ENGINEERING DRAWING
SKKK 1021

ORTHOGRAPHIC DRAWING

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LEARNING OUTCOMES

It is expected that students will be able to:

- Identify the significance and application of the orthographic drawing
- Apply the techniques of orthographic drawing
- Using the techniques for spacing [illegible] drawing

ORTHOGRAPHIC DRAWING

- INTRODUCTION
- SIGNIFICANCE AND ITS APPL
- BASIC THEORY
  - FIRST ANGLE PROJECTION
  - THIRD ANGLE PROJECTION
- TECHNIQUES FOR SPACING O DRAWING

INTRODUCTION

- **Orthographic projection**
  - A method to show real shape of an object on a certain plane
  - **Projection Plane** - plane where the object were projected
  - **View Direction** – Viewer location from the object
  - **Three Projections** – Front, adjacent and plan/top view
  - Every plane is perpendicular to each other

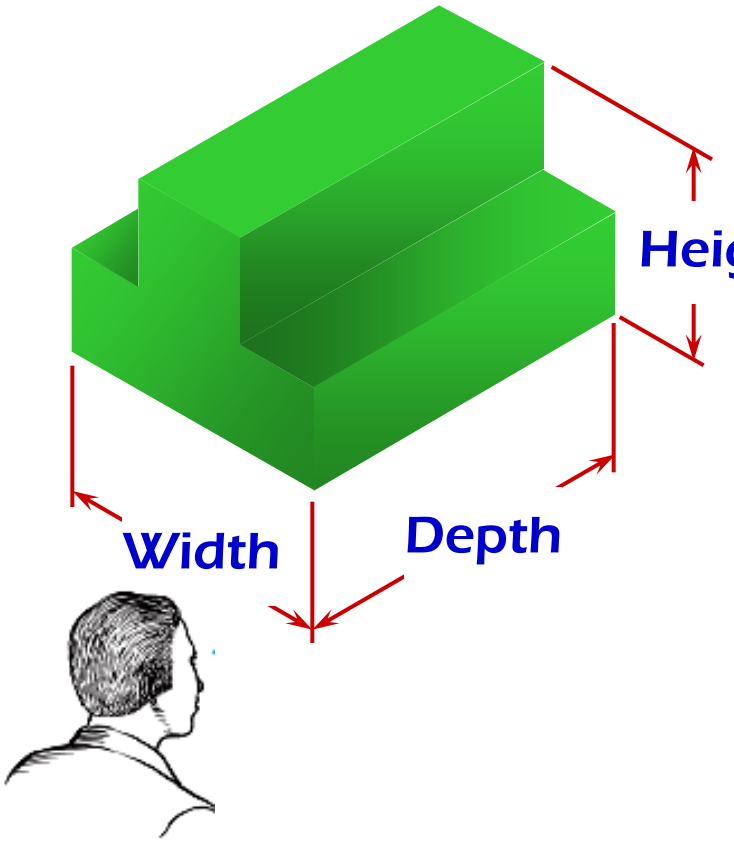
SIGNIFICANCE & APPLICATION

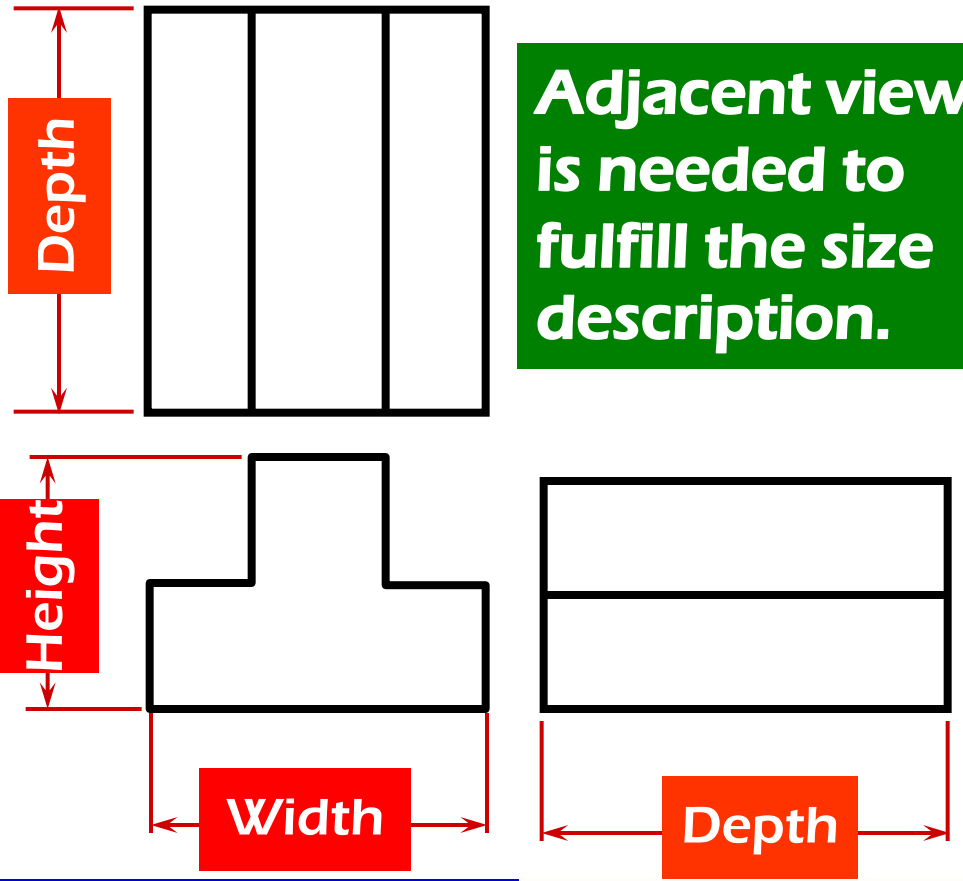
- In this chapter – transfer the isometric object to orthographic drawing and complete the drawing with projection lines.
- **Orthographic projection** is a means of representing a three-dimensional (3D) object in two dimensions (2D).
- Combination of these 2D shapes will produce complete info of a component

MULTIVIEW PROJECTION

Three principle dimensions of an object ...

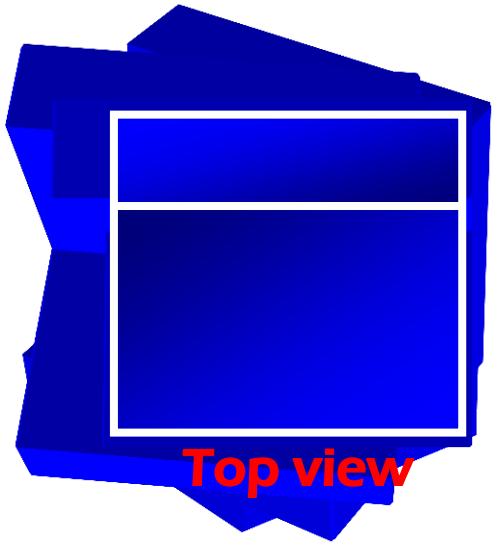
... can be presented only two in each view.



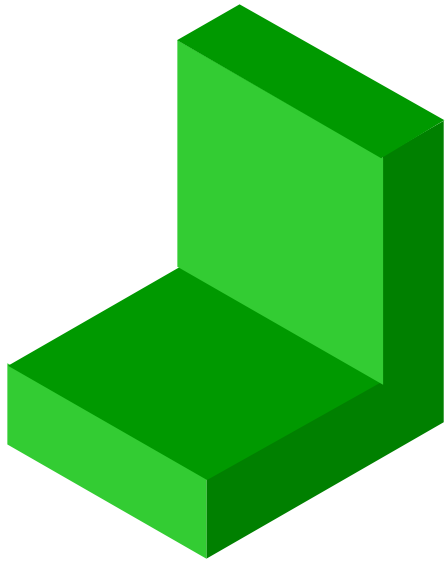


Adjacent view(s) is needed to fulfill the size description.

REVOLVE THE OBJECT



Top view

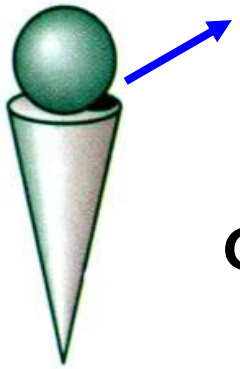


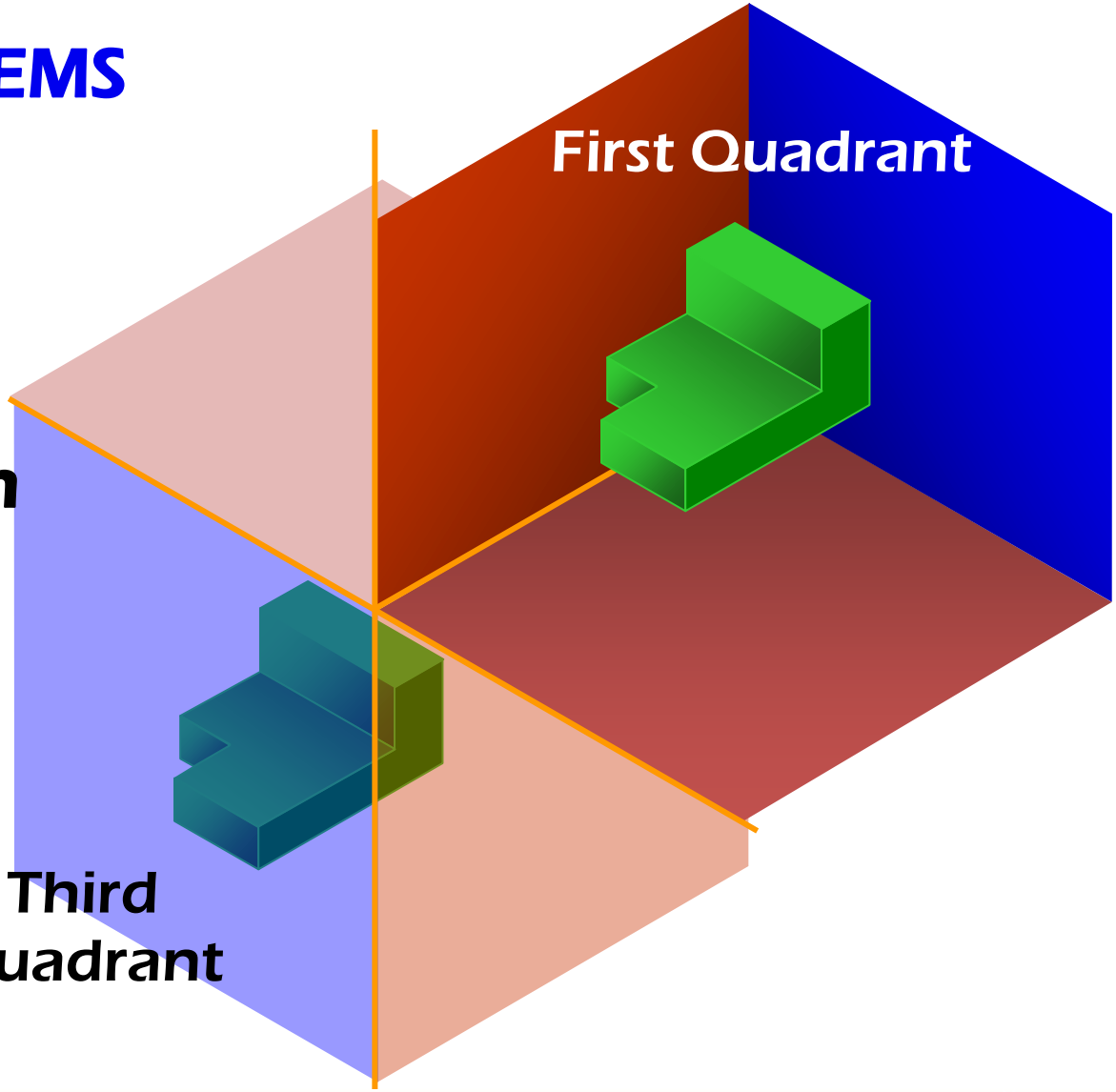
Front view

Right side view

PROJECTION SYSTEMS

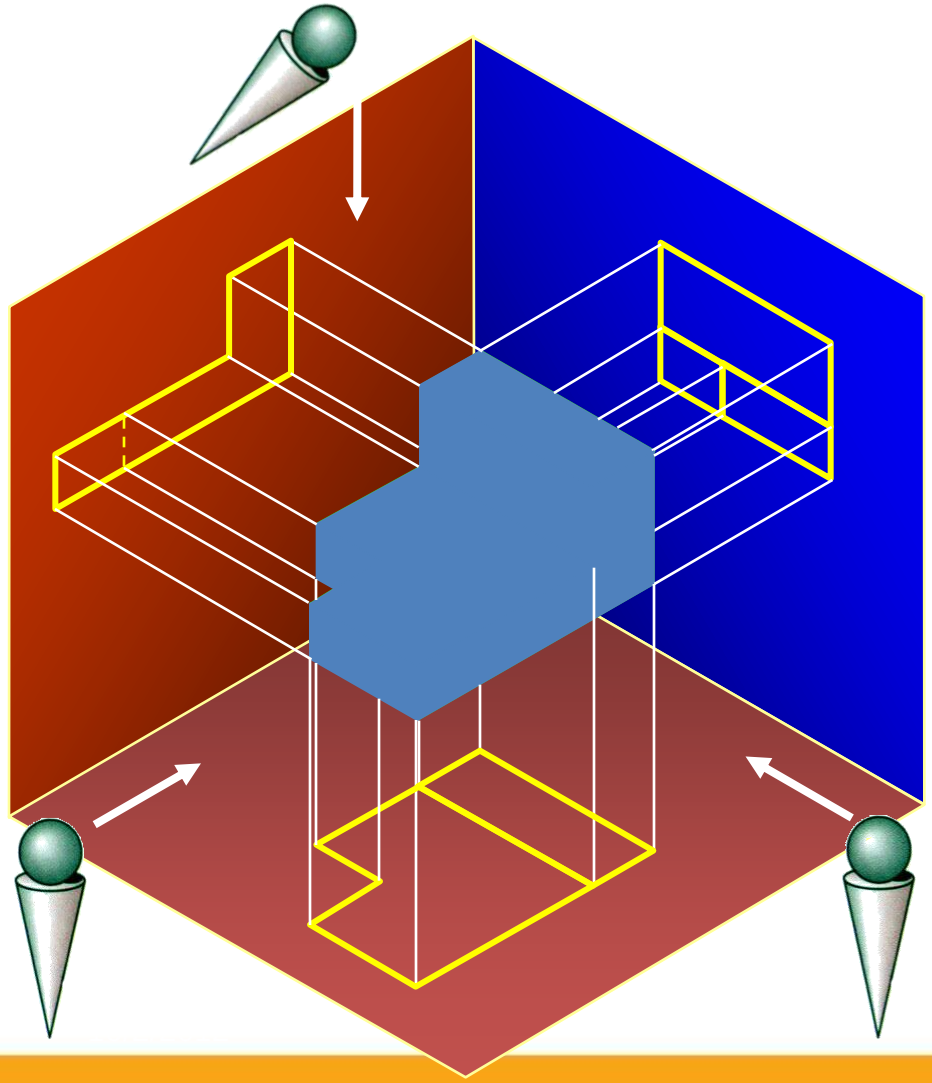
1. **First** angle system
   - European country
   - ISO standard
2. **Third** angle system
   -Canada, USA,
   Malaysia, Japan,
   Thailand



