



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

Engineering Drawing (MEng 2061)

Chapter Four

Pictorial Drawings

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April, 2021**

Course objective

At the end of this chapter students are;

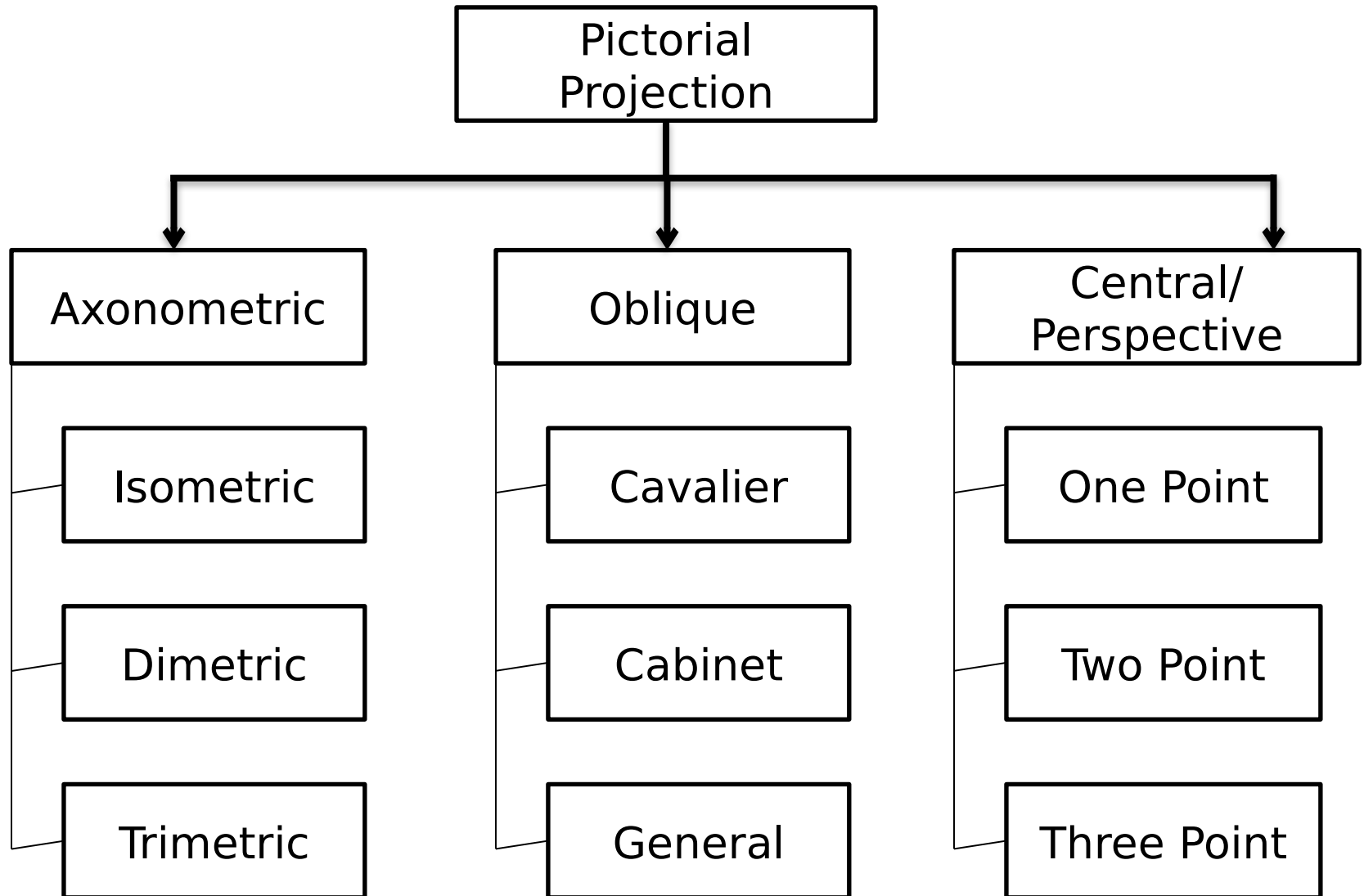
- able to explain the difference between an axonometric and an oblique projection.
- able to explain the difference between an isometric projection and an isometric drawing/sketch.
- able to create an isometric and oblique sketches from an actual object and multiview drawing.

Pictorial drawing

- **A pictorial drawing** is a method of producing a **three-dimensional** object from a two-dimensional view, that shows the three main faces indicating the height, width and depth simultaneously. It is an essential part of the graphic language.
- Differences between multiview and pictorial drawings

Multiview Drawing	Pictorial Drawing
It represents exact shape of an object.	It represents overview of an object.
It uses two or more views of an object on different picture plane.	It represents several views of an object at once on a single picture plane.
It uses hidden line to represent the hidden parts of an object.	It rarely uses hidden line when necessary.
It gives detail dimensions of a complex object.	It gives overall dimensions of a complex object.
It needs prior knowledge of technical drawing to understand.	It can be easily understood using common sense.
It is used for manufacturing, construction, production, and the like.	It is used for promotion, marketing and selling, business transaction, and the like.

Pictorial drawing

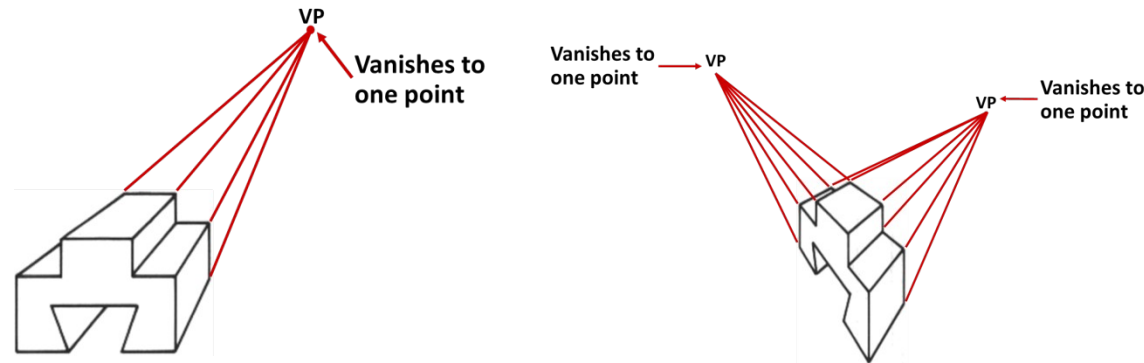
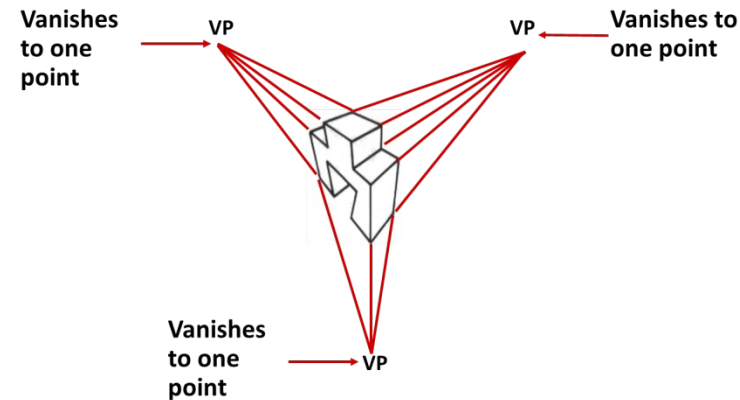
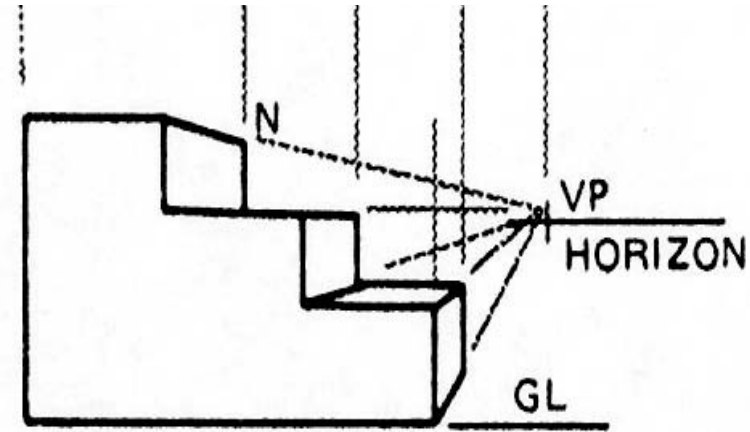


Pictorial drawing

- **Axonometric projection** is a projected view in which the lines of sight are perpendicular to the plane of projection, but the three faces of a rectangular object are all inclined to the plane of projection.
- **Isometric projection:** The receding lines are drawn at 30° from the horizontal and the others are vertical. Consider a cubic object, the three principal faces and axes are equally inclined to the plane of projection.
- **Dimetric projection:** Two of the principal faces and axes are equally inclined to the plane of projection.
- **Trimetric projection:** All three principal faces and axes make different angles with the plane of projection.
- **Oblique projection:** the projectors are oblique to the plane of projection but parallel to each other, and one of the principal face (usually front view) of the object is generally parallel to the plane of projection. The receding line is drawn at 30°, 45° and 60° from the horizontal.
- **Cavalier:** All lines of an object are drawn in their true length.
- **Cabinet:** Lines on the receding axis are shortened by half.

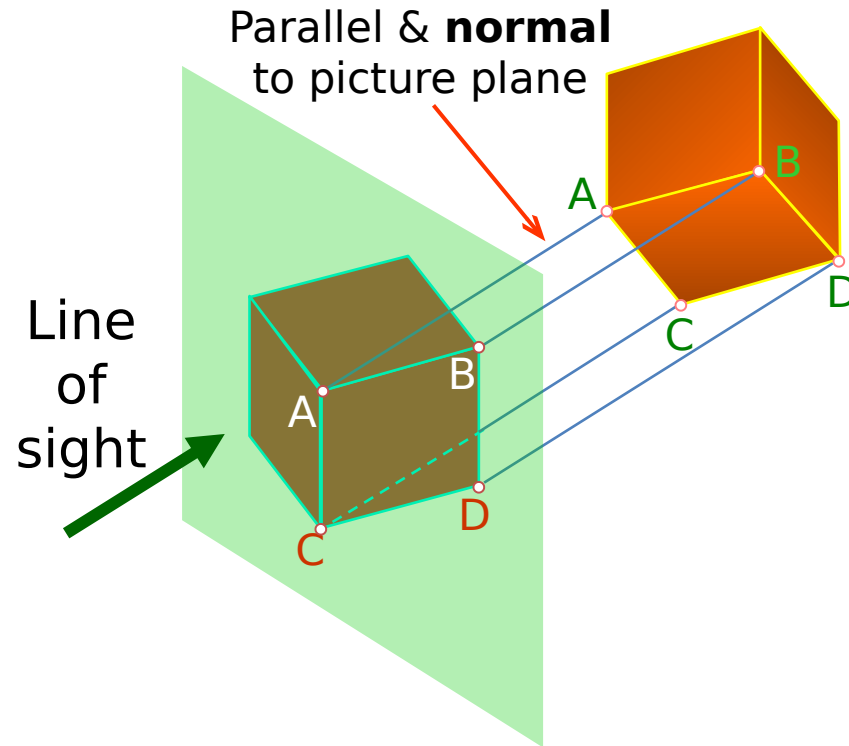
Pictorial drawing

- **Central/perspective projection** is the most realistic three-dimensional view of all the pictorial projections, because it portrays the object in a manner that is most similar to how the human eye perceives the visual world.
- **Horizon:** an imaginary horizontal line taken at eye level.
- **Vanishing point (VP):** a point on the horizon where receding lines converge.
- **One point:** have one vanishing point.
- **Two point:** have two vanishing point.
- **Three point:** have three vanishing point.



