



**Addis Ababa University
Addis Ababa Institute of Technology
School of Mechanical & Industrial Engineering**

Engineering Drawing (MEng 2061)

Chapter Three

Multi-View Drawings

**By Tadele Libay
April, 2021**

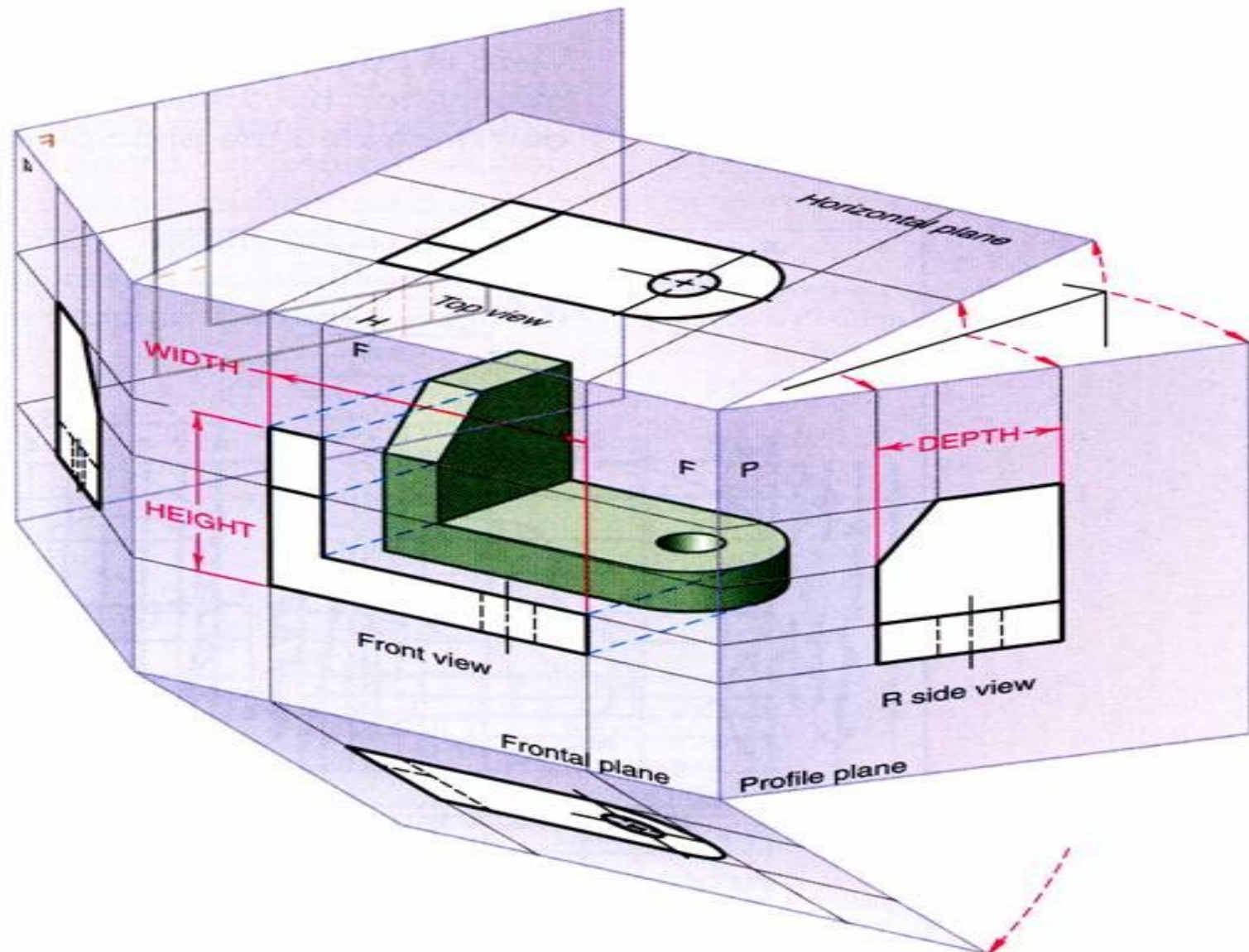
Introduction

- **Multi-view drawing** is the **graphic representation** of an object on a sheet of paper in a way that will describe exact **shape** and **proportions**. This is done by drawing **different views** of the object as it is seen from different positions. These views are then arranged in a standard order so that anyone familiar with drafting practices can understand them immediately.

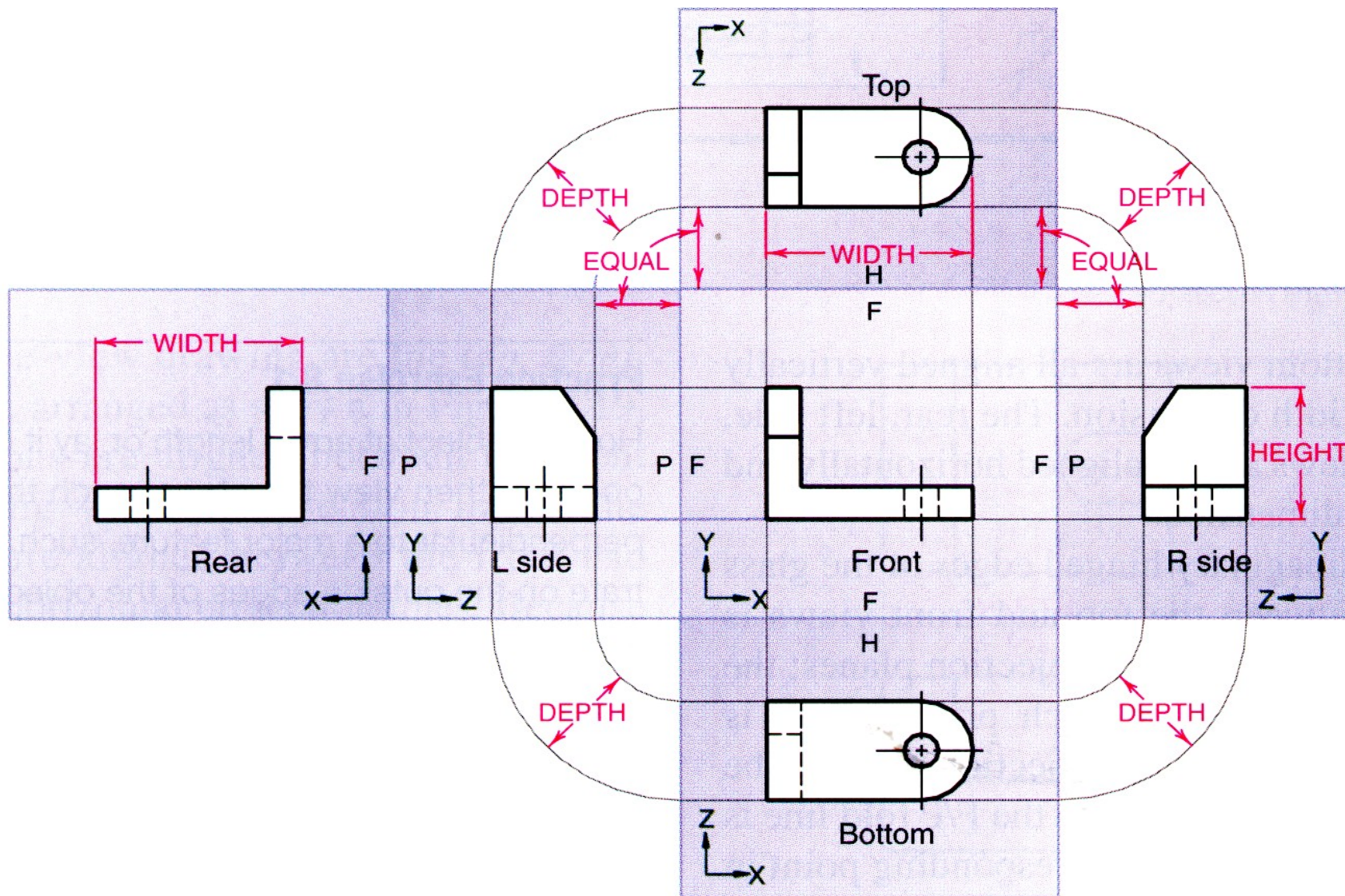
System of Projection

- To represent the **six principal views** (front, rear, top, bottom, right side and left side) of an object, multi-view drawing uses **orthographic projection**.
- The representation can be done using first angle and third angle projection technique. Hence, both first angle and third angle system projection are used in multi-view drawing.

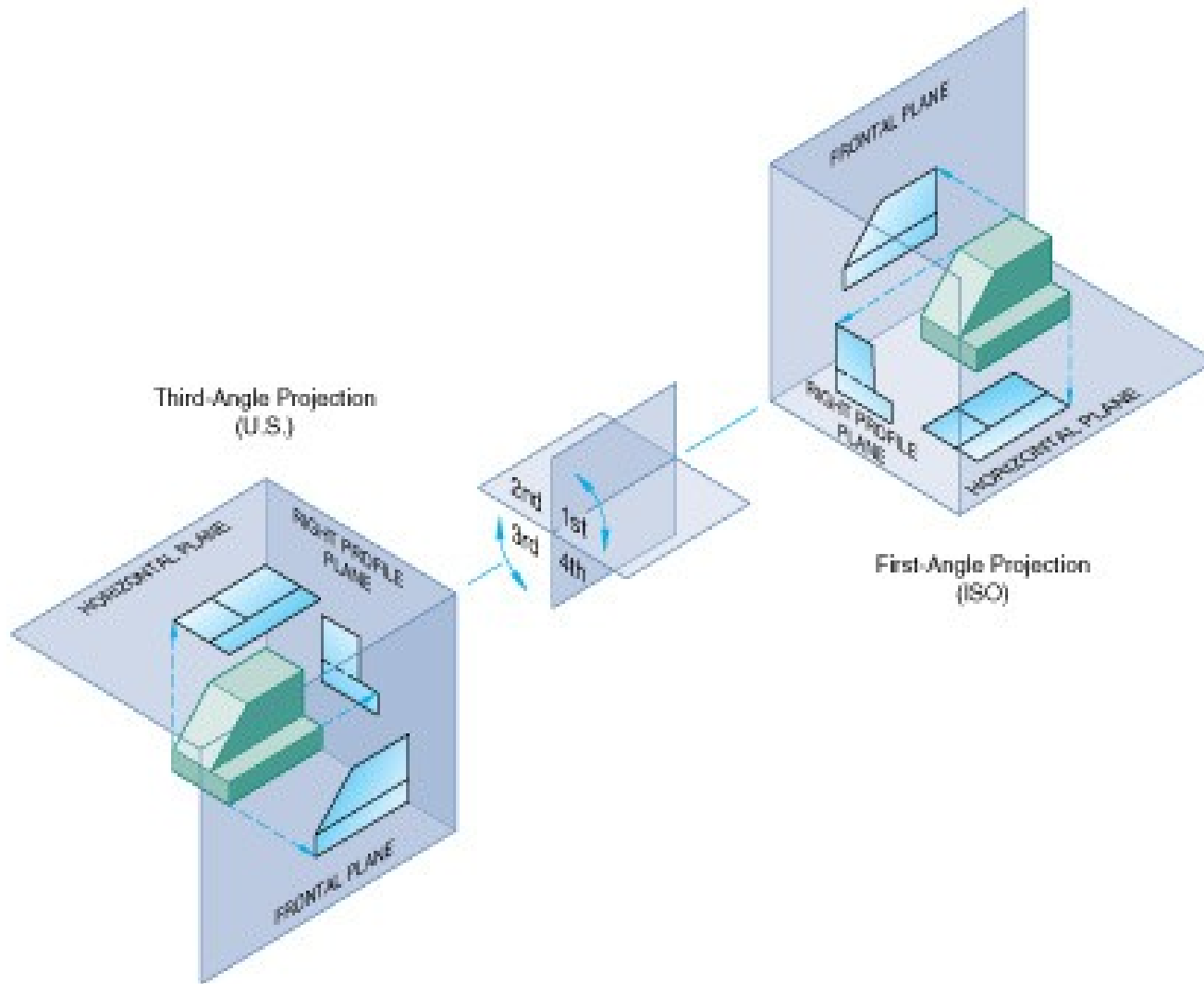
System of Projection



System of Projection

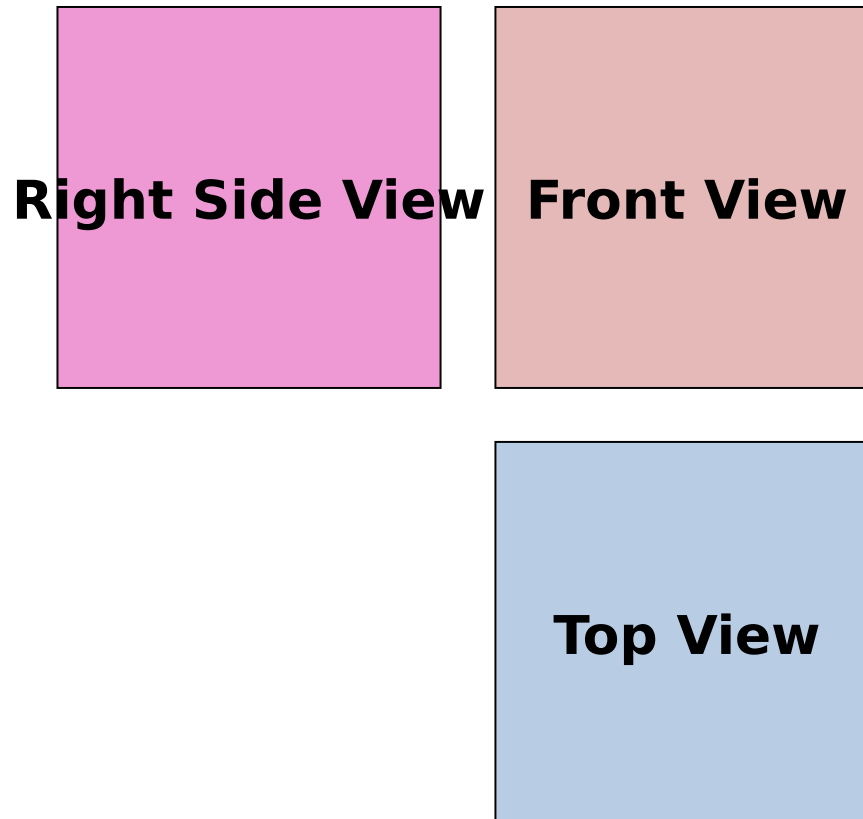


System of Projection



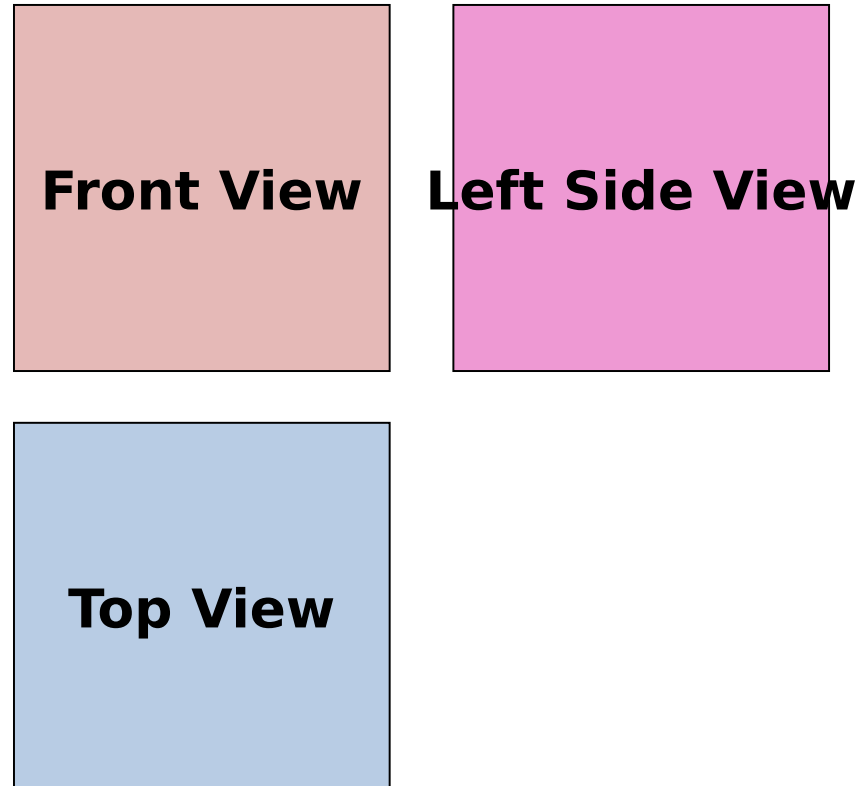
System of Projection

- Taking front view as reference, in first angle projection, when **right side view** of an object is taken; it is drawn to the **left** of front view and the **top view** is drawn **below** front view. The layout is as follow:



