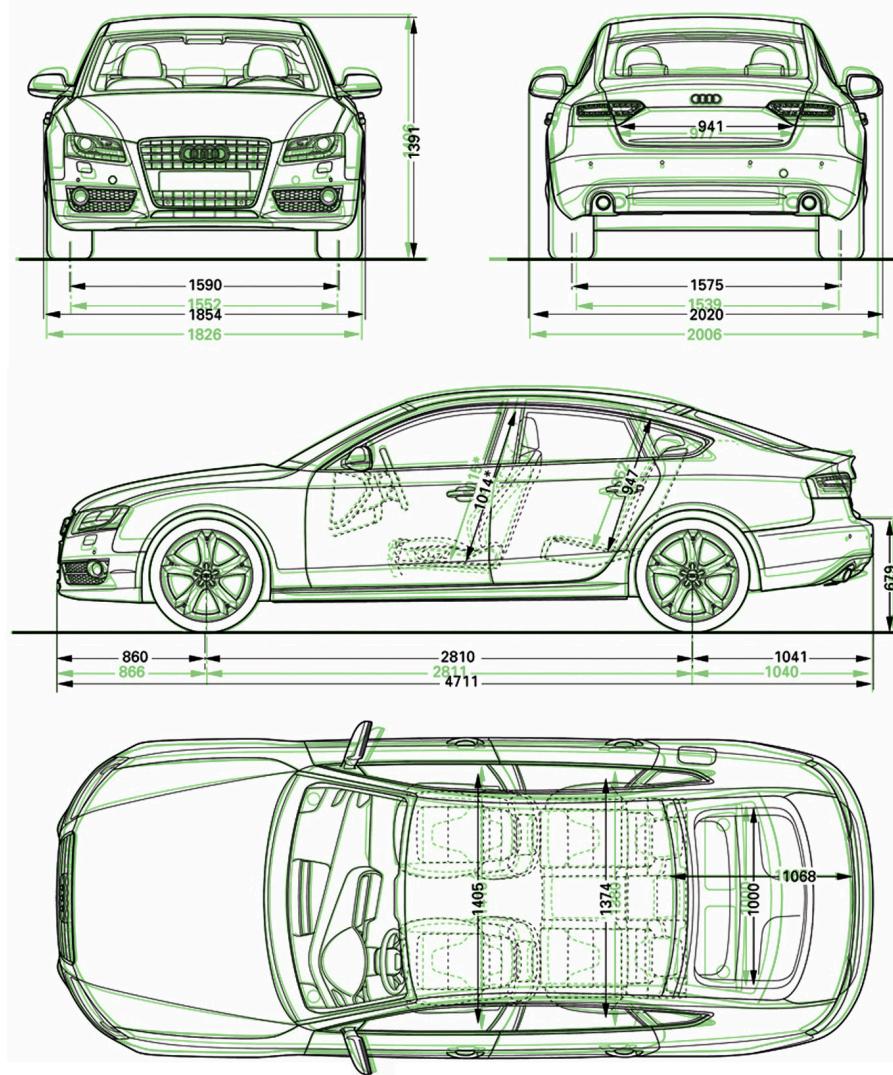


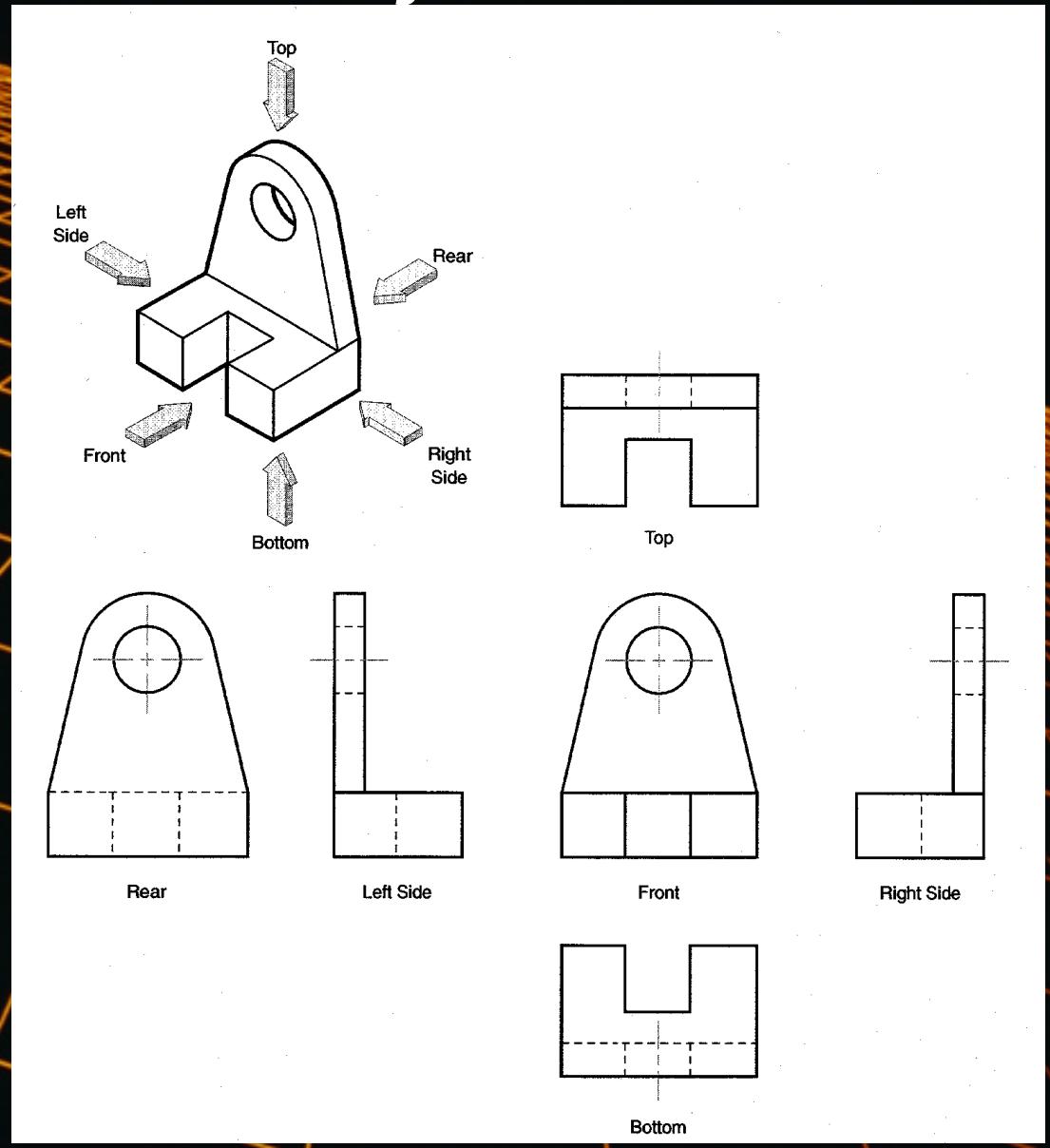
2D Drawings



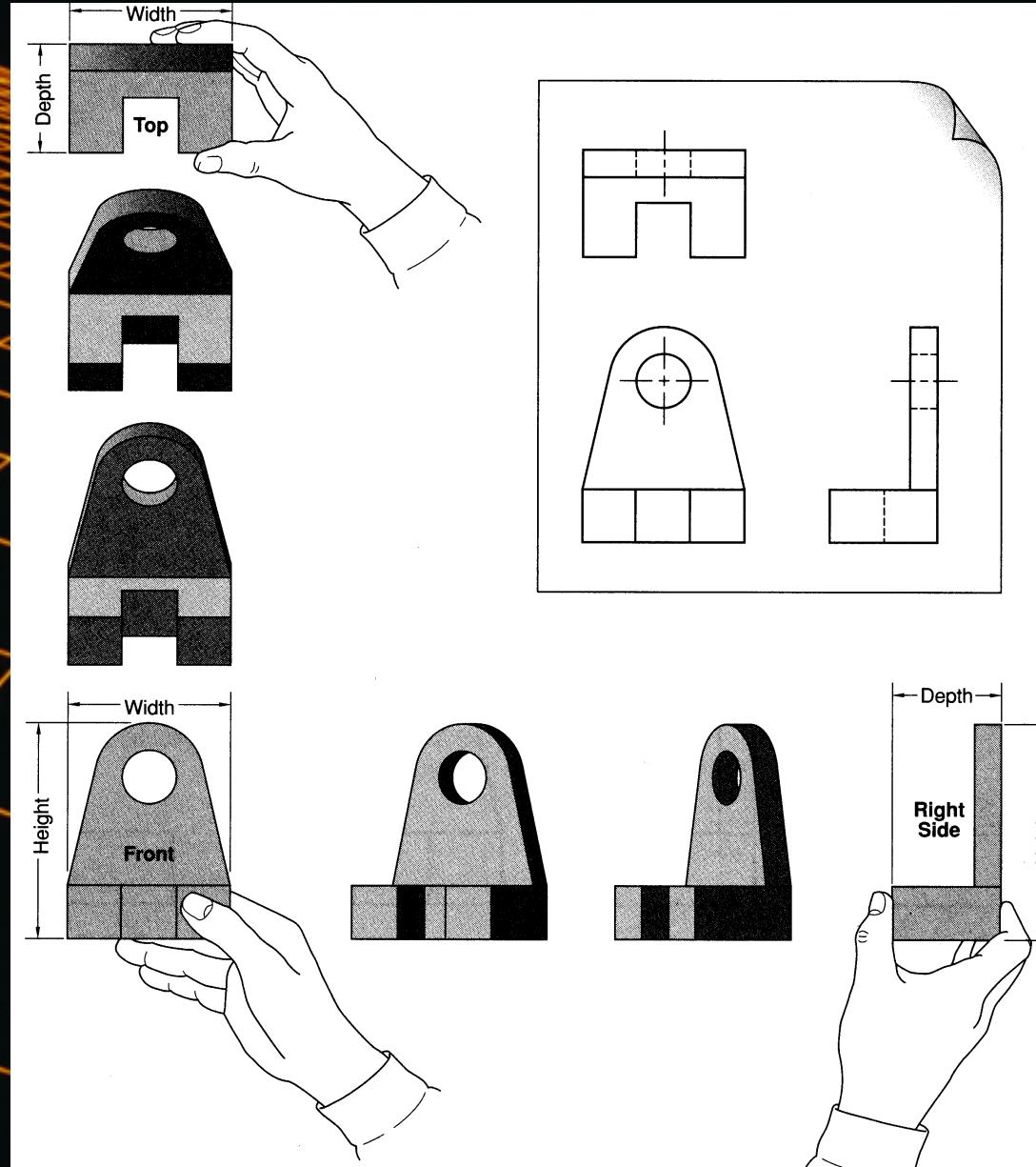
Glass Box Projection

- Gives you 6 sides to view of an object.

