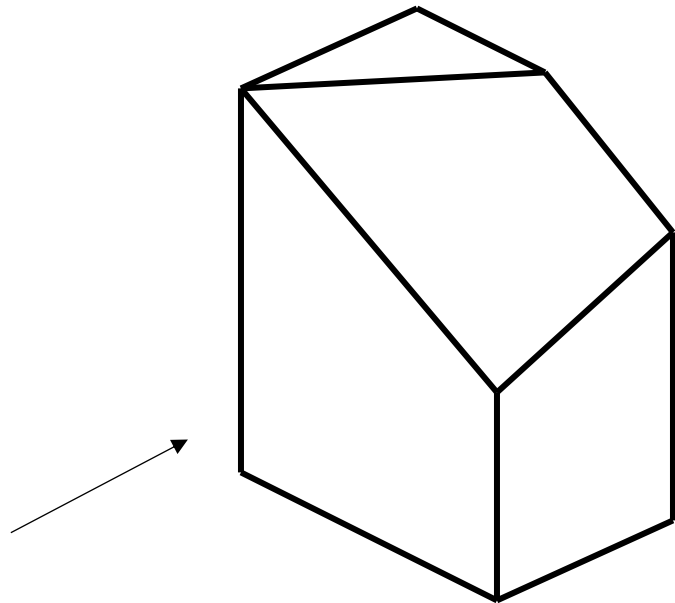
# Inclined Surfaces

- Inclined surfaces appear as an edge in two opposite principal views, and appear foreshortened (not true size) in all other principal views.



# Oblique Surfaces

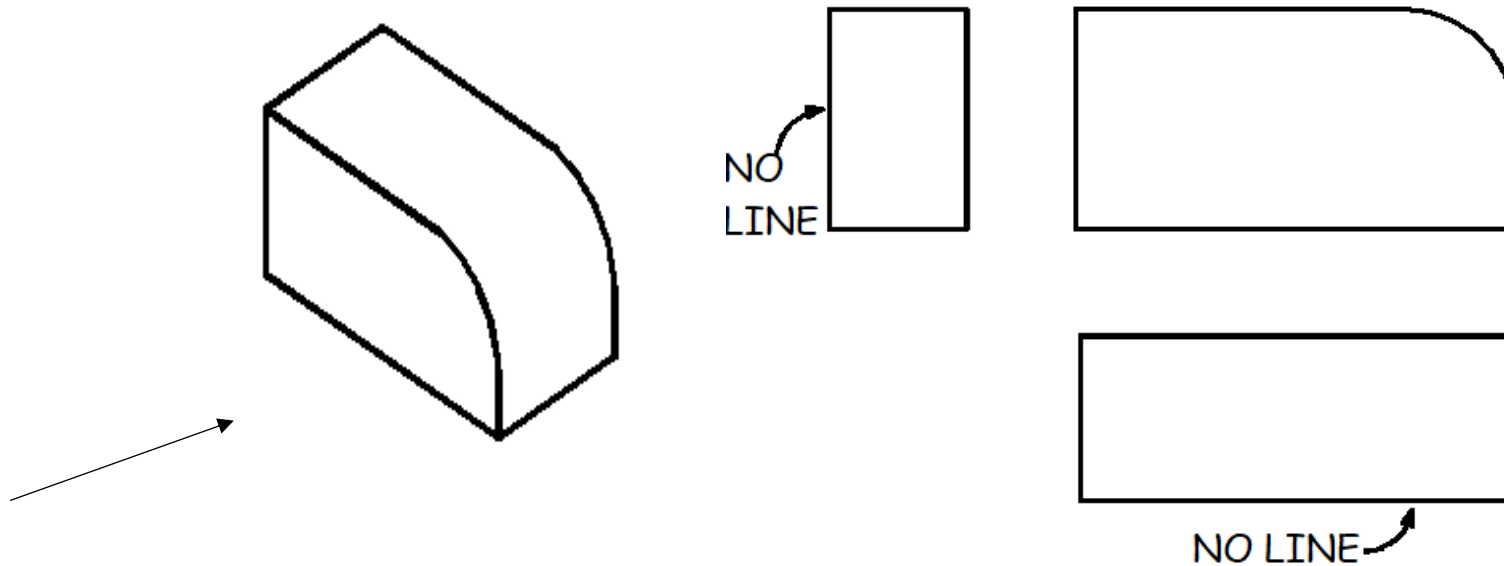
- Oblique surfaces do not appear either as an edge or true size in any principal view.