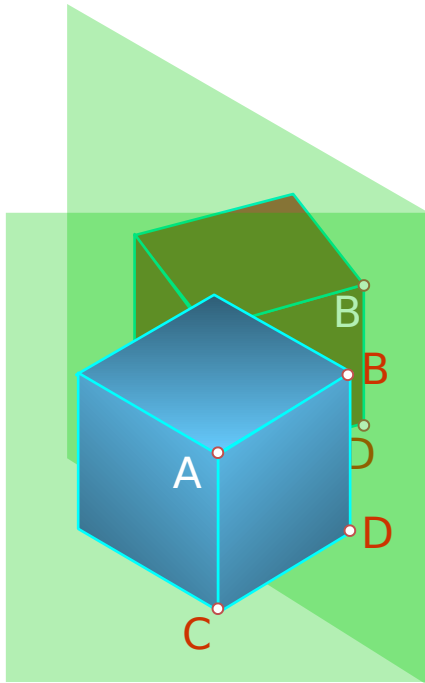
Pictorial drawing

Axonometric drawing

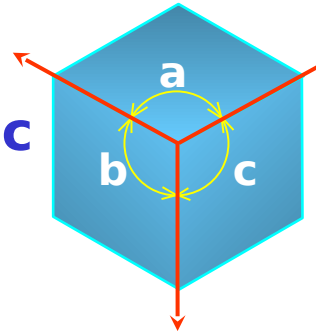


Pictorial drawing

Type of axonometric drawing



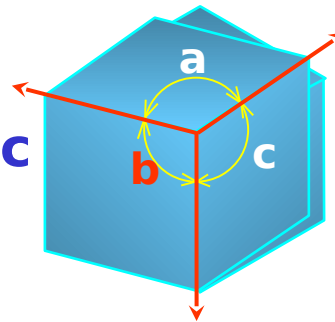
1. Isometric



Axonometric axis

All angles are equal.

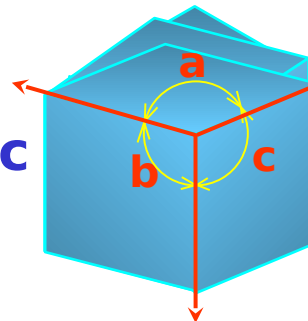
2. Dimetric



Axonometric axis

Two angles are equal.

3. Trimetric

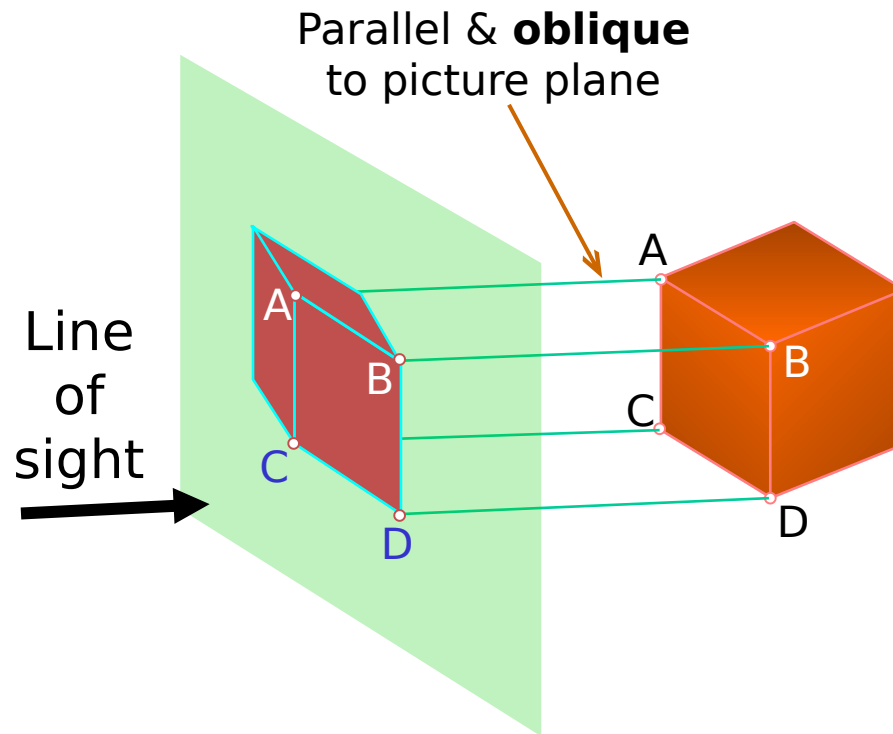


Axonometric axis

None of angles are equal.

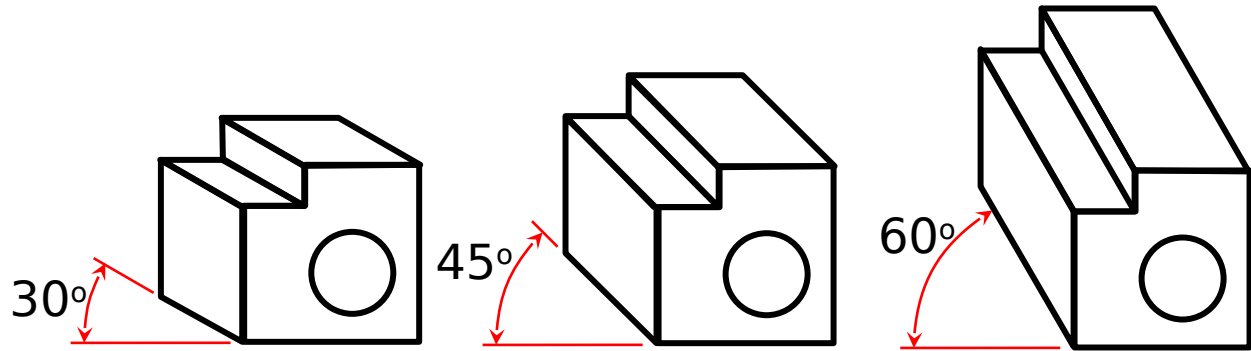
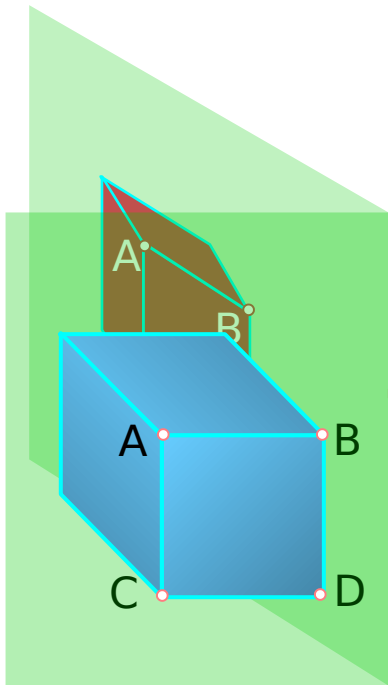
Pictorial drawing

Oblique projection



Pictorial drawing

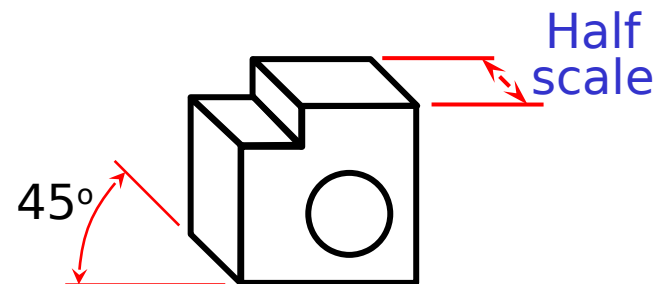
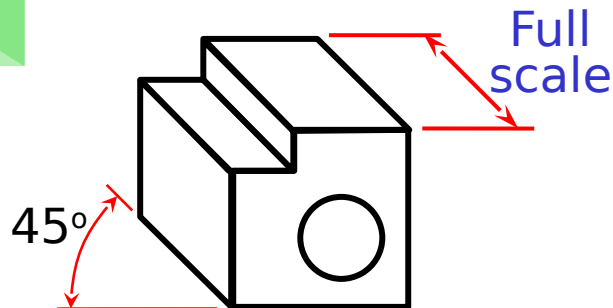
Oblique drawing angle