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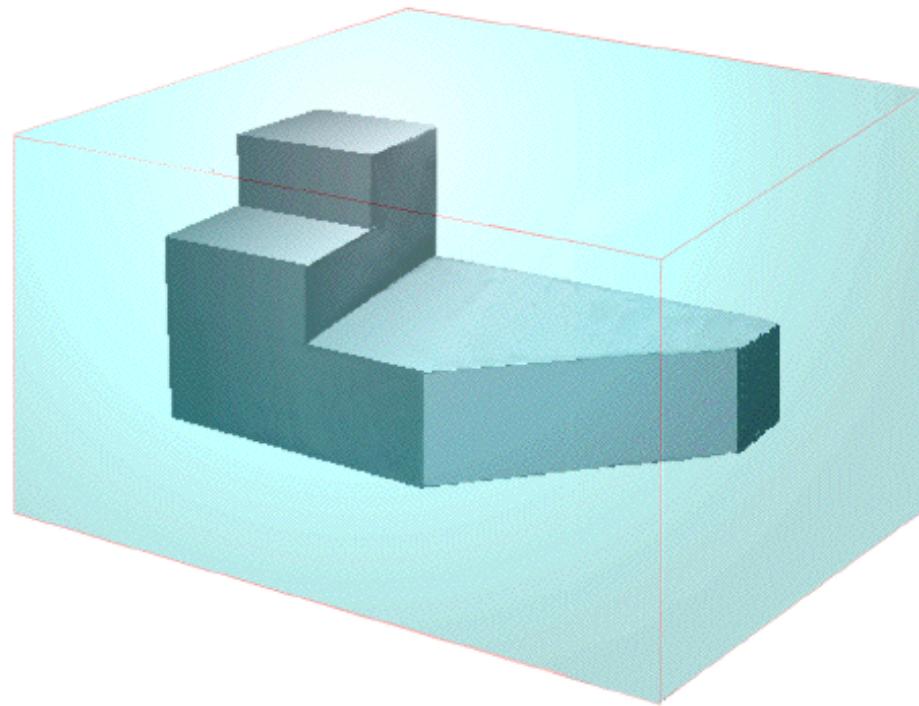