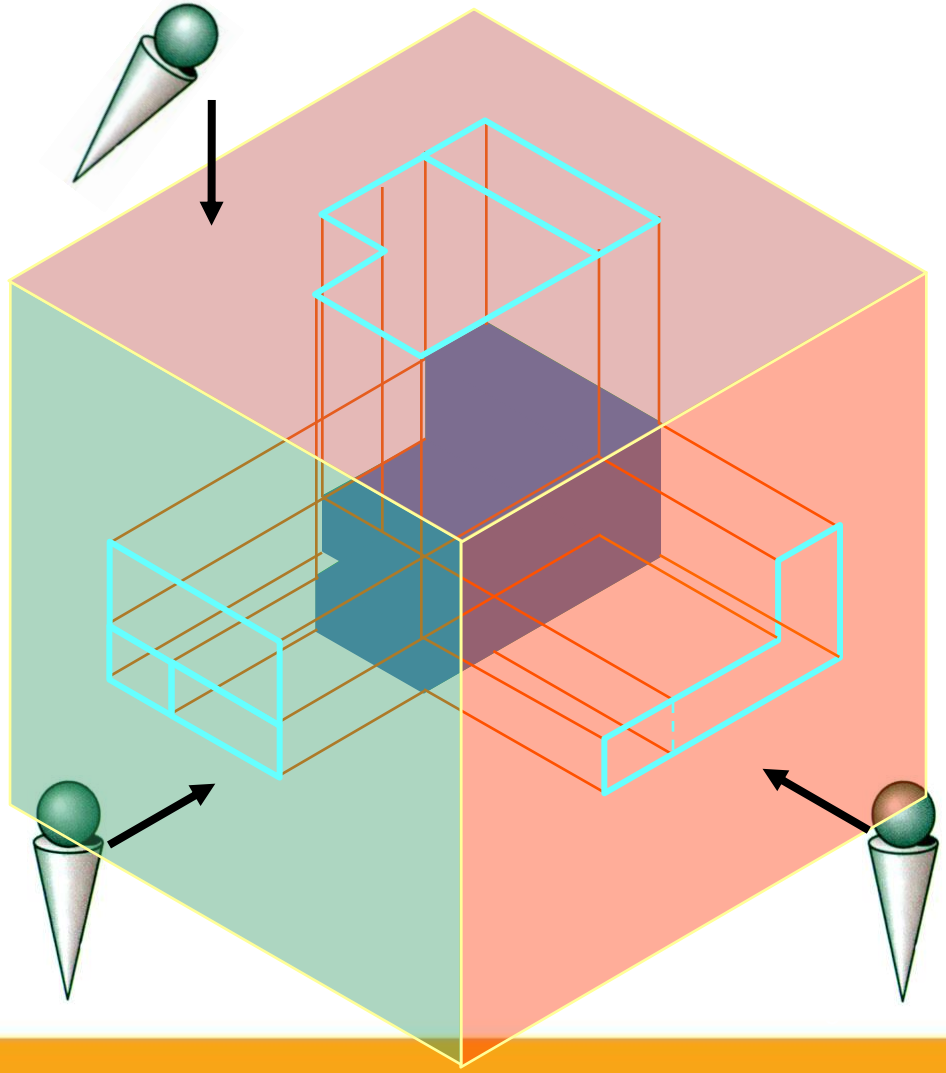


ORTHOGRAPHIC PROJECTION

1st angle system

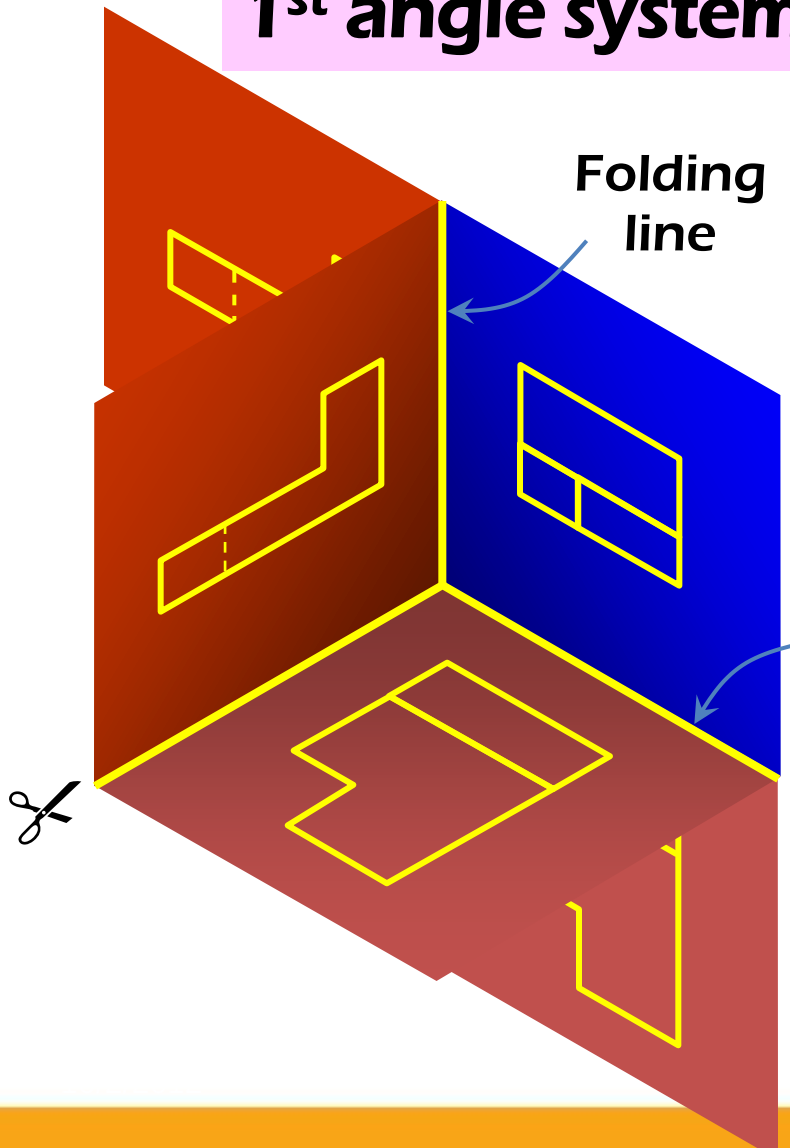


3rd angle system

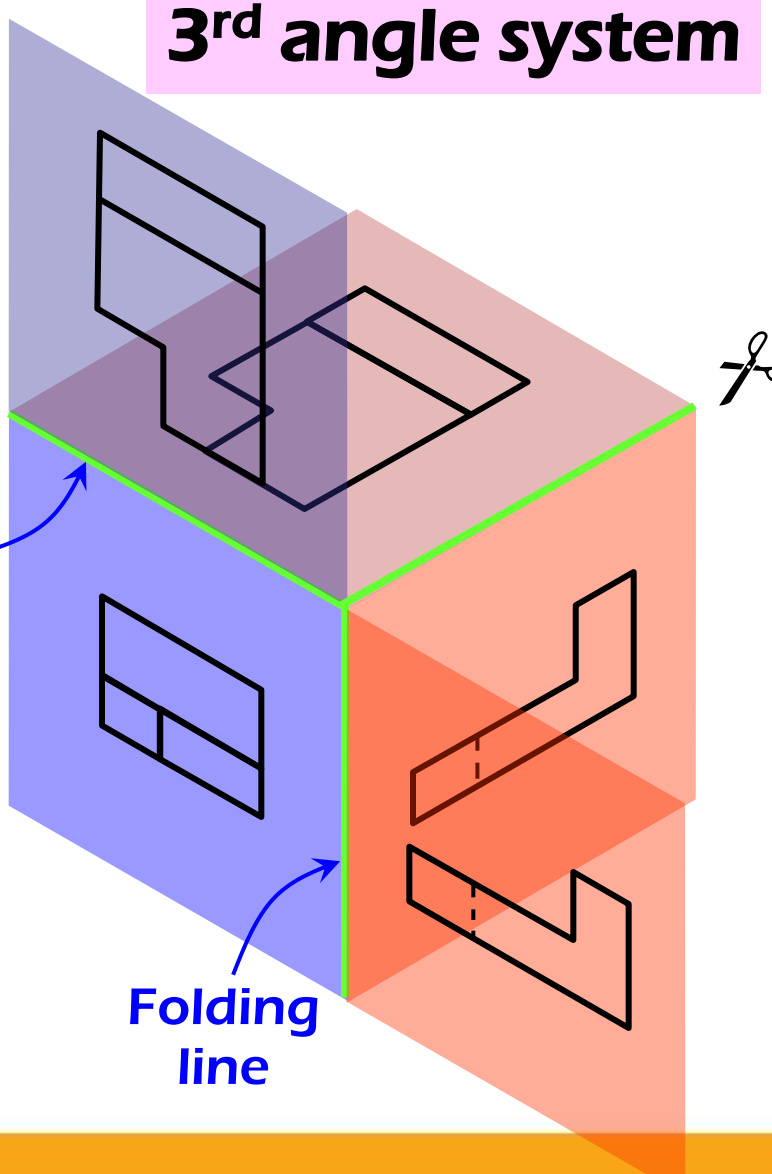


ORTHOGRAPHIC VIEWS

1st angle system

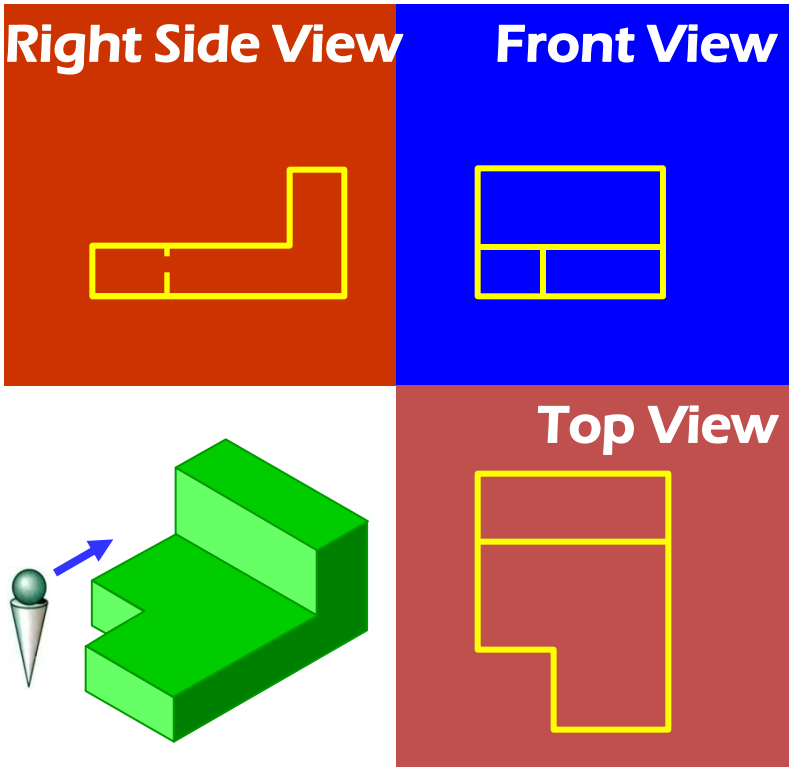


3rd angle system

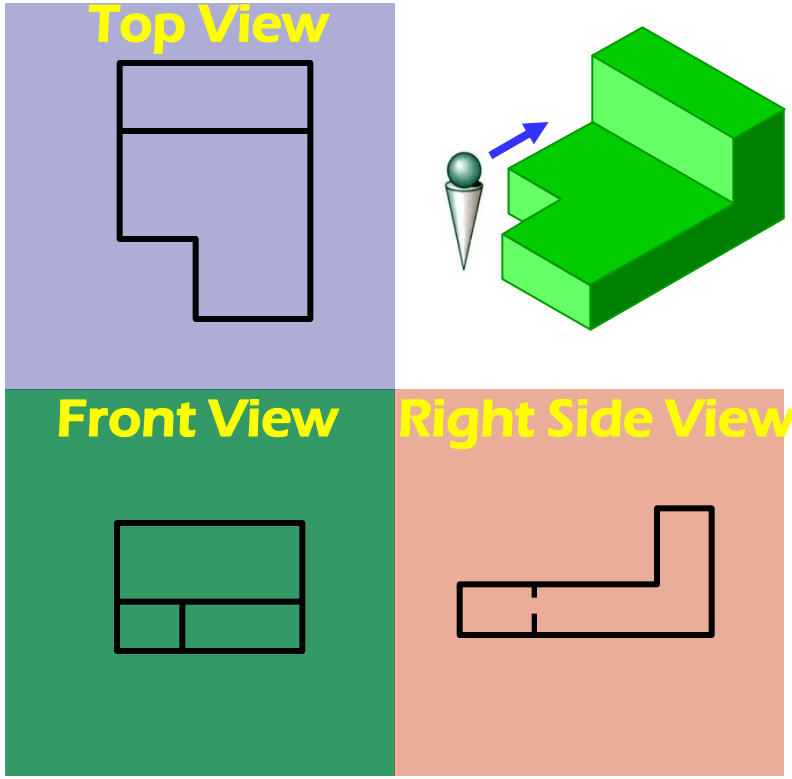


ORTHOGRAPHIC VIEWS

1st angle system

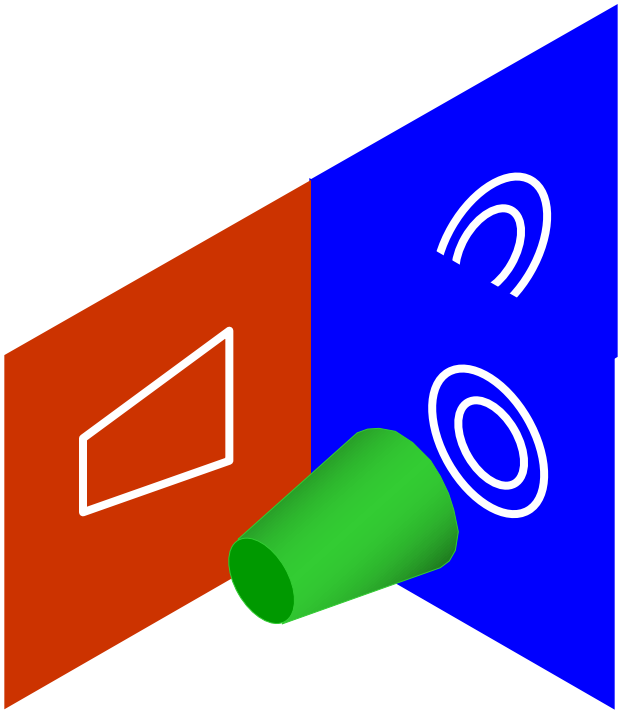


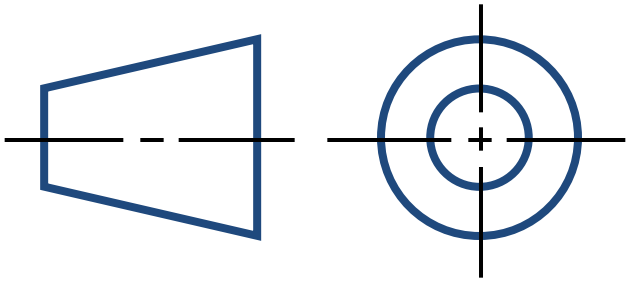
3rd angle system



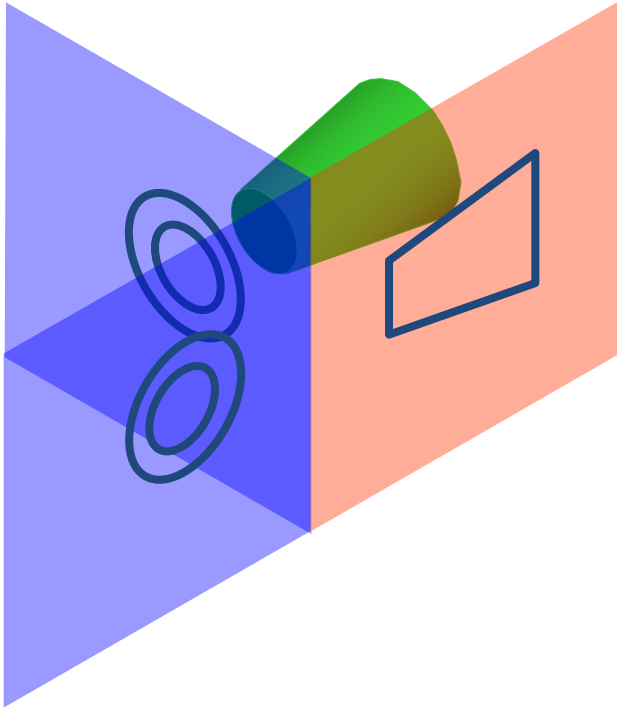