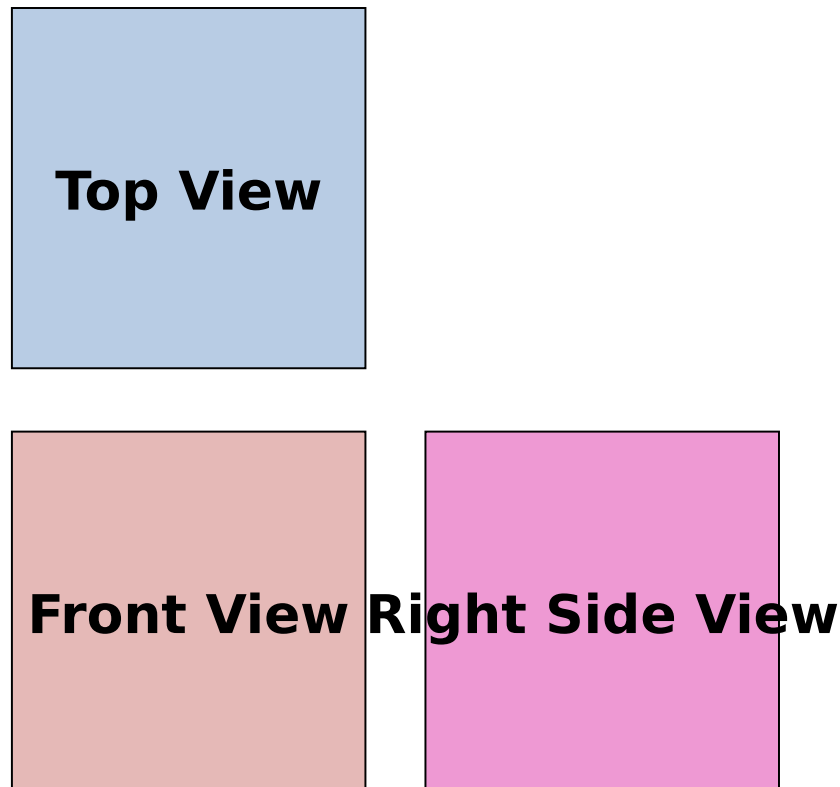
System of Projection

- Taking front view as reference, in first angle projection, when **left side view** of an object is taken; it is drawn to the **right** of front view and the **top view** is drawn **below** front view. The layout is as follow:



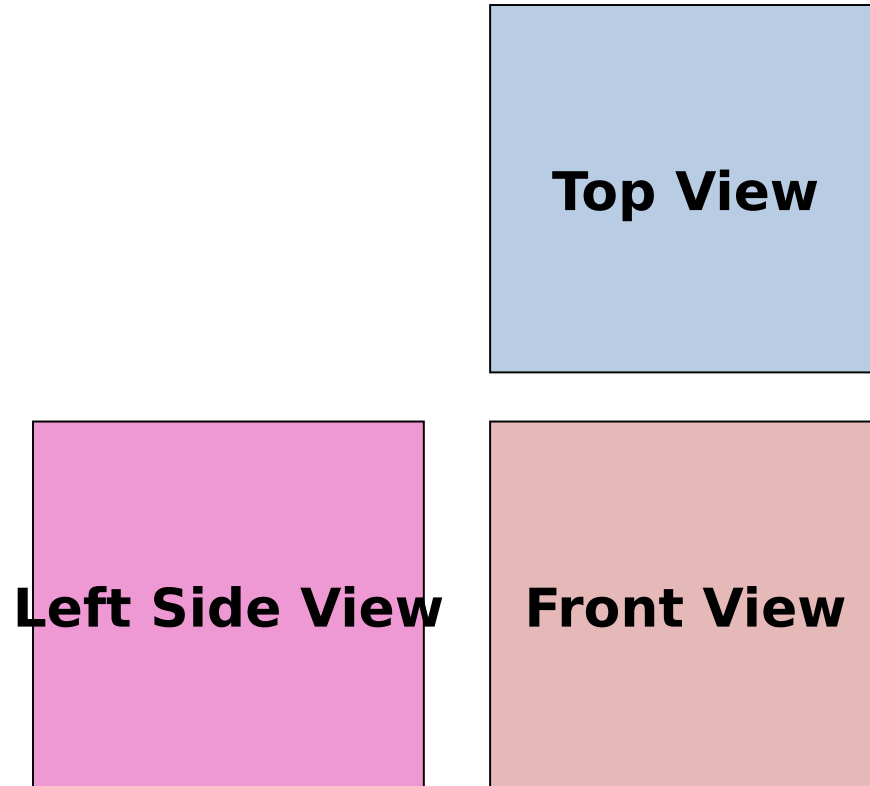
System of Projection

- Taking front view as reference, in third angle projection, when **right side view** of an object is taken; it is drawn to the **right** of front view and the **top view** is drawn **above** front view. The layout is as follow:



System of Projection

- Taking front view as reference, in third angle projection, when **left side view** of an object is taken; it is drawn to the **left** of front view and the **top view** is drawn **above** front view. The layout is as follow:



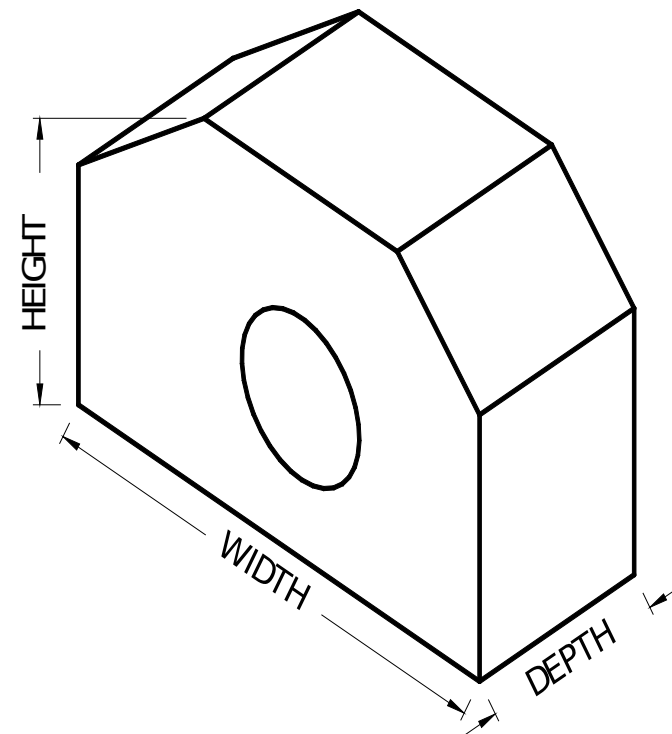
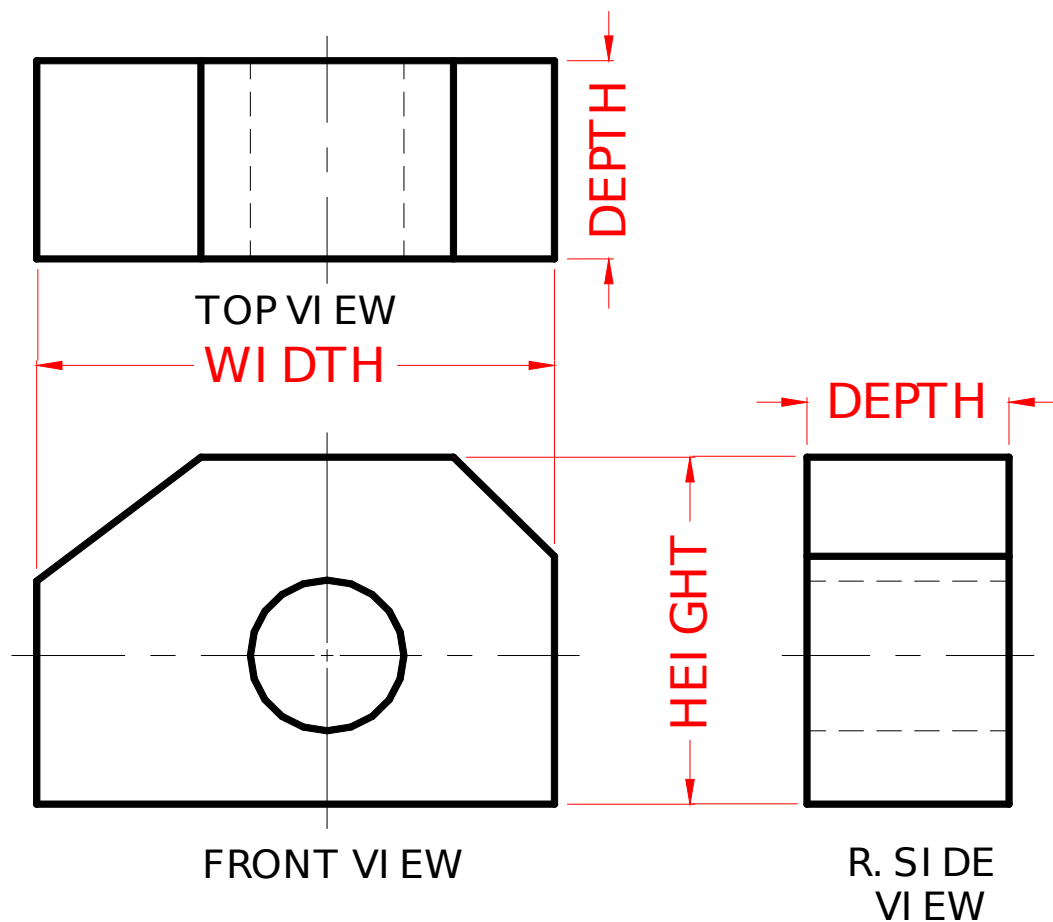
Choice of Views

- Most commonly used views are: **Front view**, **Top view** and **Right side view**. The front view is selected **first** then additional views are selected relative to front view.

The following guidelines should be considered when selecting the front view:

- Look for the **best shape** or most contours.
- Display the **most informatics** view.
- Show the most natural **position of use**.
- Provide the **longest dimension**.
- Contain the **least hidden features**.

Choice of Views



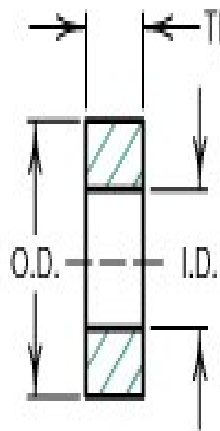
One, Two and Three View Drawings

- It is a waste of time to make views greater than the required views **enough** to describe an object. In fact, some objects require only one view.
- Multi-view drawings can have from **one to three** or **more views** of an object (rarely can have more than three views).
- **One-view drawing:** include simple objects such as a sphere, cylinder, or cube. Other applications include a thin gasket, printed circuit board, etc. Here a qualified note should be added

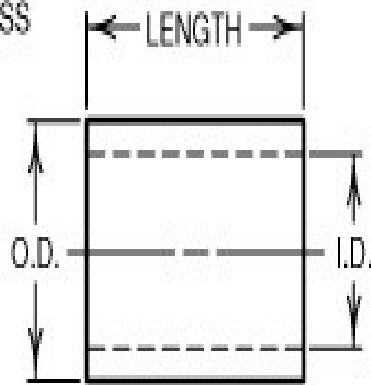
One, Two and Three View Drawings

- **Two-view drawing:** include cylindrical, conical, and pyramidal shapes.
- **Three-view drawing:** used when an object is more complex and requires three views to communicate all aspects of the drawing (width, depth, and height).

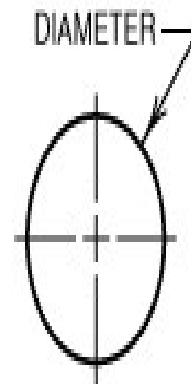
One, Two and Three View Drawings



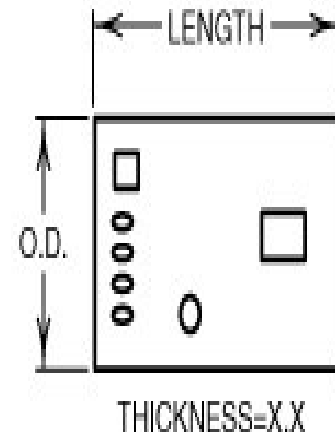
Washer



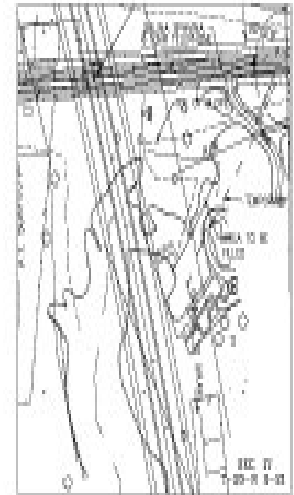
Bushing



Sphere



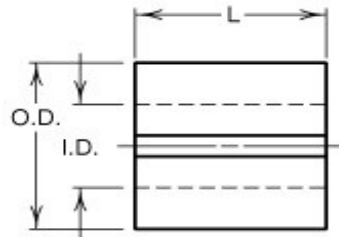
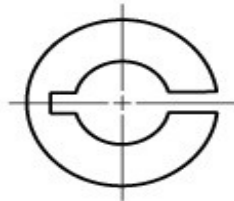
PC Board



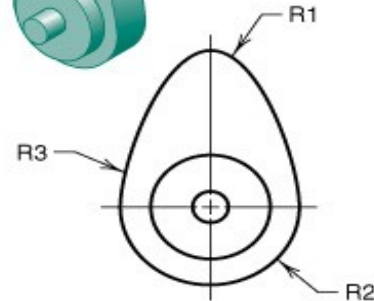
Plot Plan

One-view drawings

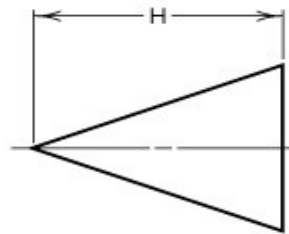
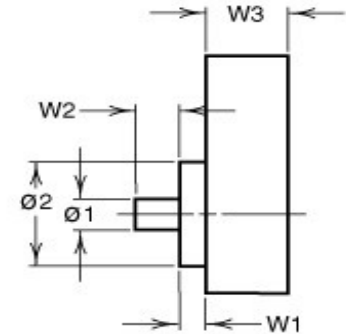
One, Two and Three View Drawings



Cylindrical parts



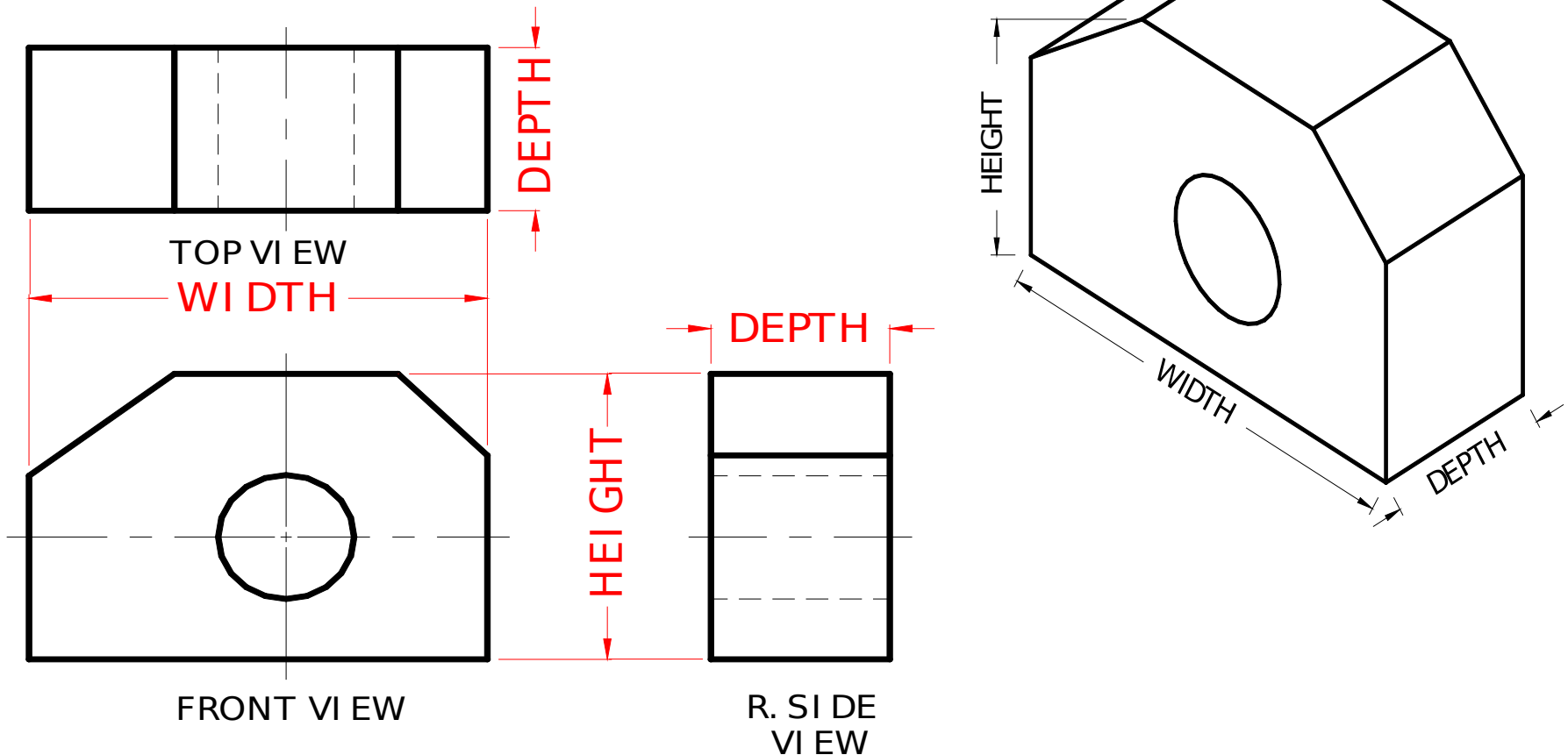
Cams



Conical parts

Two-view drawings

One, Two and Three View Drawings



Three-view drawings

Laying out of Drawings

- Laying out of drawing means putting the different views of an object into a sheet of paper. While laying out of drawing, **front** and **top** view are always inline **vertically**; front and side view are always inline **horizontally**.
- In order to have an eye attracting drawing, the drawing approximately should be put at the center of the net working area.