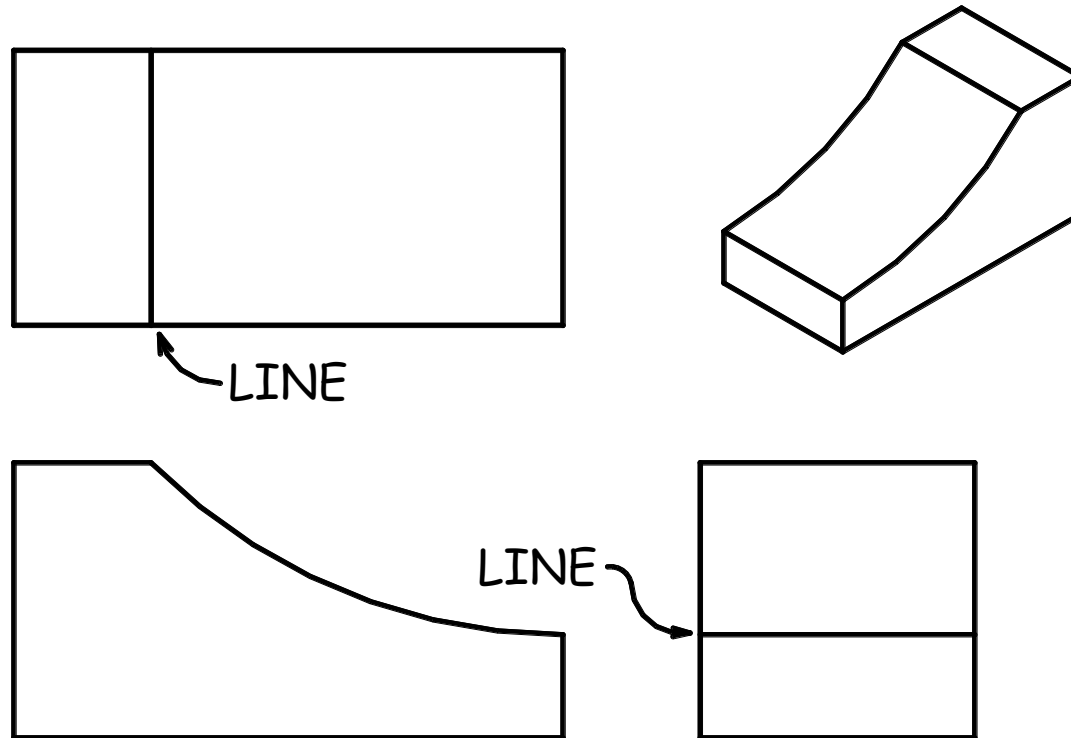
# Intersections & Tangencies

- Where a curved surface is *tangent* to a plane surface, no line should be shown where they join



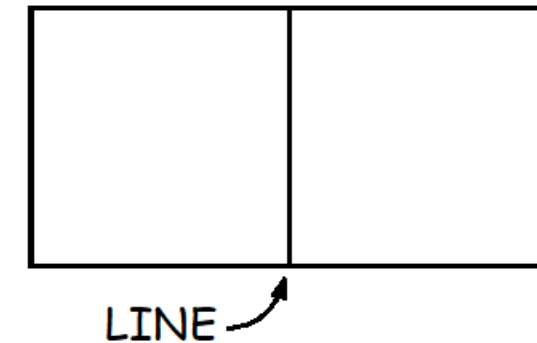
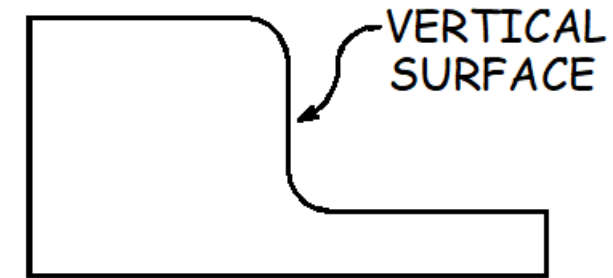
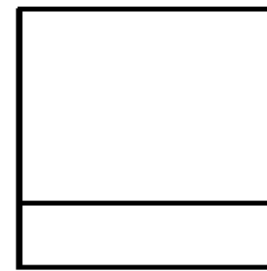
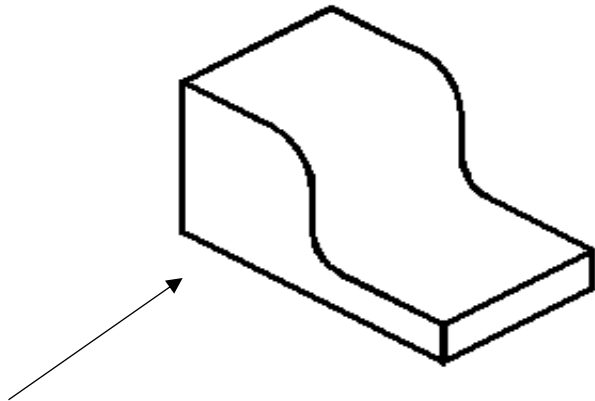
# Intersections & Tangencies

- Where a plane surface intersects a curved surface, an edge is formed



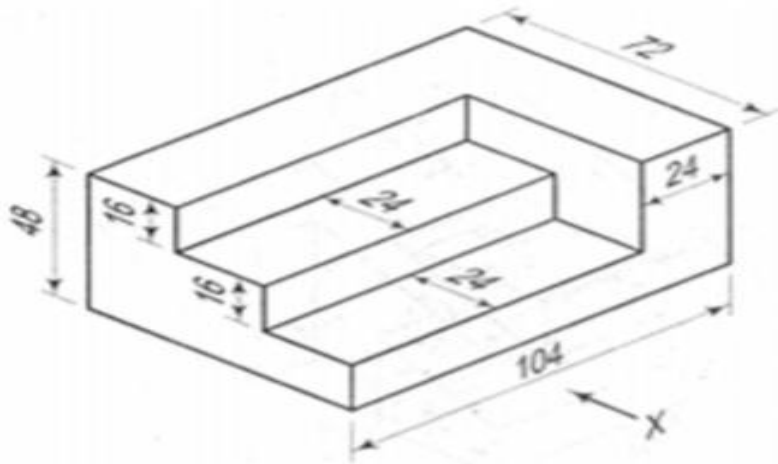
# Intersections & Tangencies

- Where the plane surface is horizontal or vertical, exceptions to these rules may occur