PROJECTION SYMBOLS

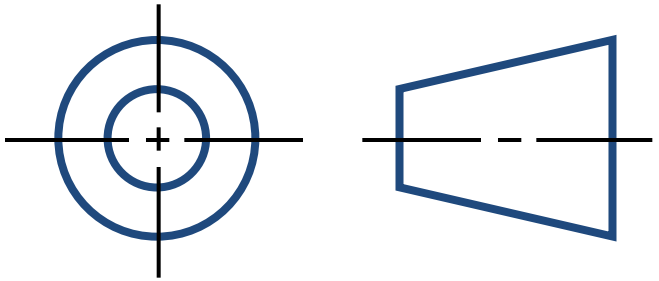
First angle system





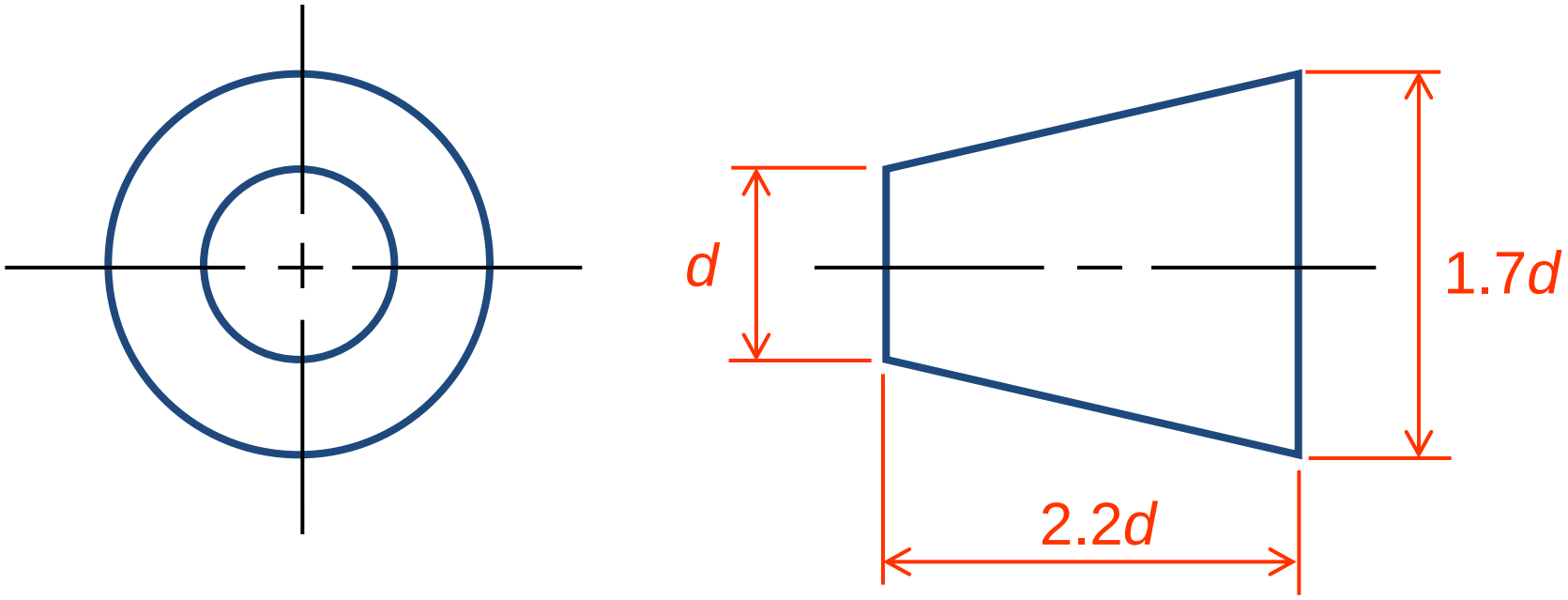
Third angle system



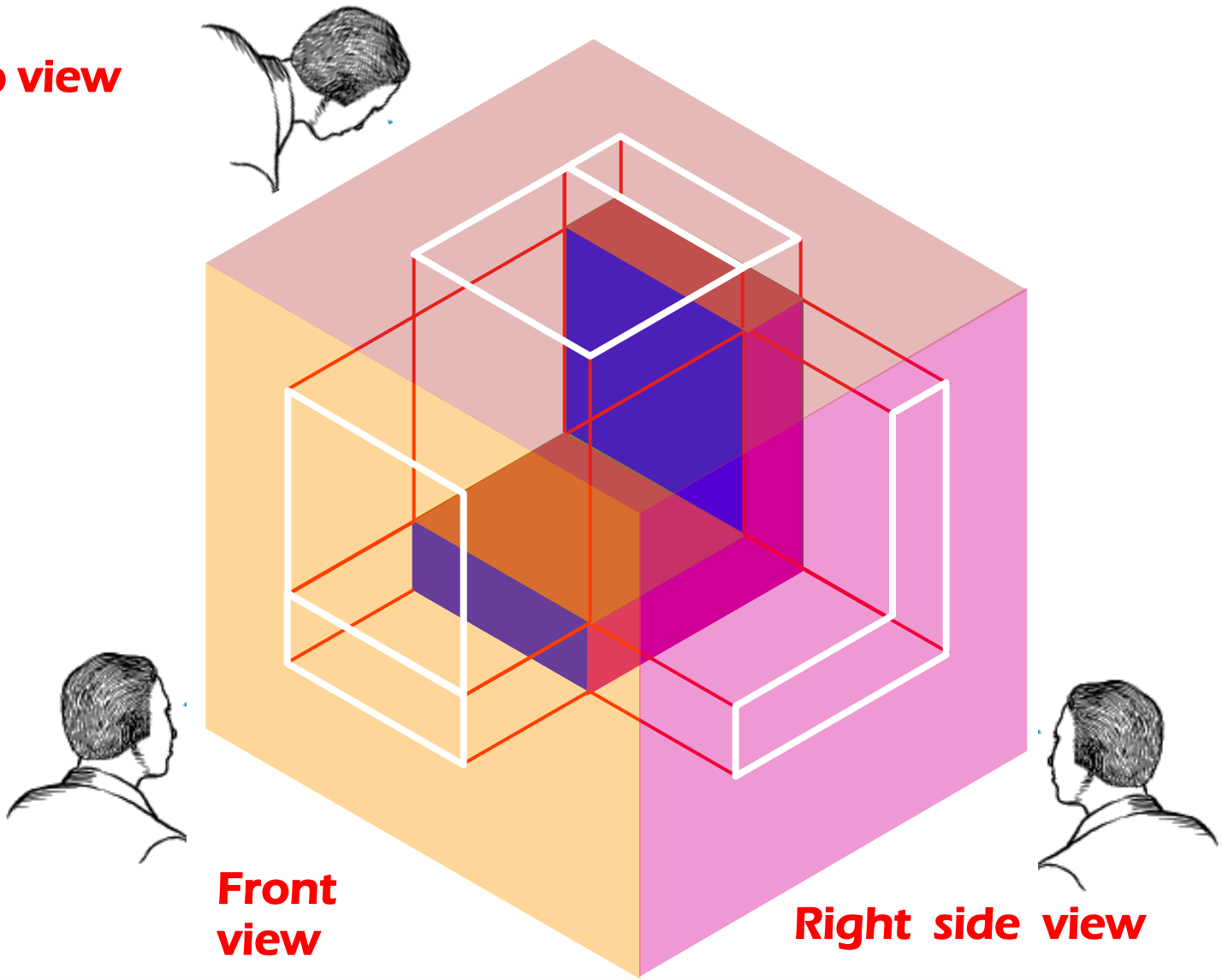


PROJECTION SYMBOLS

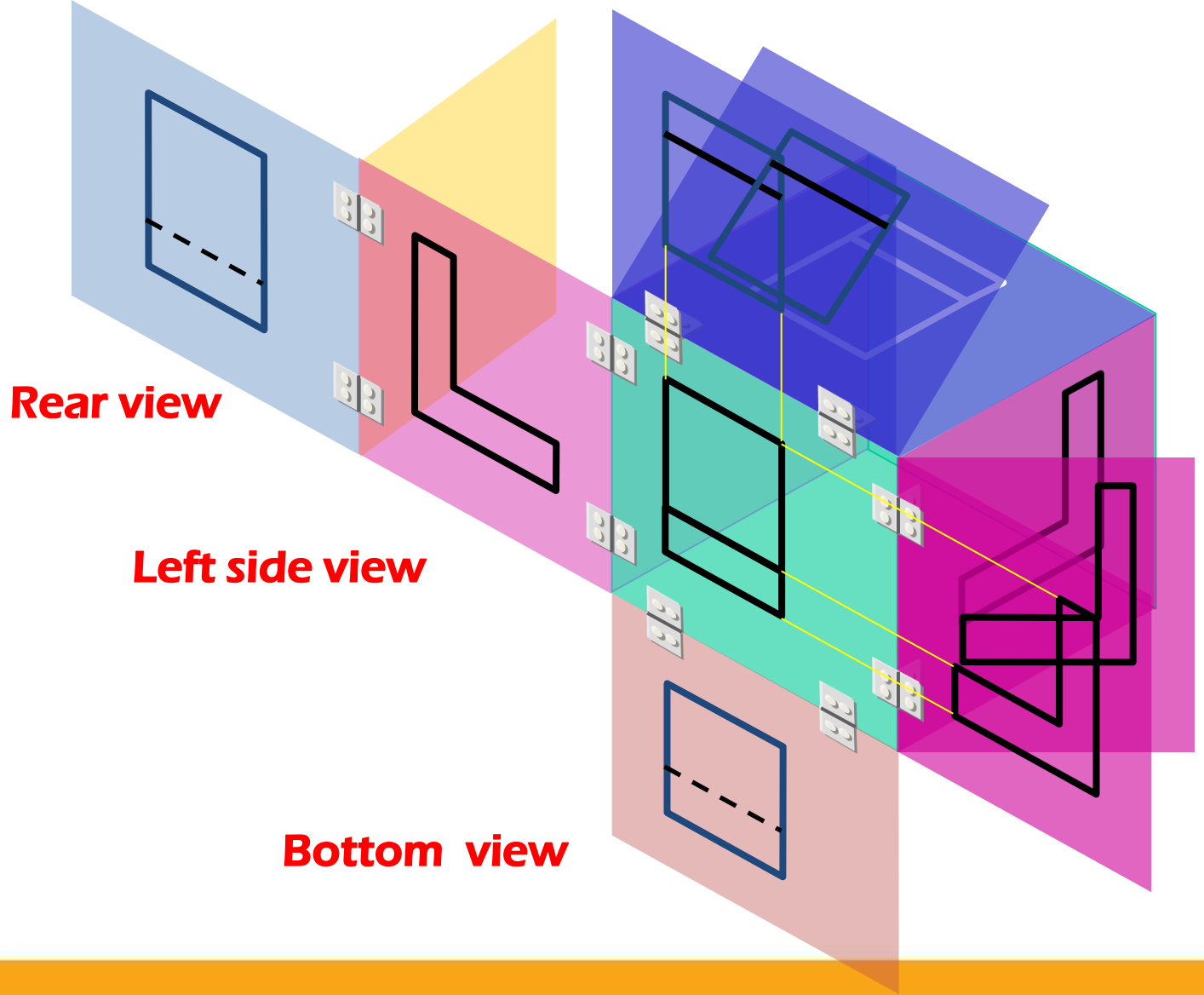
Suggested proportion

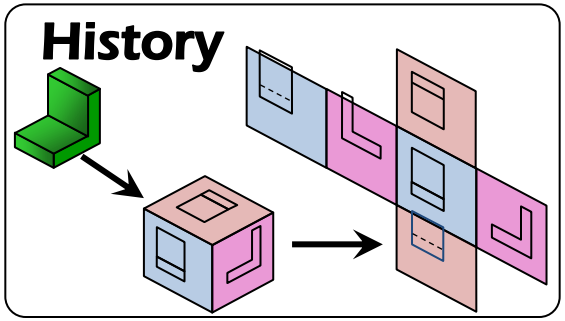


OBSERVER MOVE AROUND



THE GLASS BOX CONCEPT



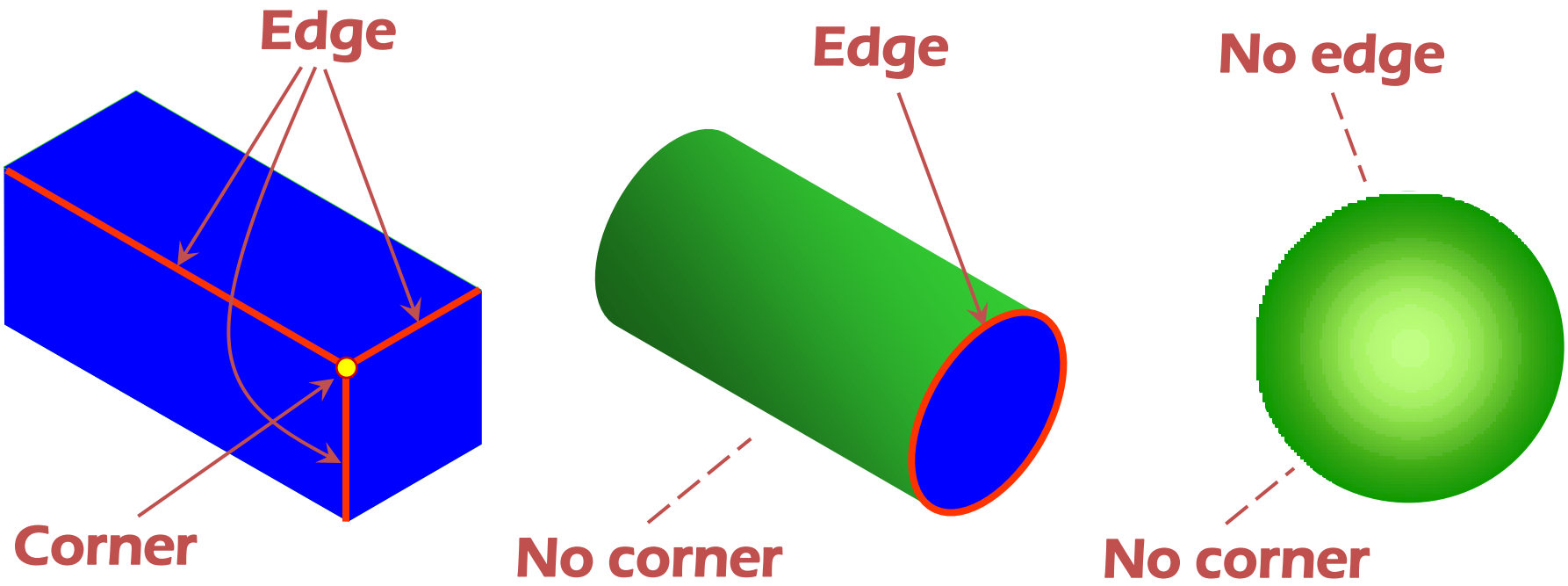

History

Depth
Width
Height

OBJECT FEATURES

Edges are lines that represent the boundary between two faces.