- We can simplify this for some objects to 3 views



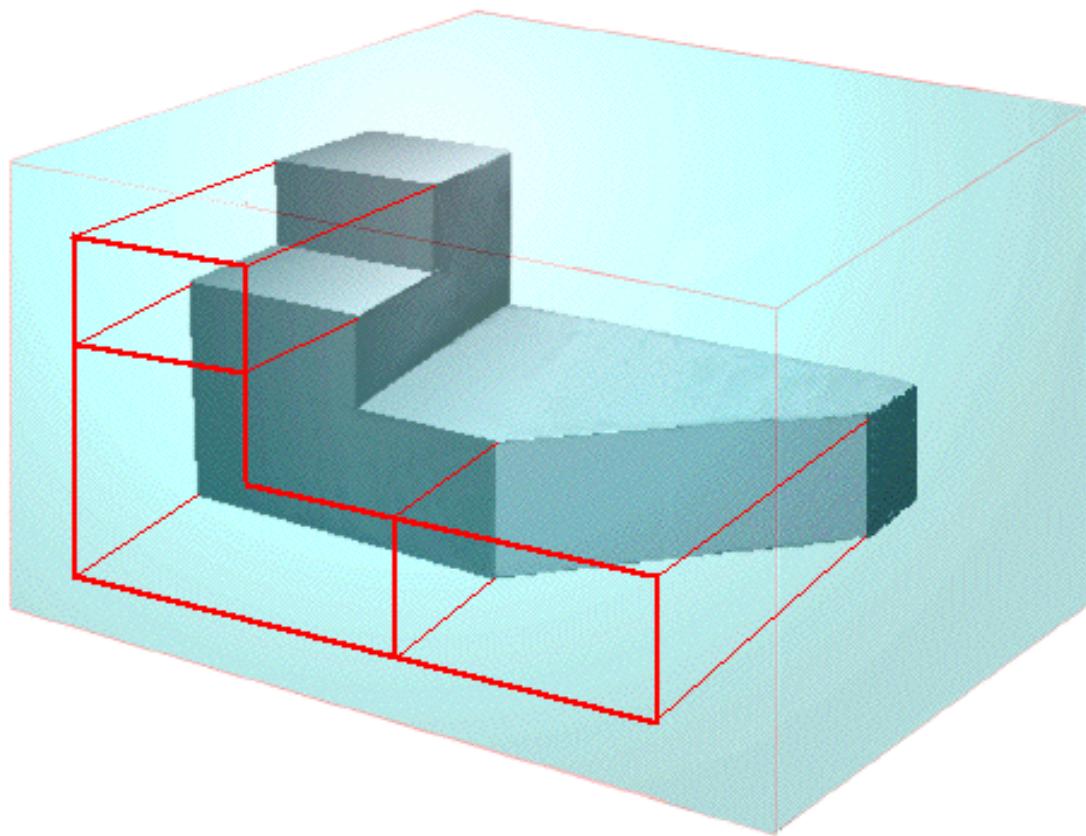
Glass Box Approach

Projection of points to the three views



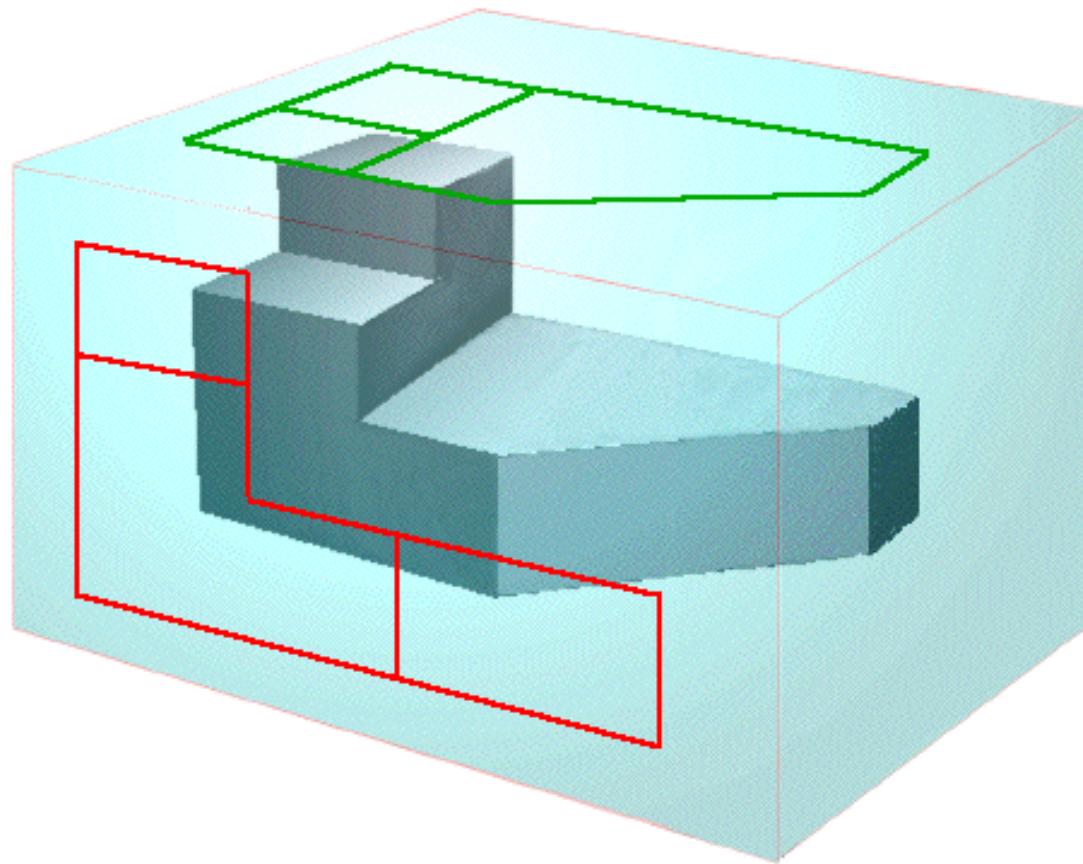
Glass Box Approach

Projection of points to FRONT VIEW



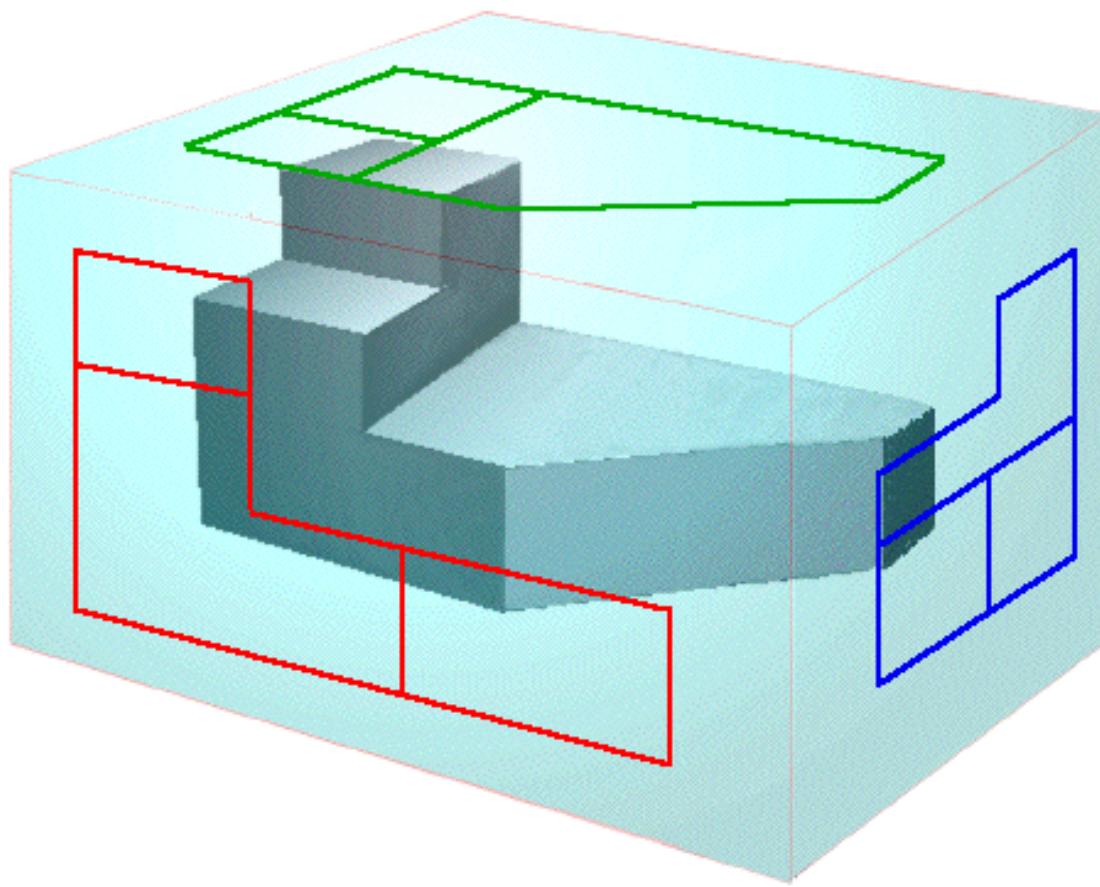
Glass Box Approach

Projection of points to TOP VIEW



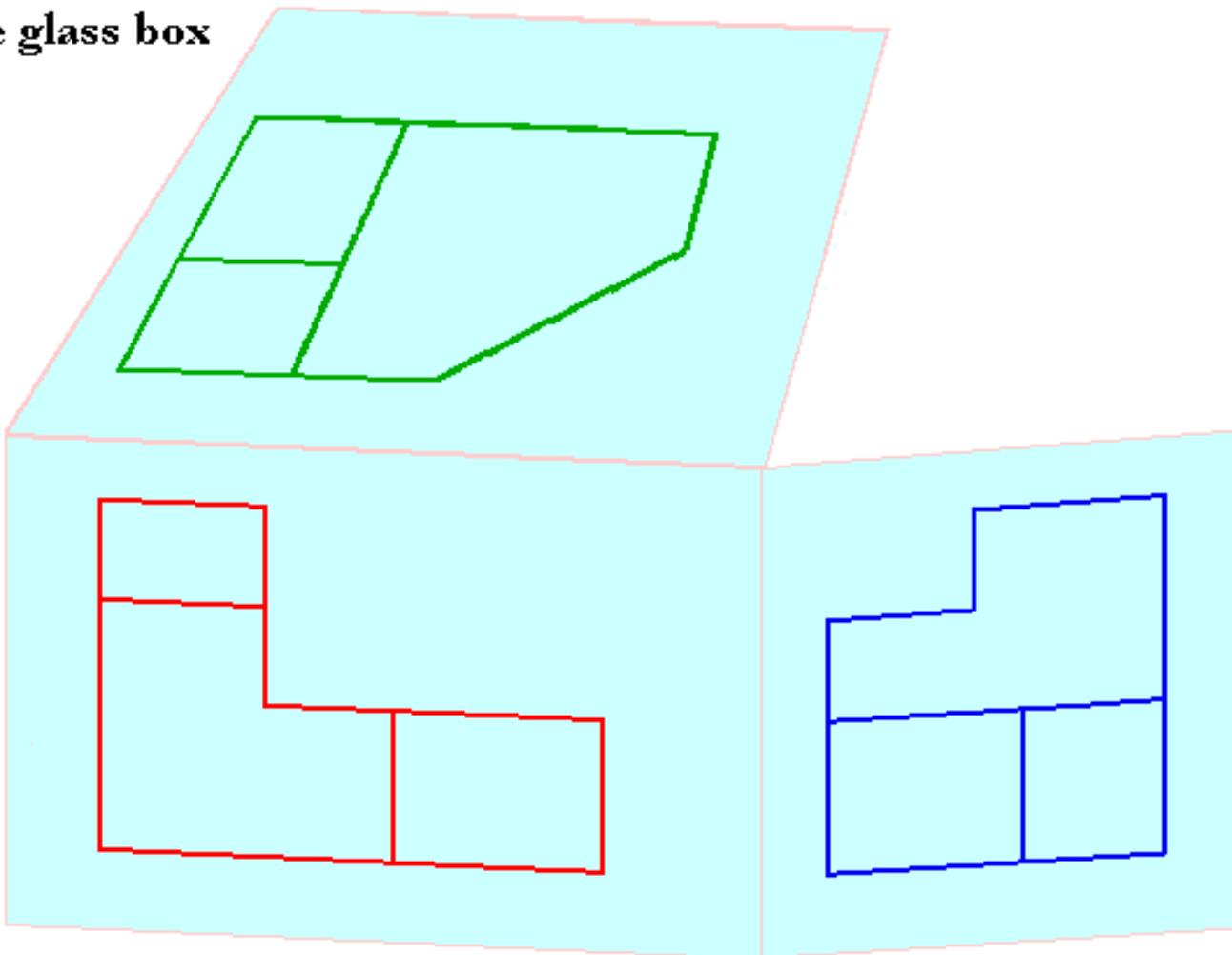
Glass Box Approach

Projection of points to RIGHT SIDE VIEW