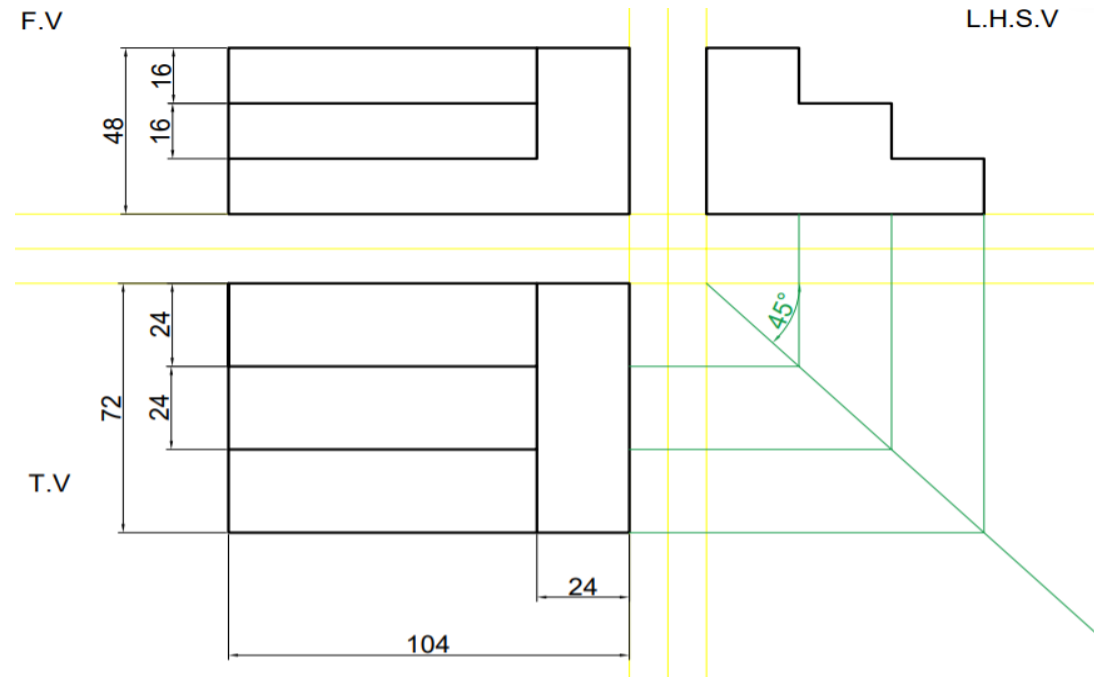


# Practice Problem 1

Figure below show pictorial views. Draw the T.V, F.V and LHSV views using first angle method of projections.

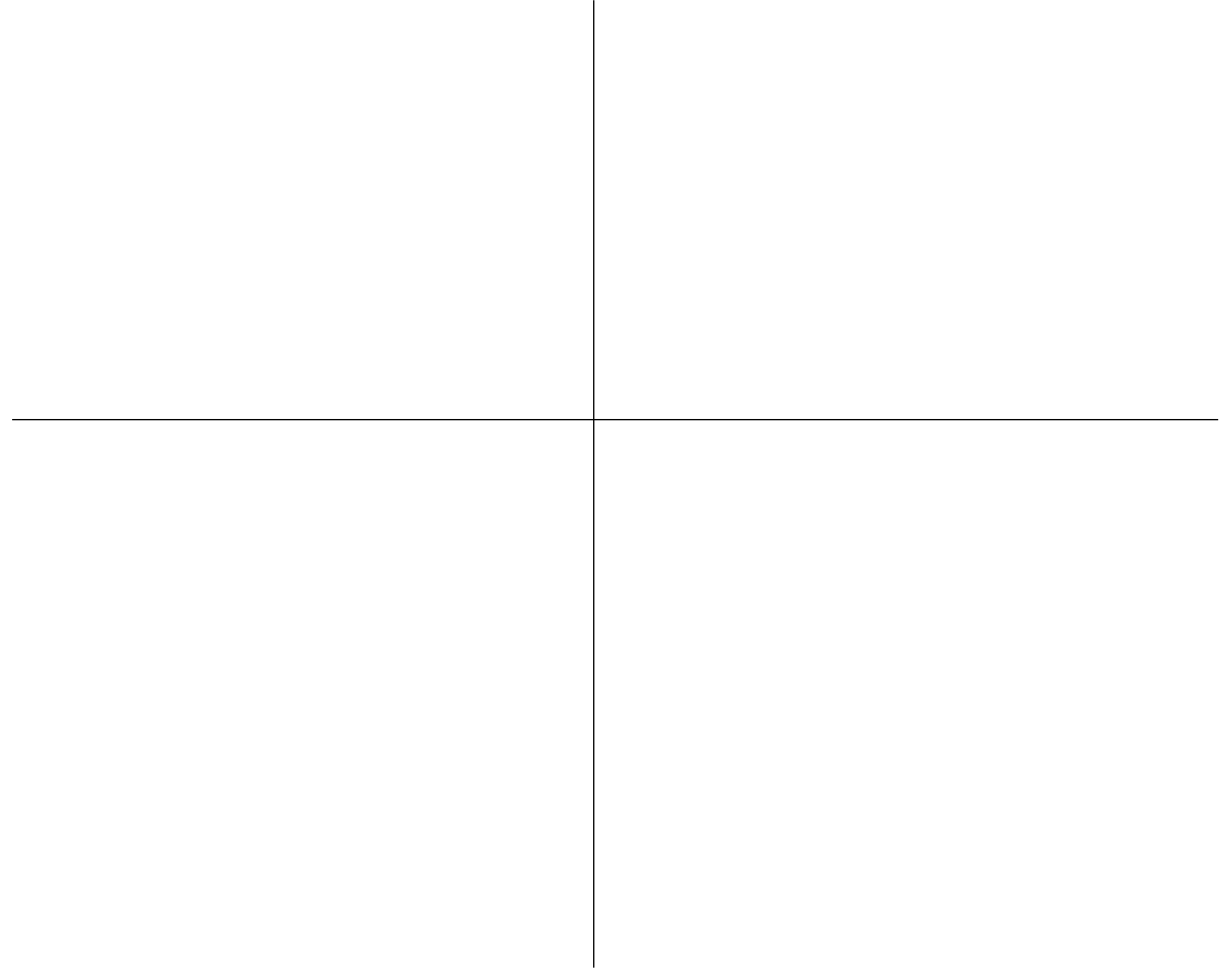
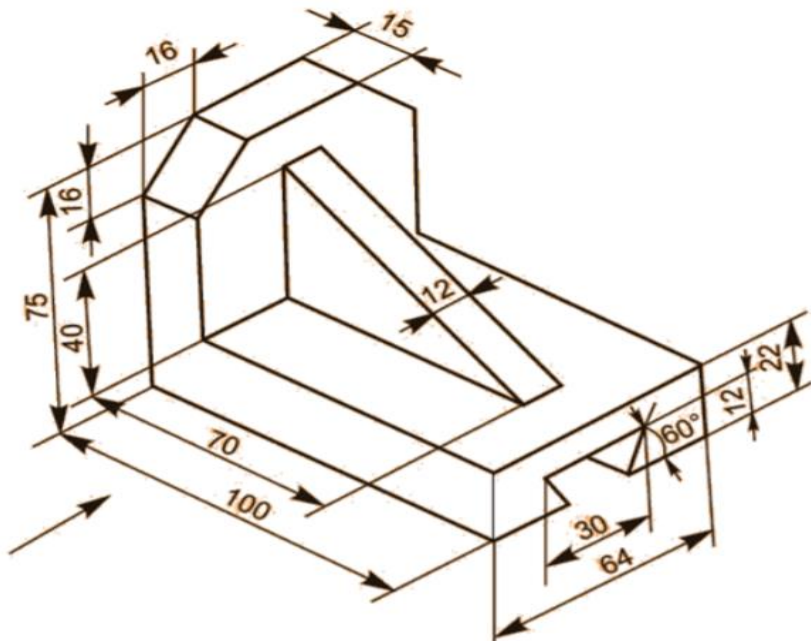