Type of Oblique drawing

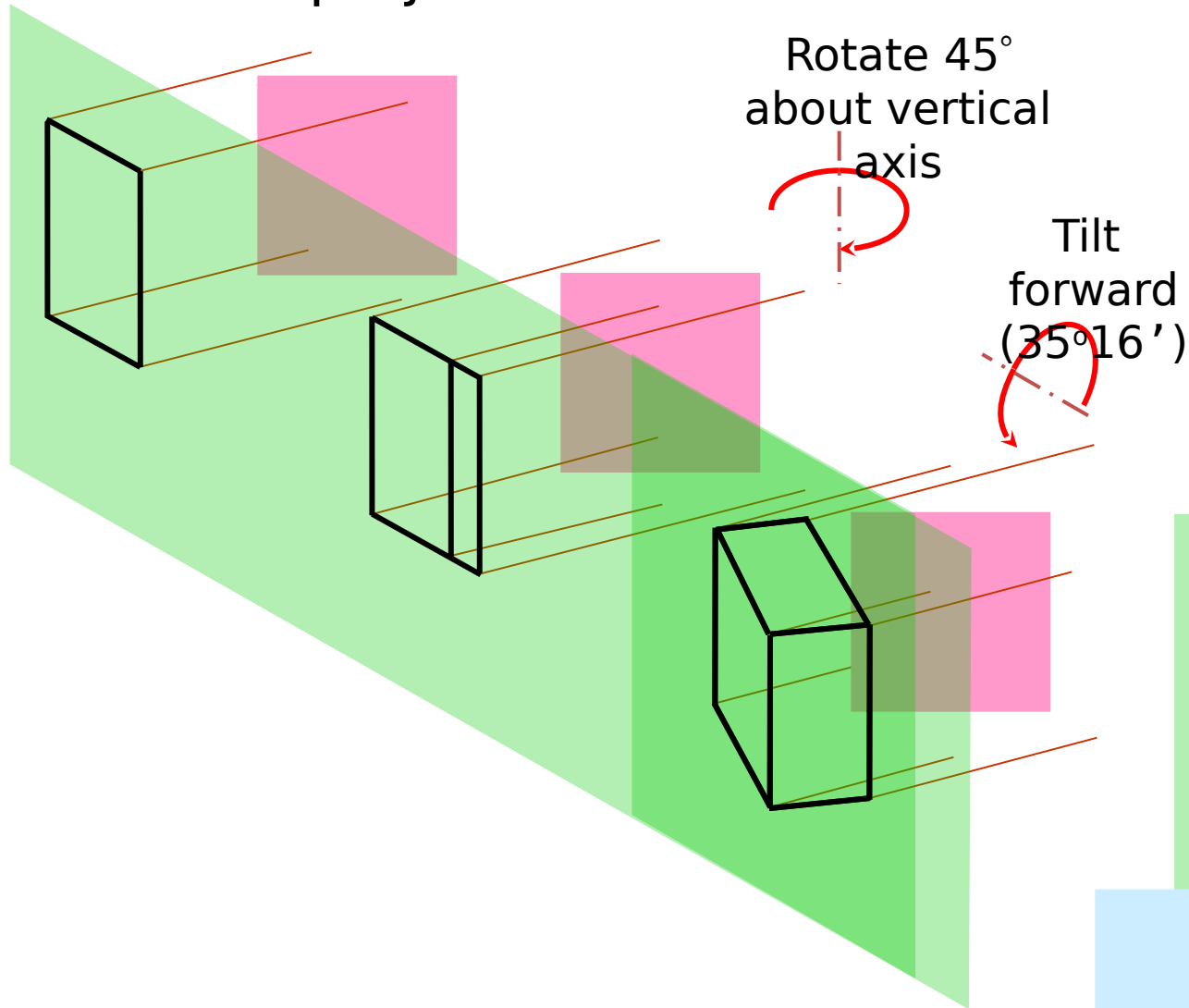
1) Cavalier

2) Cabinet



Pictorial drawing

Isometric projection

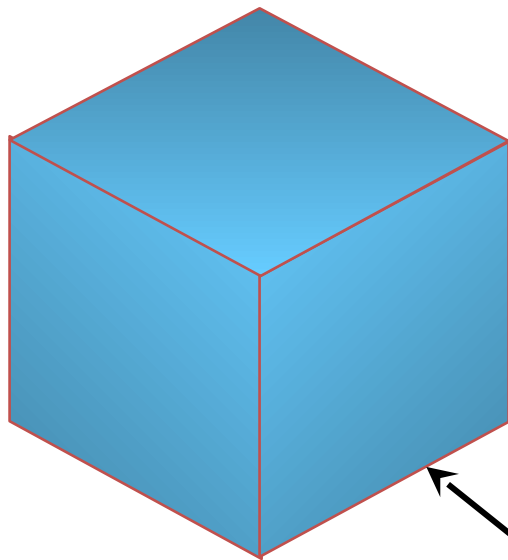


All edges
foreshorten
about 0.8 time.

Pictorial drawing

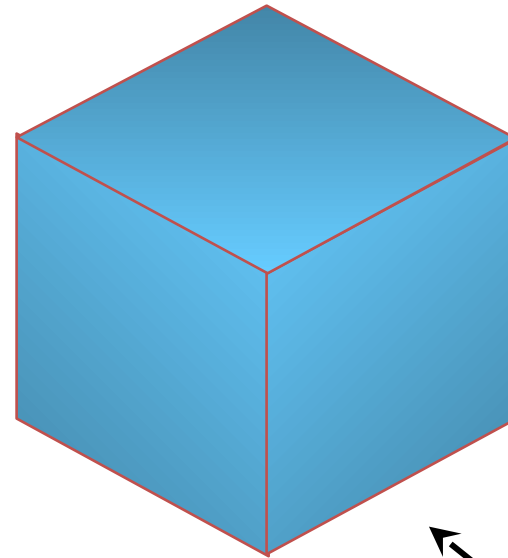
- Isometric drawing is a drawing drawn on an isometric axes using full scale.

Isometric projection
(True projection)



Forshorten

Isometric drawing
(Full scale)

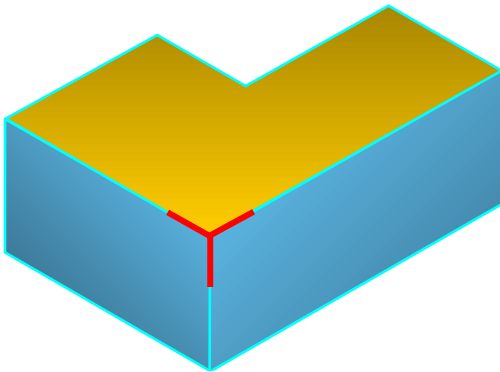


Full scale

Pictorial drawing

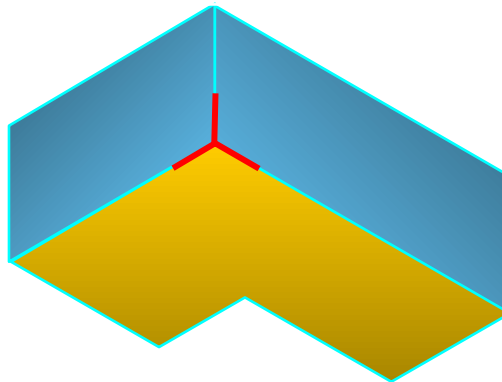
Isometric axes: Can be arbitrarily positioned to create different views of a single object.

Regular isometric



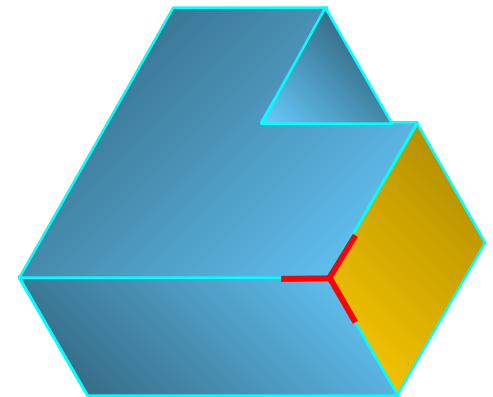
View point is looking down on the top of the object.

Reverse axis isometric



View point is looking up on the bottom of the object.

Long axis isometric

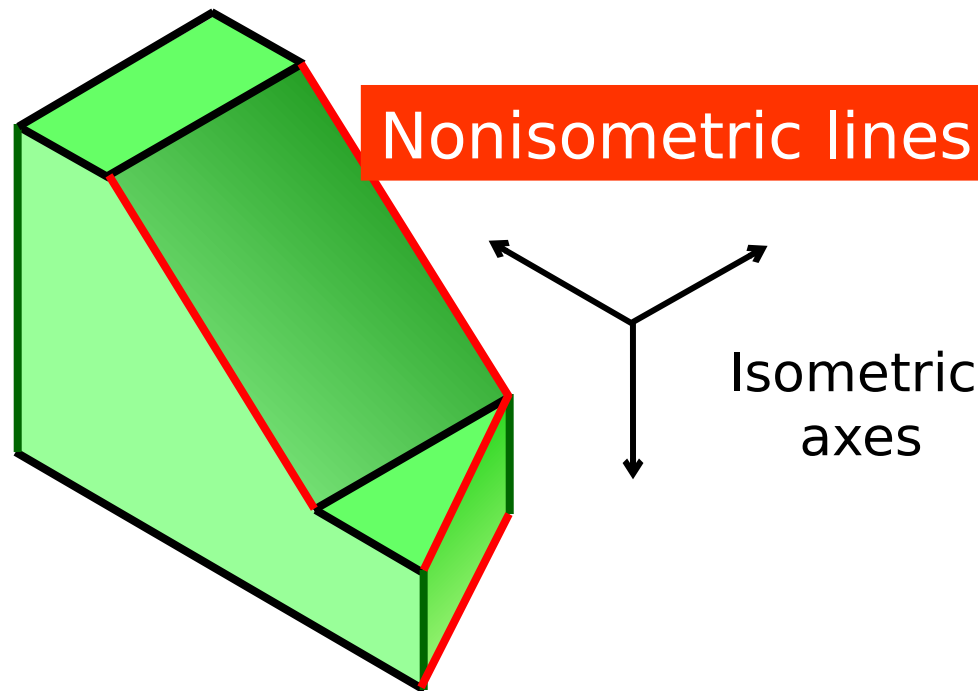


View point is looking from the right (or left) of the object.

Pictorial drawing

Distance in isometric drawing:

- True-length distances are shown along isometric lines.
- Isometric line is the line that run parallel to any of the isometric axes.



Pictorial drawing

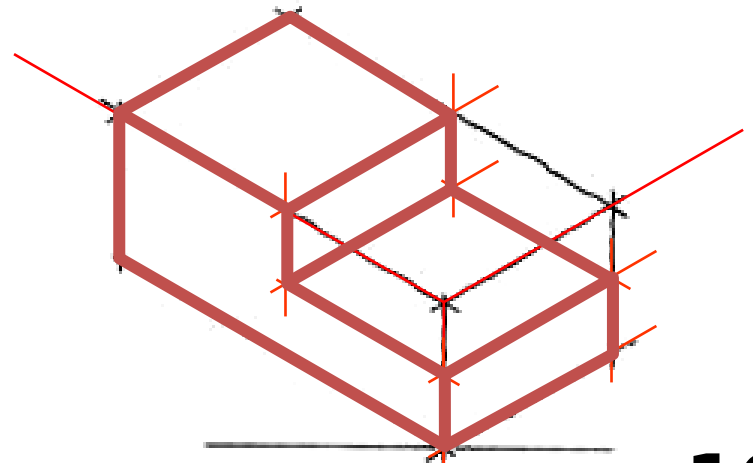
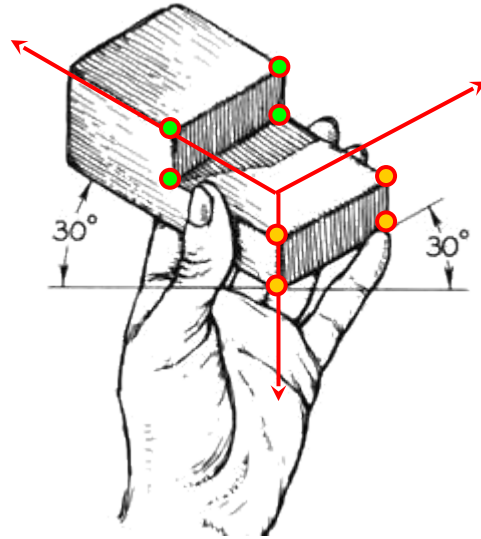
Sketch from an actual object

1. Place the object in the position which its shape and features are clearly seen.
2. Define an isometric axis.
3. Sketching the enclosing box.
4. Estimate the size and relationship of each details.
5. Darken all visible lines.