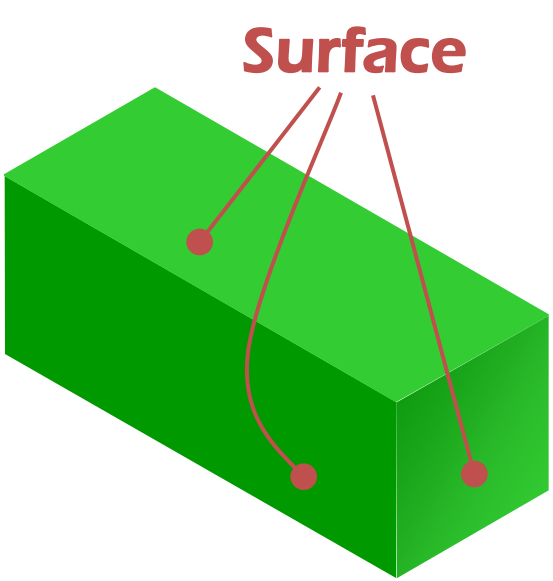
Corners Represent the intersection of two or more edges.

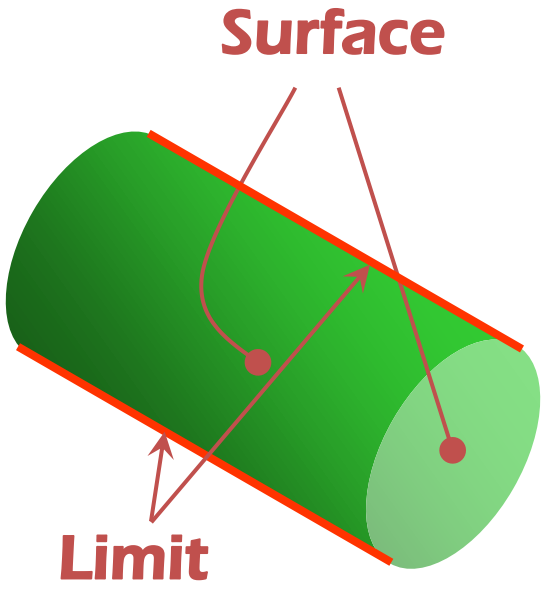


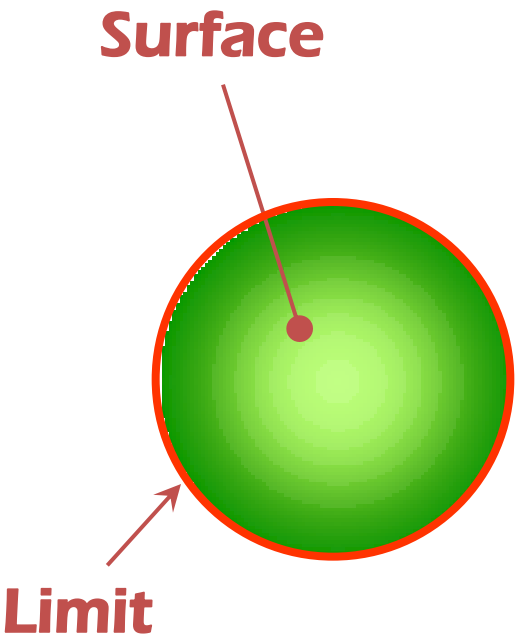
OBJECT FEATURES

Surfaces are areas that are bounded by edges or limiting element.

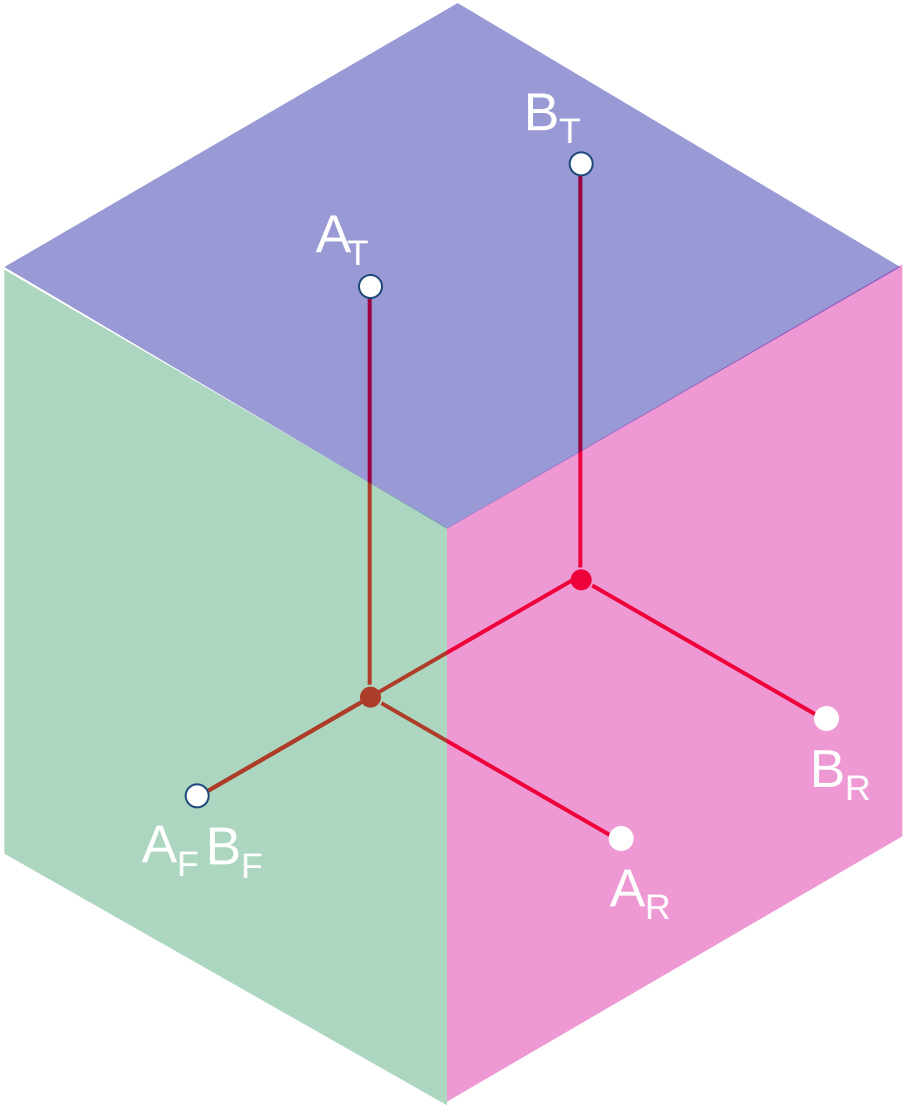
Limiting element is a line that represents the last visible part of the curve surface.

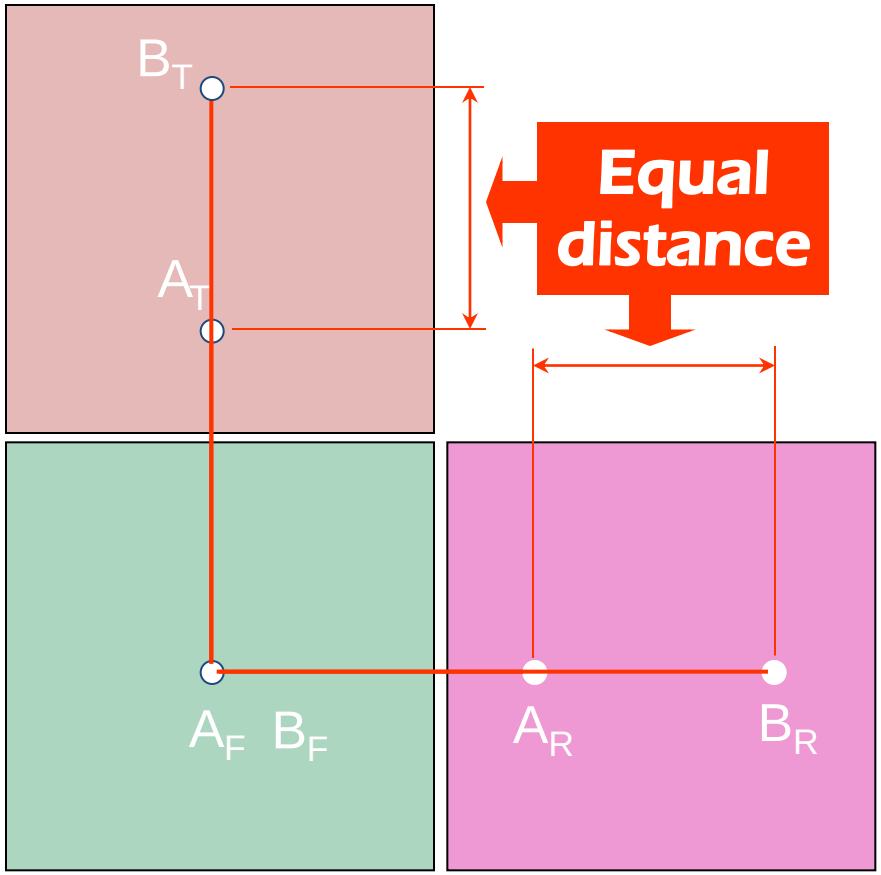




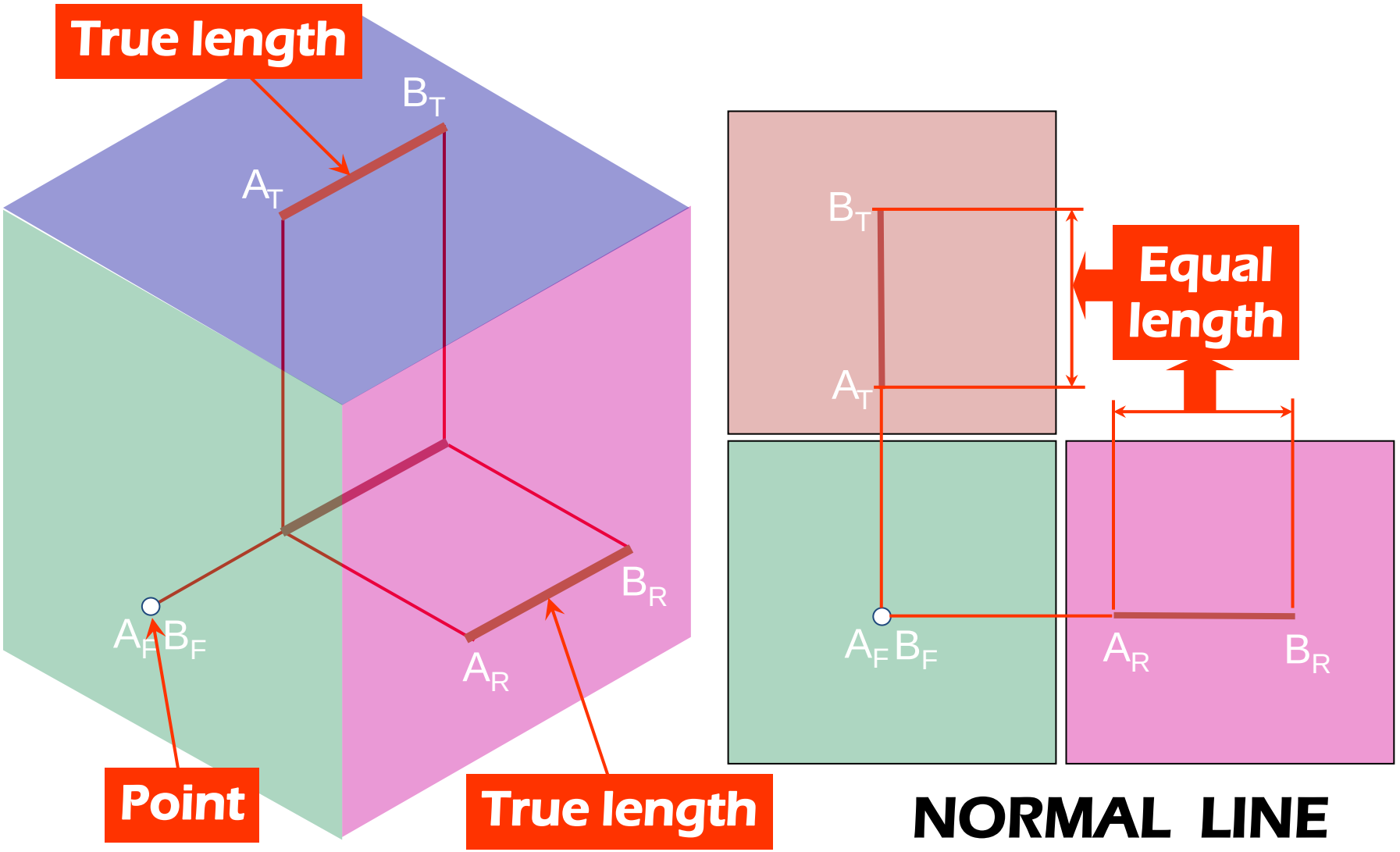


PROJECTION OF POINT(S)