Draw: (i) F.V.  
 (ii) T.V.  
 (iii) L.H.S.V.



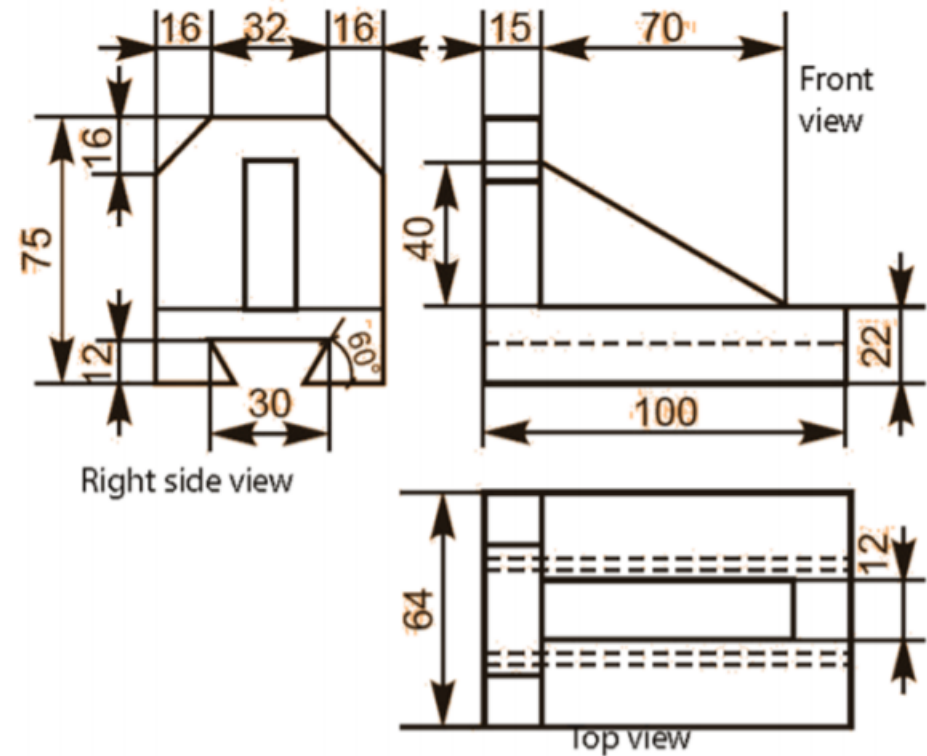
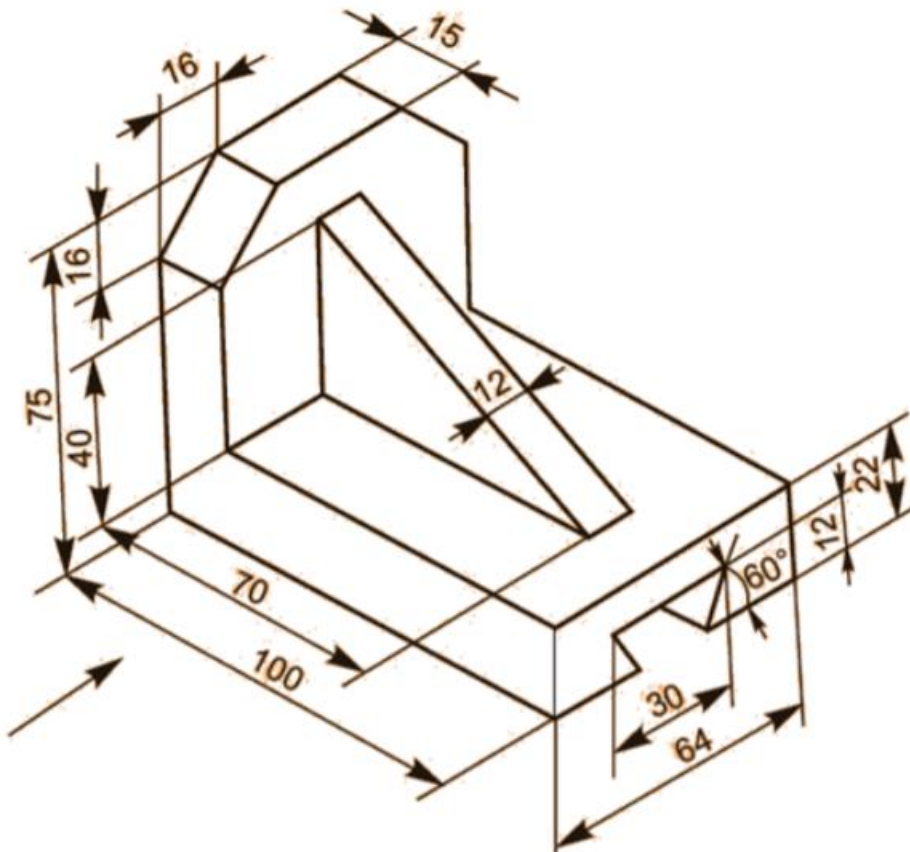
## Practice Problem 2

Figure below show pictorial views. Draw the T.V, F.V and RHSV views using first angle method of projections.