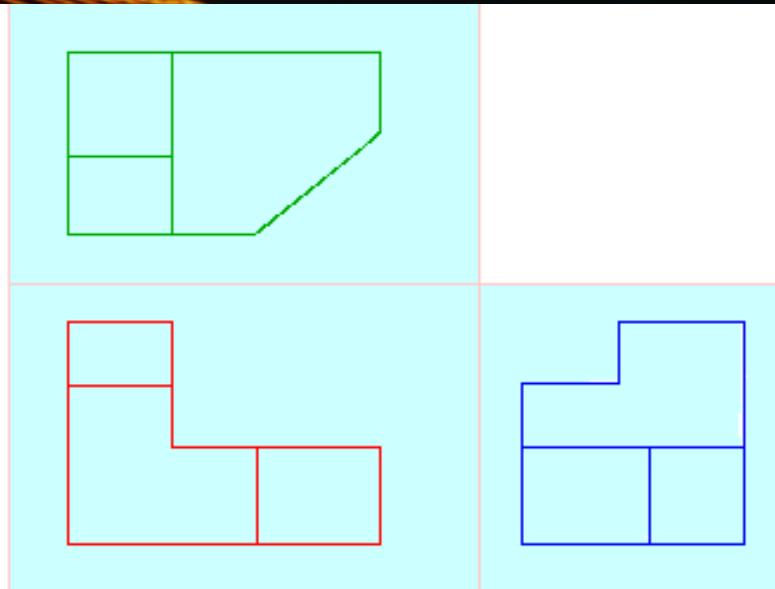
Glass Box Approach

Unfold the glass box

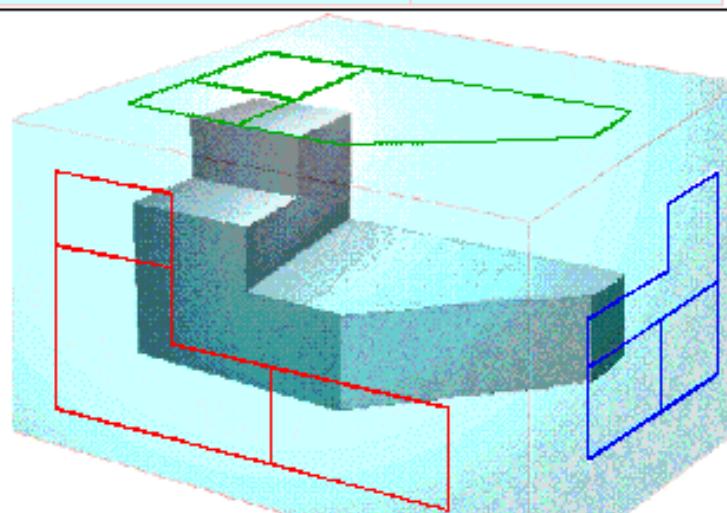


Glass Box Approach

Unfolded
glass-box

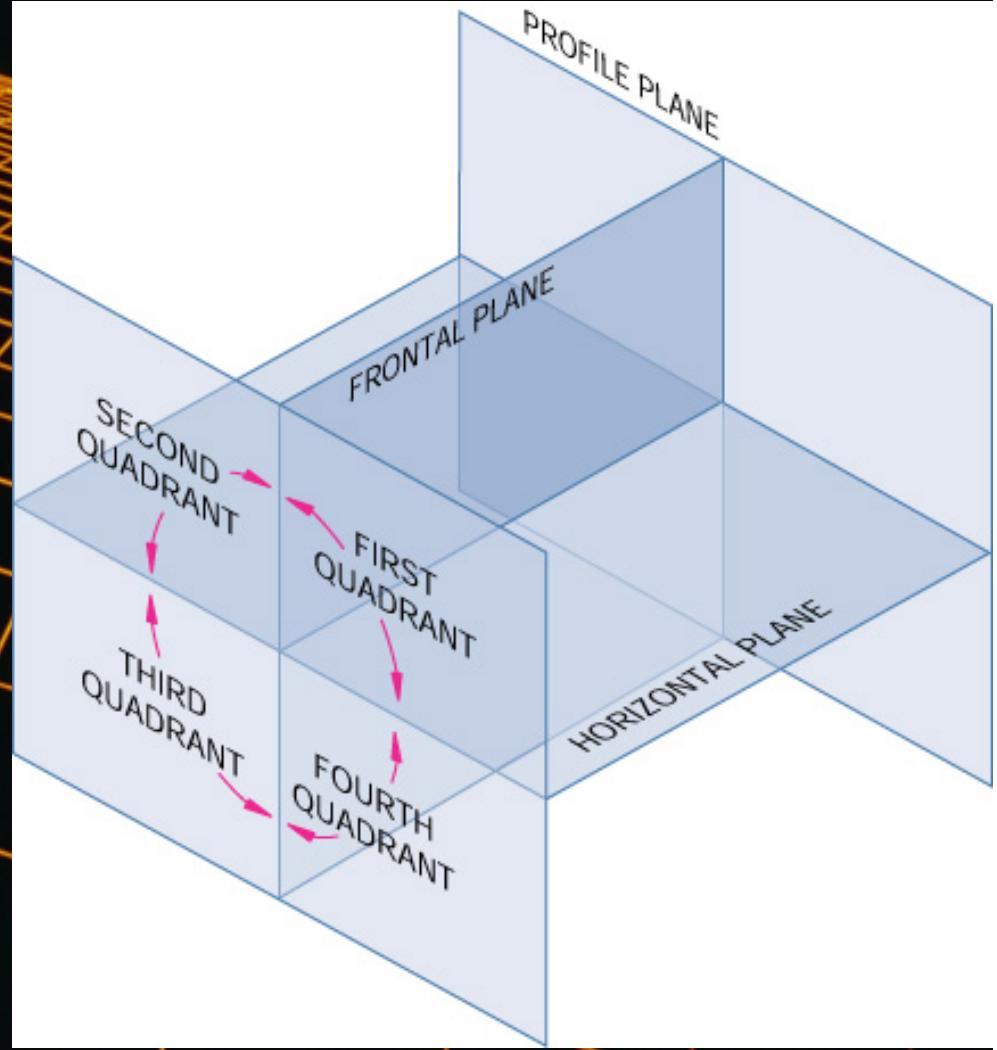


Object in the
glass-box

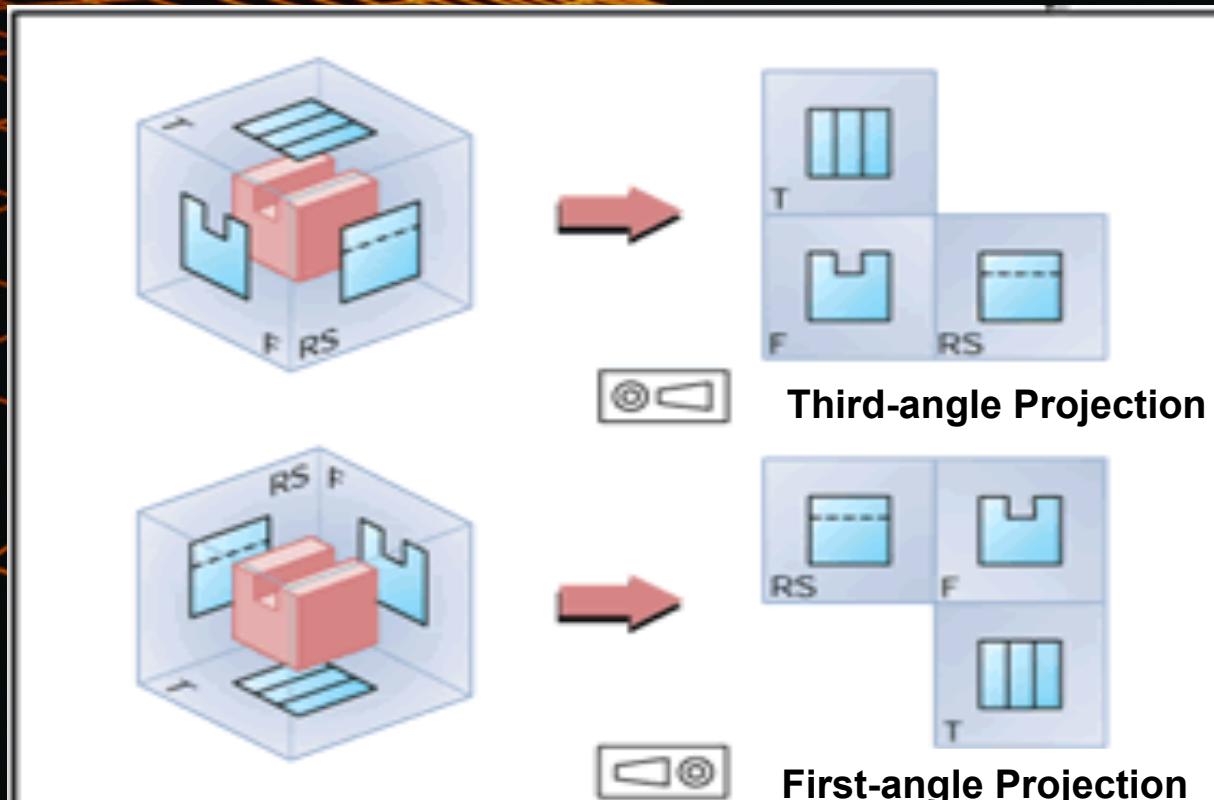


Orthographic Projection

- A standard for drawing 2D Multiviews
- The Standard in Canada is to draw the 3 angle (quadrant) views of the projected sides.
- MODEL