Pictorial drawing

Sketch from an actual object

1. Positioning object.
2. Select isometric axis
3. Sketch enclosing box.
4. Add details.
5. Darken visible lines.

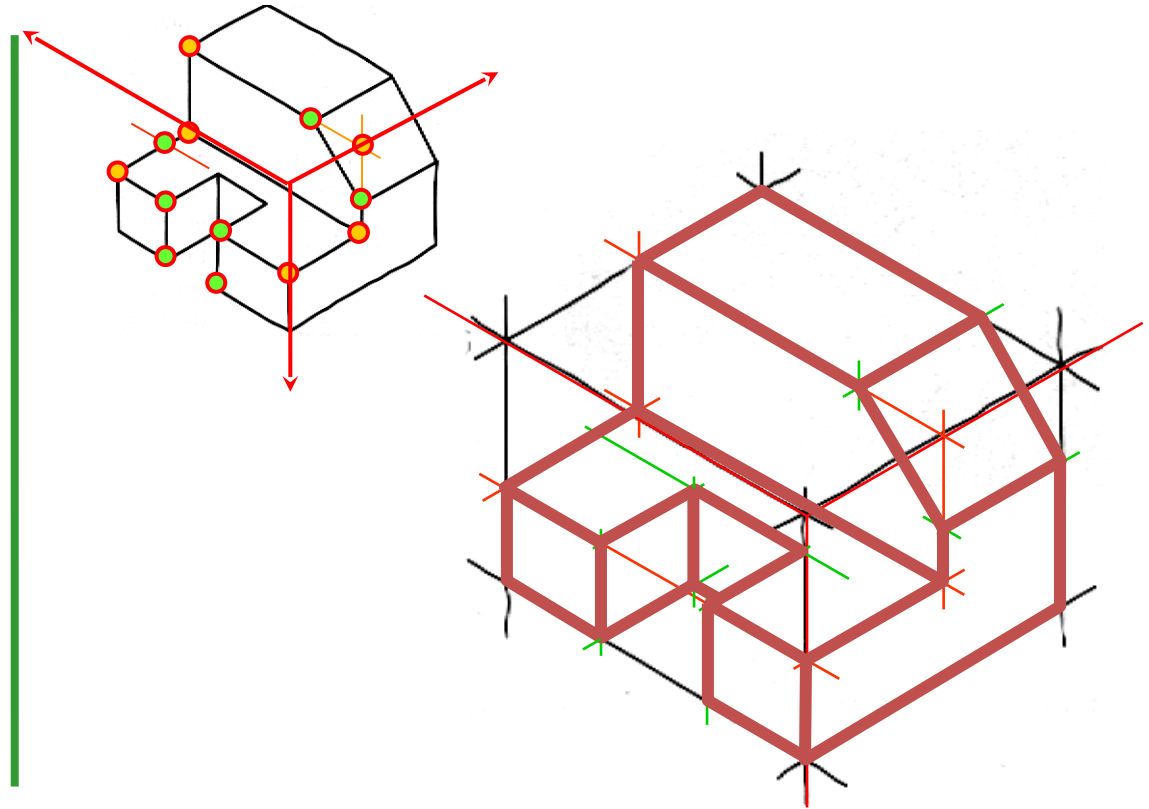


Note: In isometric sketch/drawing), hidden lines are omitted unless they are absolutely necessary to completely describe the object.

Pictorial drawing

Sketch from an actual object

1. Positioning object.
2. Select isometric axis
3. Sketch enclosing box.
4. Add details.
5. Darken visible lines.

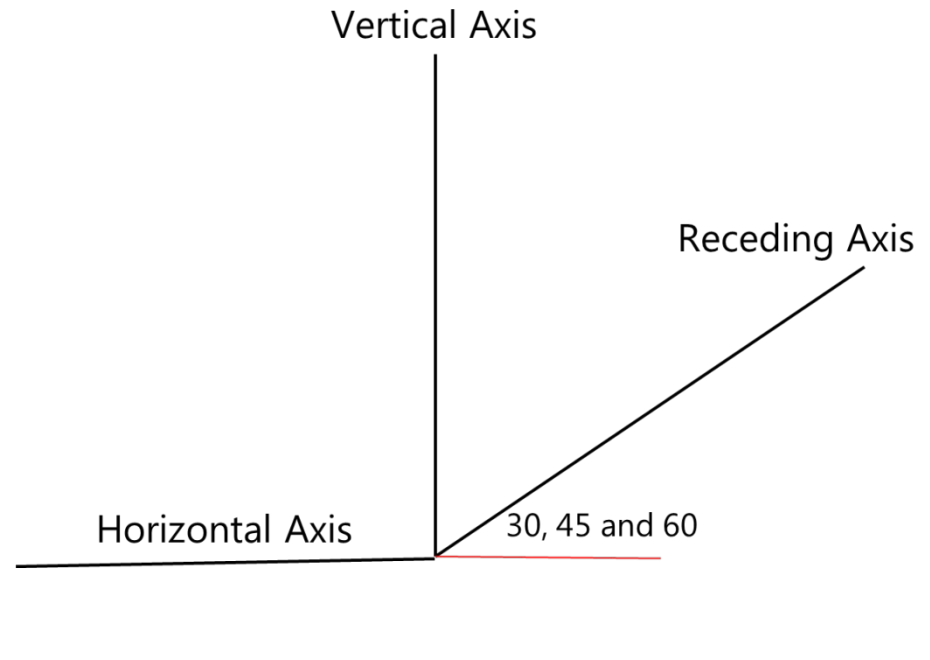


Pictorial drawing

Sketch from an actual object:

Oblique STEPS

1. Positioning object.
2. Select oblique axis
3. Sketch enclosing box.
4. Add details.
5. Darken visible lines.



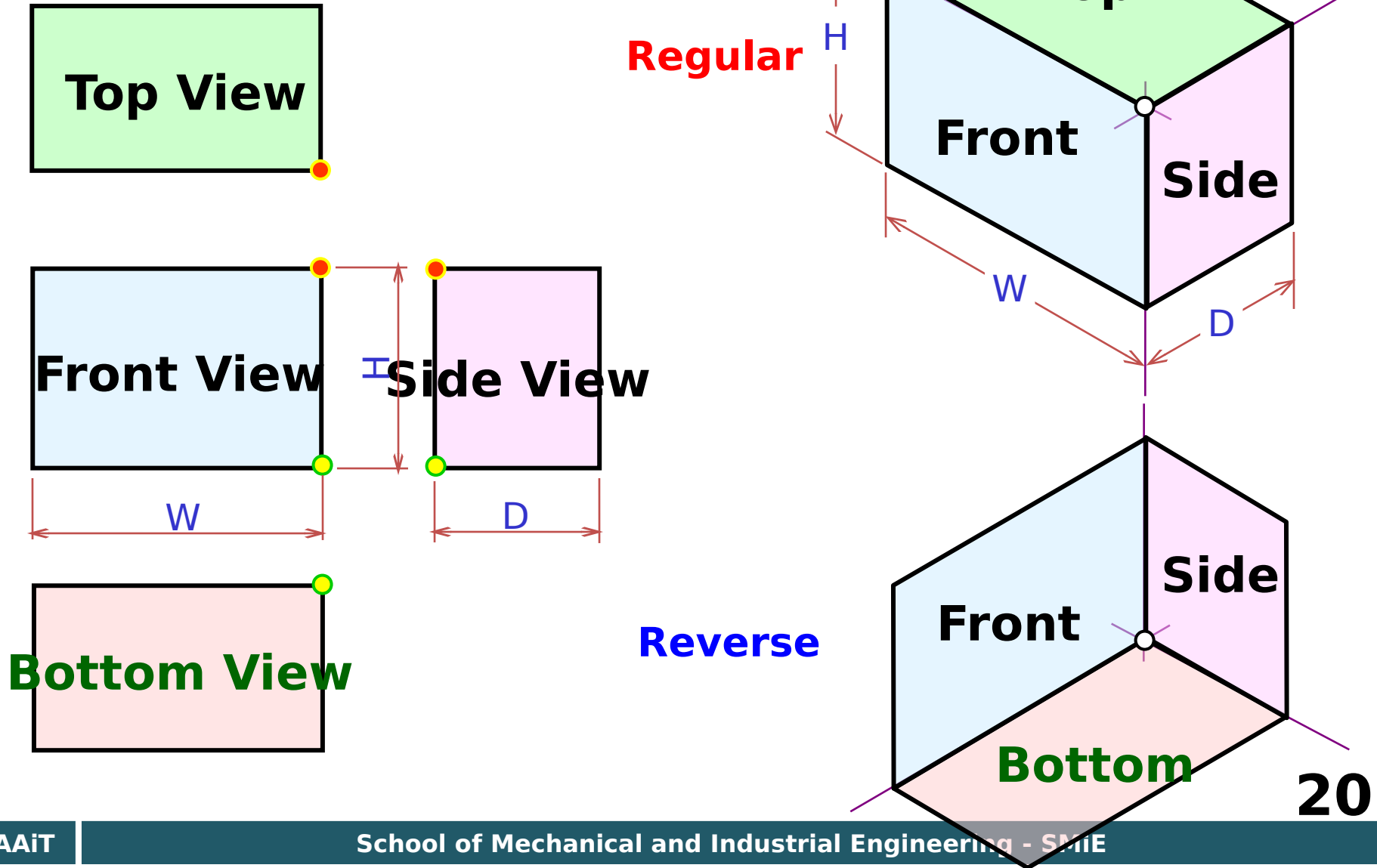
Pictorial drawing

Sketch from Multiview drawing

- Interpret the meaning of lines/areas in multiview drawing.
- Locate the lines or surfaces relative to isometric axis.