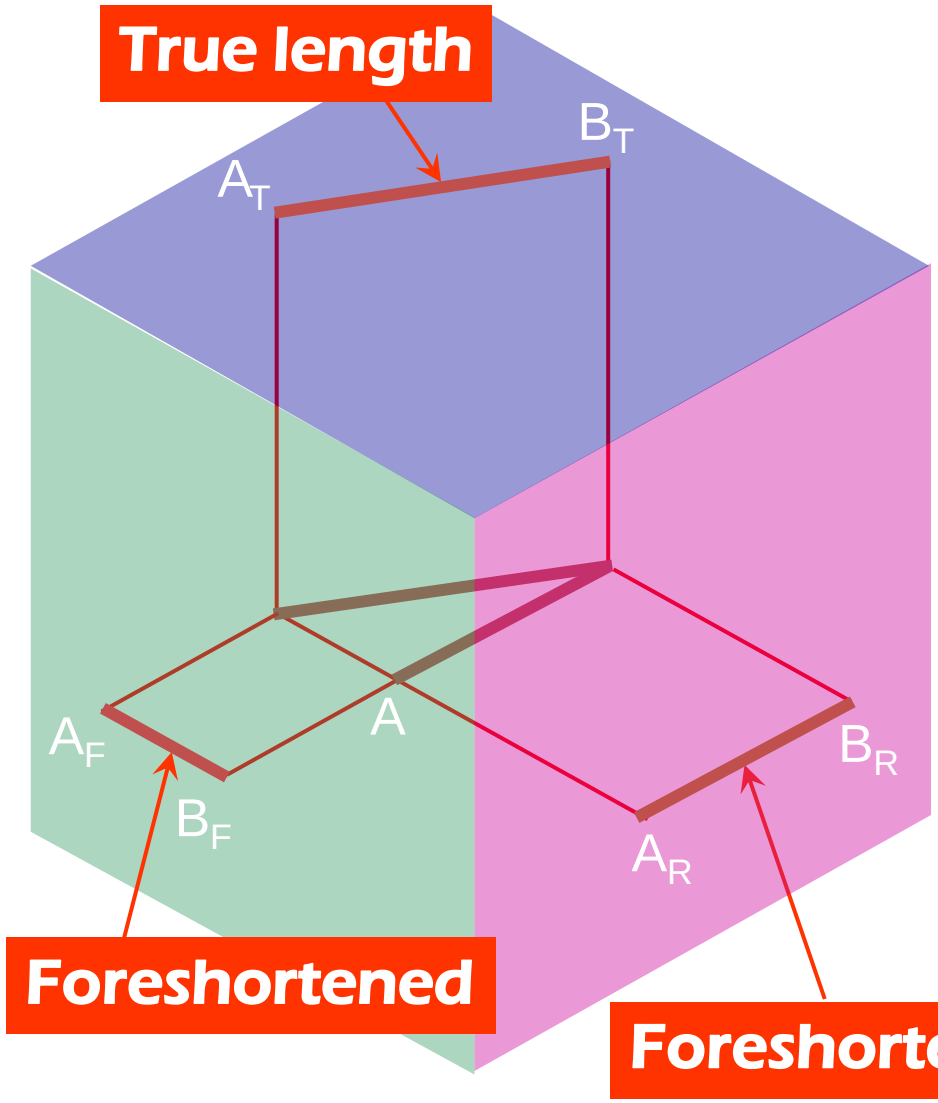


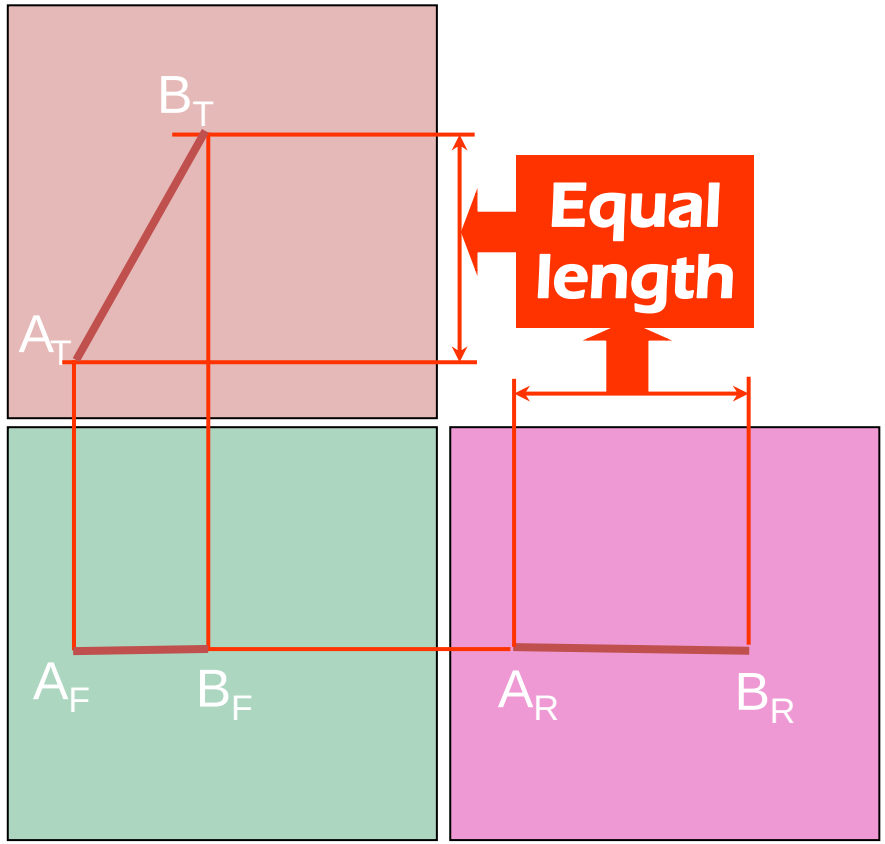
PROJECTION OF LINE



NORMAL LINE

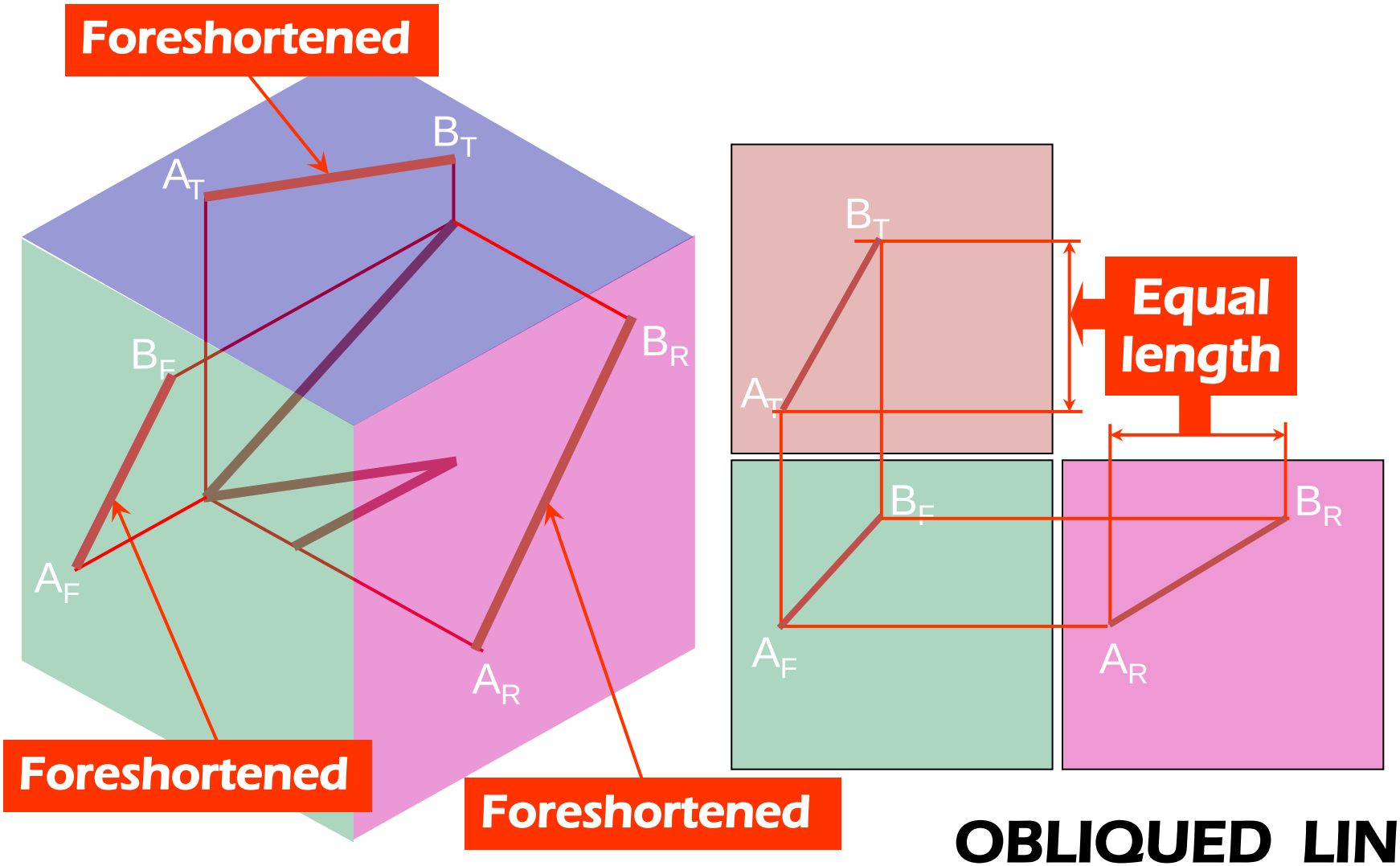
PROJECTION OF LINE





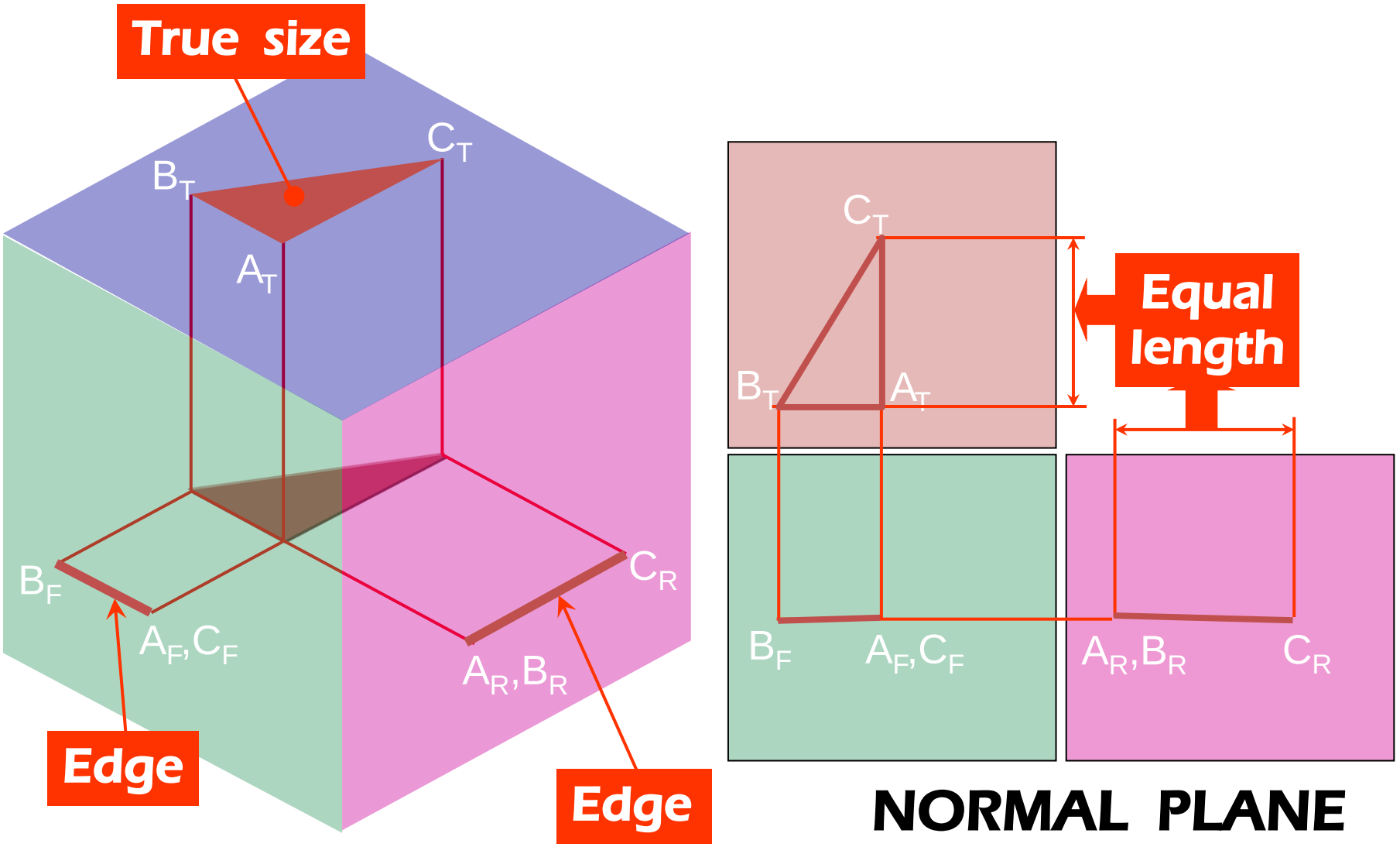
INCLINED LINE

PROJECTION OF LINE



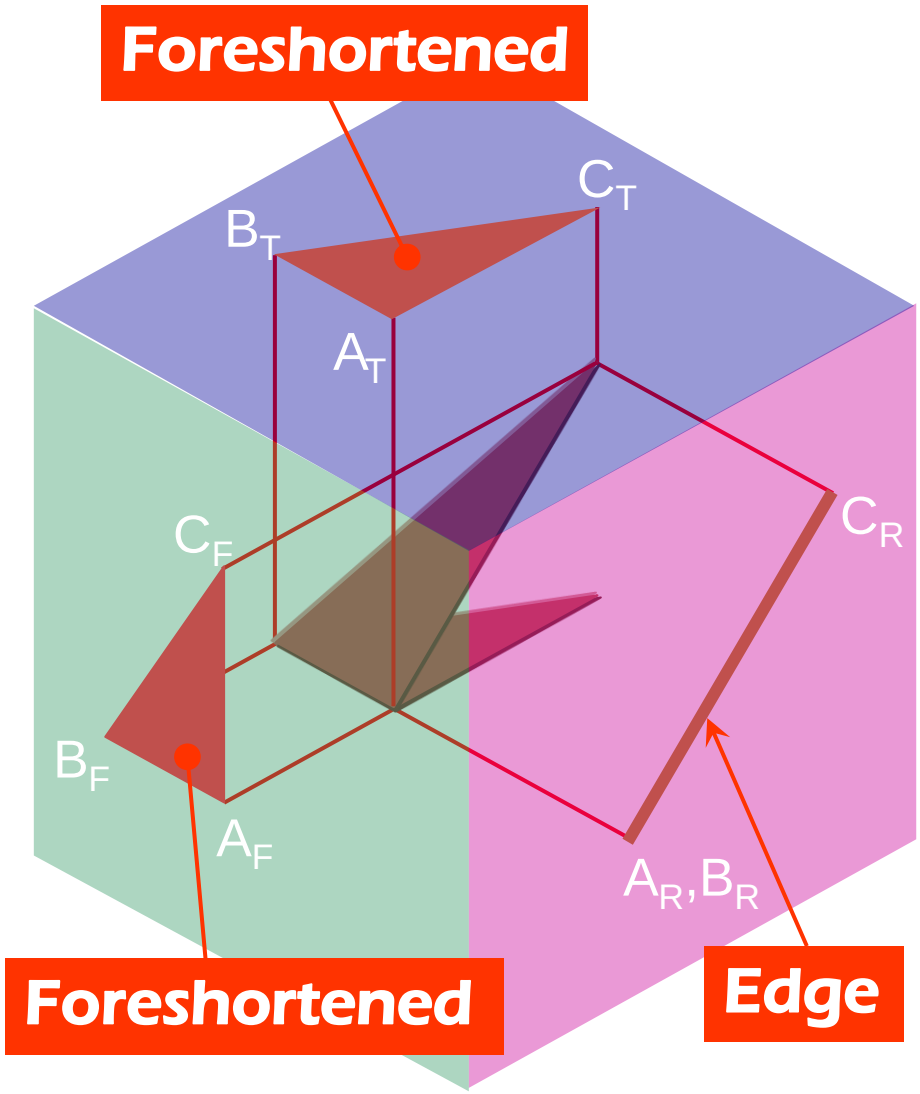
OBLIQUED LINE

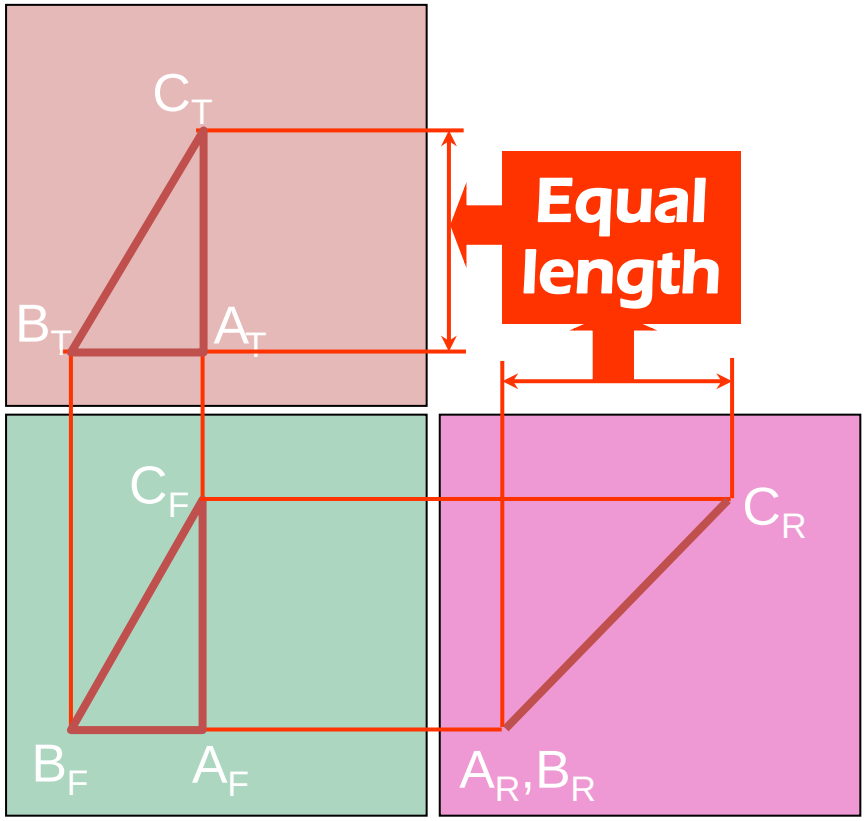
PROJECTION OF PLANE



NORMAL PLANE