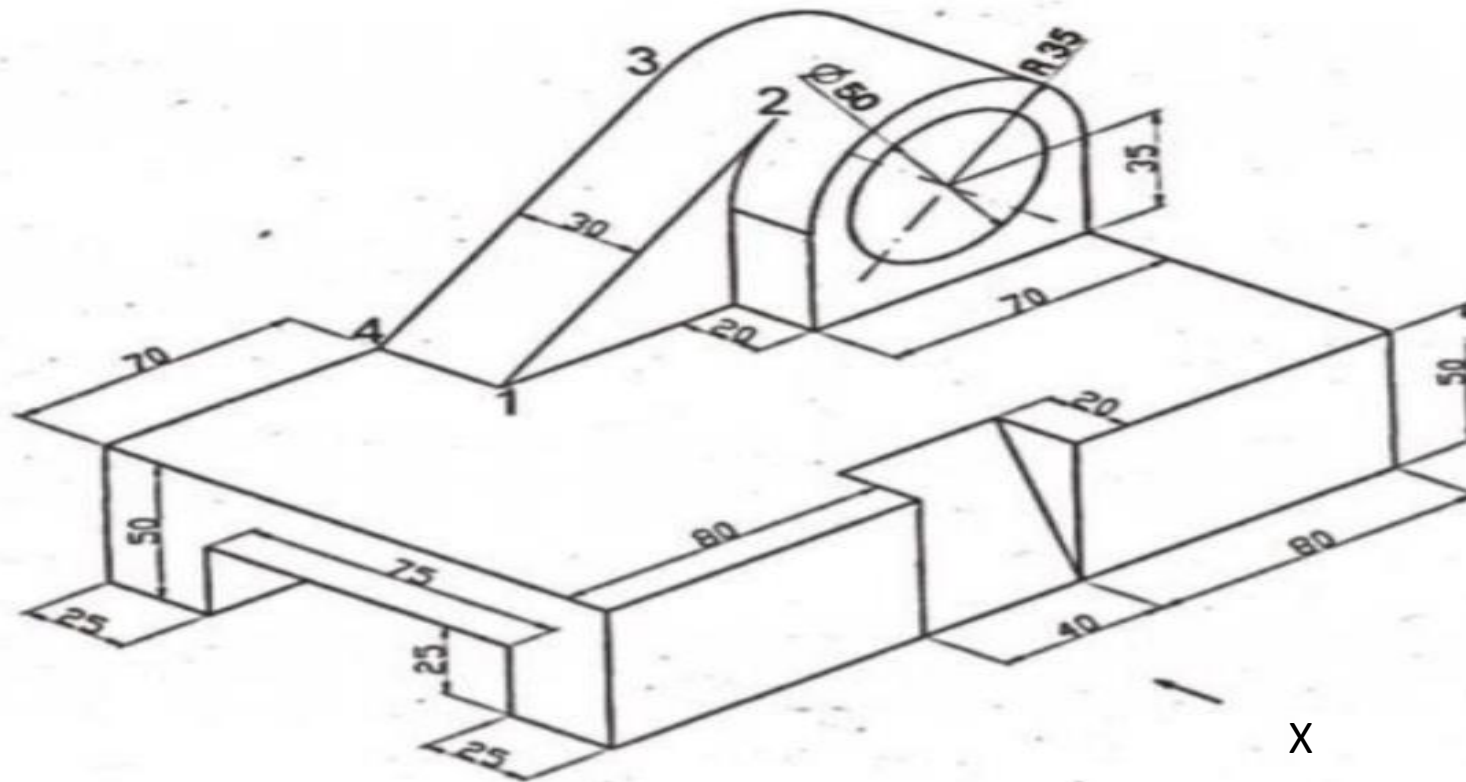
## Practice Problem 2

Figure below show pictorial views. Draw the T.V, F.V and RHSV views using first angle method of projections.