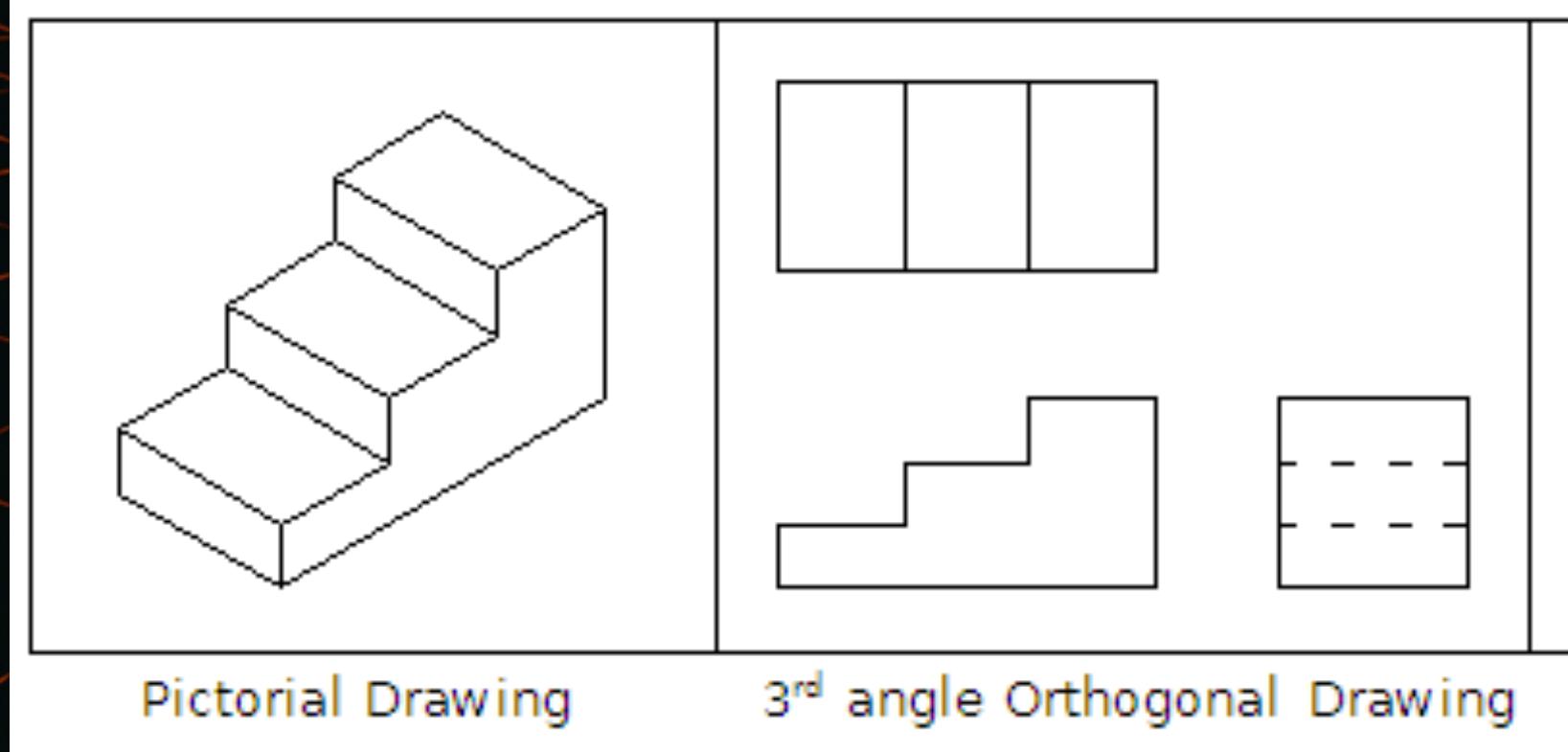


First and Third Angle Projections



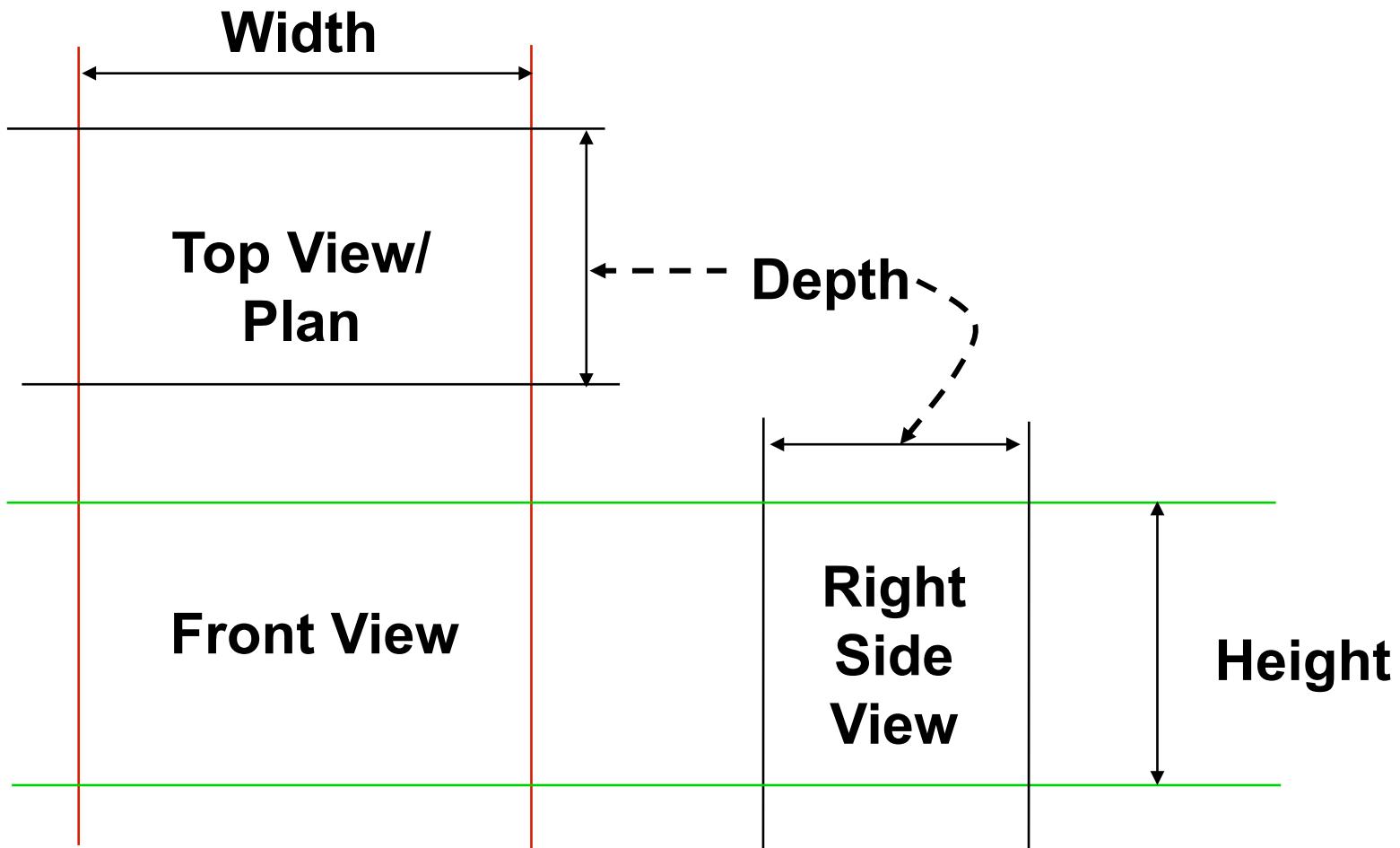
- First Angle
- Third Angle

Orthographic Projection #1

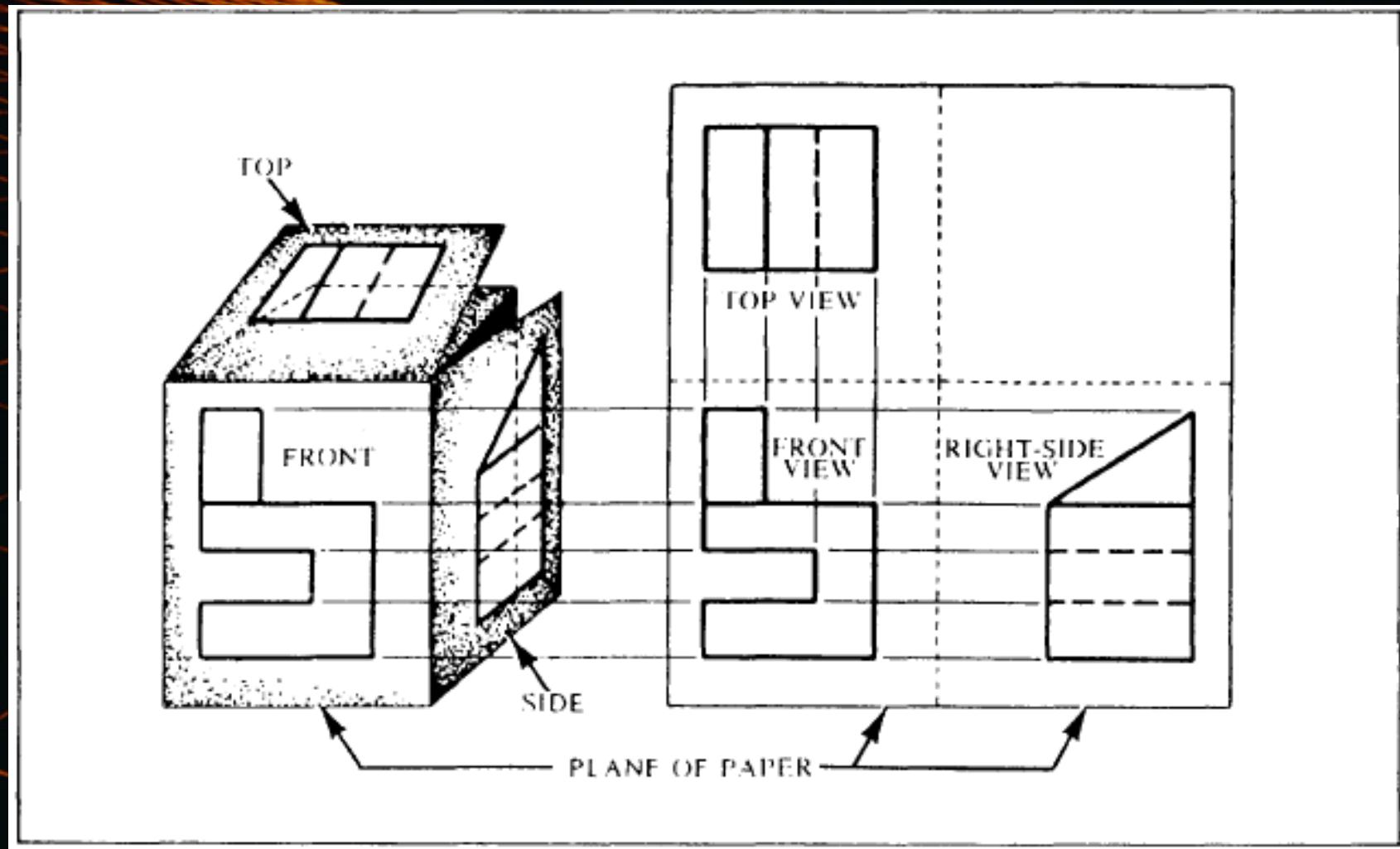


Note that dotted lines represent hidden lines in projection.

Conventional Orthographic Views



Orthographic Projection #1



Try your best to draw this object as a 3D object on your notes page.