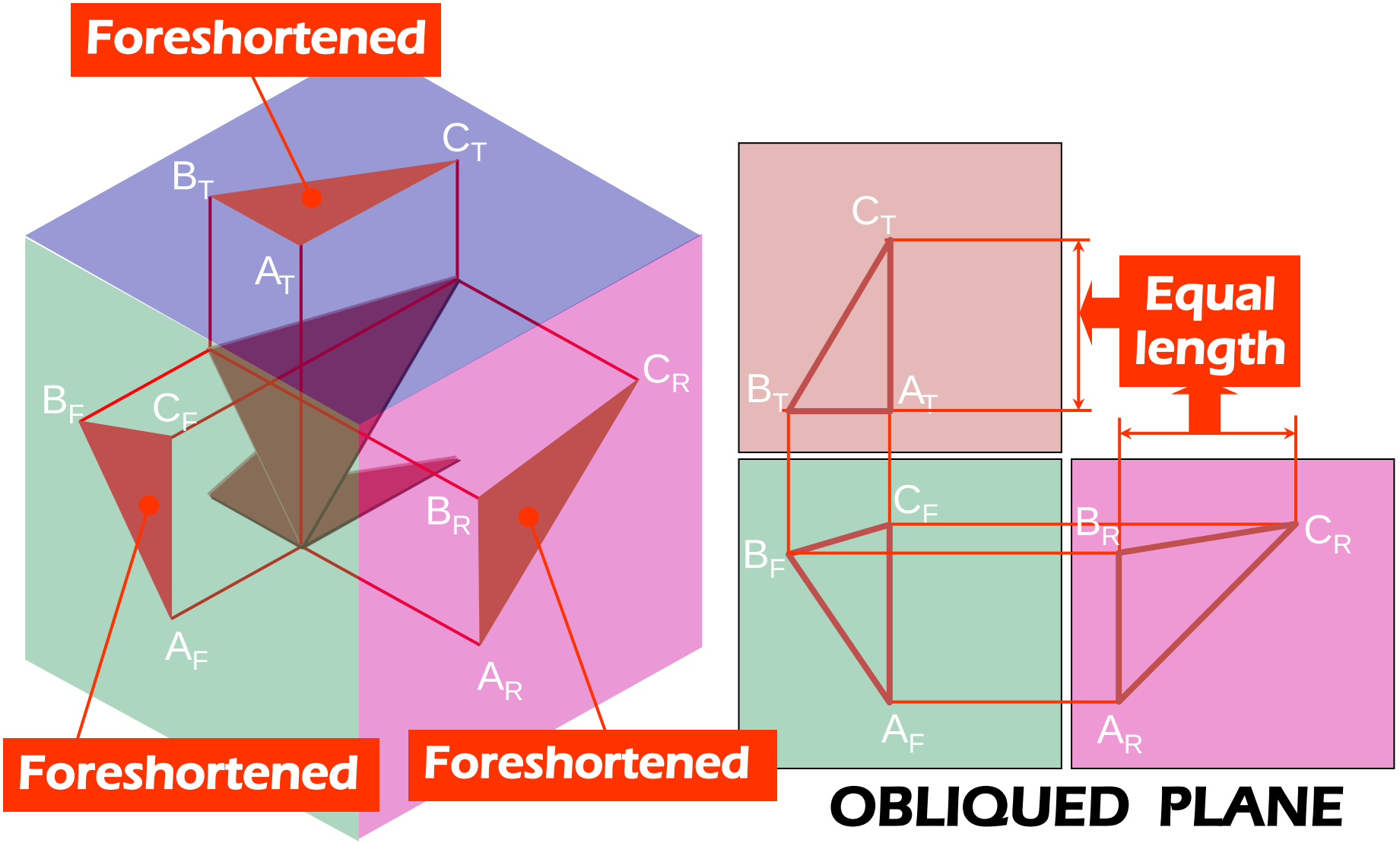
PROJECTION OF PLANE





INCLINED PLANE

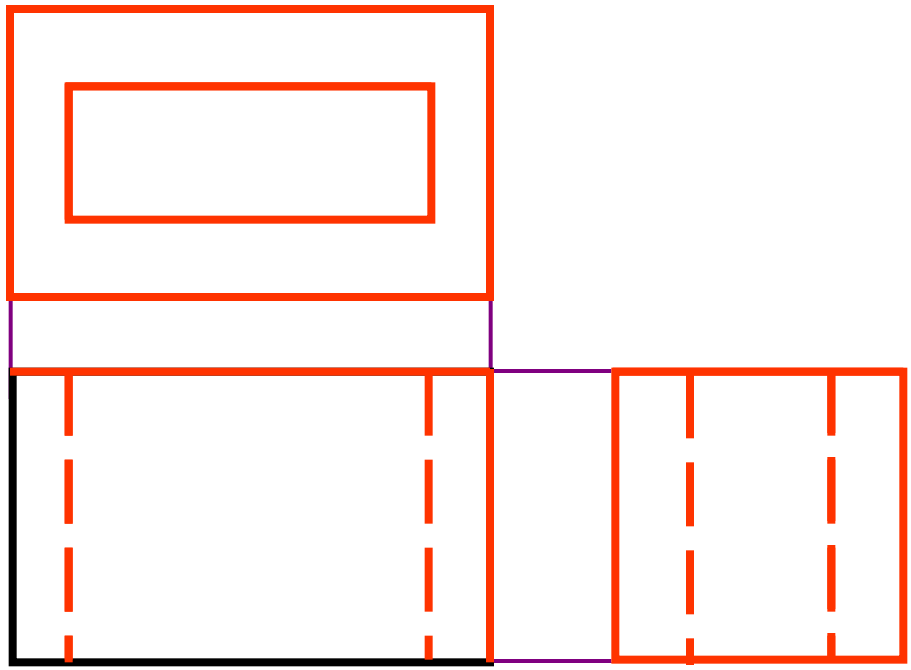
PROJECTION OF PLANE

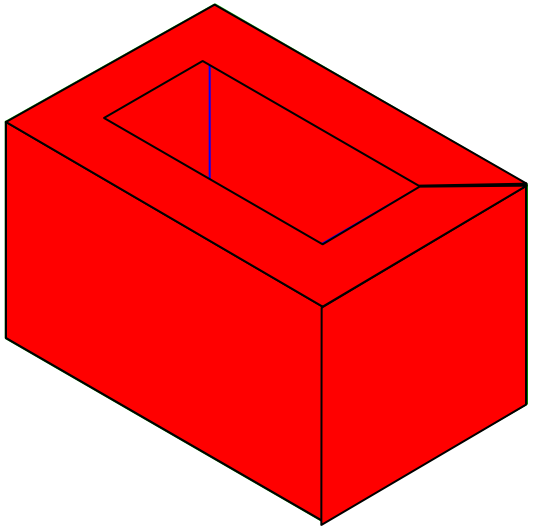


OBLIQUED PLANE

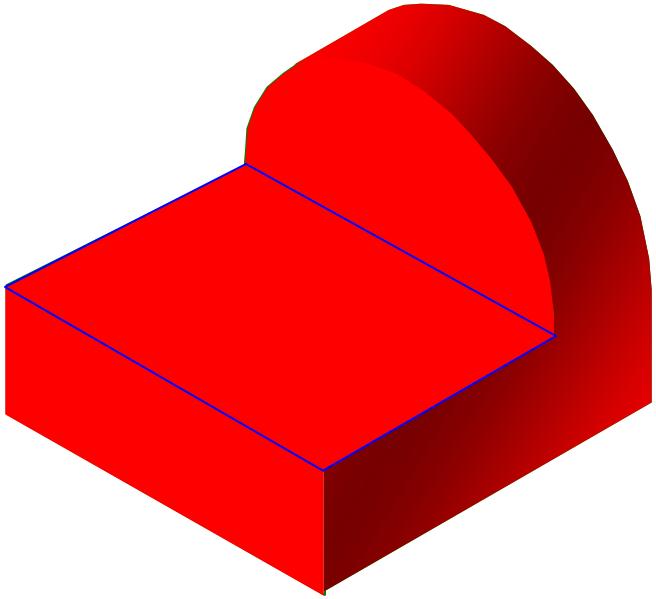
PROJECTION OF OBJECT

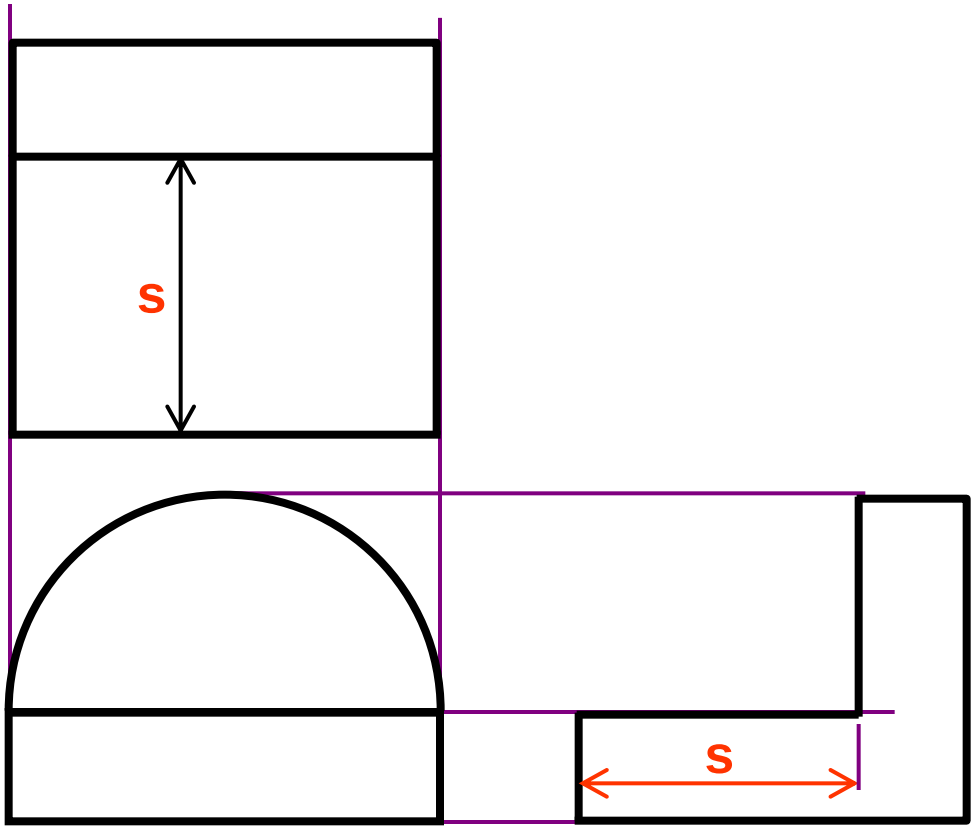
The views are obtained by projecting all object features to the picture plane.