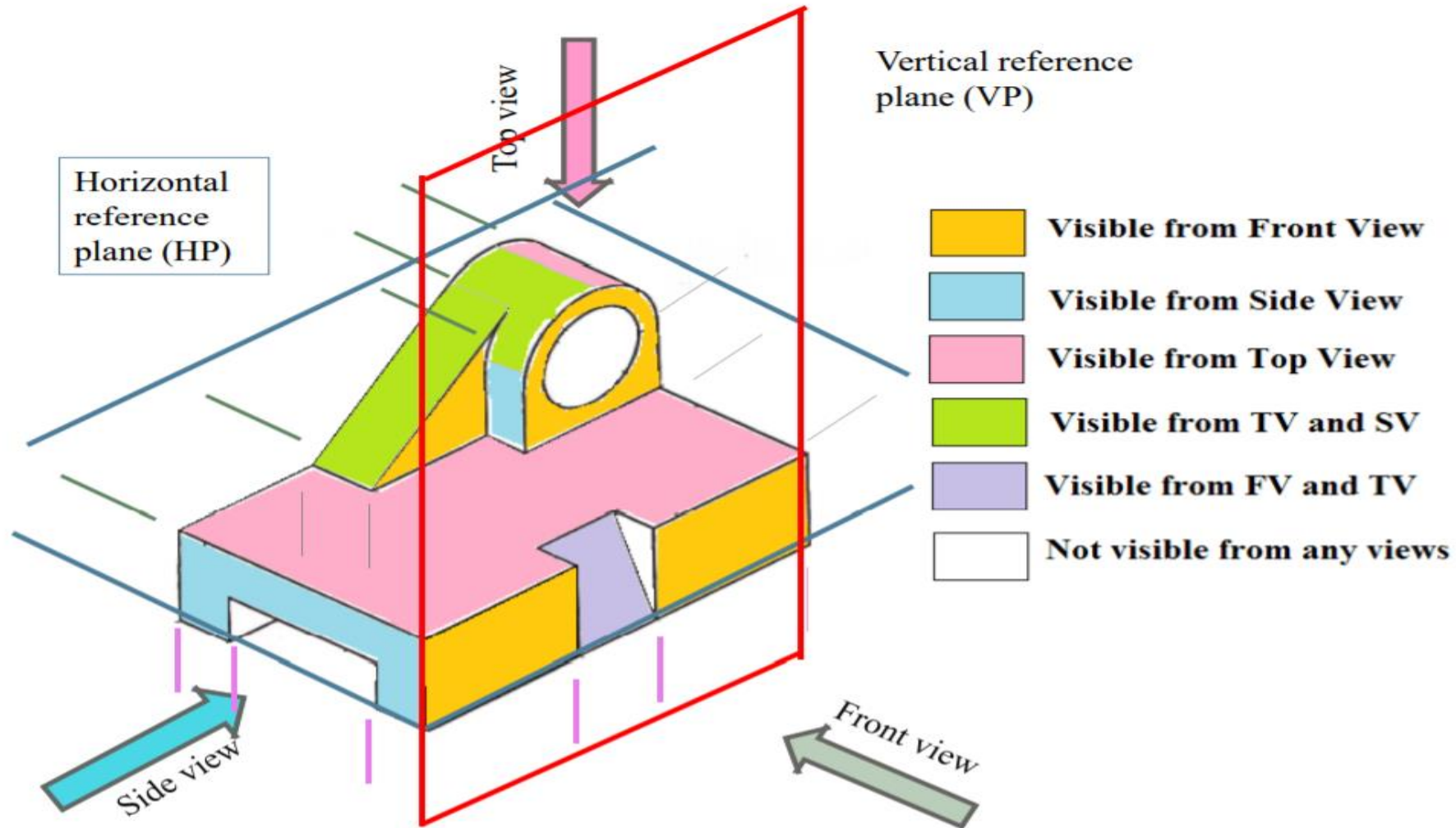
## Practice Problem 3

Figure below show pictorial views. Draw the T.V, F.V and LHSV views using first angle method of projections.