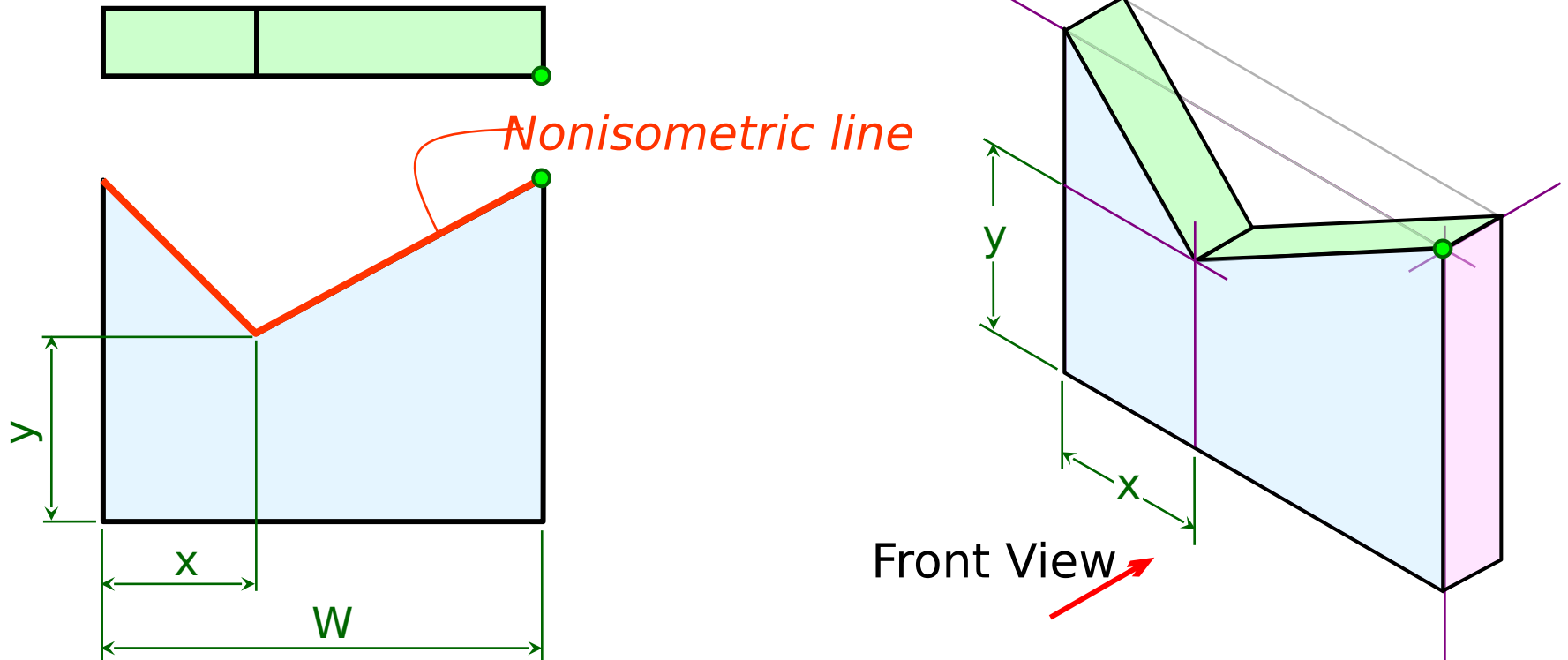
Pictorial drawing

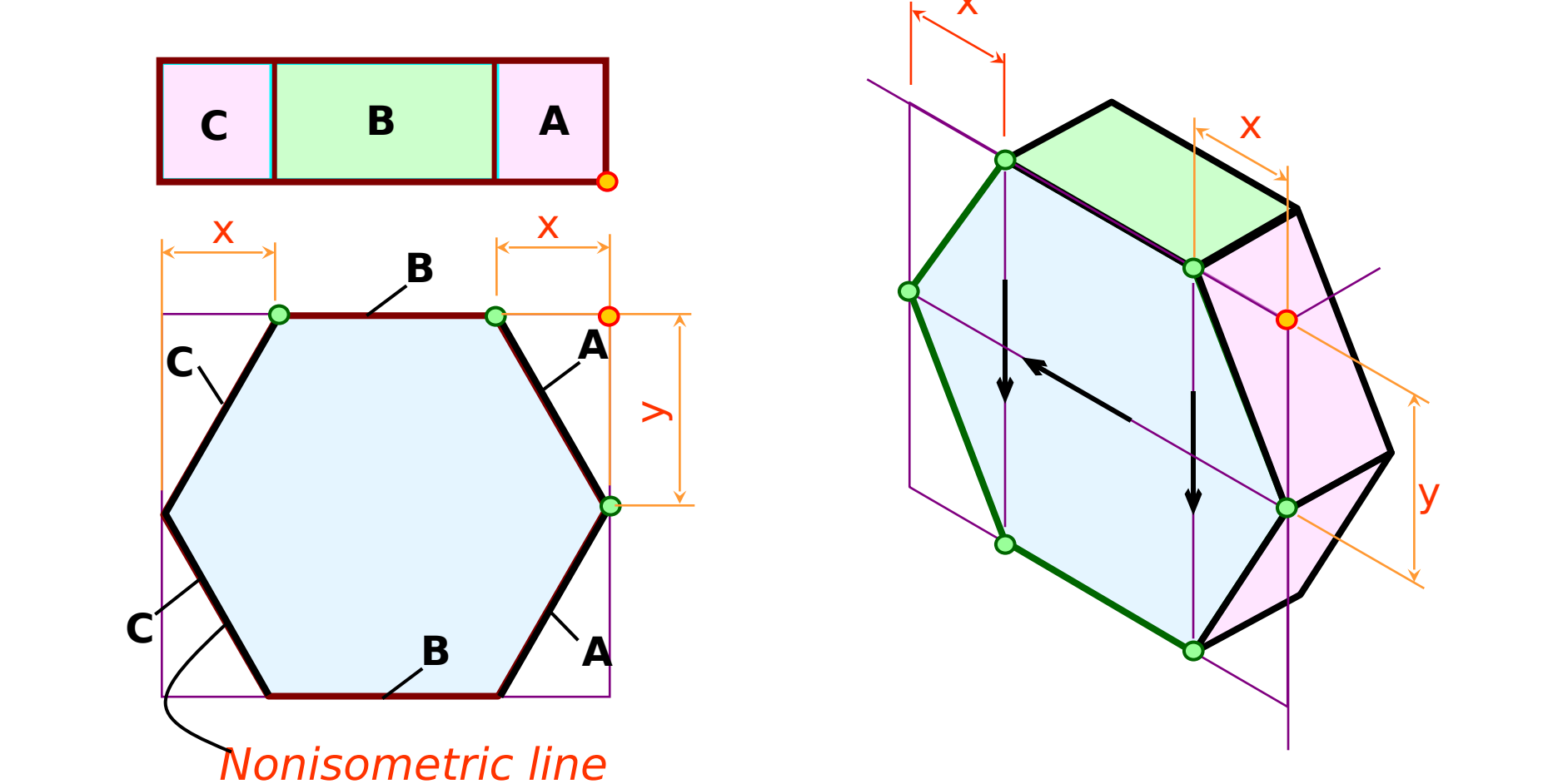
Example 1: Object has only normal surfaces



Pictorial drawing

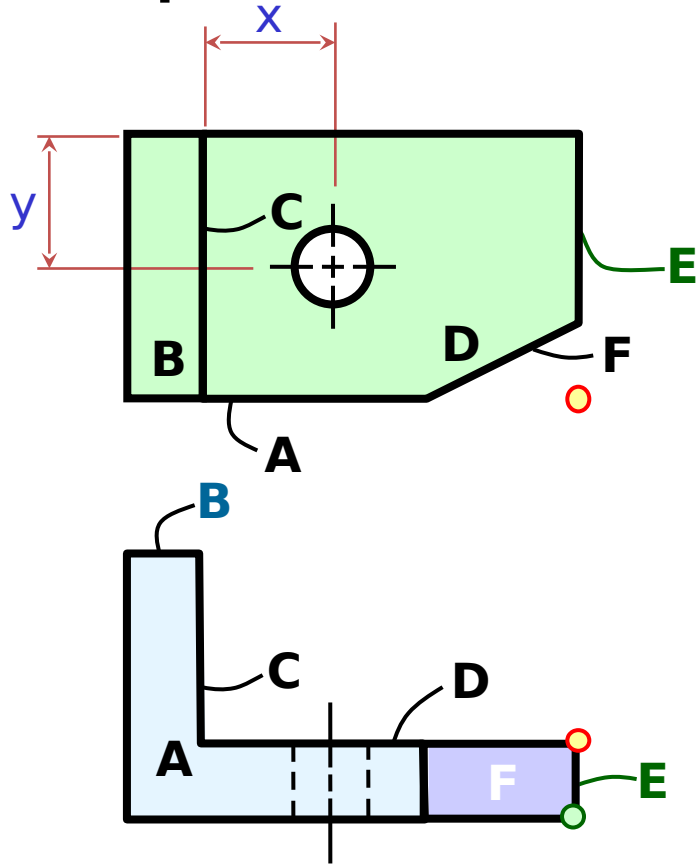
Example 2: Object has inclined surfaces



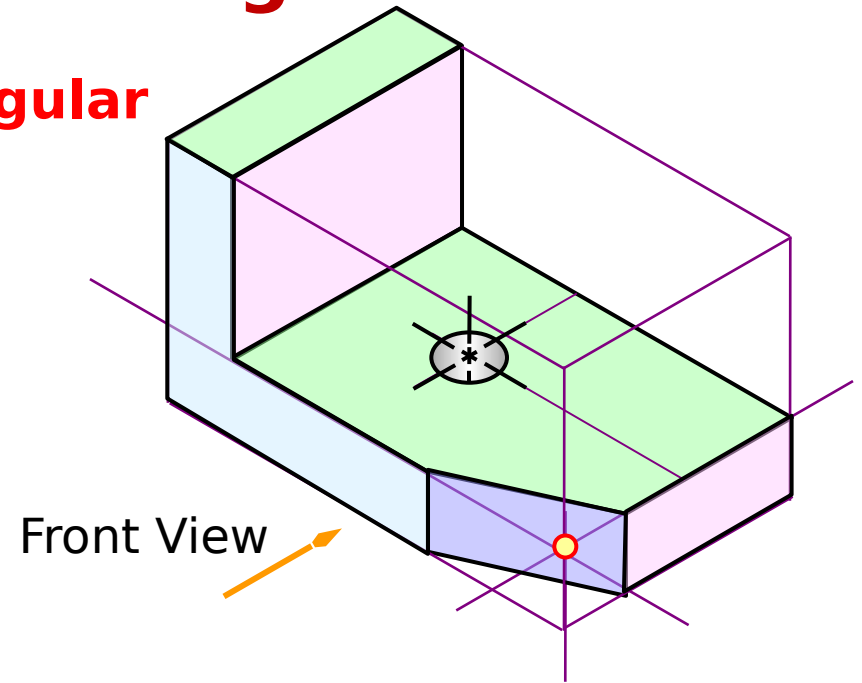


Pictorial drawing

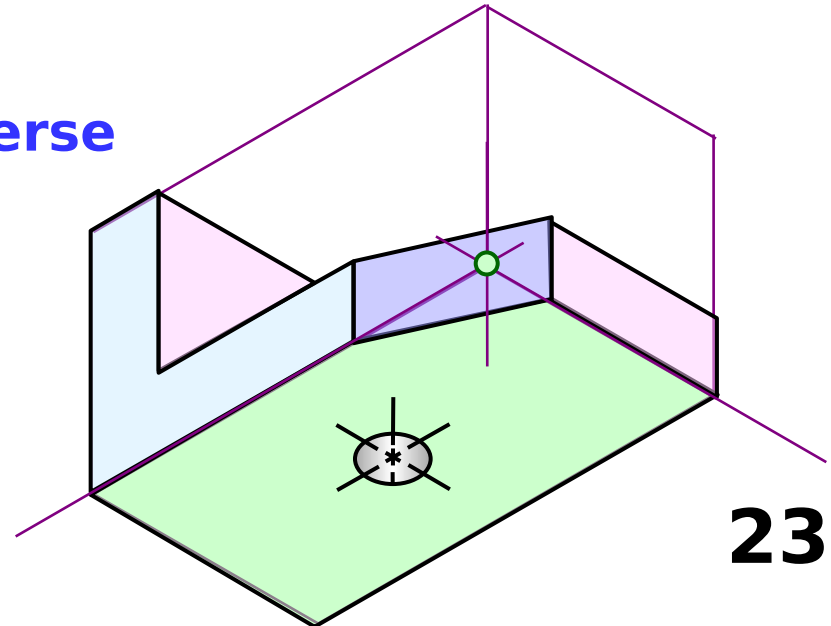
Example 4:



Regular



Reverse



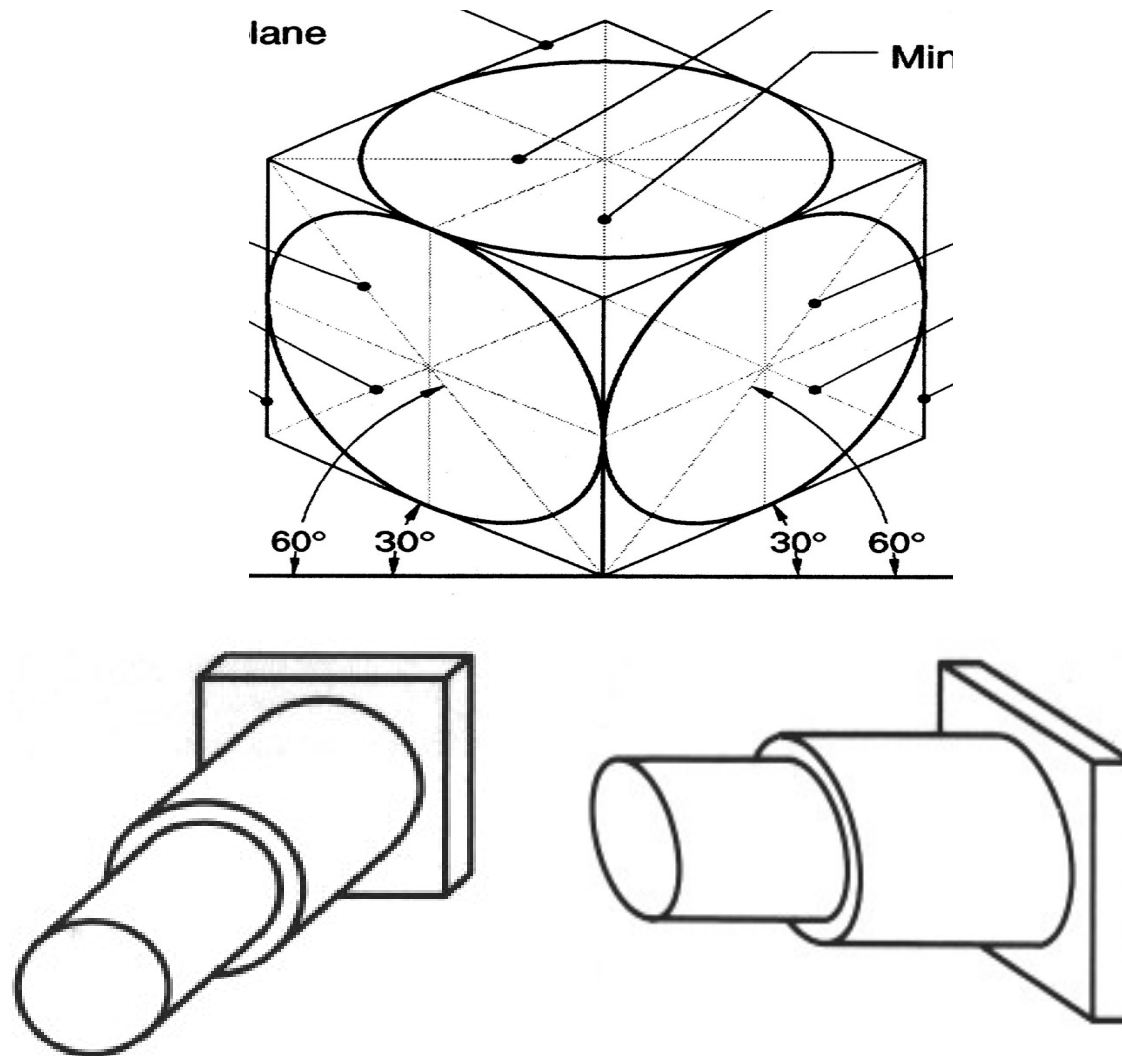
Circles in Pictorial Drawing

Circles in pictorial drawing always become ellipses except it is **parallel** to normal plane of oblique pictorial.

In isometric drawing, the circle **always** become **ellipse**.

In oblique drawing when the circle is parallel to normal plane, it is drawn as its true shape and become **circle**; for other planes **other than** normal plane the circle becomes **ellipse**.

Circles in Pictorial Drawing



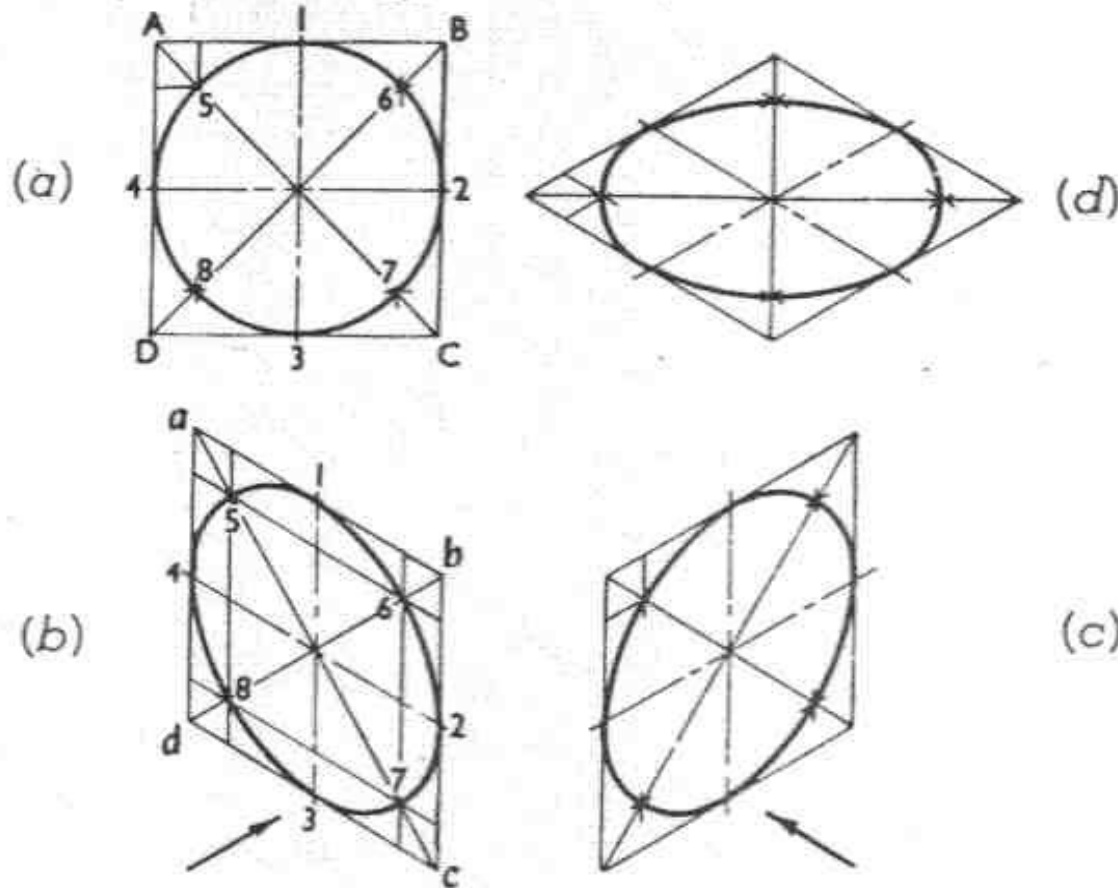
Circles in Pictorial Drawing

Methods to Draw Ellipse:

There are two method namely, **offset** method and **four center** method.

The **offset method** can be **diagonal** approach and **division** approach.

Circles in Pictorial Drawing



Diagonal approach offset method.

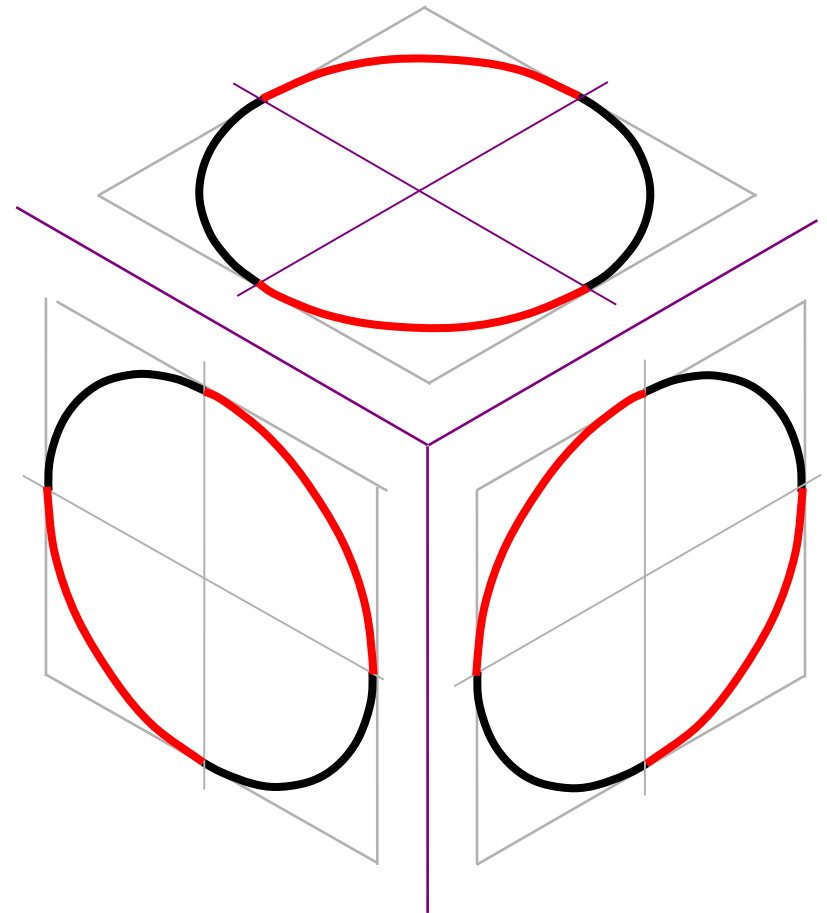
Circles in Pictorial Drawing

The **four center method** as its name indicates uses **four center** to draw an ellipse. It is efficient method.

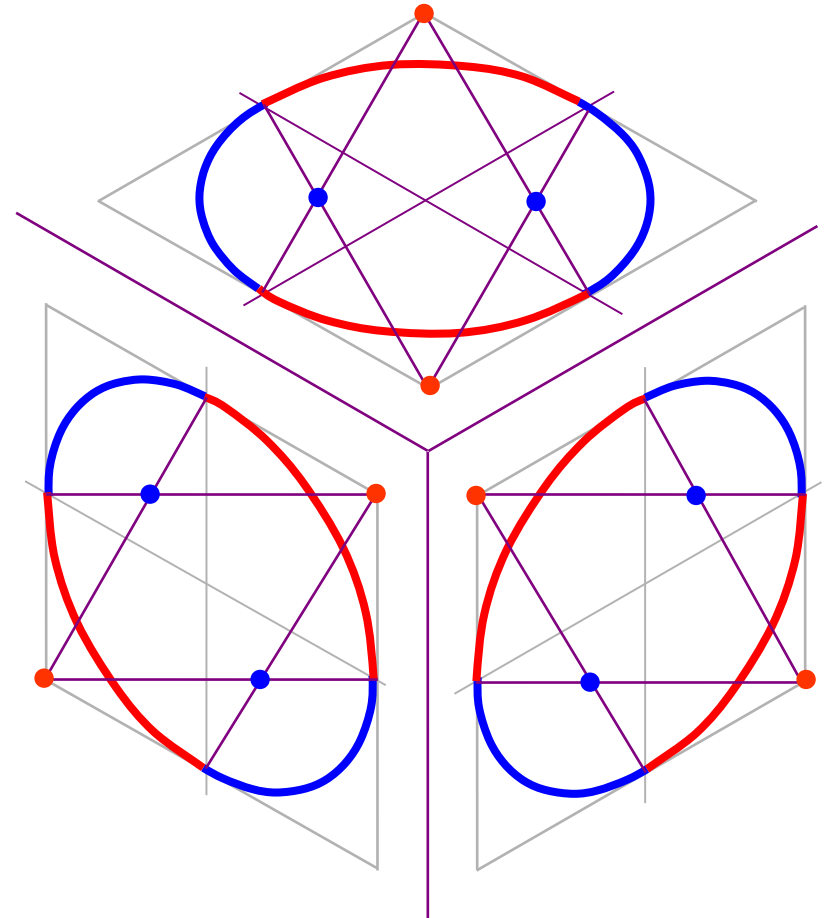
Steps in Four Center Method:

1. Draw a rhombus using the **diameter** of a circle.
2. Construct perpendicular bisecting lines from each side of rhombus.
3. Draw lines from **obtuse angle** corners to opposite side of rhombus by intersecting the **midpoint**.
4. Locate the **four** centers.
5. Draw the arcs with this centers and **tangent** to rhombus.