Steps to centering the drawing:

I-Draw border line and title block.

II-Draw diagonal lines from the corners of the net working area.

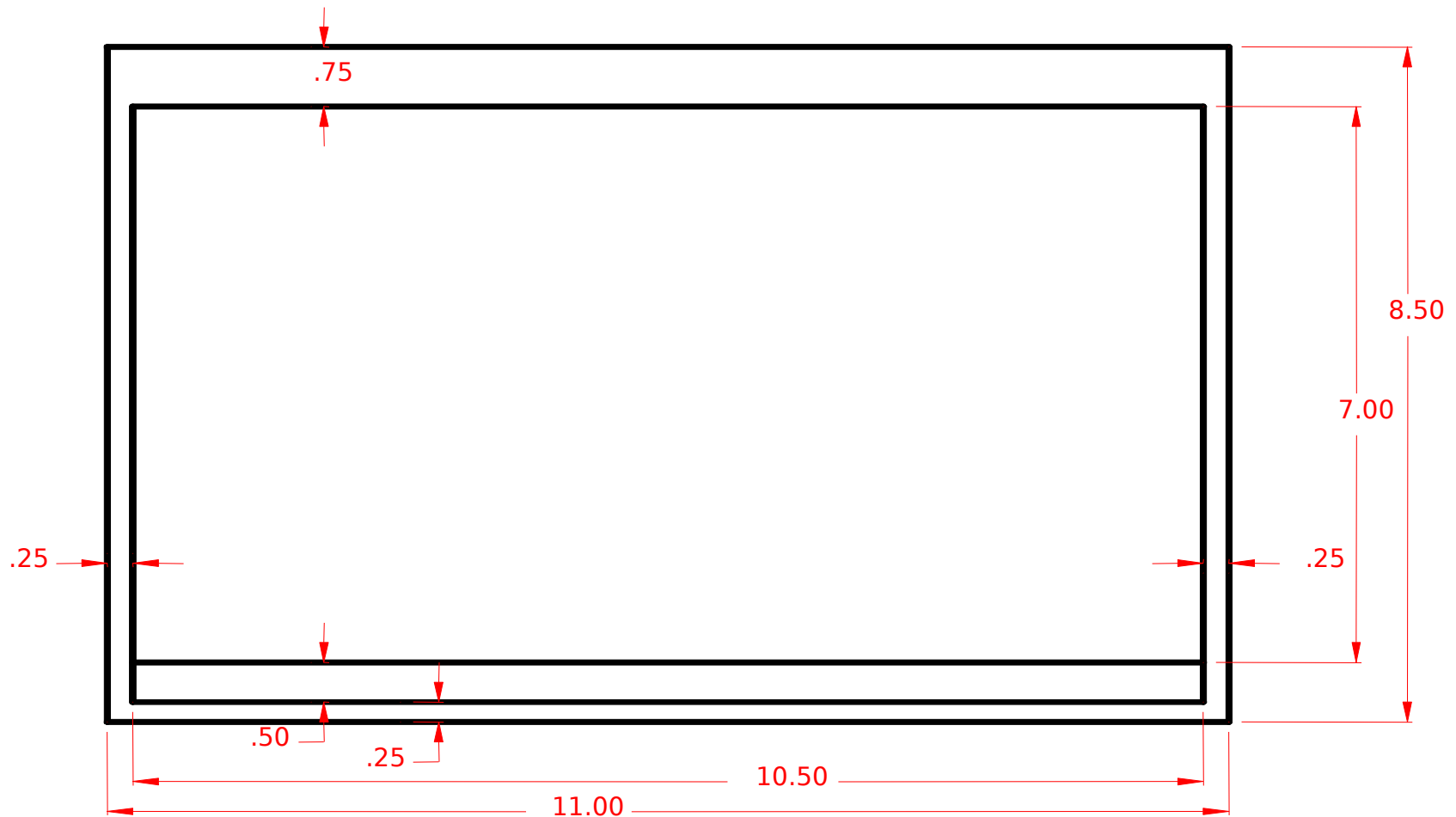
Laying out of Drawings

Steps for centering the drawing:

- III)-Calculate the total horizontal and vertical distance covered by the drawing by considering the space between each view.
- IV)-Draw line from the center line (intersection point of the diagonal lines) to half of horizontal and vertical distance.
- V)-Draw the area required for each view.
- VI)-Draw each views.
 - **Note that:** except border, title block and the views, all other are done using construction lines.

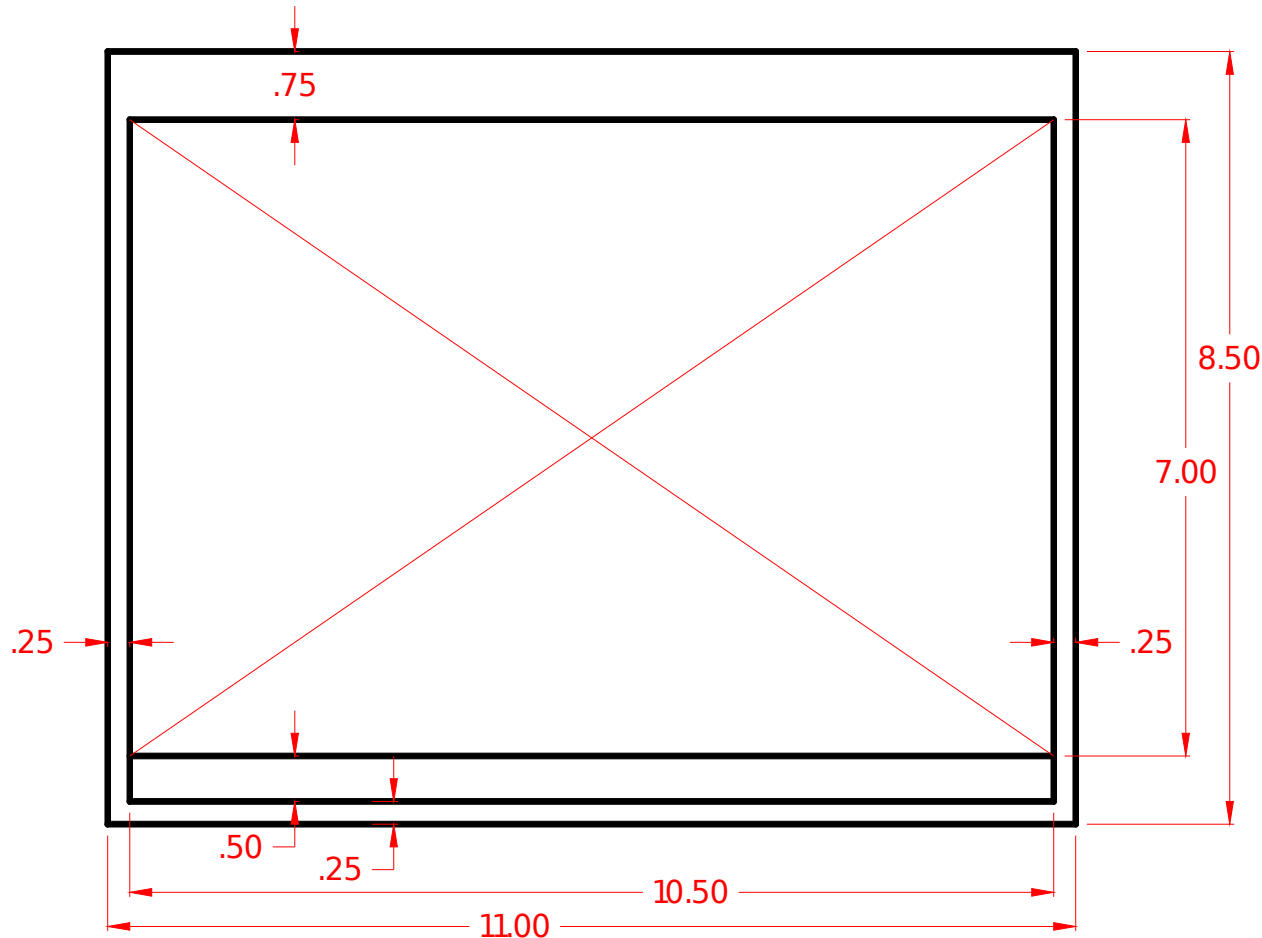
Laying out of Drawings

- Step 1:



Laying out of Drawings

- Step 2:

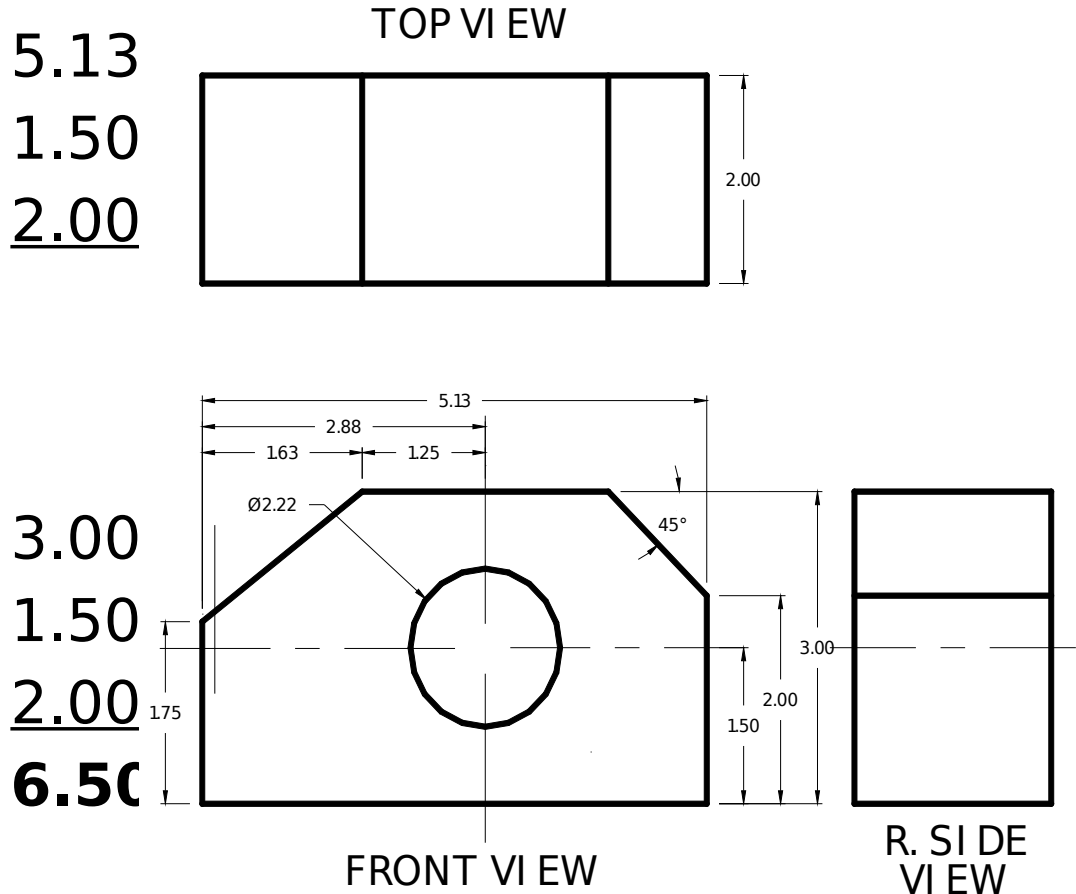


Laying out of Drawings

• Step 3:

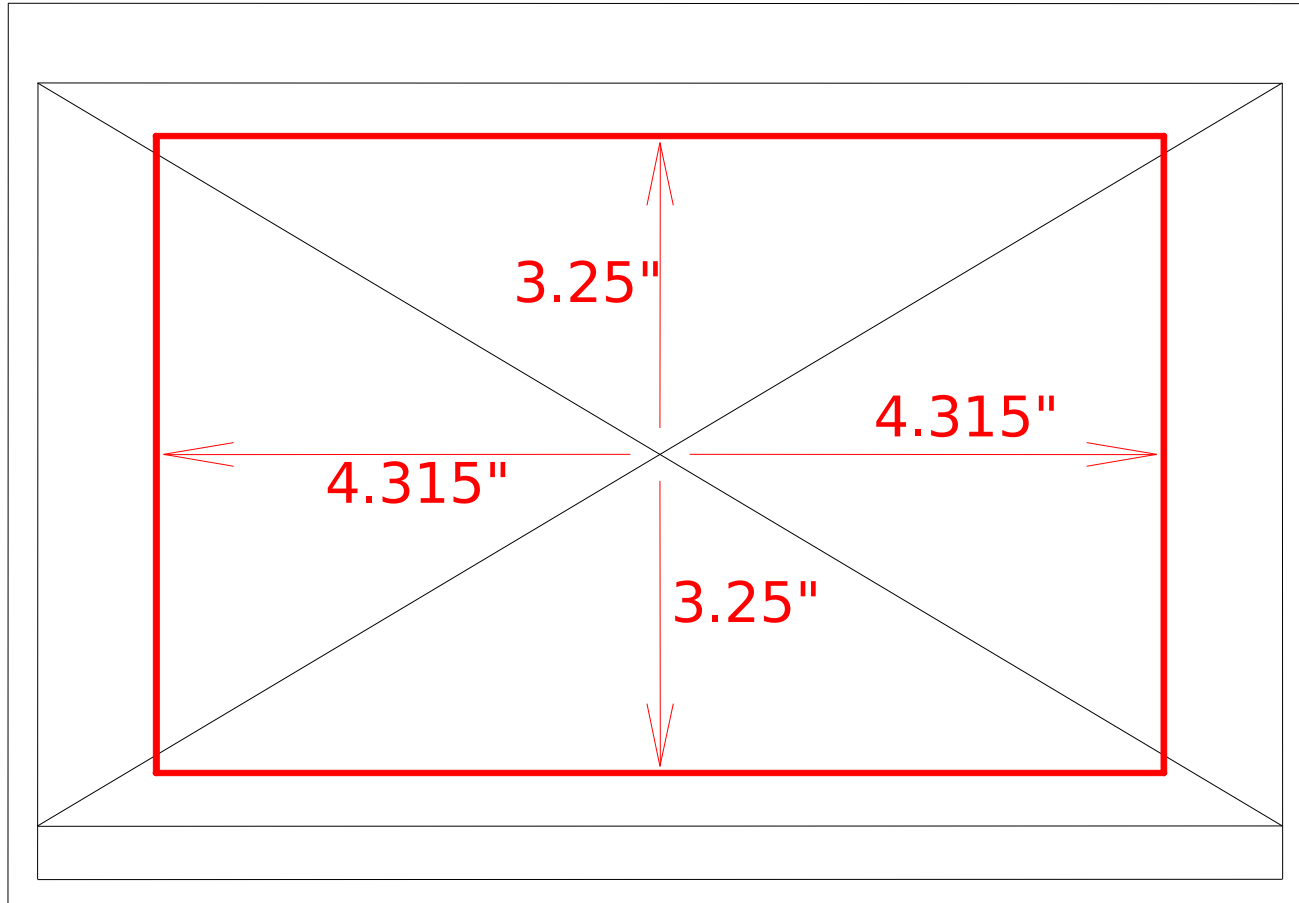
- Width 5.13
- Space 1.50
- Depth 2.00
- **Horizontal 8.63**