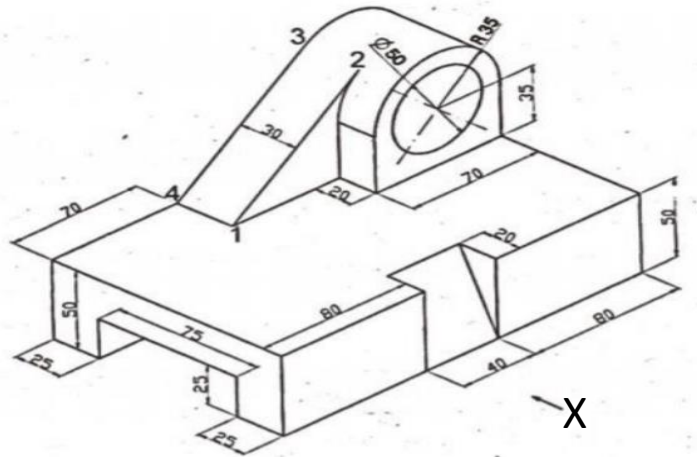




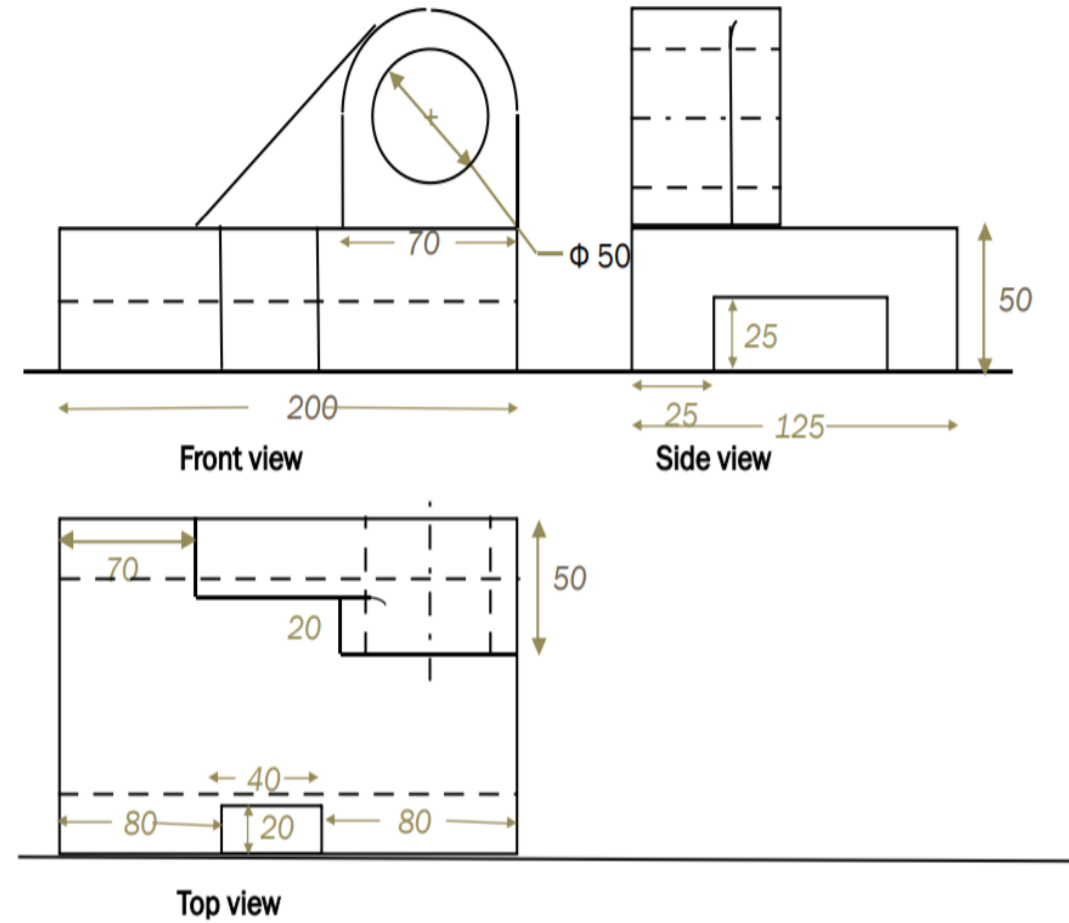
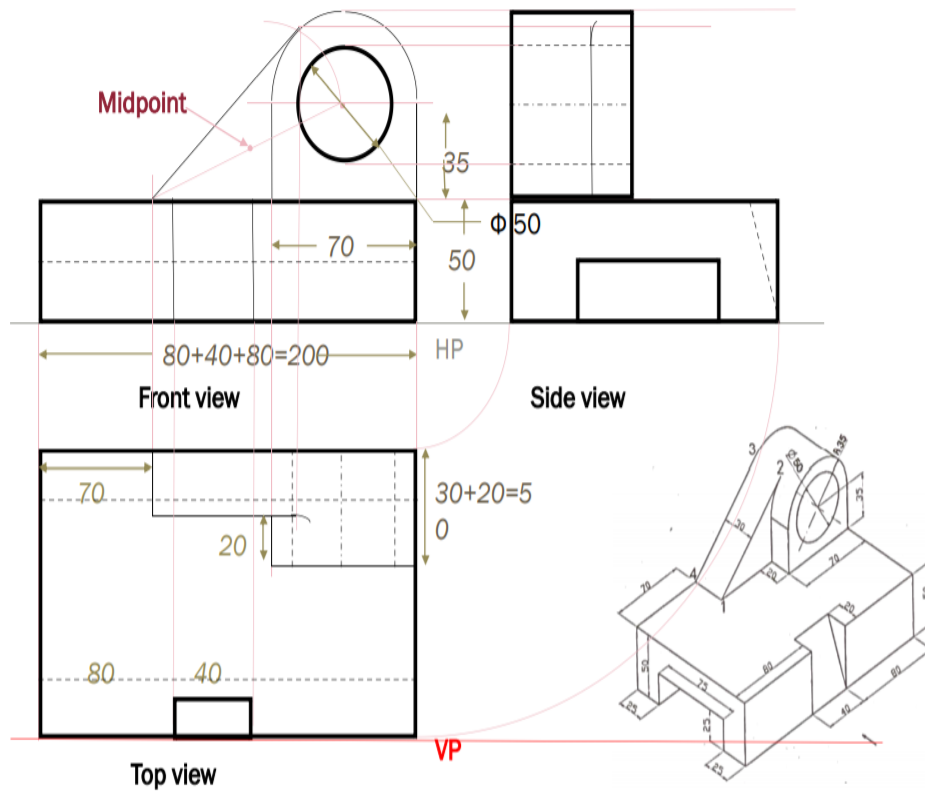
# Practice Problem 3



# Practice Problem 3



# Practice Problem 3 - solution



## Practice Problem 4

Figure below show pictorial views. Draw the T.V, F.V and RHSV views using first angle method of projections.