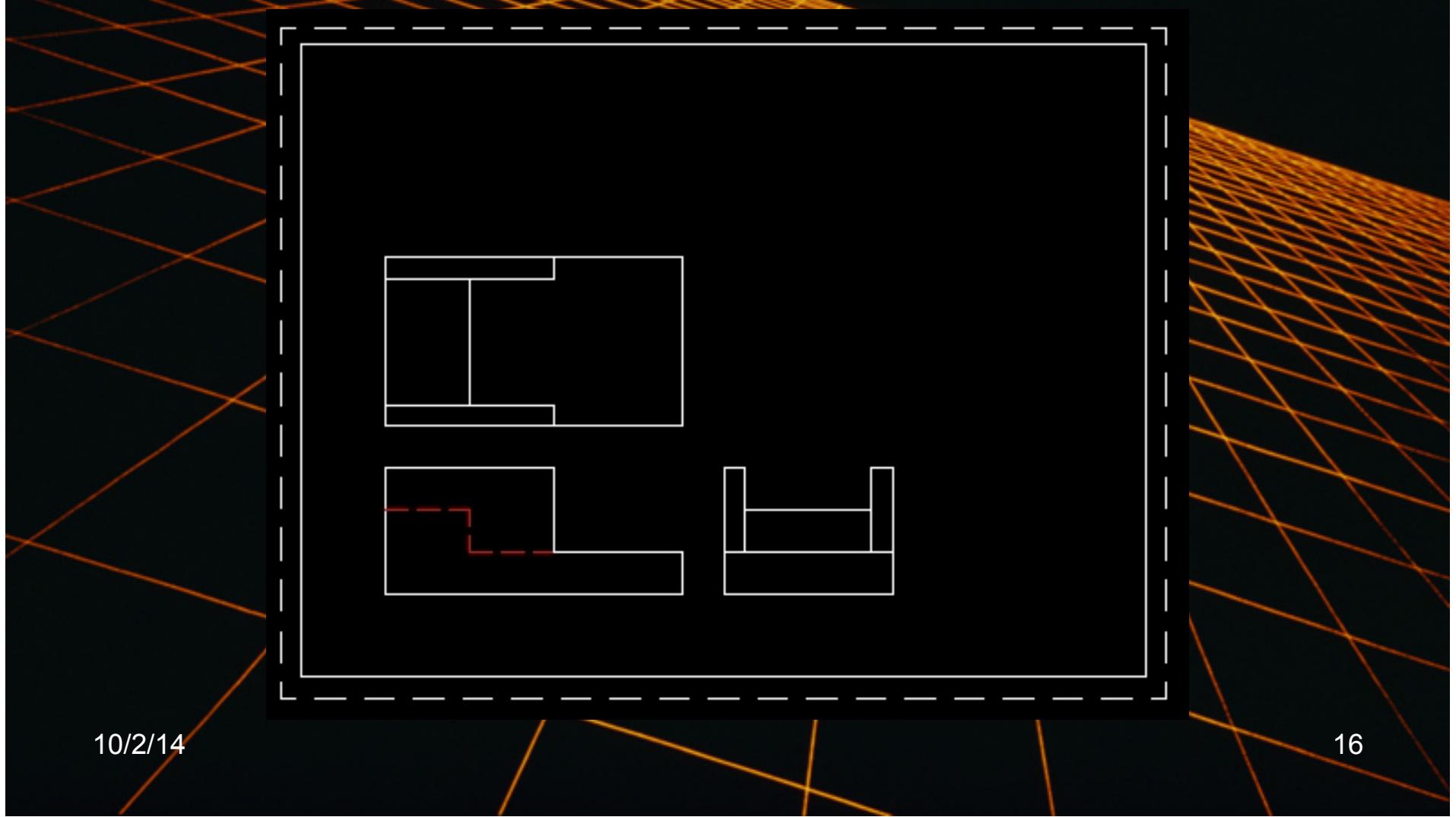
What to avoid in your drawings...



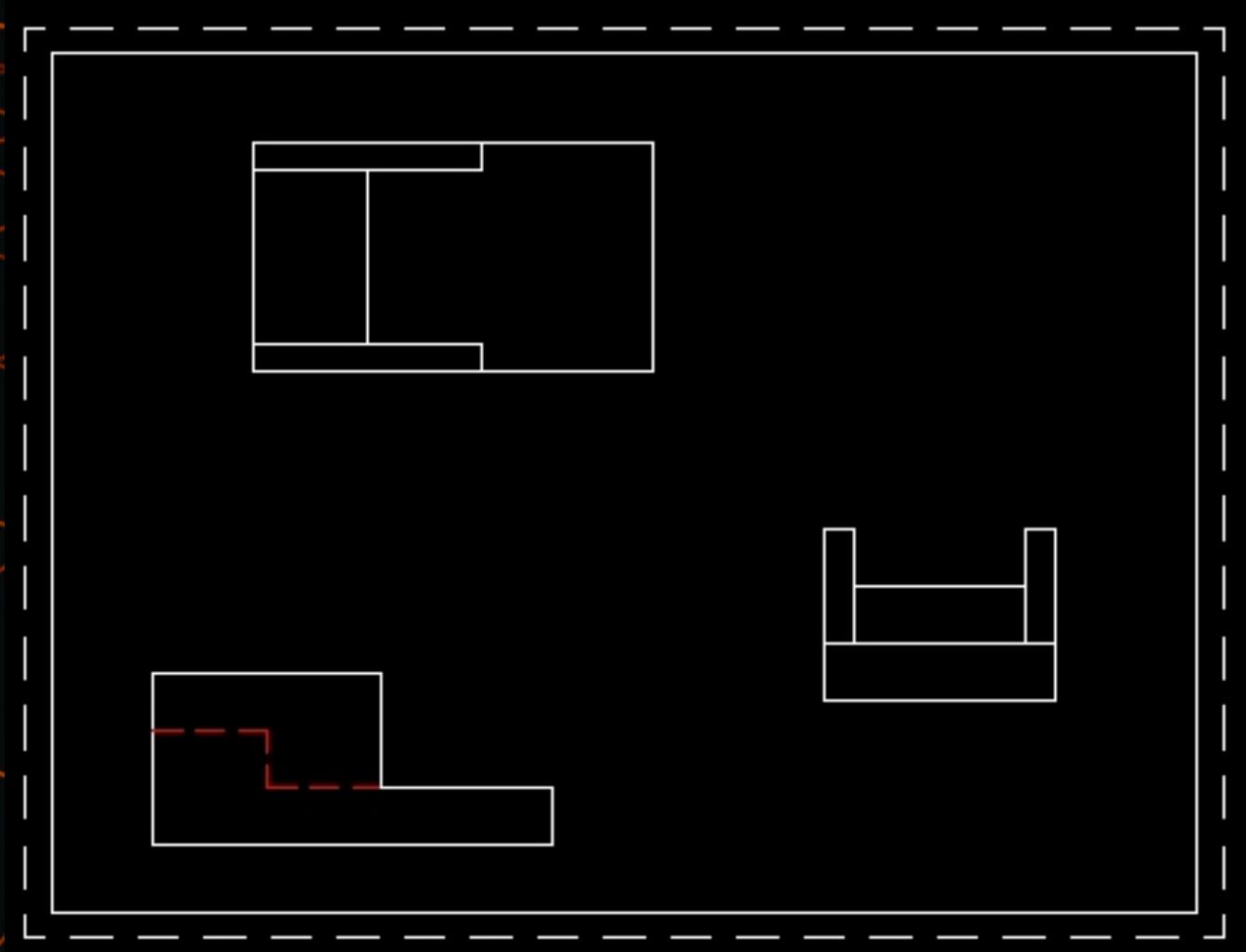
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Views are too far apart.

Views are too close and not centered

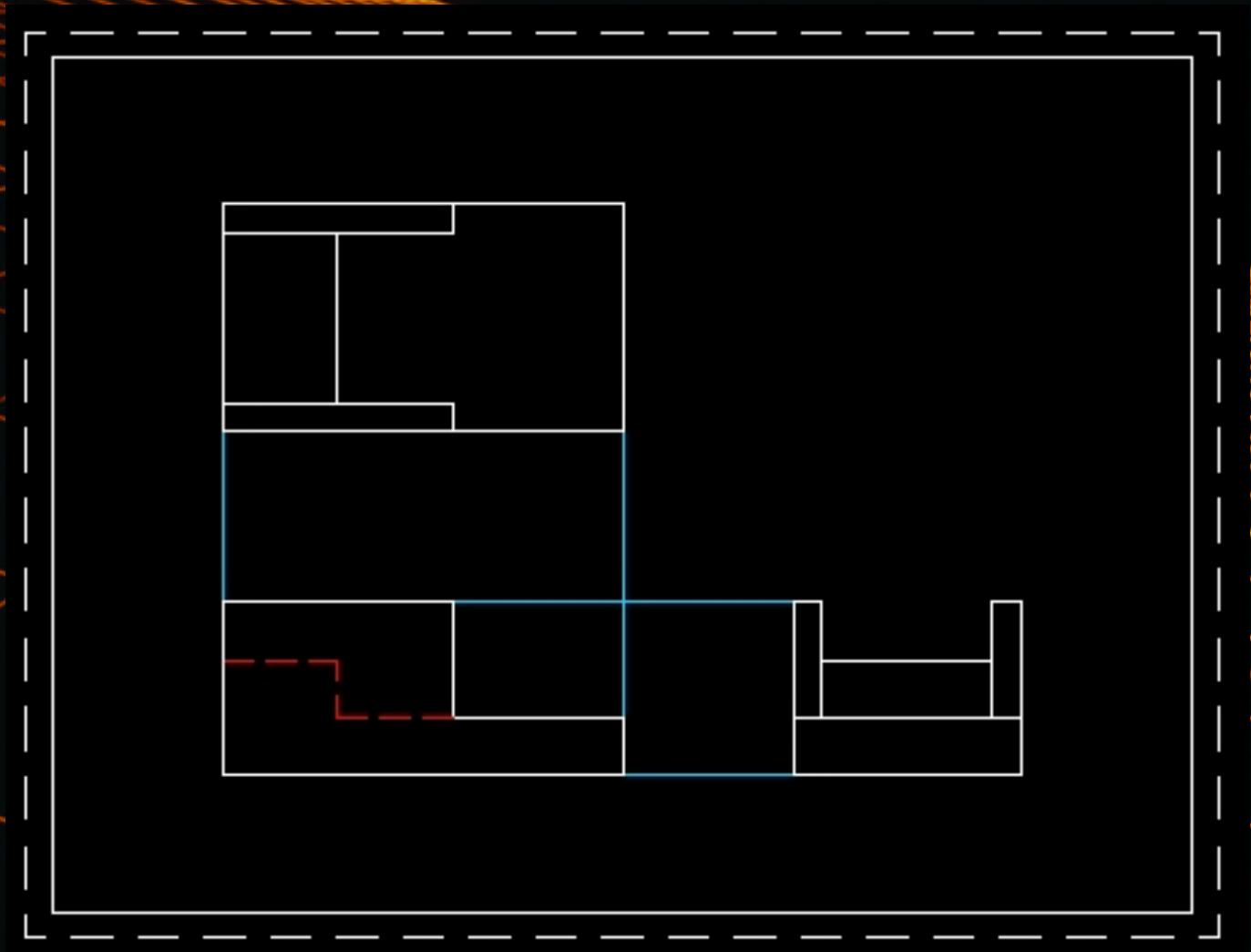


Not aligned.