- Height 3.00
- Space 1.50
- Depth 2.00
- **Vertical 6.50**



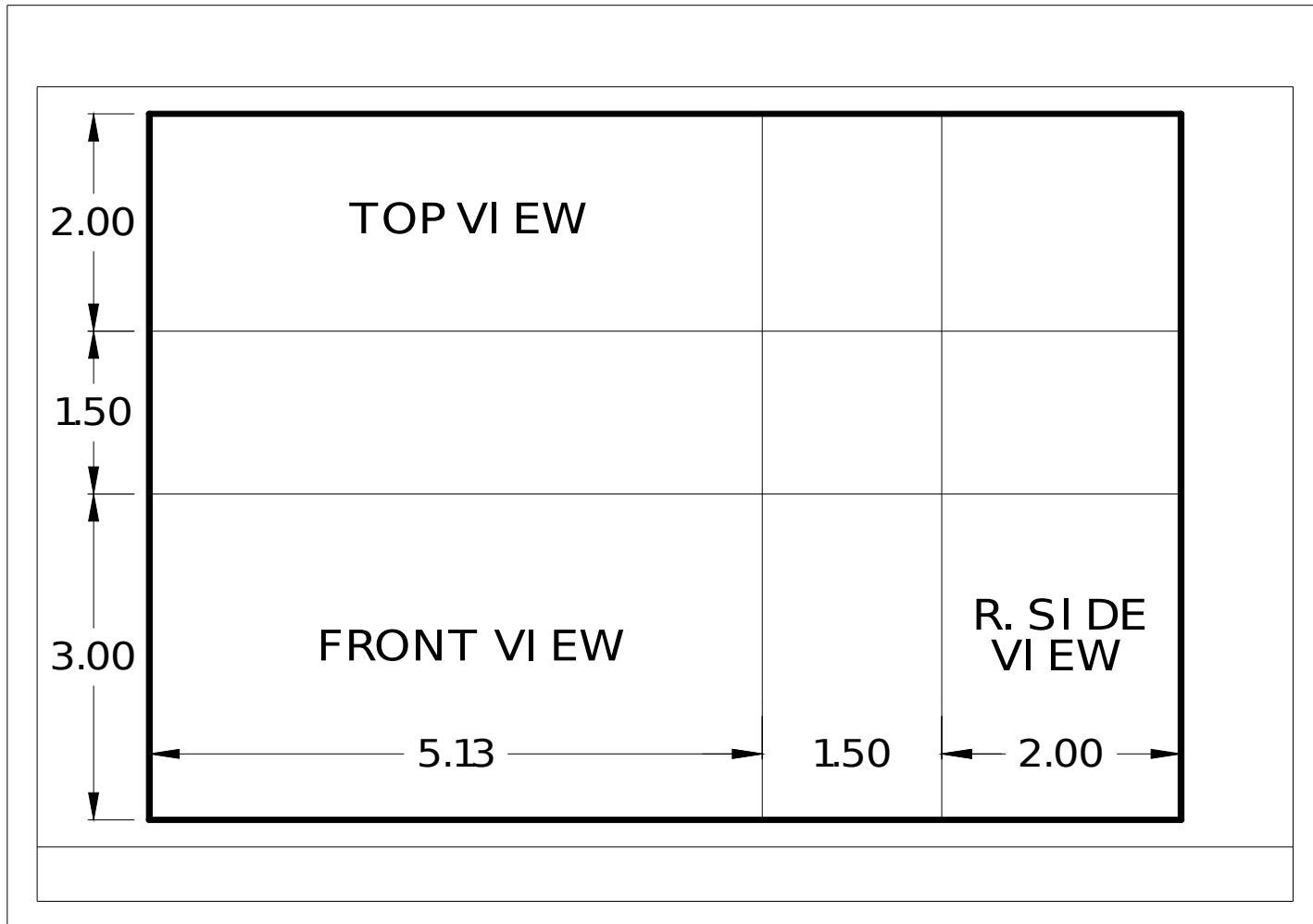
Laying out of Drawings

- Step 4:



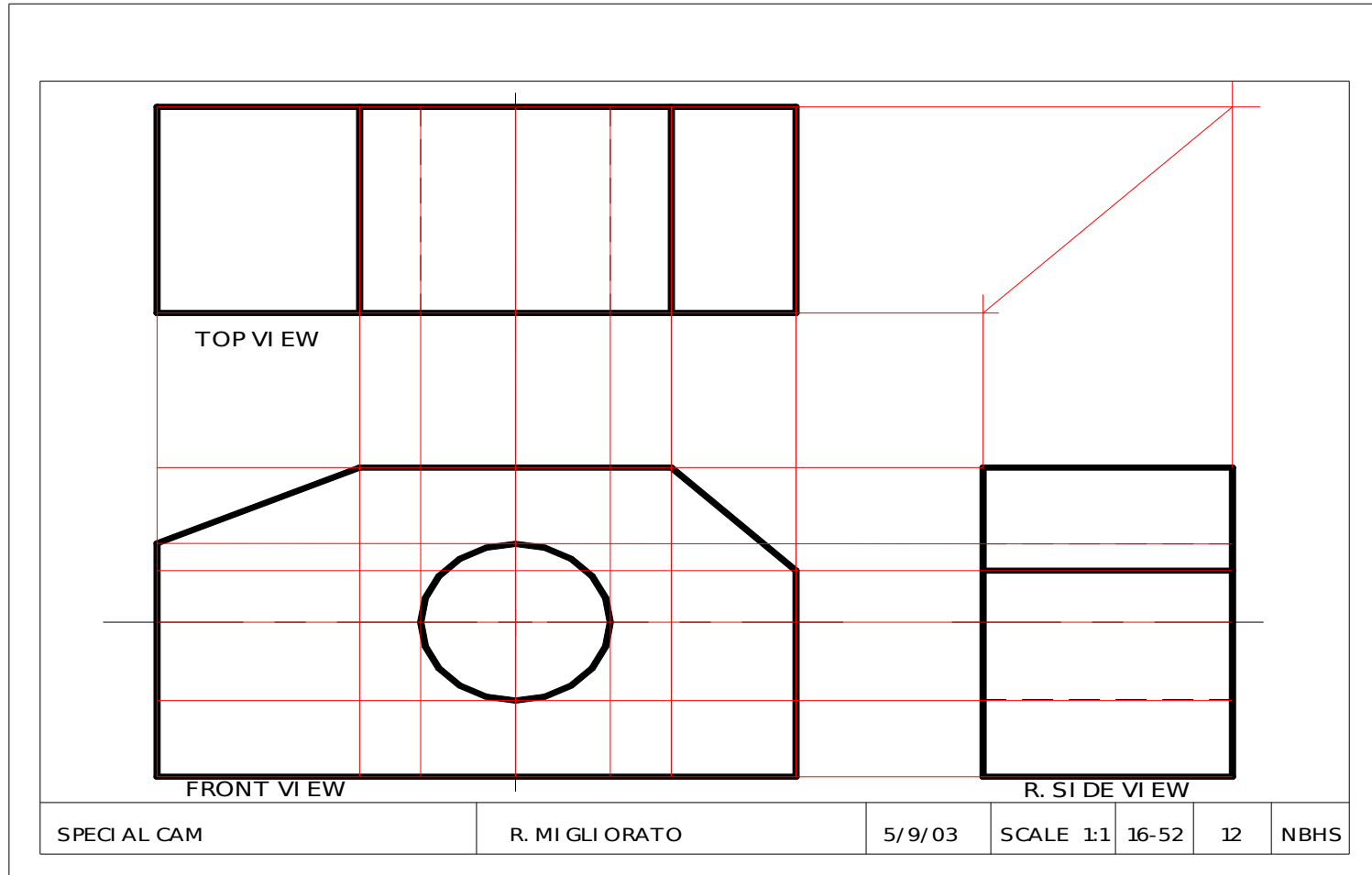
Laying out of Drawings

- Step 5:



Laying out of Drawings

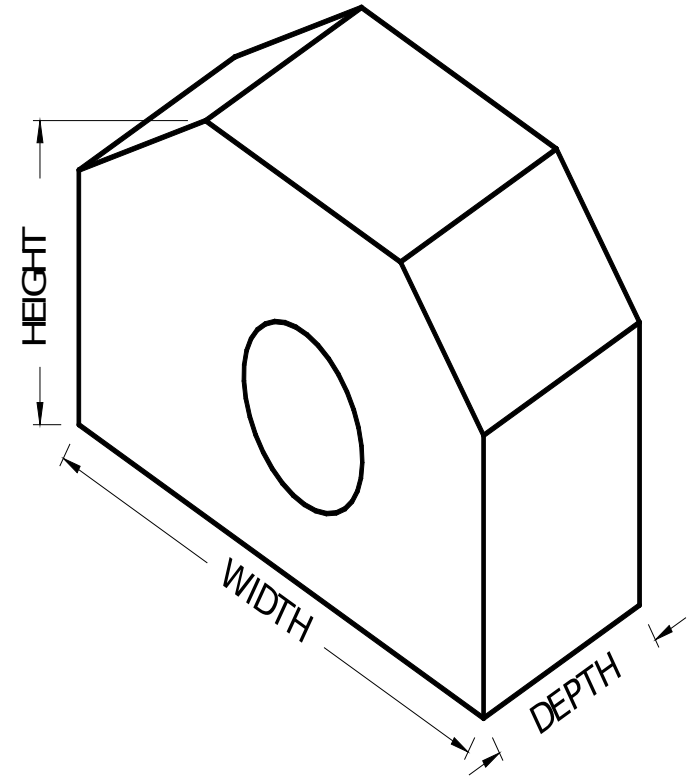
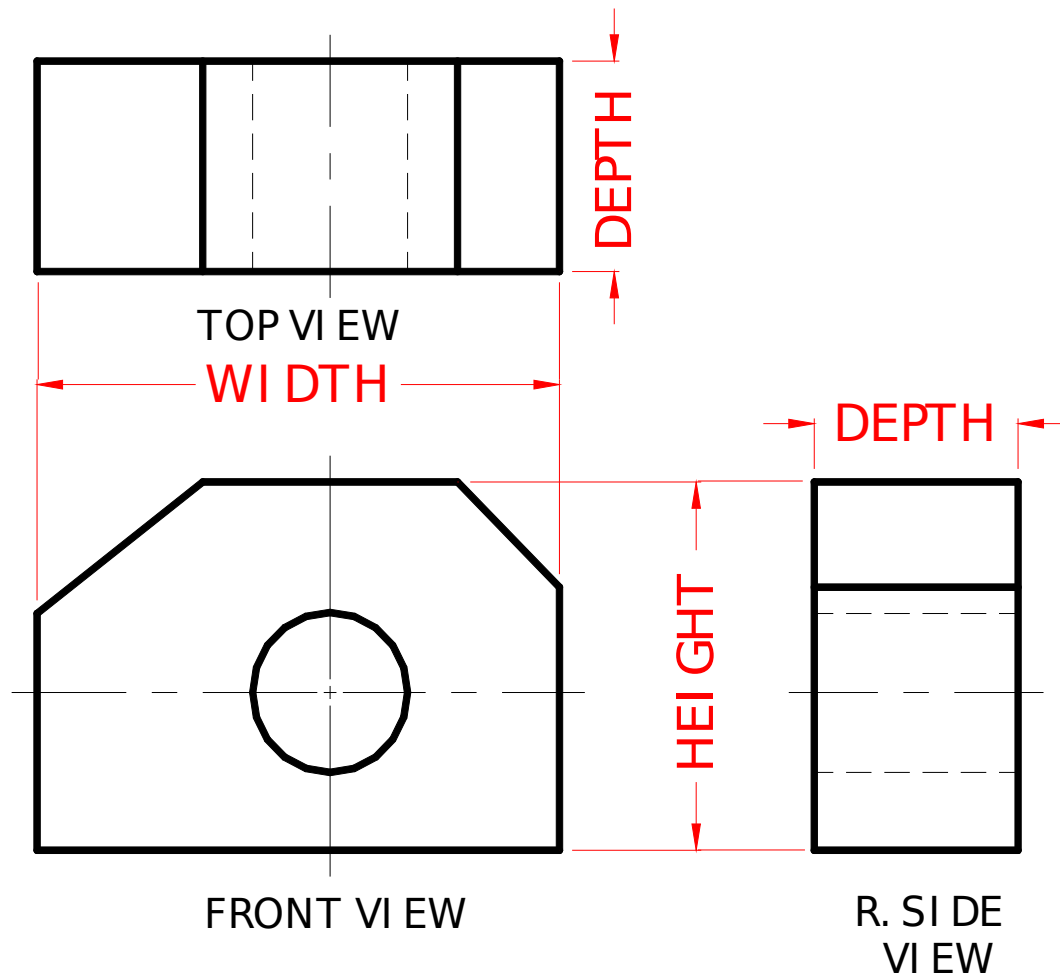
- Step 6:



Width, Height and Depth Relationships

- All three-dimensional objects have **width**, **height**, and **depth**.
 - **Height:** Distance from top to bottom
 - **Width:** Distance from side to side
 - **Depth:** Distance from the front to back
- The **width** of front, rear, top, and bottom views is equal.
- The **height** of front, rear, right side and left side views is equal.
- The **depth** of top, bottom, right side and left side views is equal.

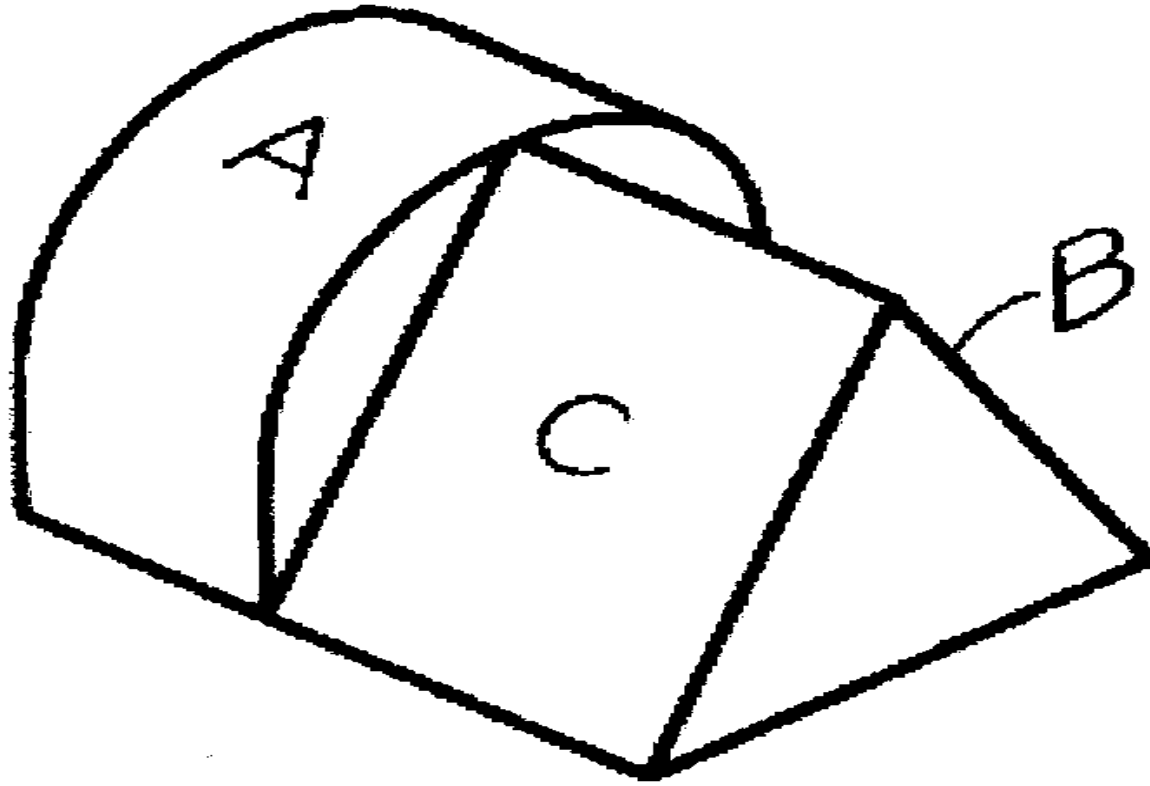
Width, Height and Depth Relationships



Projection of Planer and Non-planer Surface

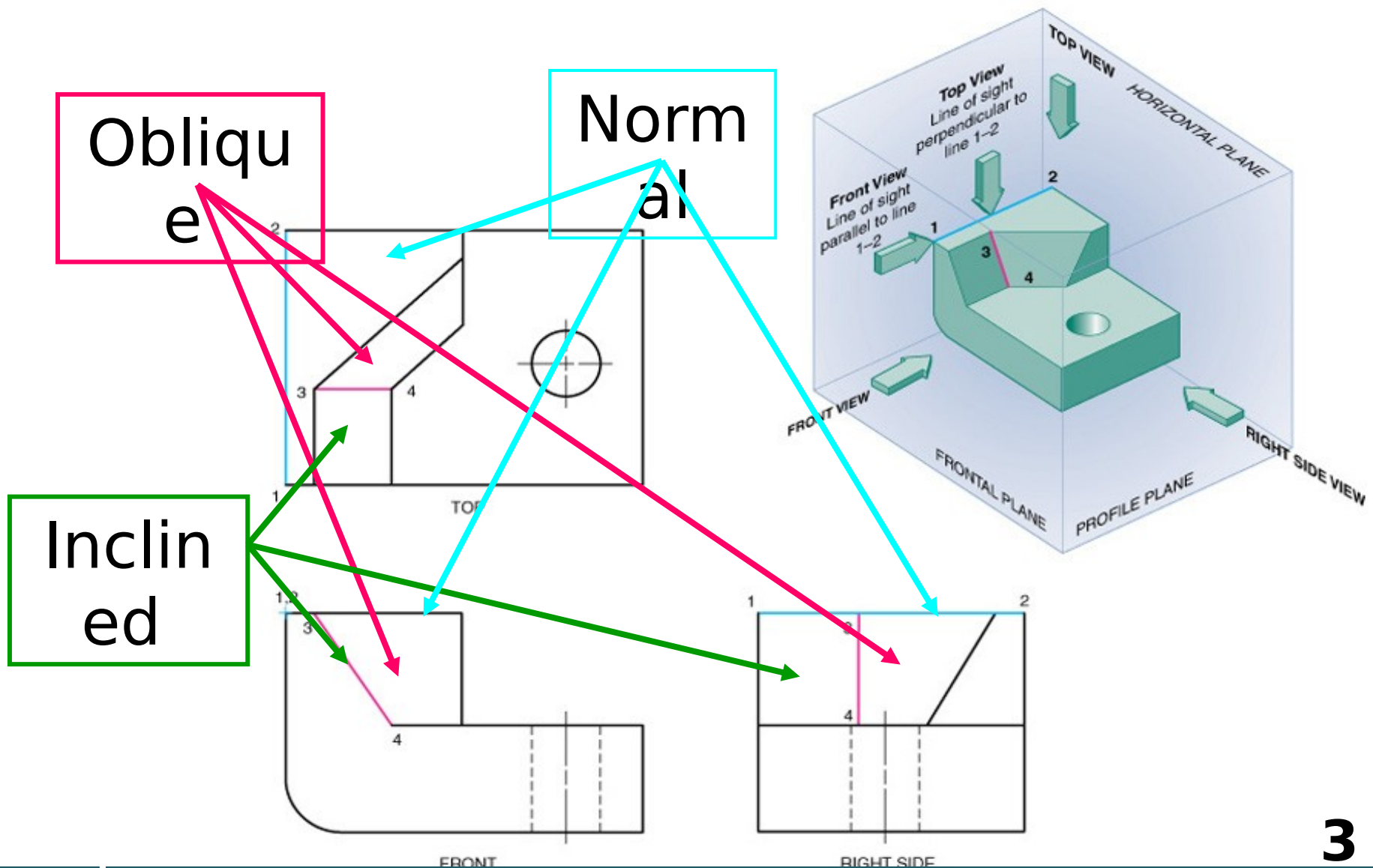
- **Planer surfaces** are surfaces that **can overlap** with a plane. Include flat surfaces.
- **Non-planer surfaces** are surfaces that **do not overlap** with a plane. Include rounds, fillets, curved surfaces, etc.