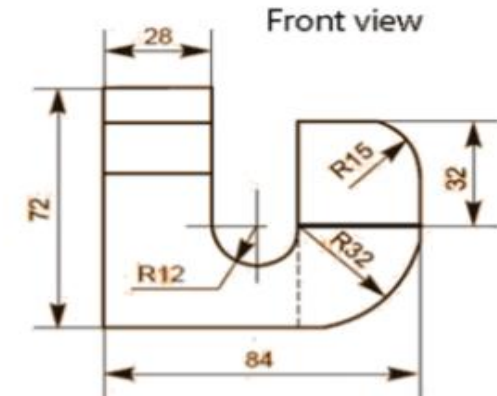
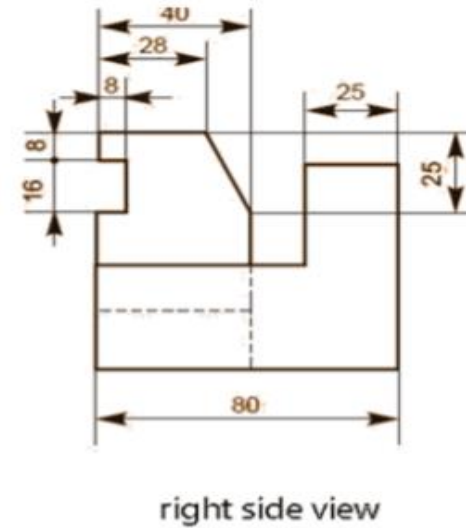
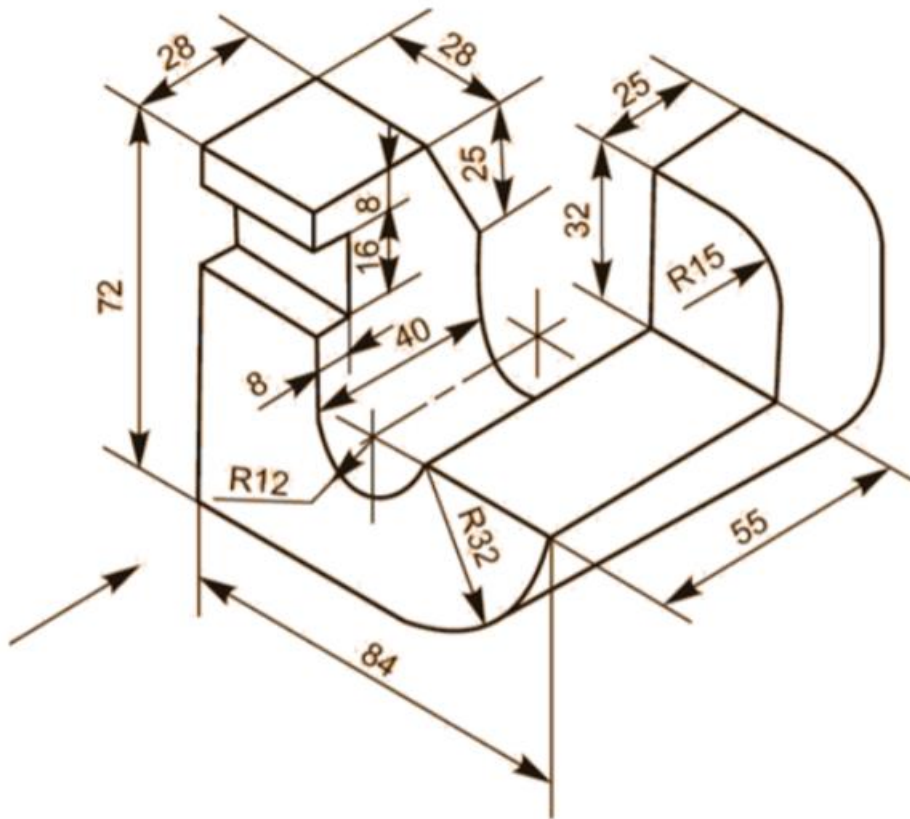
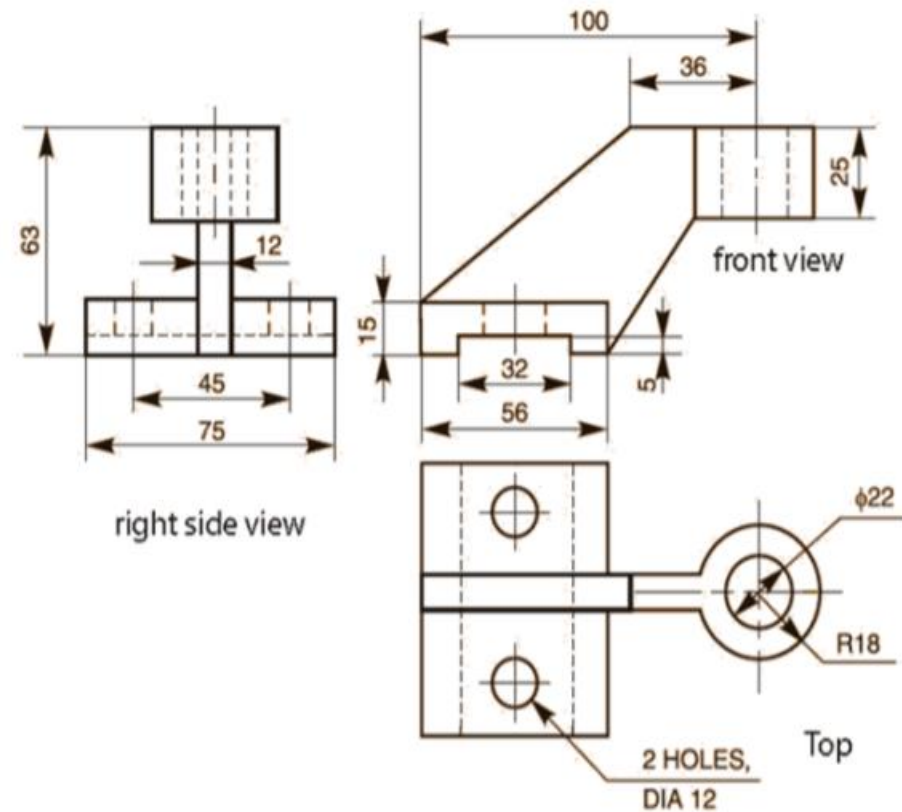
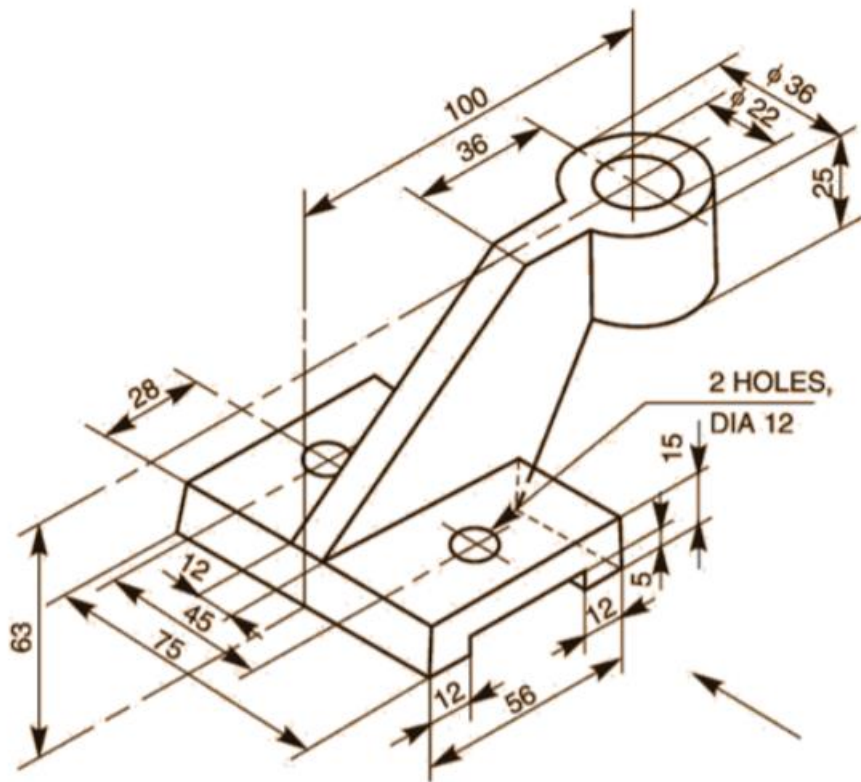






Figure below show pictorial views. Draw the T.V, F.V and RHSV views using first angle method of projections.









## Practice Problem 8

Figure below show pictorial views. Draw the T.V, F.V and LHSV views using first angle method of projections.