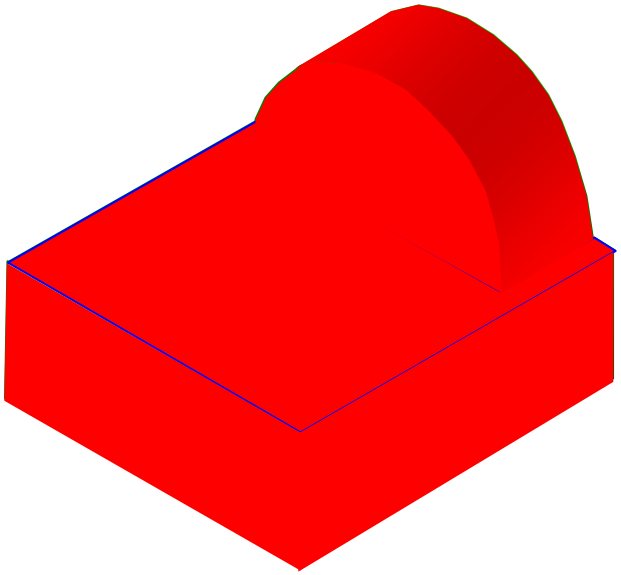


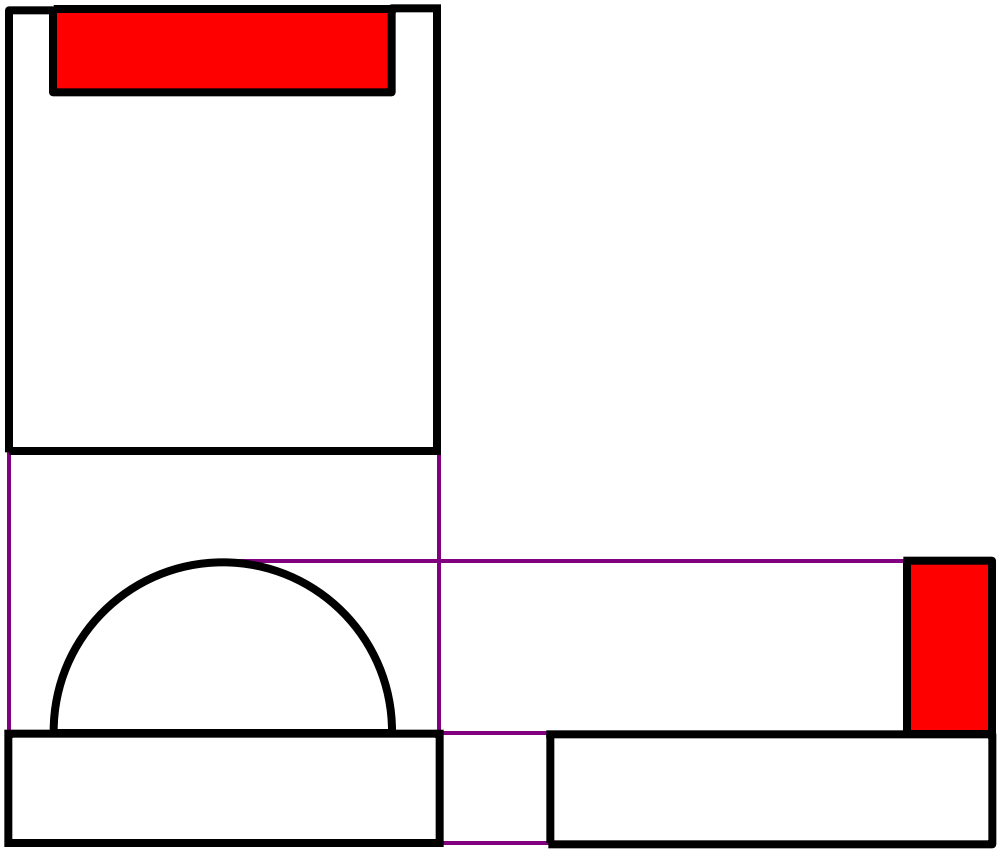
PROJECTION OF OBJECT





PROJECTION OF OBJECT





TECHNIQUES FOR SPACING OUT DRAWING

- Things to consider

o Selection of the front view

o Selection of the adjacent view

o Method to space out drawing

Select a Front View

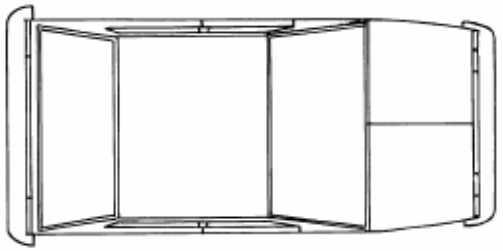
- The object's **longest dimension** should be presented as a **width**.

First choice

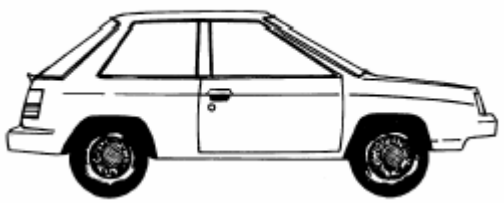
Waste more space

Inappropriate

Second choice



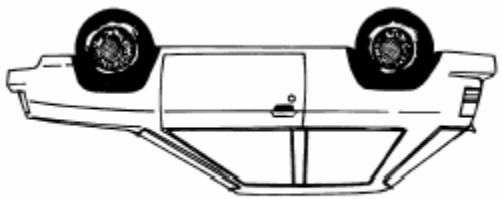
GOOD

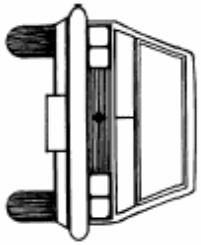


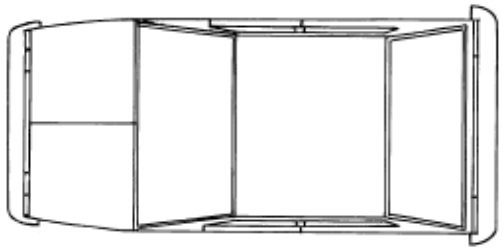
Select a Front View

- The adjacent views that are projected from the selected front view should appear in its natural position.

Inappropriate

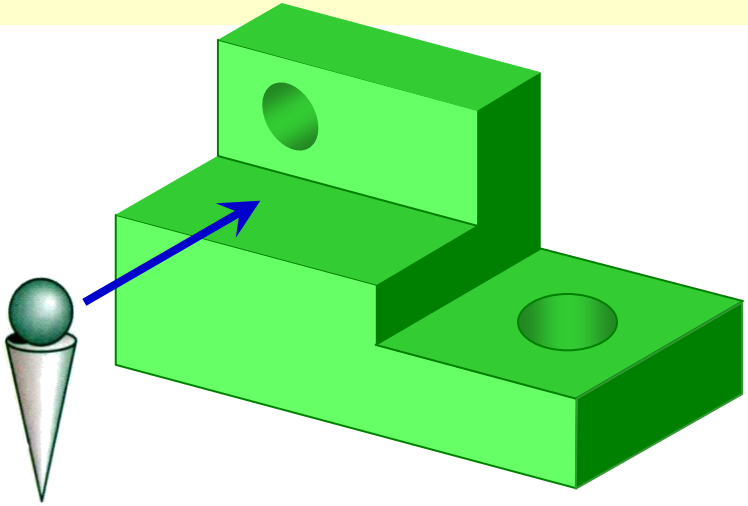


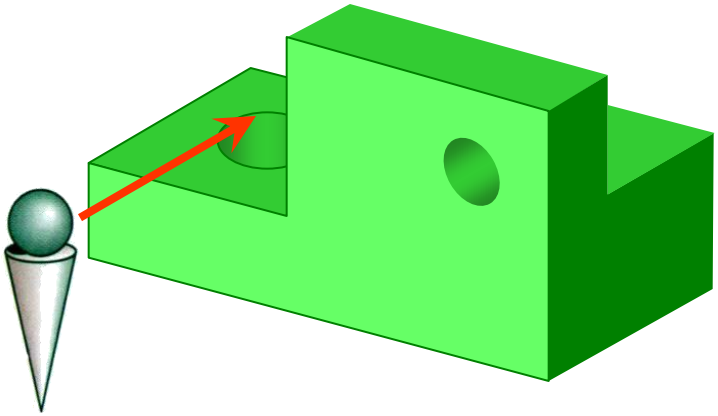


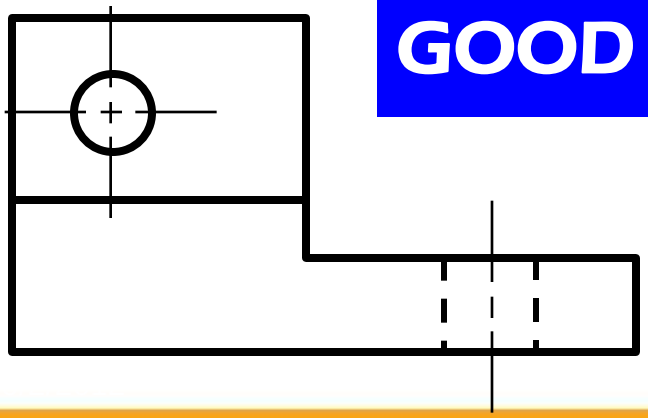


Select a Front View

- Choose the view that have the fewest number of hidden lines.

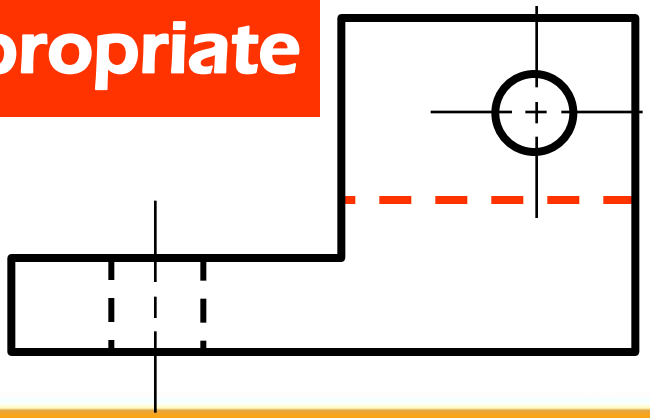






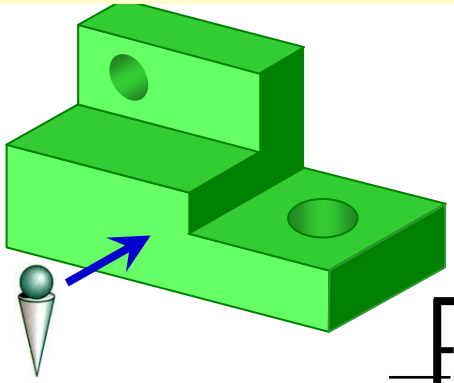
GOOD

Inappropriate

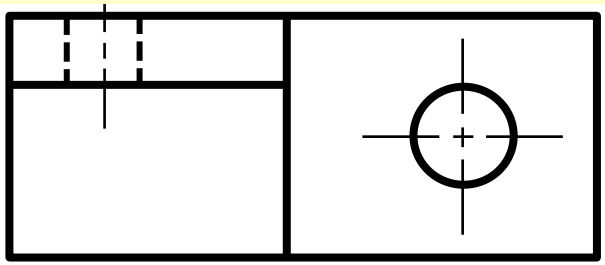


Select an Adjacent View

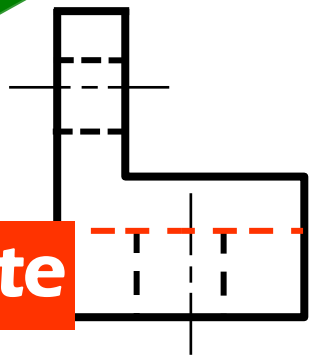
- Choose the view that have the fewest number of hidden lines.