Projection of Planer and Non-planer Surface



- From above object, surface C and surface B are **planer surfaces**; and surface A is **non-planer** surface.

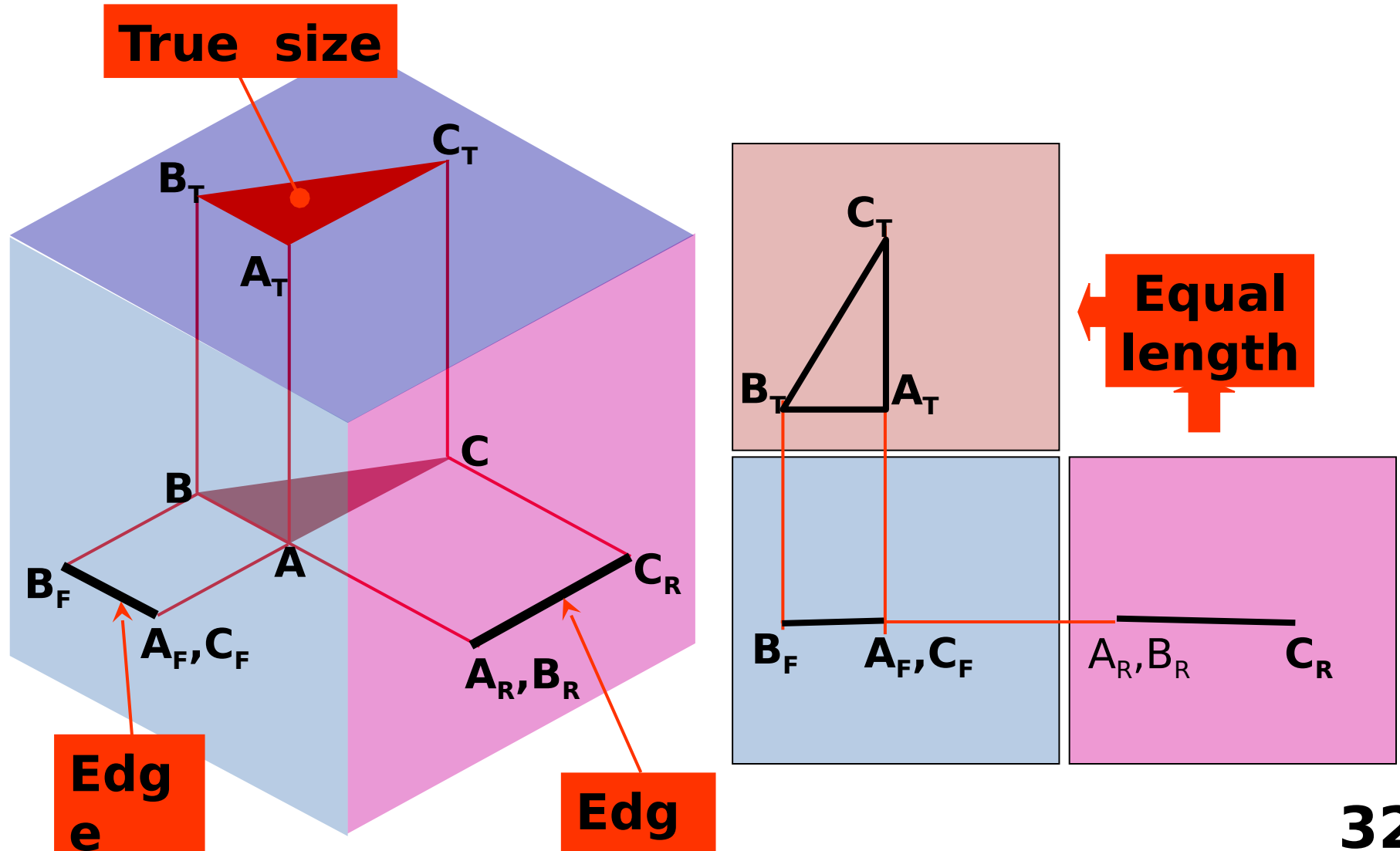
Projection of Planer Surfaces



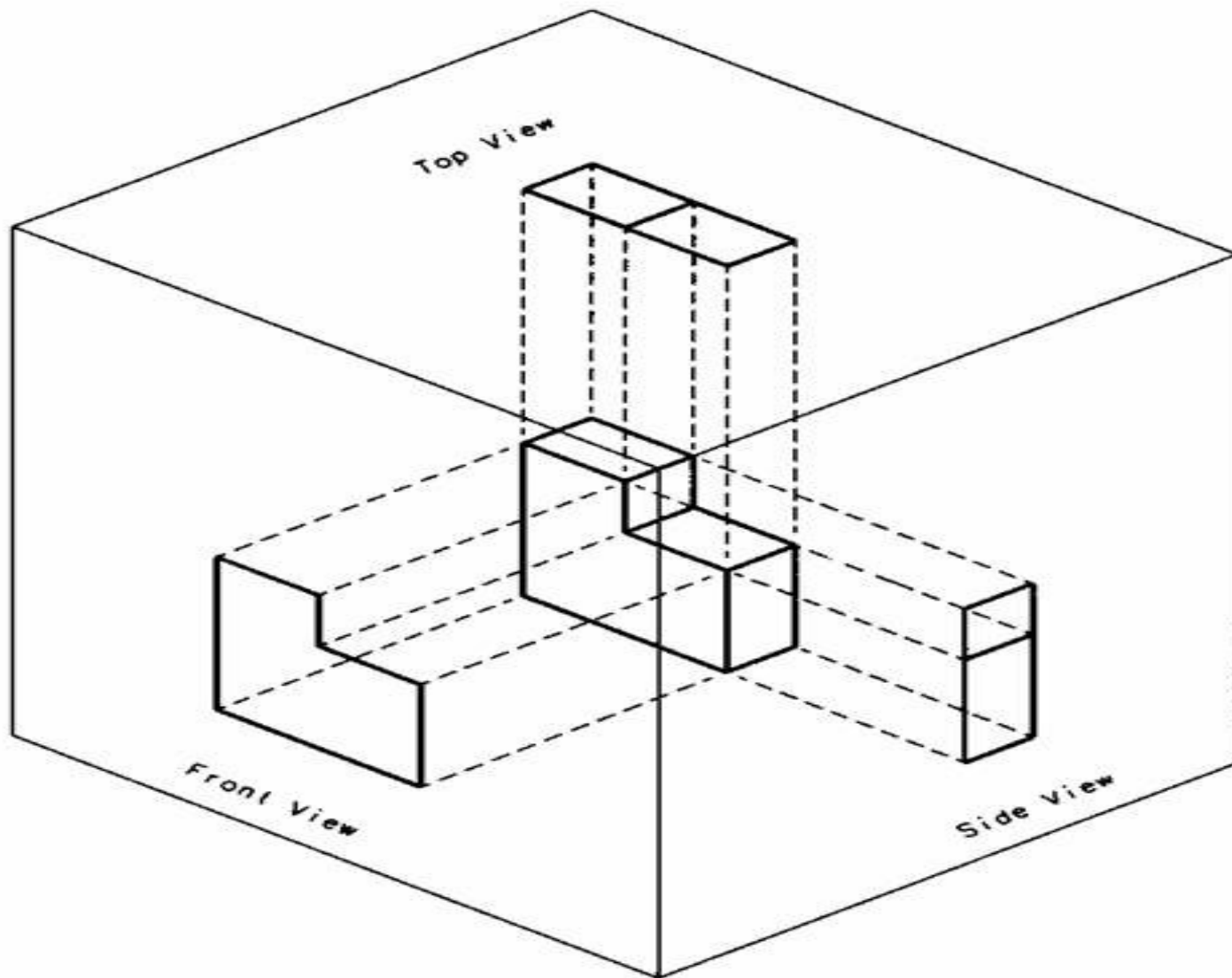
Projection of Normal Planer Surfaces

- Normal planer surfaces are **parallel** to one of the projection plane and they appear as a **true** shape and size on this plane and as a **line** (edge view) on the other adjacent plane.

Projection of Normal Planer Surfaces



Projection of Normal Planer Surfaces

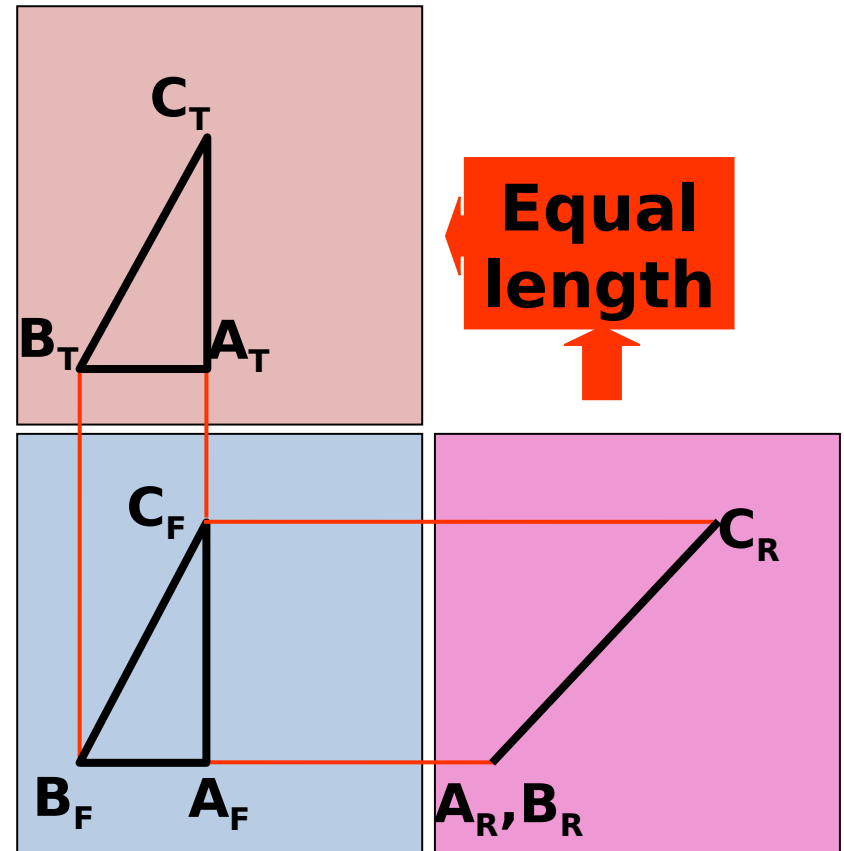
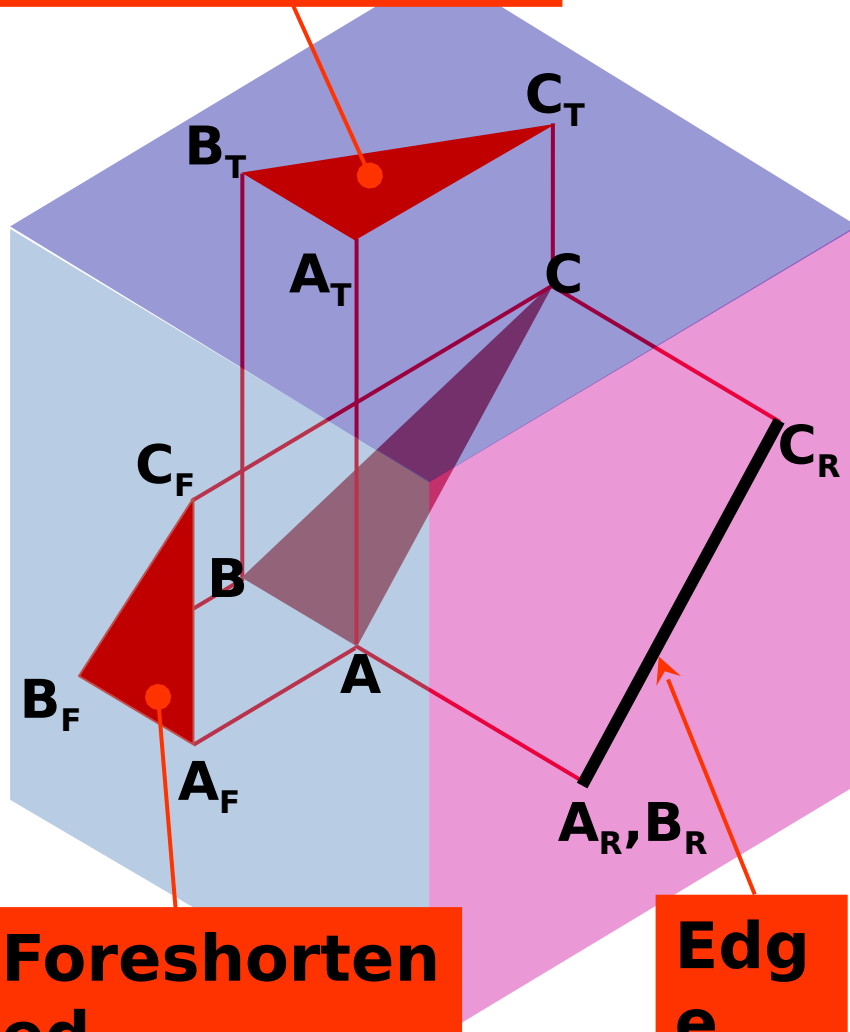


Projection of Inclined Planer Surfaces

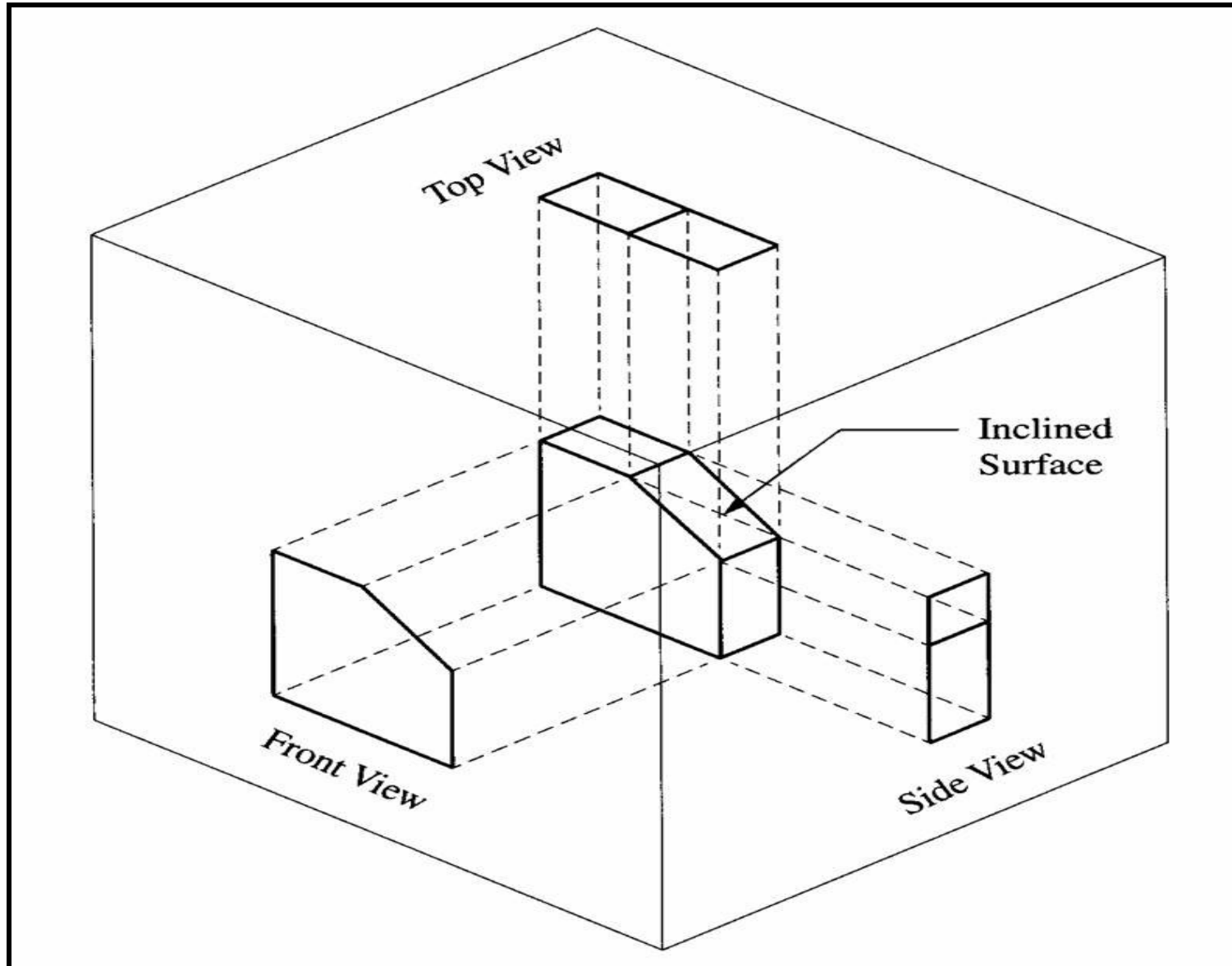
- Inclined planer surfaces are **perpendicular** to one of the projection plane and they appear as a **line** (edge view) on this plane and as a **foreshortened** surfaces on the other adjust planes.
- To represent inclined planer surfaces' true shape and sized **auxiliary view** is needed.