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Example of proper alignment:



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Establishing the Front View of An Object.

Most objects that must be described by orthographic projection do not have a front like cars or houses. Therefore, to determine the front view of an object that has no recognizable front, apply the following rules:

1. Choose the side of the object that shows its length and provides the most information about its shape.
2. Draw the front view in a position that is balanced and pleasing to the eye.

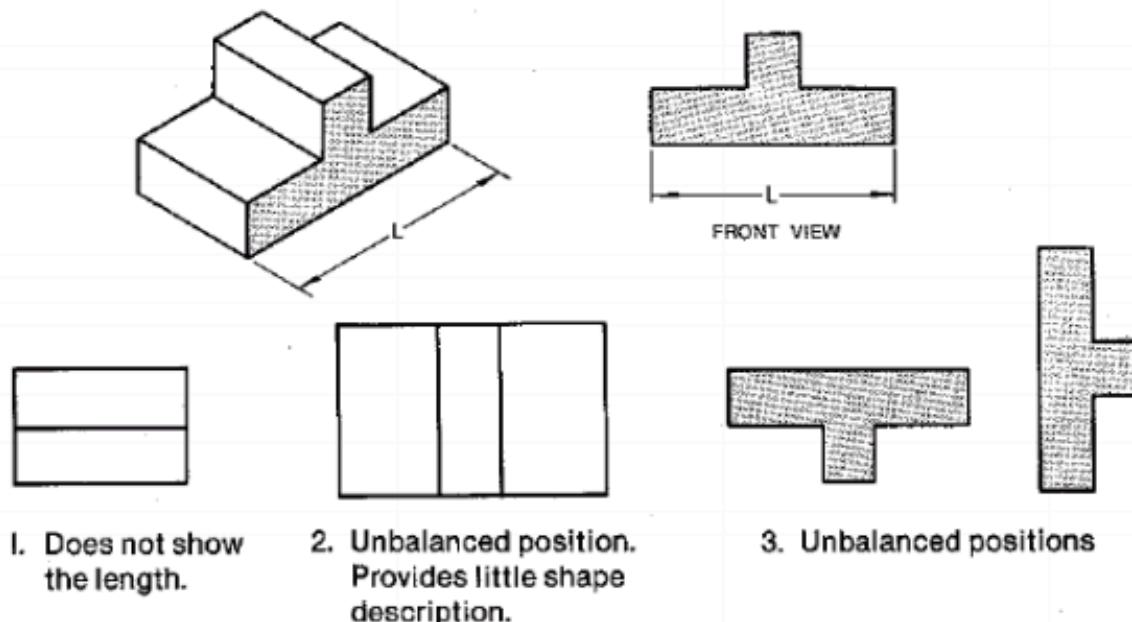
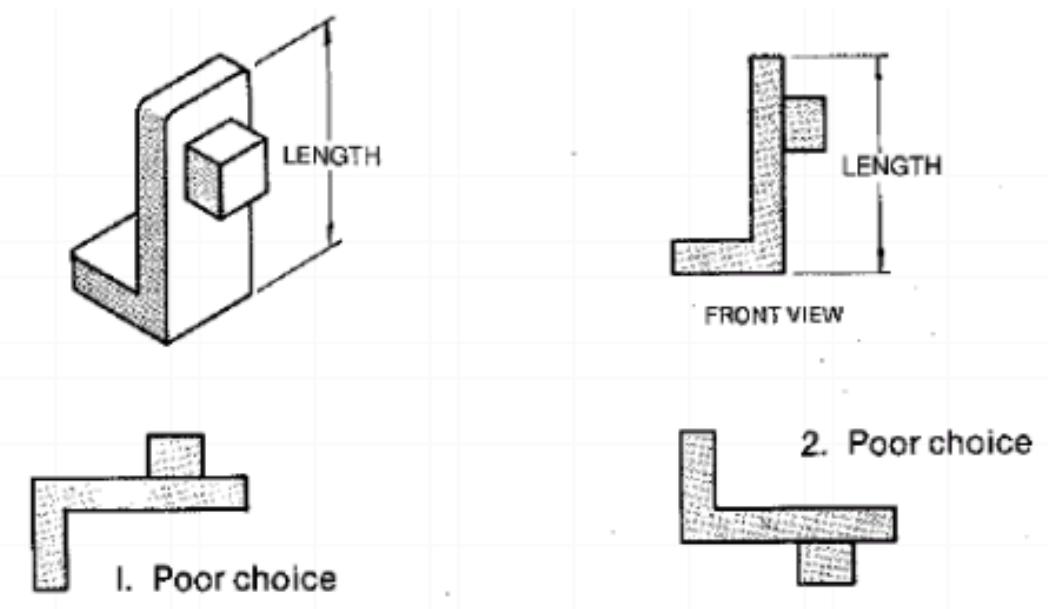


FIG. 4:6 SELECTION OF THE FRONT VIEW

The front view of most objects are drawn with the length in a horizontal position. However, some objects appear better balanced and more pleasing to the eye when the front view is drawn with the length of the object in a vertical position.

FIG. 4:6 SELECTION OF THE FRONT VIEW

The front view of most objects are drawn with the length in a horizontal position. However, some objects appear better balanced and more pleasing to the eye when the front view is drawn with the length of the object in a vertical position.



Front View Id Sheet

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Lines on an engineering drawing signify more than just the geometry of the object and it is important that the appropriate line type is used.

Line Thickness

For most engineering drawings you will require two thickness', a thick and thin line. The general recommendation are that thick lines are twice as thick as thin lines.



A thick continuous line is used for visible edges and outlines.

A thin line is used for hatching, leader lines, short centre lines, dimensions and projections.

Line Styles

Other line styles used to clarify important features on drawings are:

- **Thin** chain lines are a common feature on engineering drawings used to indicate centre lines. Centre lines are used to identify the centre of a circle, cylindrical features, or a line of symmetry.
- Dashed lines are used to show important hidden detail for example wall thickness and holes..

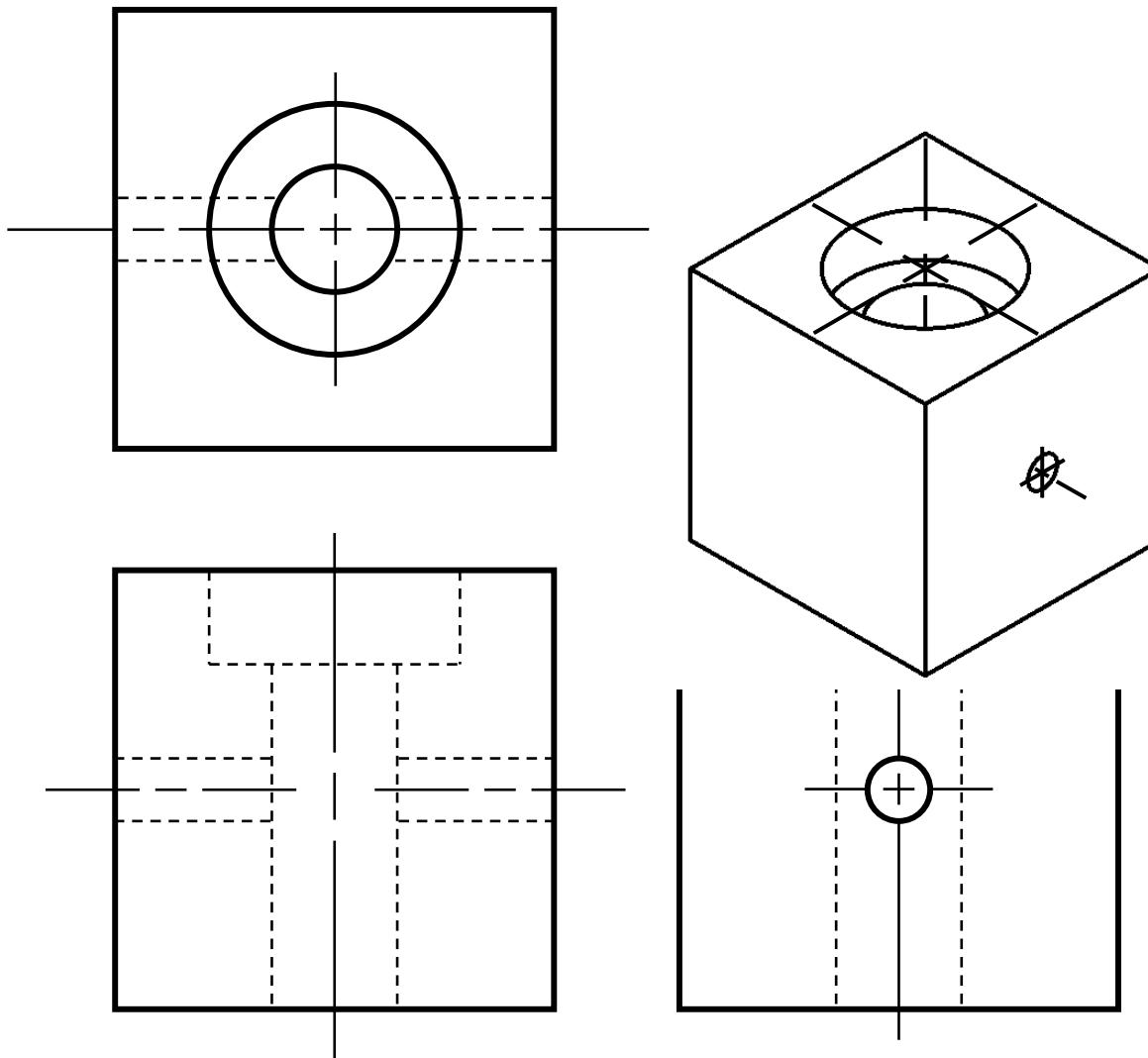
Precedence of Lines

 **0.6 mm**

 **0.3 mm**

 **0.6 mm**

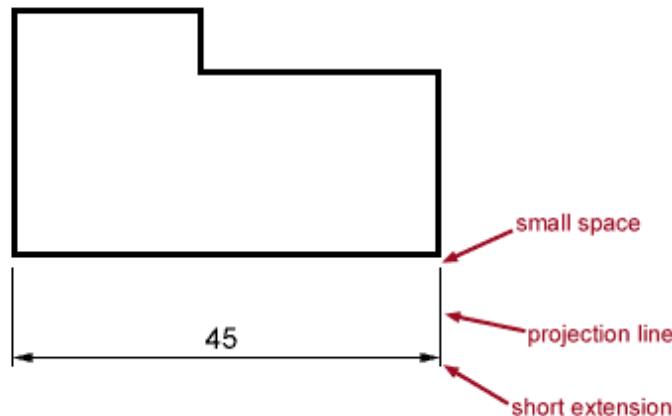
For Example:



- 1. Visible**
- 2. Hidden**
- 3. Center**

Dimensioning

A dimensioned drawing should provide all the information necessary for a finished product or part to be manufactured. An example dimension is shown below.