Pictorial drawing

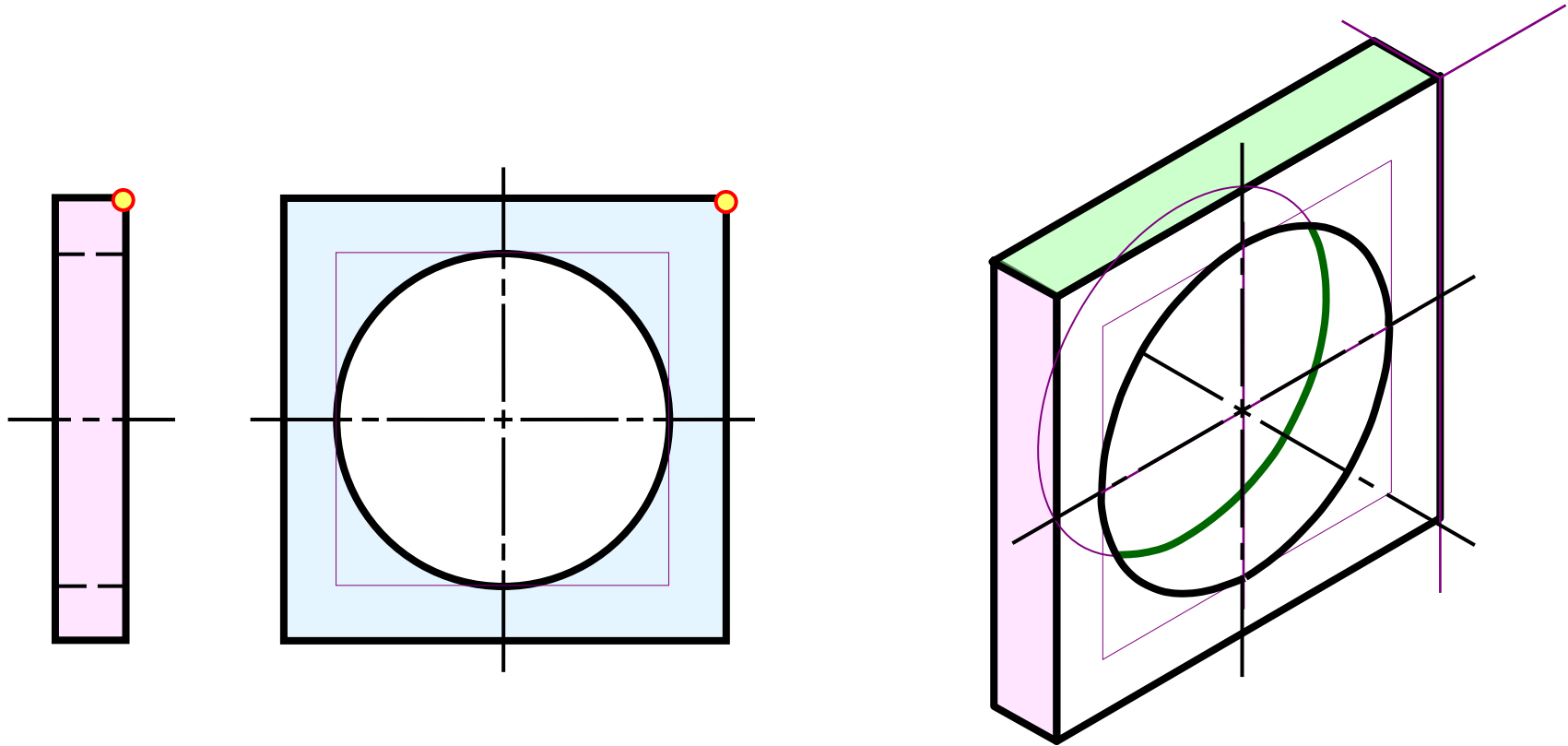


Pictorial drawing

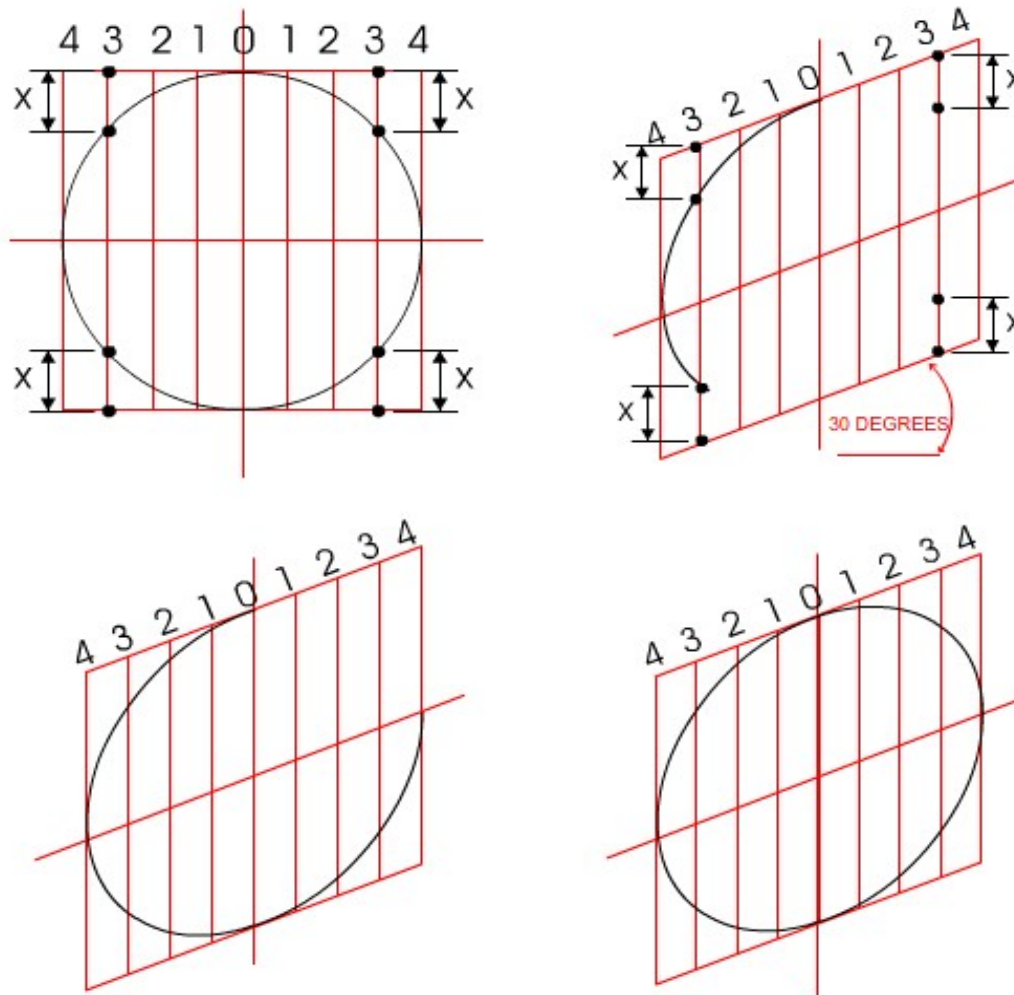


Pictorial drawing

Example 5



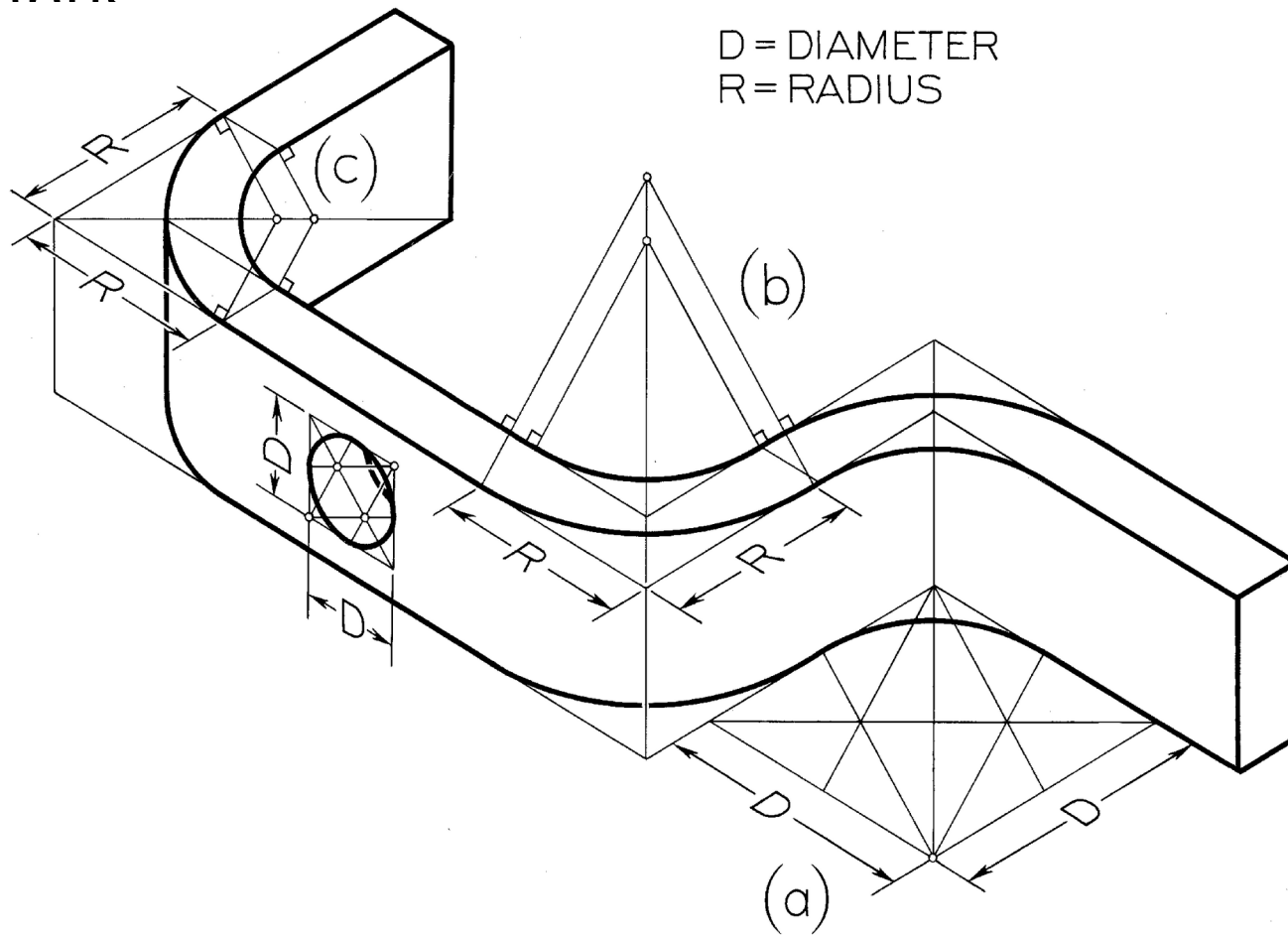
Pictorial drawing



Division approach offset method.

Pictorial drawing

Arcs are usually sketched by locating their centers and then boxing in the enclosing rhombus and **tangent** to the rhombus.