Projection of Inclined Planer Surfaces

Foreshortened



Projection of Inclined Planer Surfaces

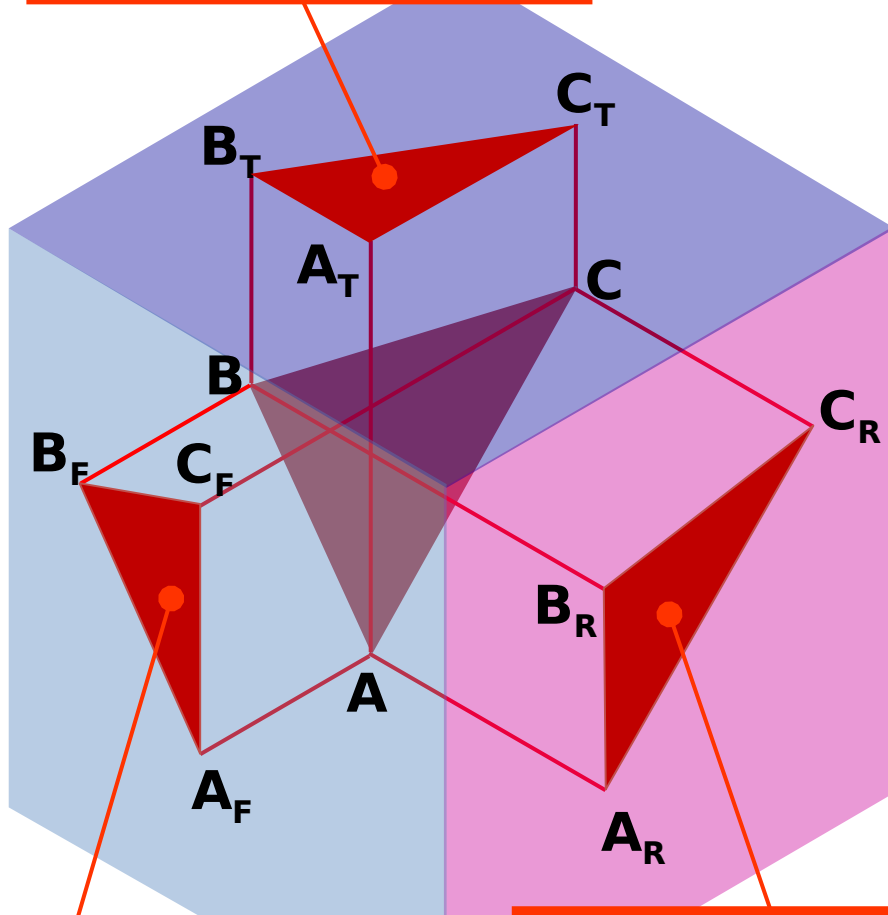


Projection of Oblique Planer Surfaces

- Inclined planer surfaces are **oblique** to all of the projection planes and they appear as a **foreshortened** surfaces on all the planes.
- To represent oblique planer surfaces' true shape and sized **auxiliary view** is needed.

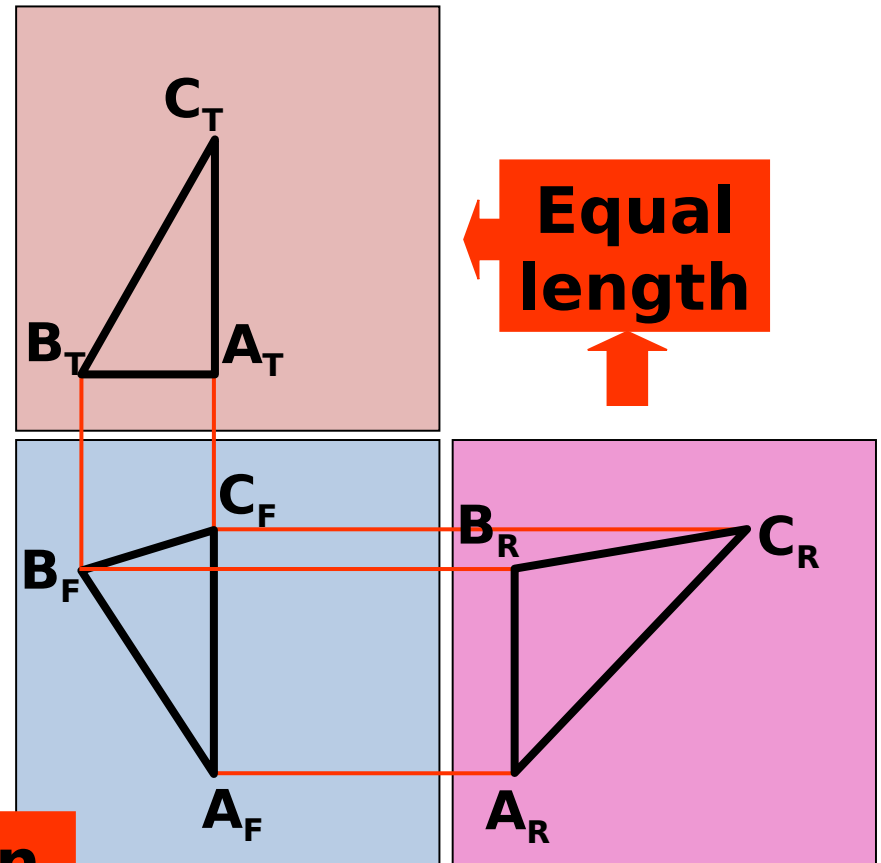
Projection of Oblique Planer Surfaces

Foreshortened

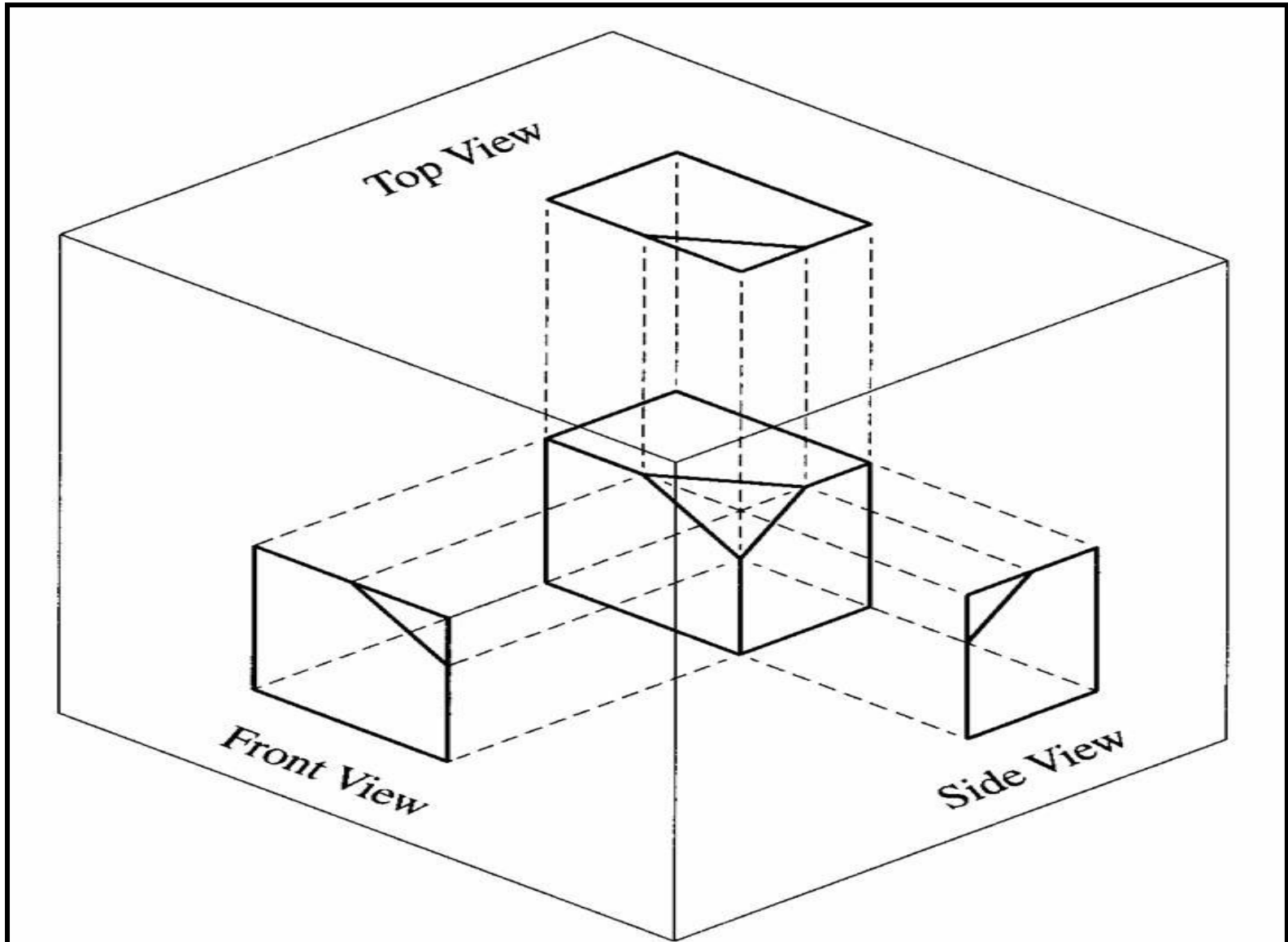


Foreshorten

Foreshorten



Projection of Oblique Planer Surfaces

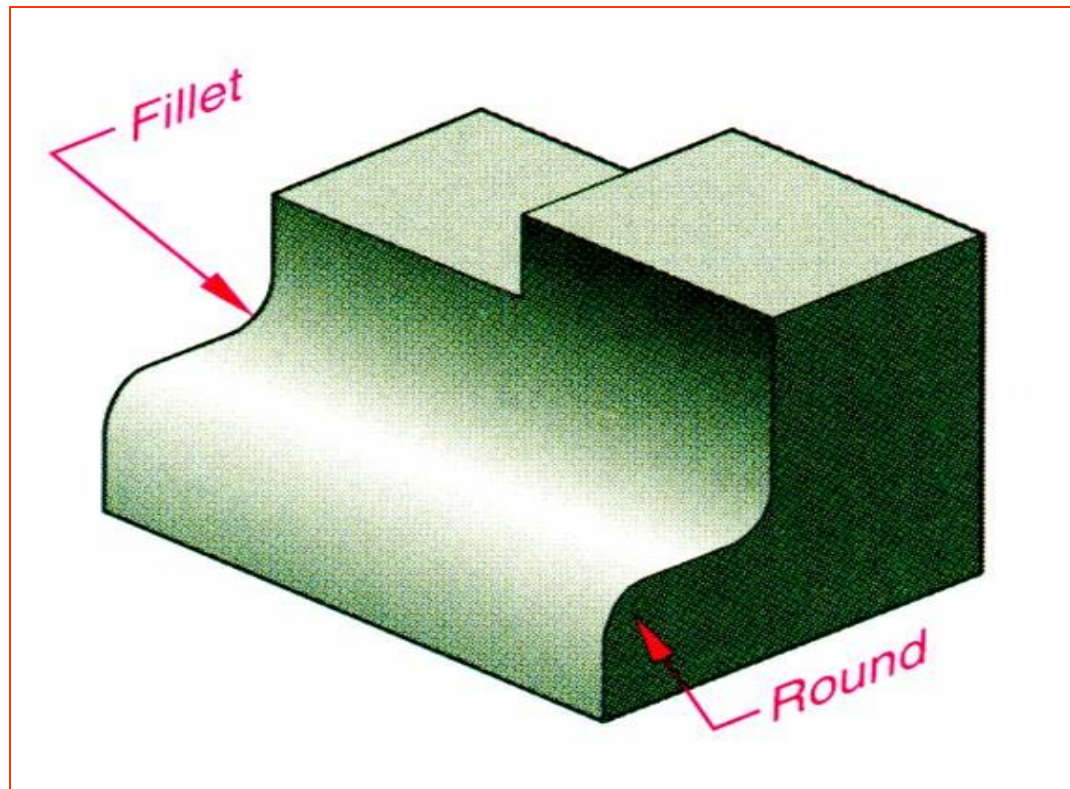


Projection of Fillets, Rounds and Run-out

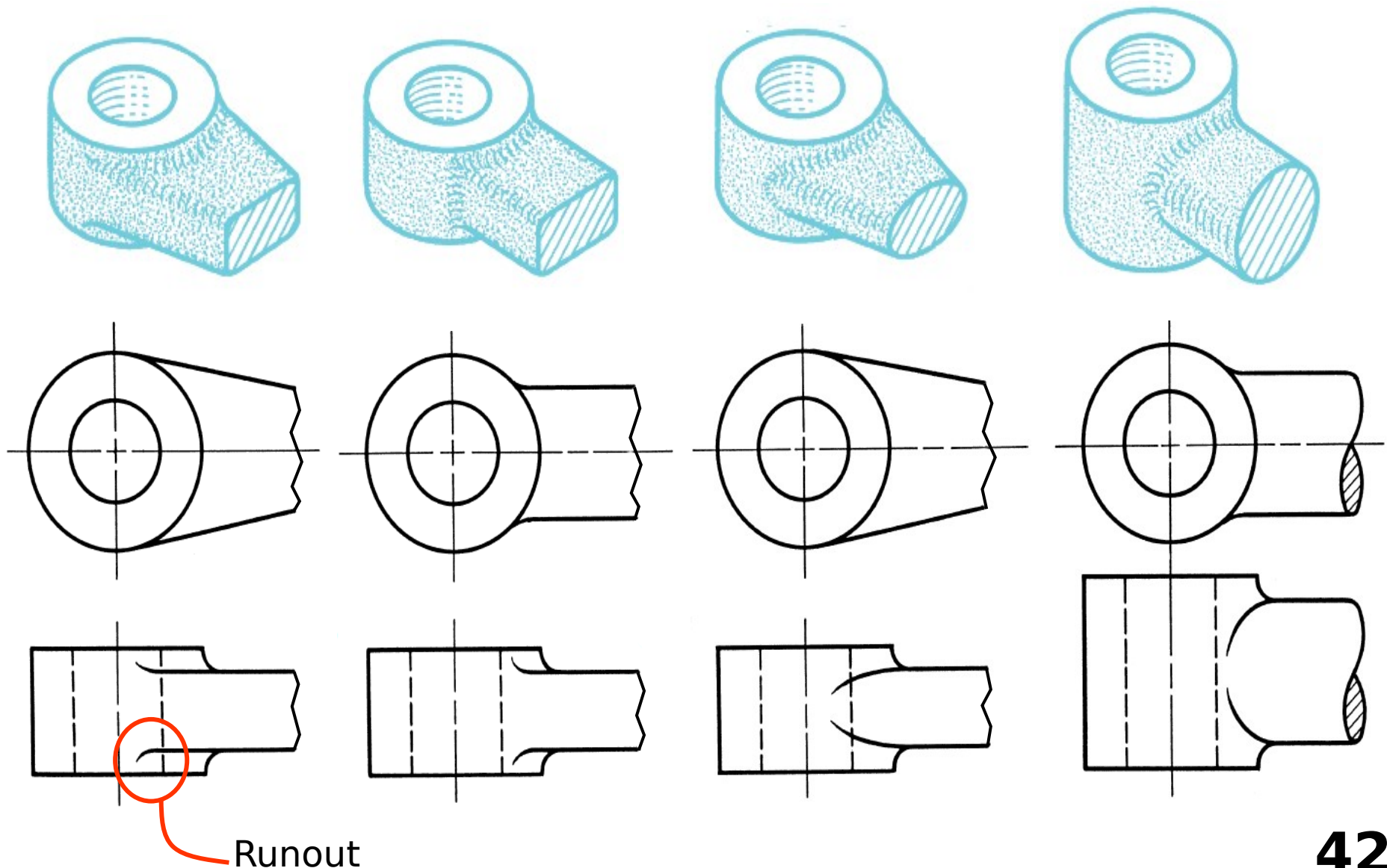
- A rounded **interior corner** is called a **fillet**, and a rounded **exterior corner** is called a **round**.
- In cast or forged objects, two intersecting rough surfaces produce a rounded corner. If one or both of these surfaces is machined, the corner becomes sharp. On a drawing, a rounded corner means that both intersecting corners are **rough**, and a sharp corner means that one or both surfaces has been **machined**.