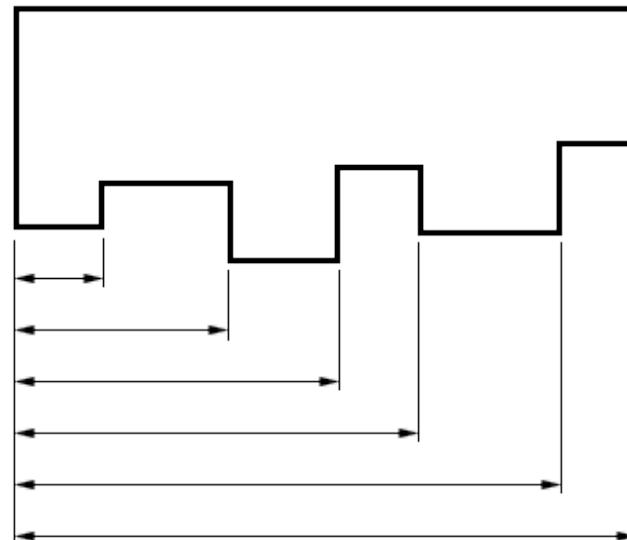


Dimensions are always drawn using continuous thin lines. Two projection lines indicate where the dimension starts and finishes. Projection lines do not touch the object and are drawn perpendicular to the element you are dimensioning.

All dimensions less than 1 should have a leading zero. i.e. .35 should be written as 0.35

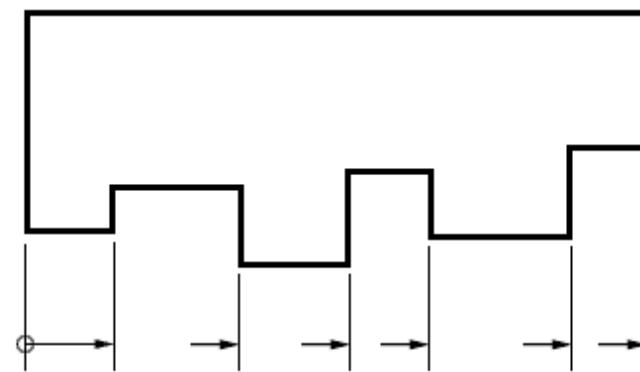
Types of Dimensioning

- **Parallel Dimensioning**
- Parallel dimensioning consists of several dimensions originating from one projection line.

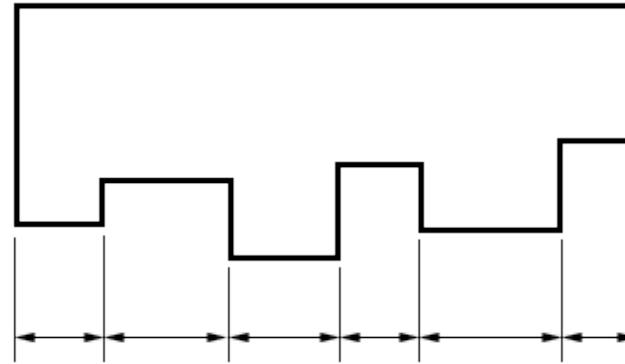


•Superimposed Running Dimensions

•Superimposed running dimensioning simplifies parallel dimensions in order to reduce the space used on a drawing. The common origin for the dimension lines is indicated by a small circle at the intersection of the first dimension and the projection line.

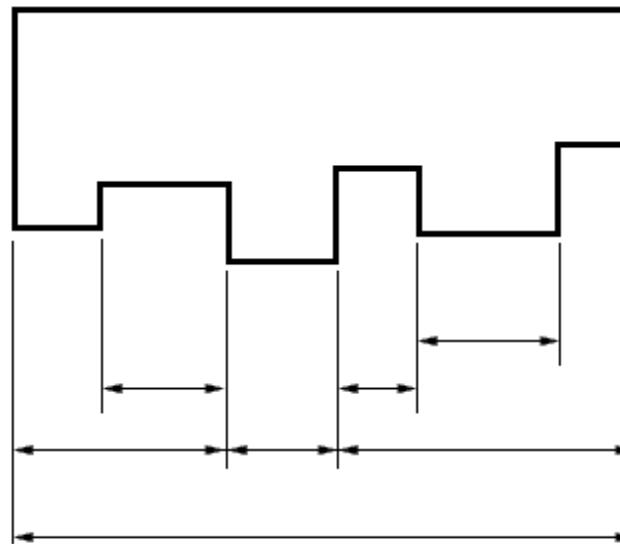


•Chain Dimensioning

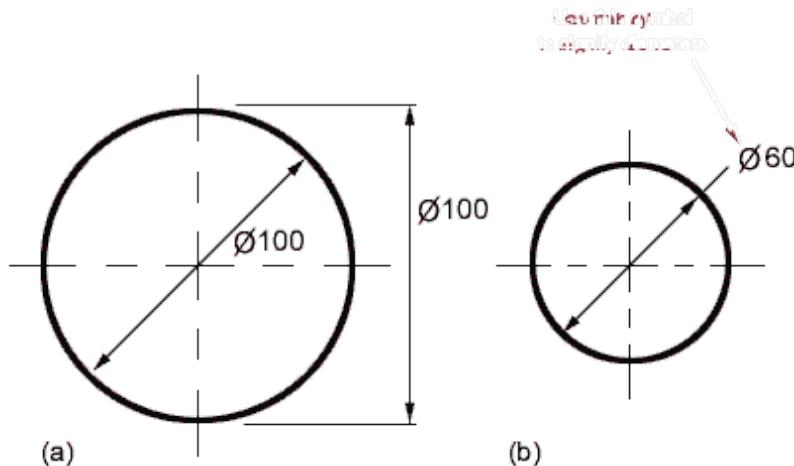


•Combined Dimensions

A combined dimension uses both chain and parallel dimensioning.

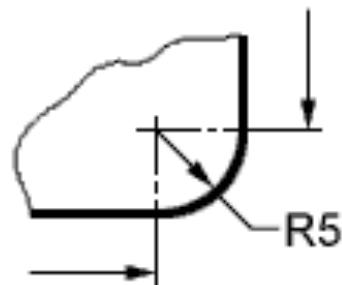


Dimensioning of circles

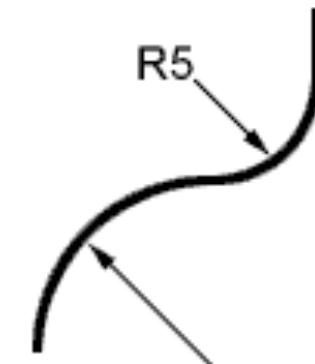


- (a) shows two common methods of dimensioning a circle. One method dimensions the circle between two lines projected from two diametrically opposite points. The second method dimensions the circle internally.
- (b) is used when the circle is too small for the dimension to be easily read if it was placed inside the circle.

Dimensioning Radii



(a)



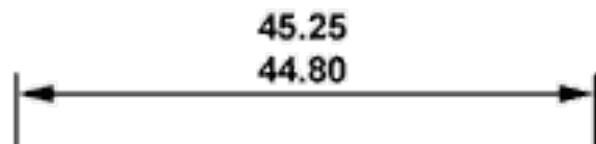
(b)

(a) shows a radius dimensioned with the centre of the radius located on the drawing.

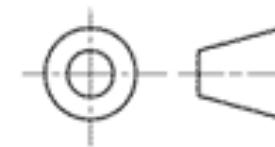
(b) shows how to dimension radii which do not need their centres locating.

Tolerancing

- It is not possible in practice to manufacture products to the exact figures displayed on an engineering drawing. The accuracy depends largely on the manufacturing process. A tolerance value shows the manufacturing department the maximum permissible variation from the dimension.
- Each dimension on a drawing must include a tolerance value. This can appear either as:
- a general tolerance value applicable to several dimensions. i.e. a note specifying that the General Tolerance $+/-. 0.5$ mm.
- or a tolerance specific to that dimension



Drawing layout

TITLE WHEEL BEARING	
NAME John Smith	CHECKED 
VERSION 1.1	DATE 16.10.98
NO NEED TO MEASURE -ALL MEASUREMENTS IN MM	SCALE 1:1
ITI ENGINEERING	

The title block should include:

Title:- title of the drawing

Name:- name of the person who produced the drawing

Checked:- before manufacture, drawings are usually checked

Version:- many drawings are amended, each revision must be noted

Date:- the date the drawing was produced or last amended

Notes:- any note relevant to the drawing

Scale:- the scale of the drawing

Company name:- name of the company

Projection:- the projection system used to create the drawing