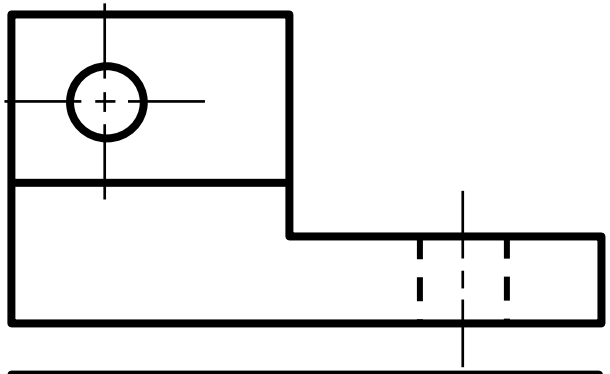


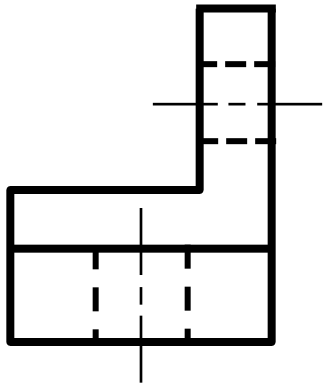
GOOD



Inappropriate

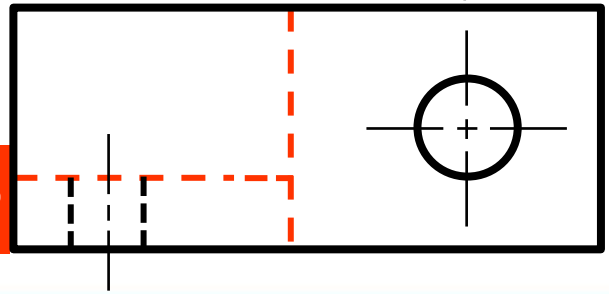






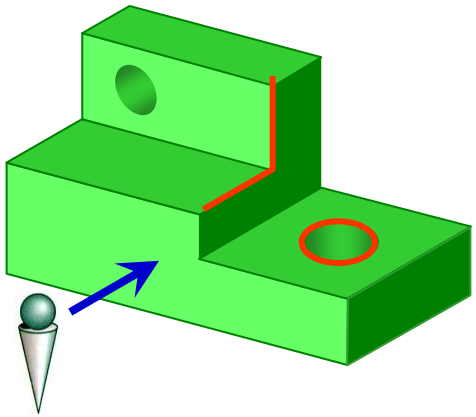
GOOD

Inappropriate

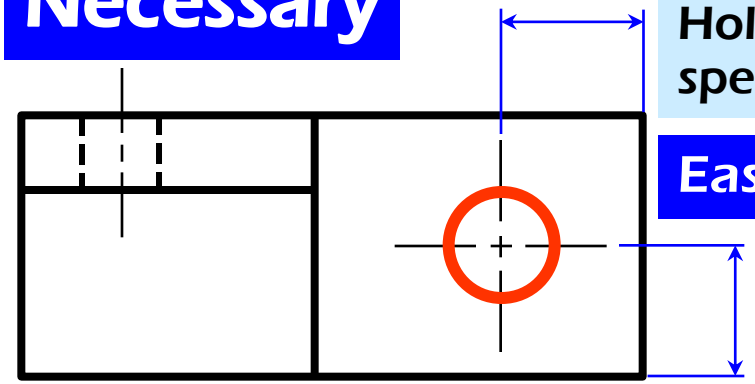


Select an Adjacent View

- Choose the **minimum** number of views that can represent the major features of the object.



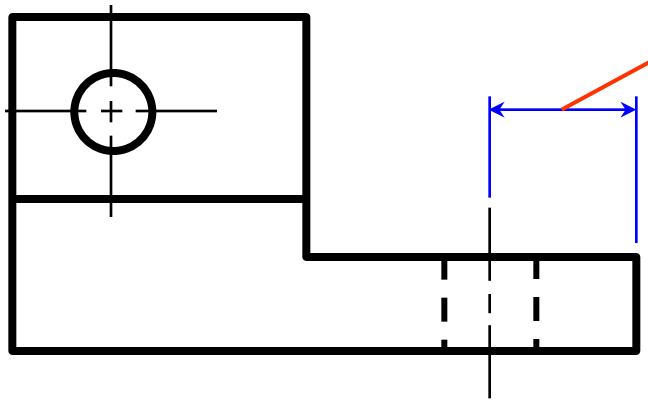
Necessary

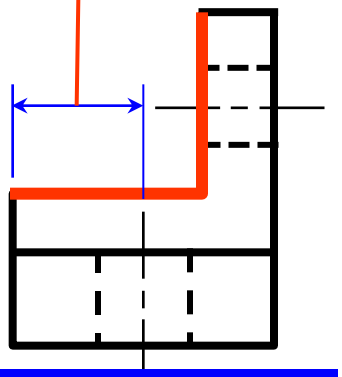


Hole's location can be specified on the same view.

Easy to understand

Difficult to interpret.



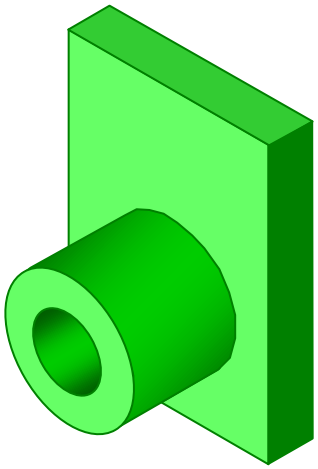


Necessary

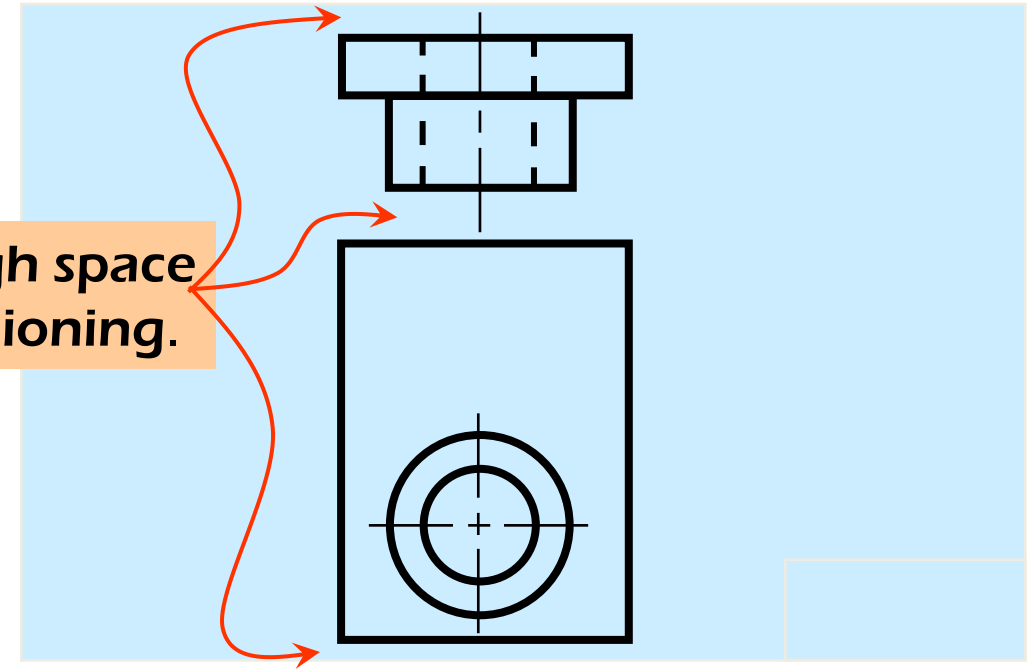
Select an Adjacent View

- Choose the views that are suitable to a drawing space.

POOR

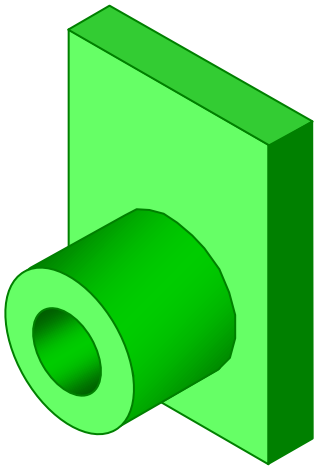


Not enough space for dimensioning.

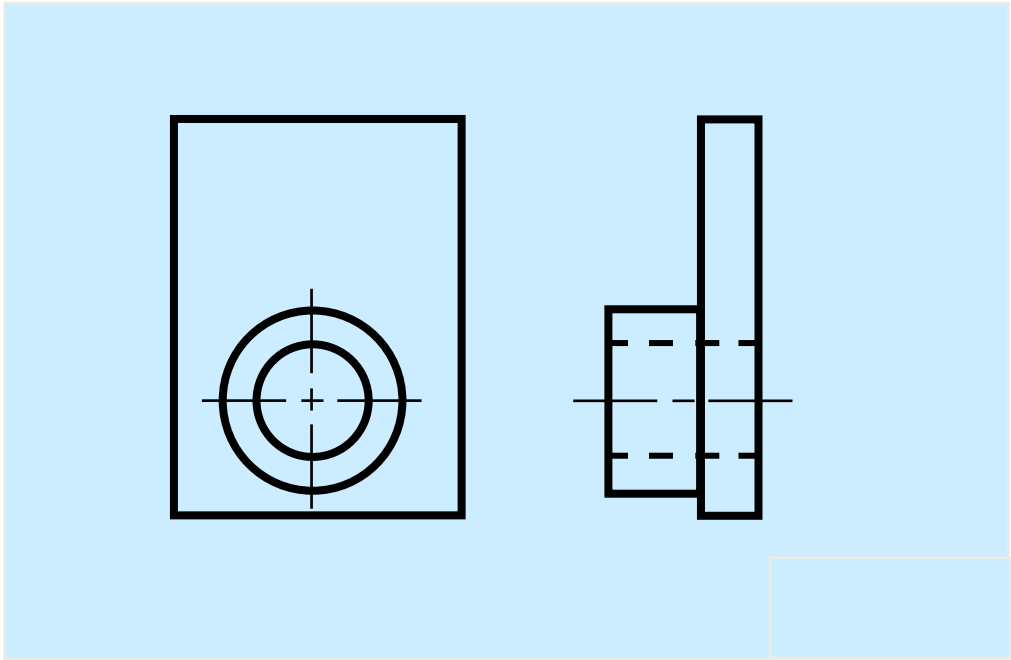


Select an Adjacent View

- Choose the views that are suitable to a drawing space.



GOOD

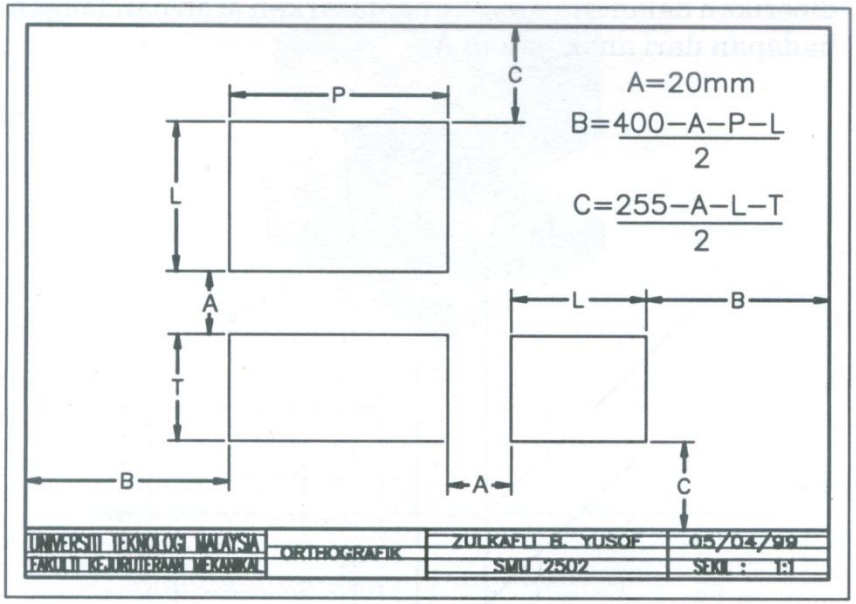


Method to space out drawing

- Before starting the orthographic drawing, the drawing space must be divided by determining the space for front, adjacent and plan view.
- The space can be divided as follows:

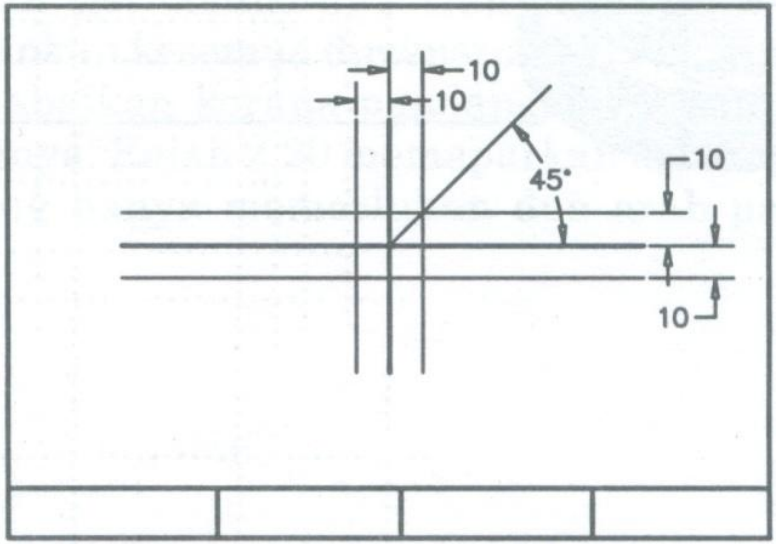
$$B = \frac{285 - A - P - L}{2}$$

$$C = \frac{175 - A - L - T}{2}$$



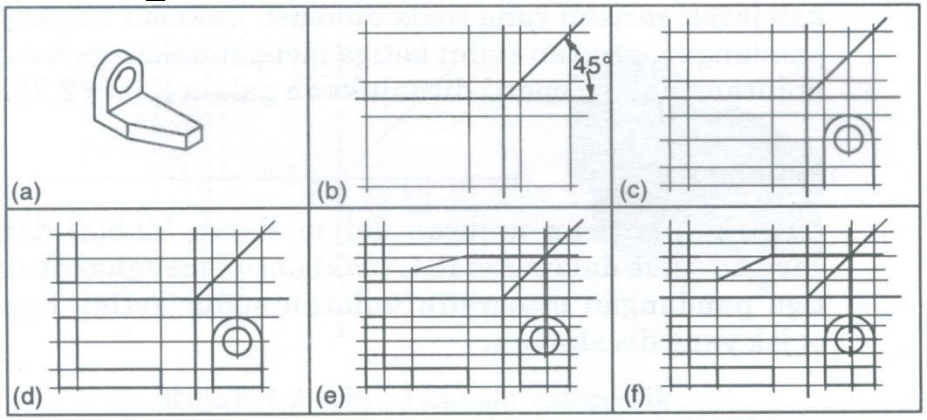
Method to space out drawing (cont'd)

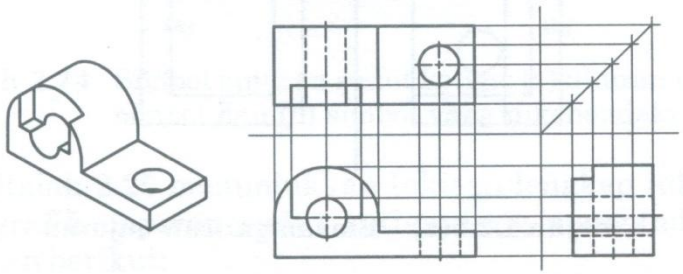
- The drawing space is divided into four quarters (one quarter-45 degrees line – reflection reference)
- The visible lines are drawn 10 mm from the dividing lines



Method to space out drawing (cont'd)

- **Projection lines**
  - Used as guide lines to produce the drawing
  - Projected from one edge to another in the other view
  - Drawn at a length more than the edge of an object
  - Intersections of this line will produce sides of an object





WRITING STEPS

1. Select the necessary views
2. Layout the views.
3. Project the views.
4. Dimension the views.

END OF CHAPTE