Projection of Fillets, Rounds and Run-out

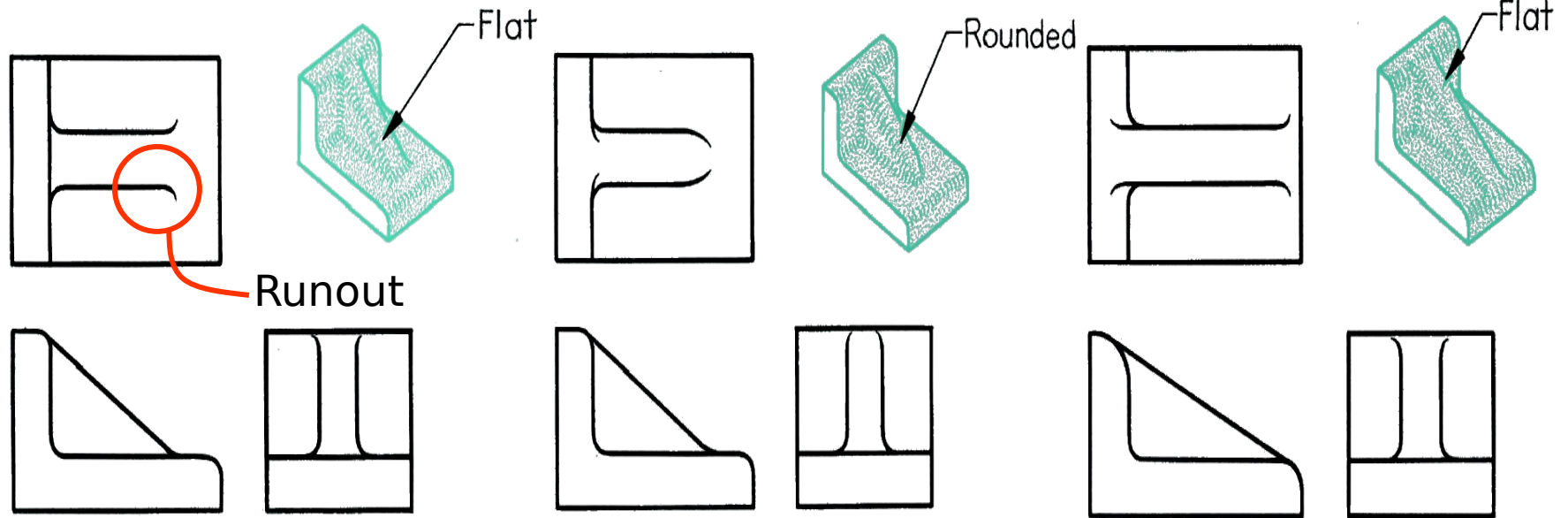
- A run-out is produced when a **filleted** or **rounded** corner between two plane surfaces intersects a surface.



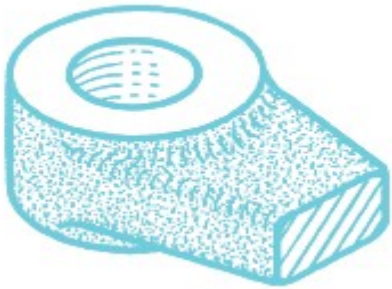
Projection of Fillets, Rounds and Run-out



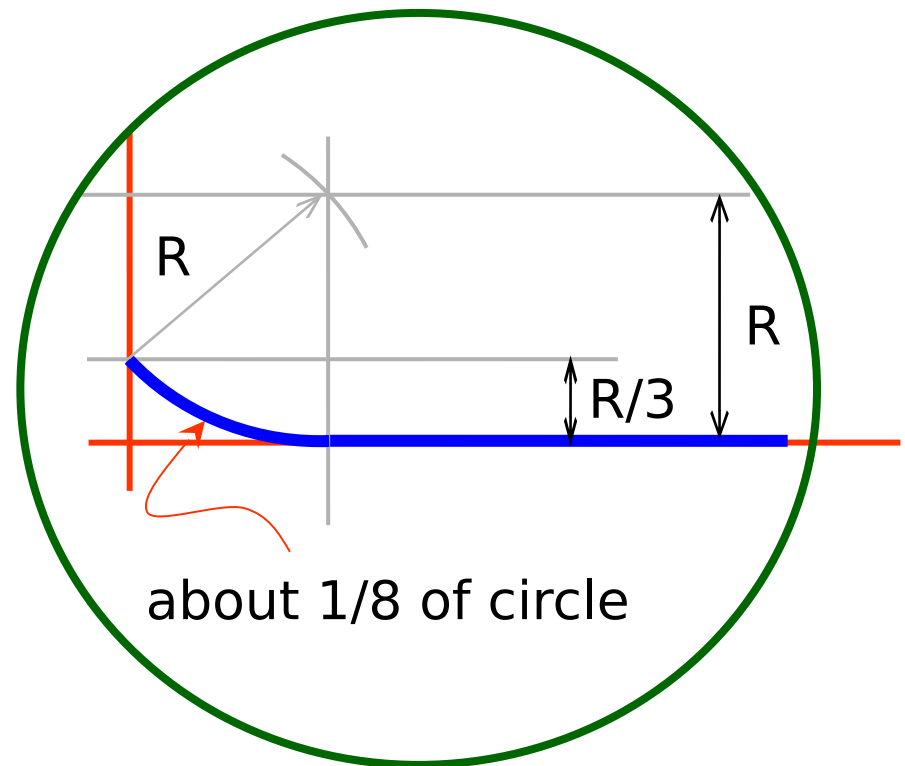
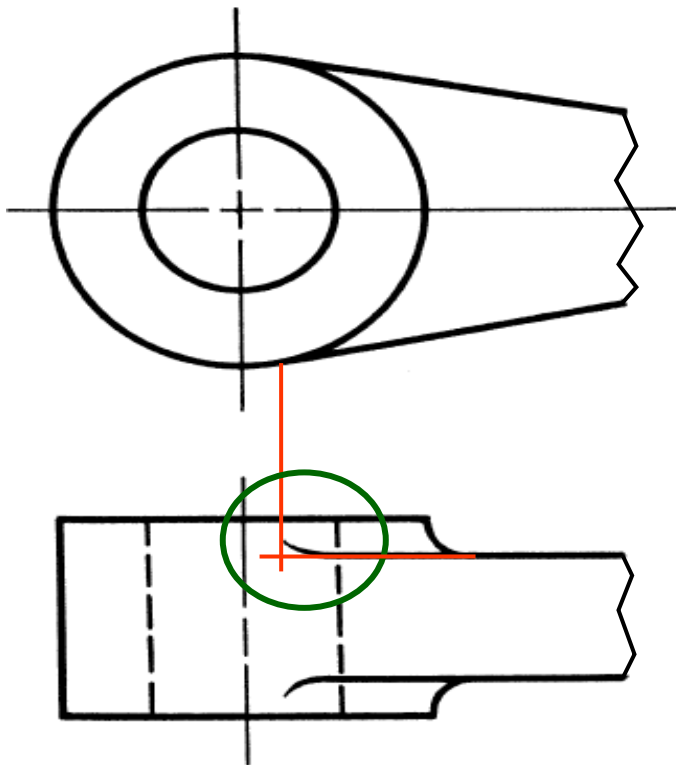
Projection of Fillets, Rounds and Run-out



Projection of Fillets, Rounds and Run-out

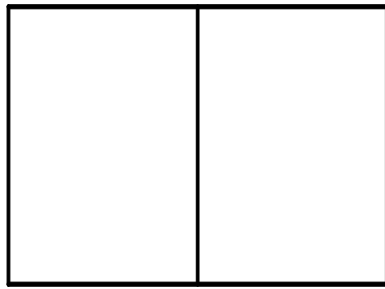


The run-out is drawn by taking R ; where R is radius of fillet or round.

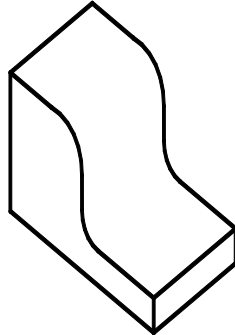


Intersections and Tangencies

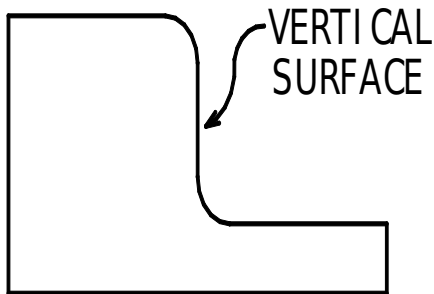
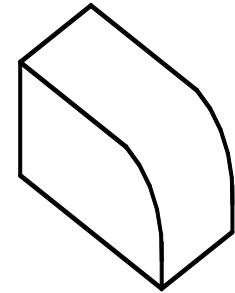
- When a curved surface is **tangent** to a plane surface, **no line** should be shown where they intersect.



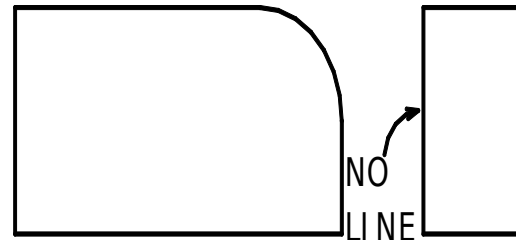
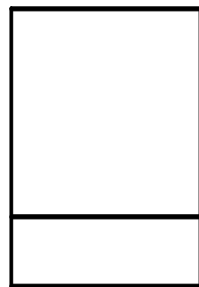
LINE



NO LINE



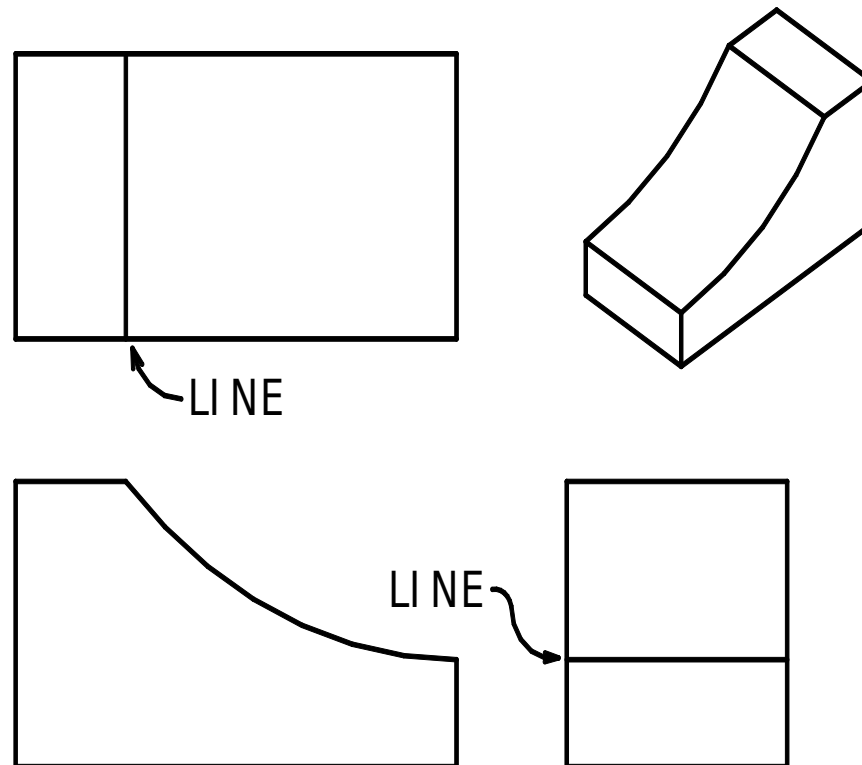
VERTICAL SURFACE



NO LINE

Intersections and Tangencies

- When a curved surface is **not tangent** to a plane surface, **an edge** is formed at the intersection point.



Precedence of Lines

- In some views there is likely to be a **coincidence (overlap)** of lines. Thus, it is necessary to follow a consistent rule as to which takes precedence over the other.
- The order of **precedence** of lines is given below:
 1. Object line
 2. Hidden line
 3. Center line or cutting plane line
 4. Break line
 5. Dimension line and extension line
 6. Section line

Precedence of Lines

**Order of
importance**

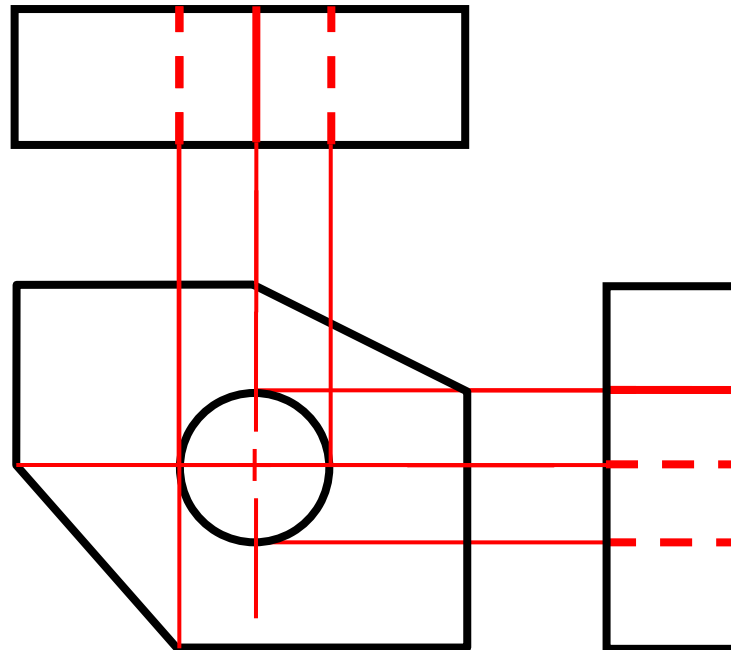
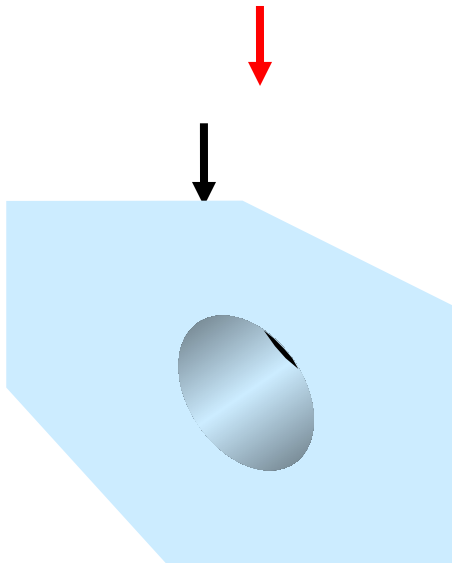
**Visible
line**



**Hidden
line**

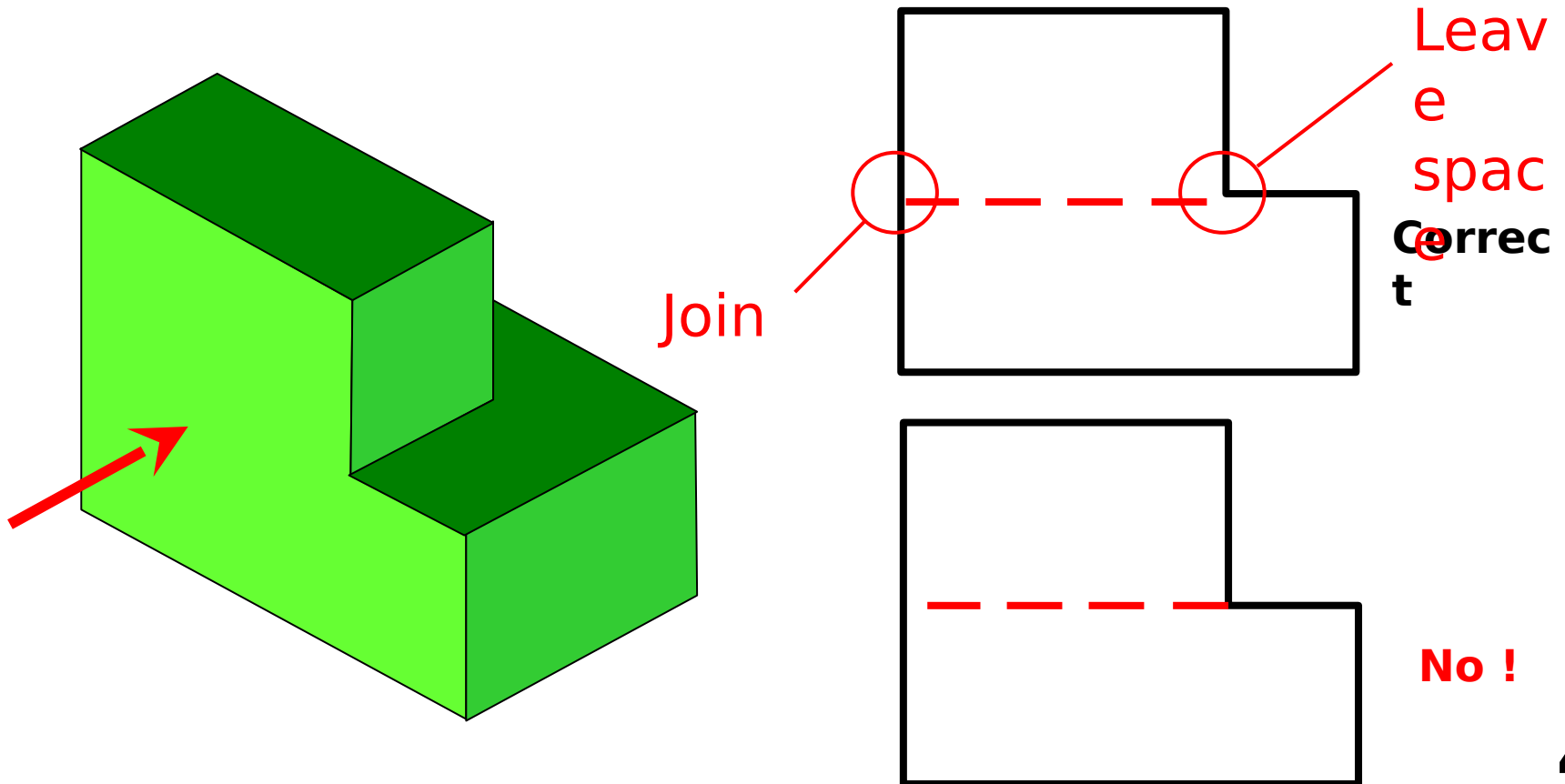


**Center
line**



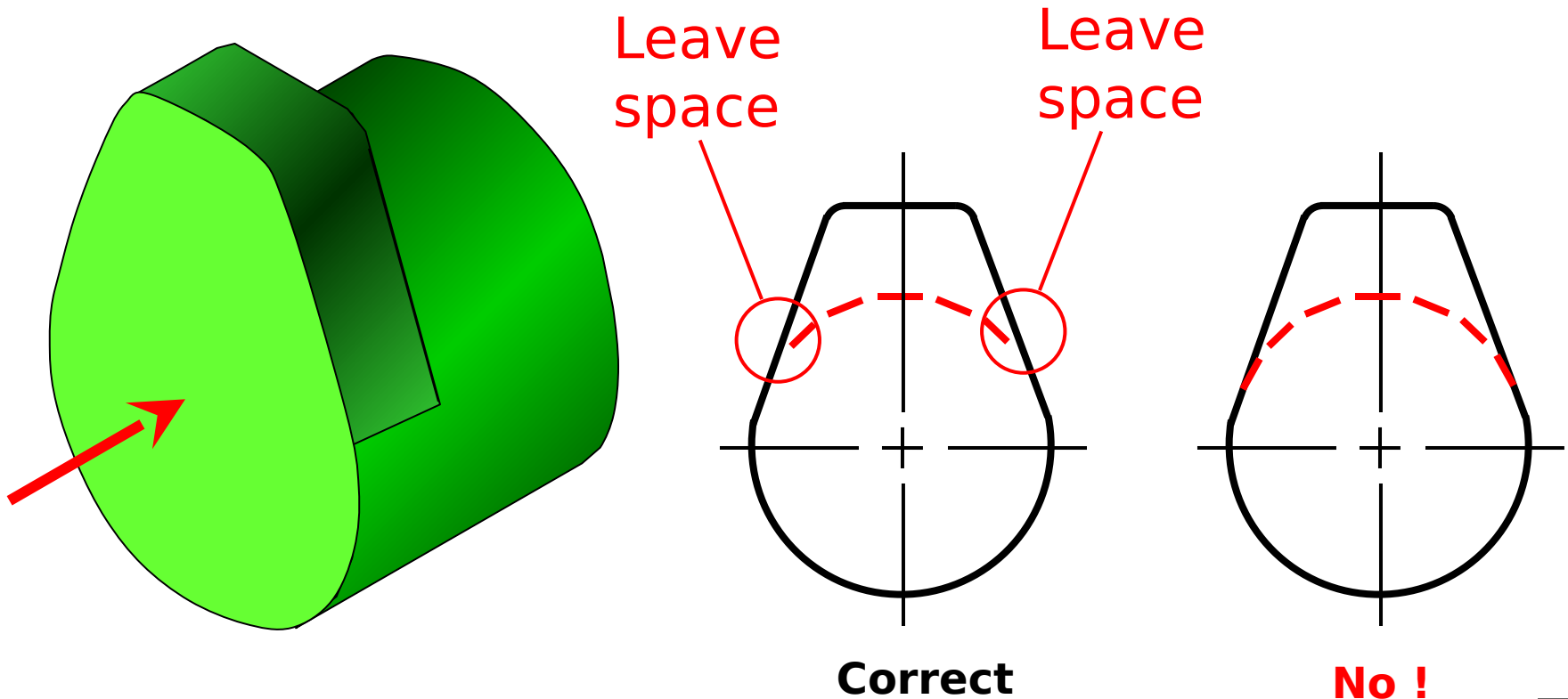
Hidden Line Practices

- Hidden line should join a visible line, **except** it extended from the visible line.



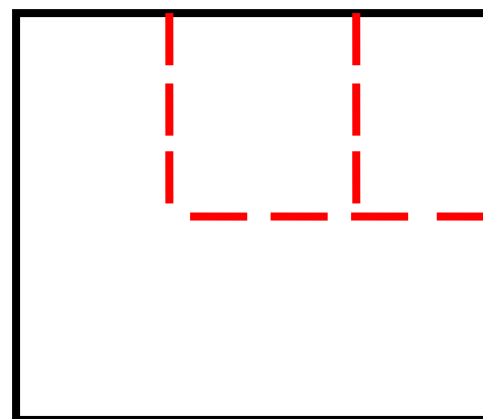
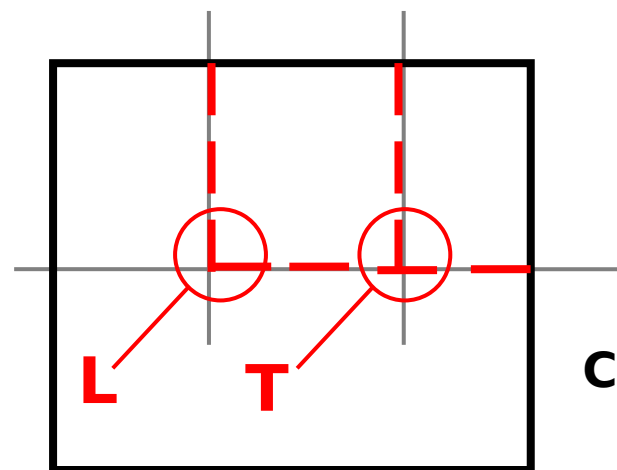
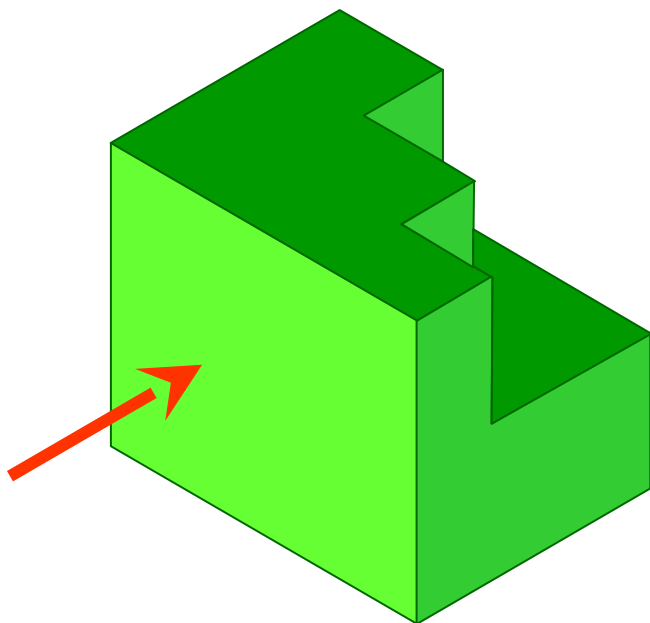
Hidden Line Practices

- Hidden line should join a visible line, **except** it extended from the visible line.



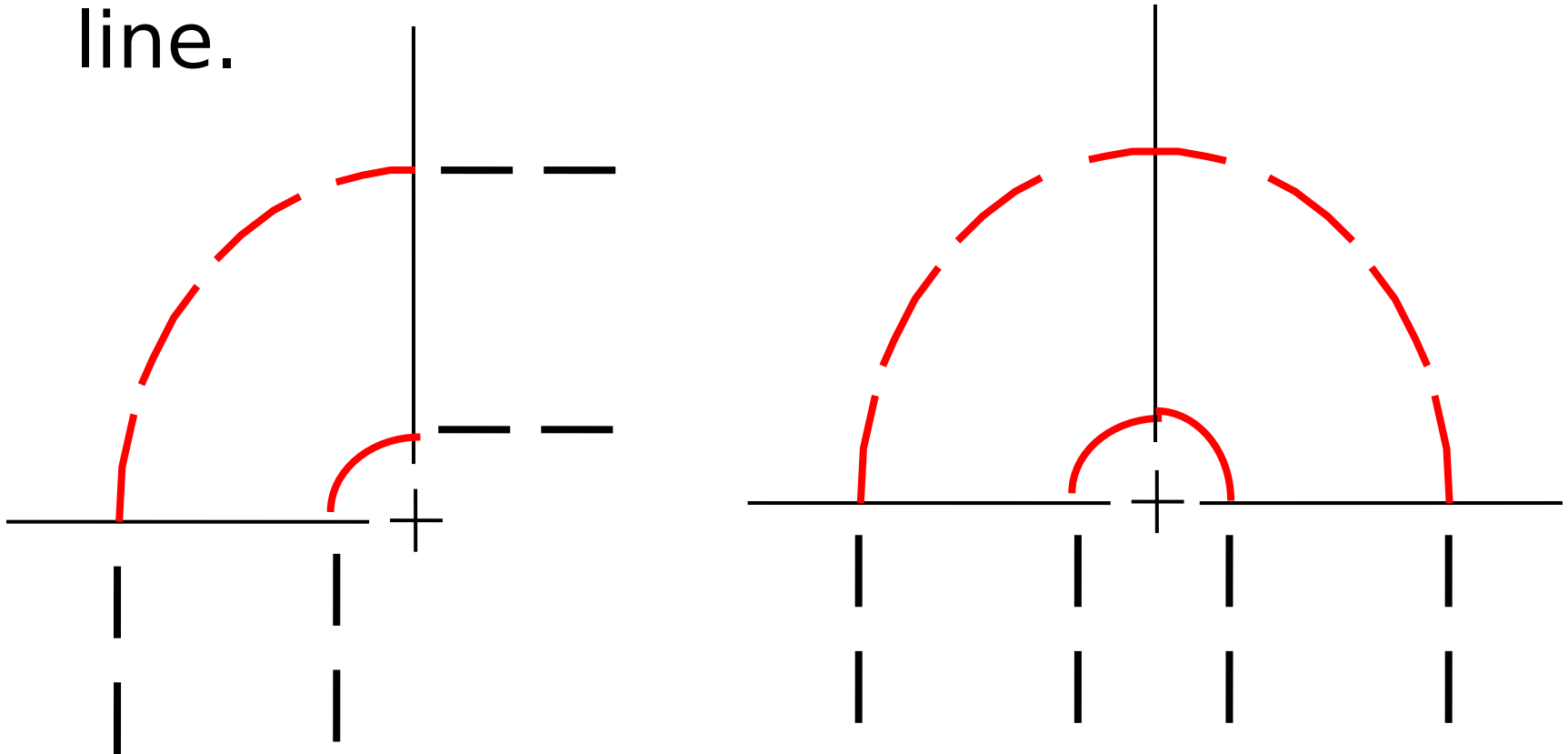
Hidden Line Practices

- Hidden line should intersect to form **L** and **T** corners.



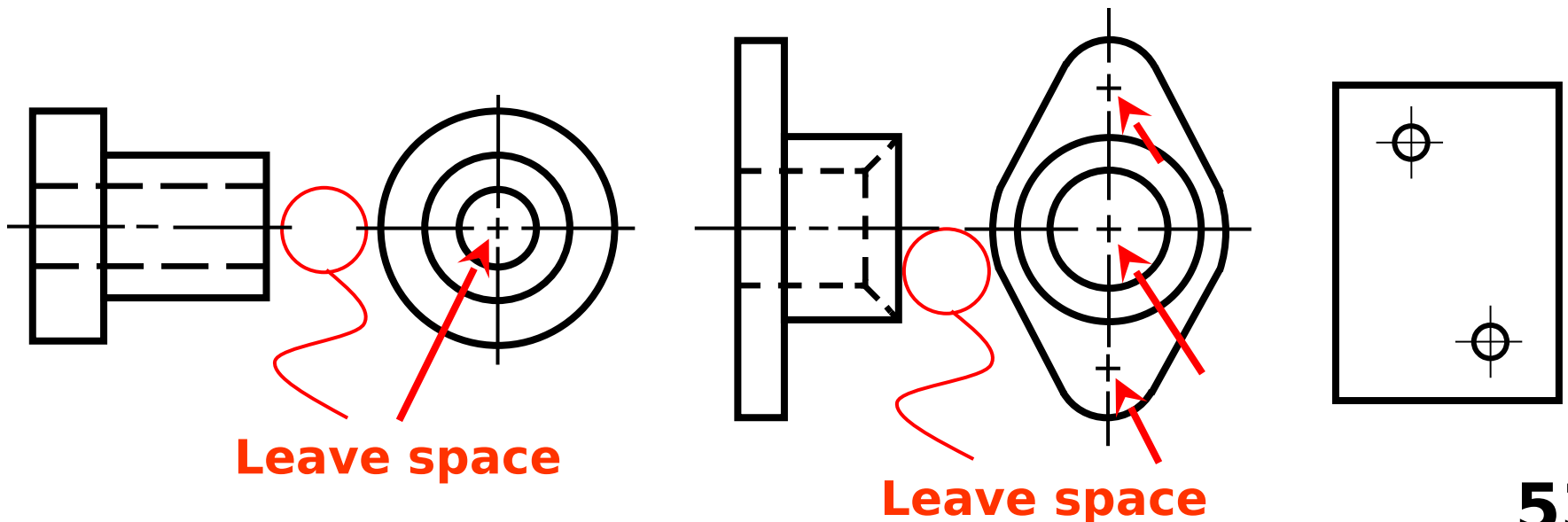
Hidden Line Practices

- Hidden line should start from a center line.



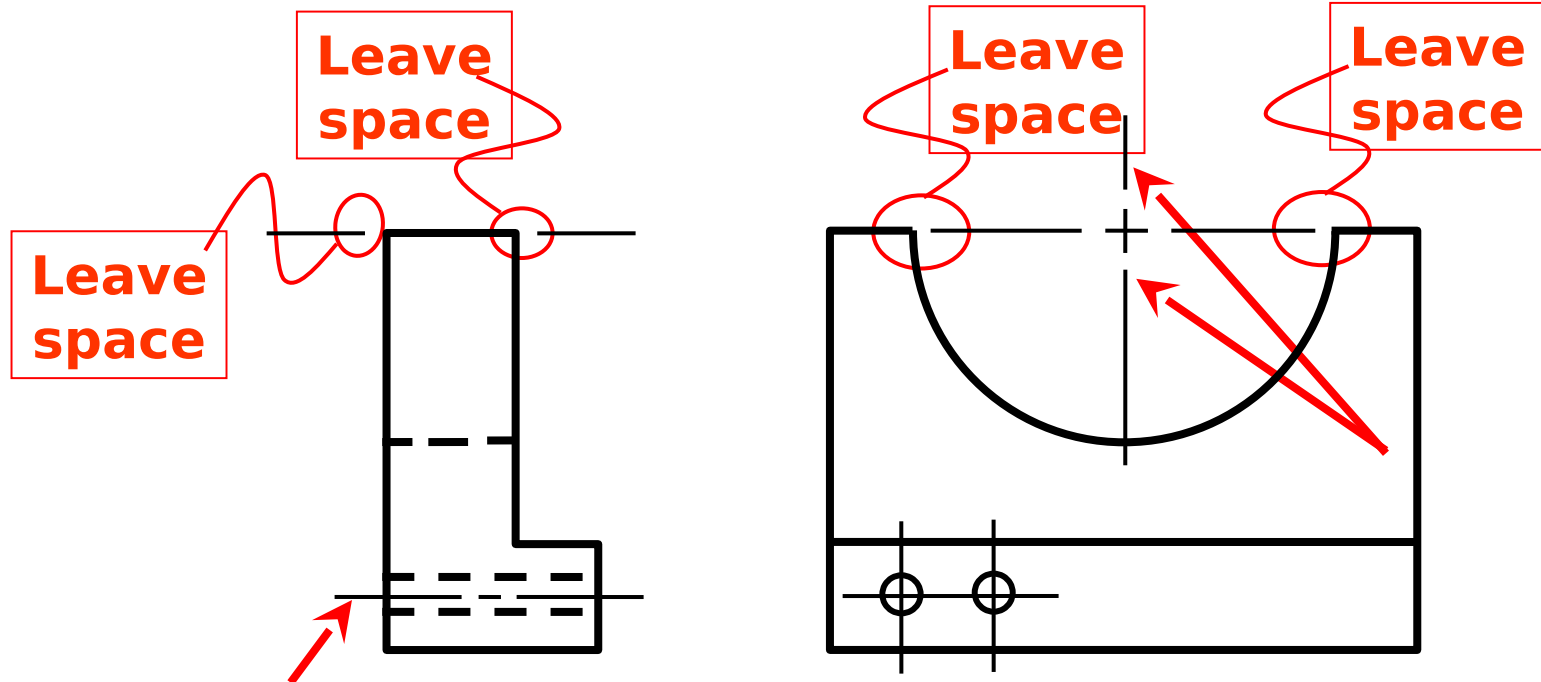
Center Line Practices

- In circular view, **short dash should cross** at the intersections of center line.
- For small hole center lines should be presented as a **thin continuous line**.
- Center lines should **not extend** between views.



Center Line Practices

- Leave a **gap** when center line forms a continuation with a visible or hidden line .
- Center line should start and end with **long dash**.



Thank You
Any Question?