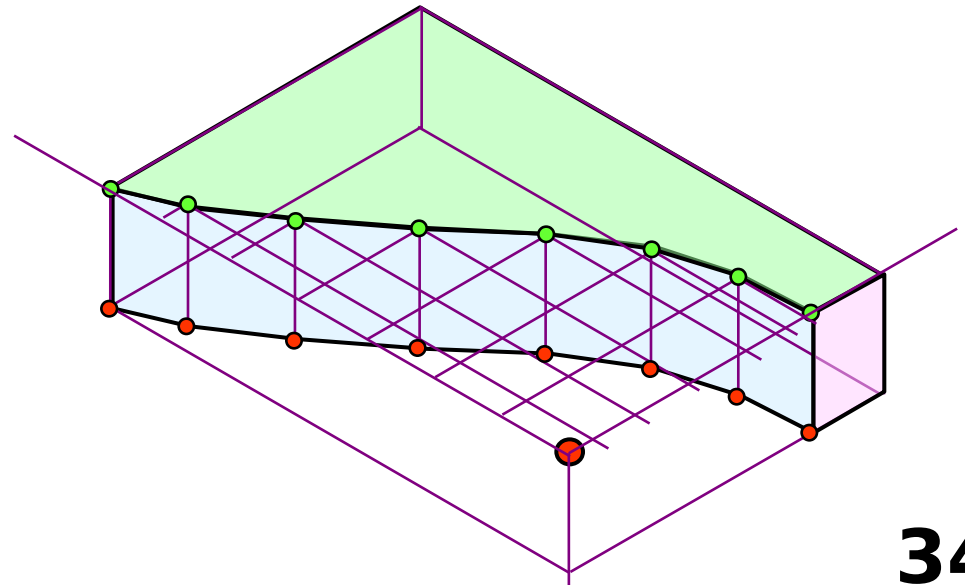
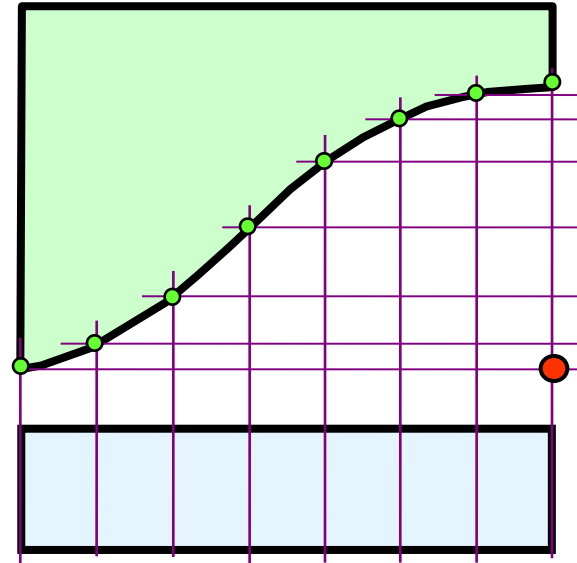


Pictorial drawing

Irregular curve in isometric

Steps:

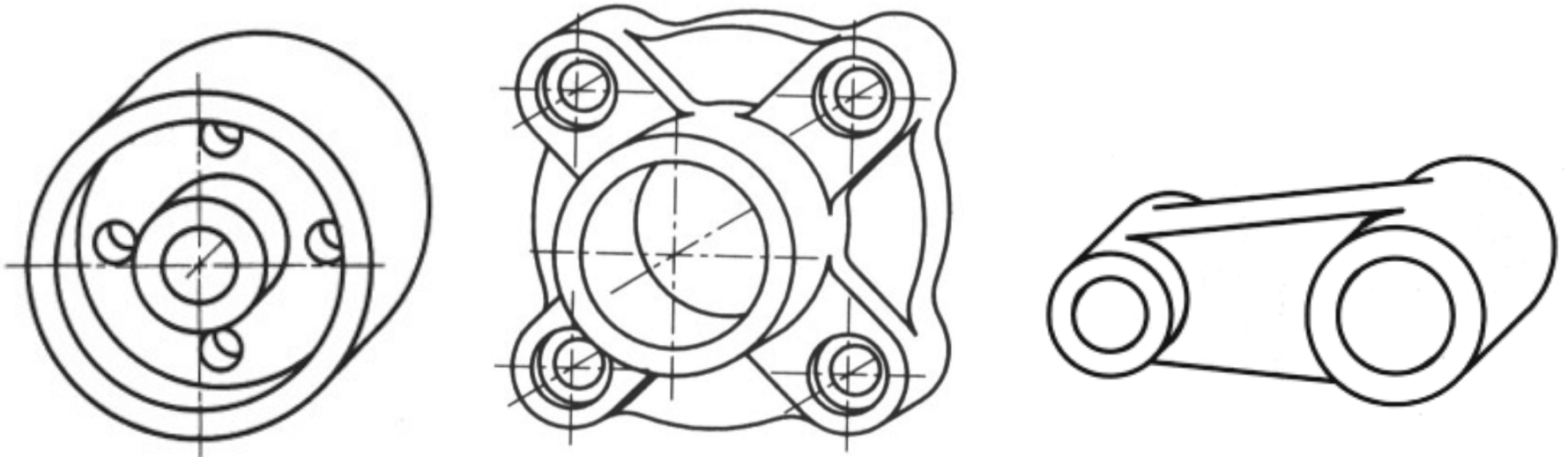
1. Construct points along the curve in multiview drawing.
2. Locate these points in the isometric view.
3. Sketch the connecting lines.



Pictorial drawing

Object orientation and guideline

- Place complex features (arc, hole, irregular shape surface) parallel to frontal plane.



Pictorial drawing

Object orientation and guideline

- The longest dimension of an object should be parallel to the frontal plane.

Pictorial drawing

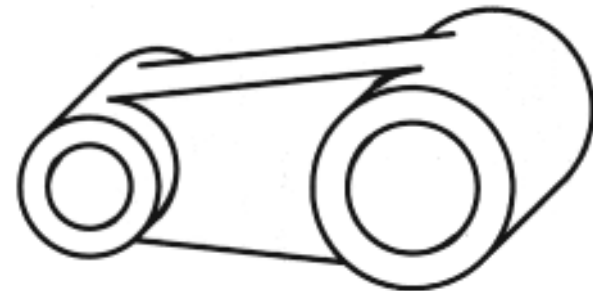
Object orientation and guideline

- The longest dimension of an object should be parallel to the fronta

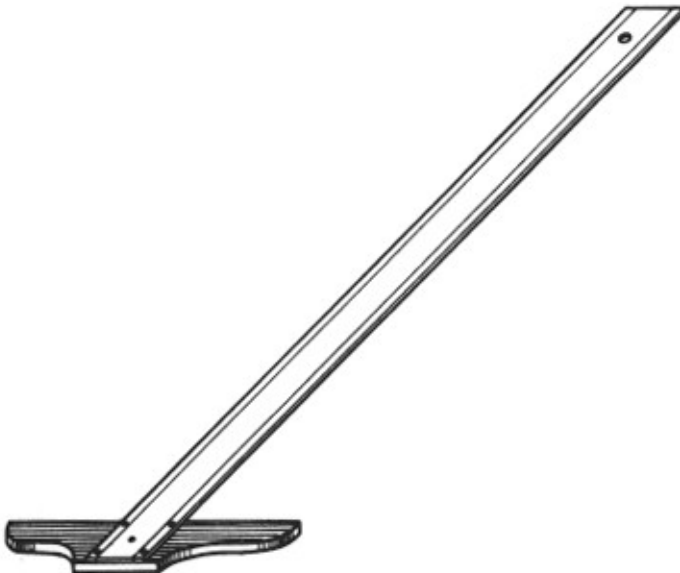
GOOD



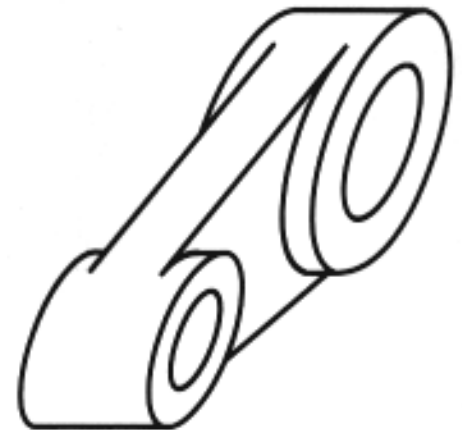
GOOD



WORSE

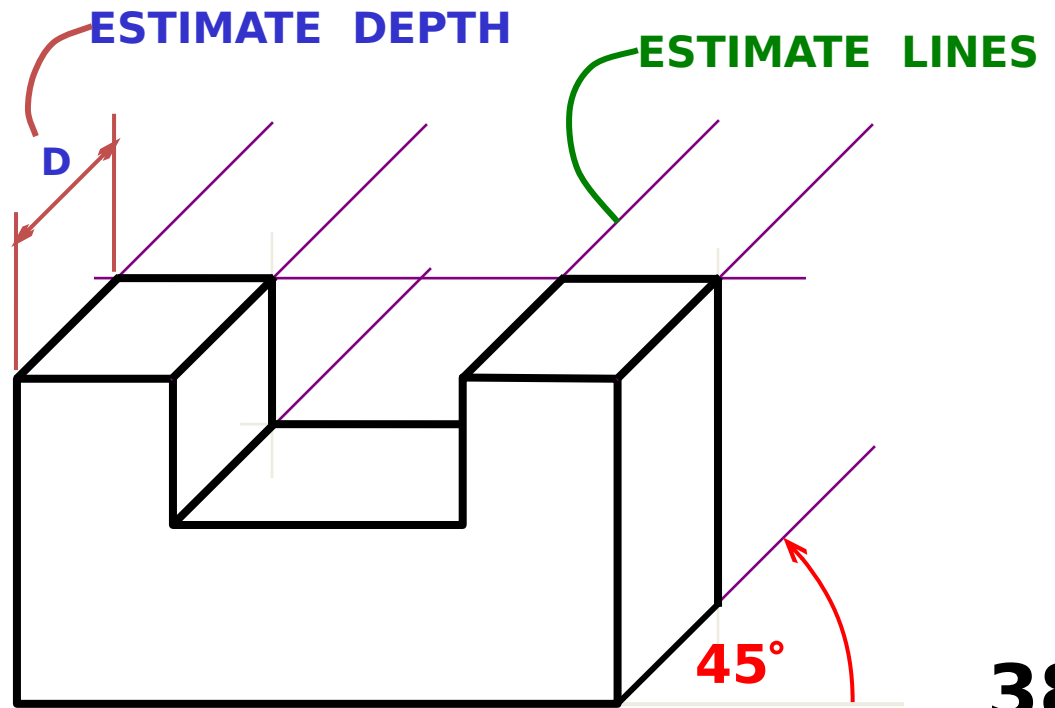
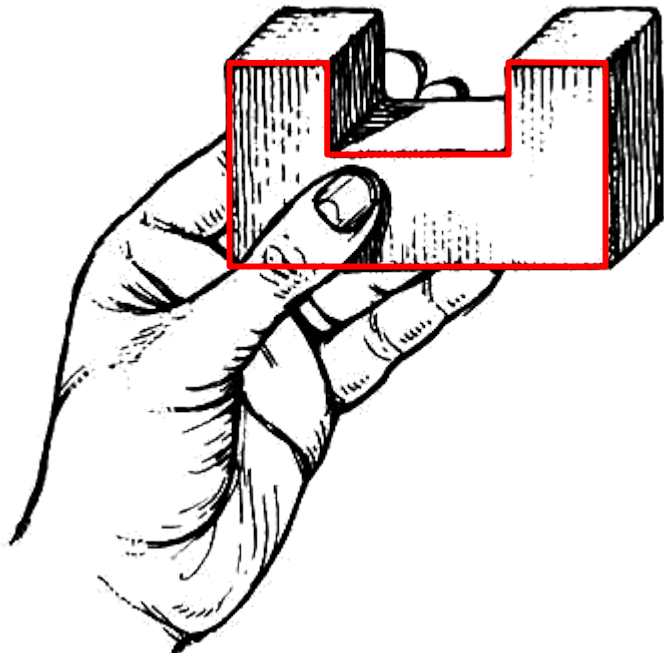


WORSE



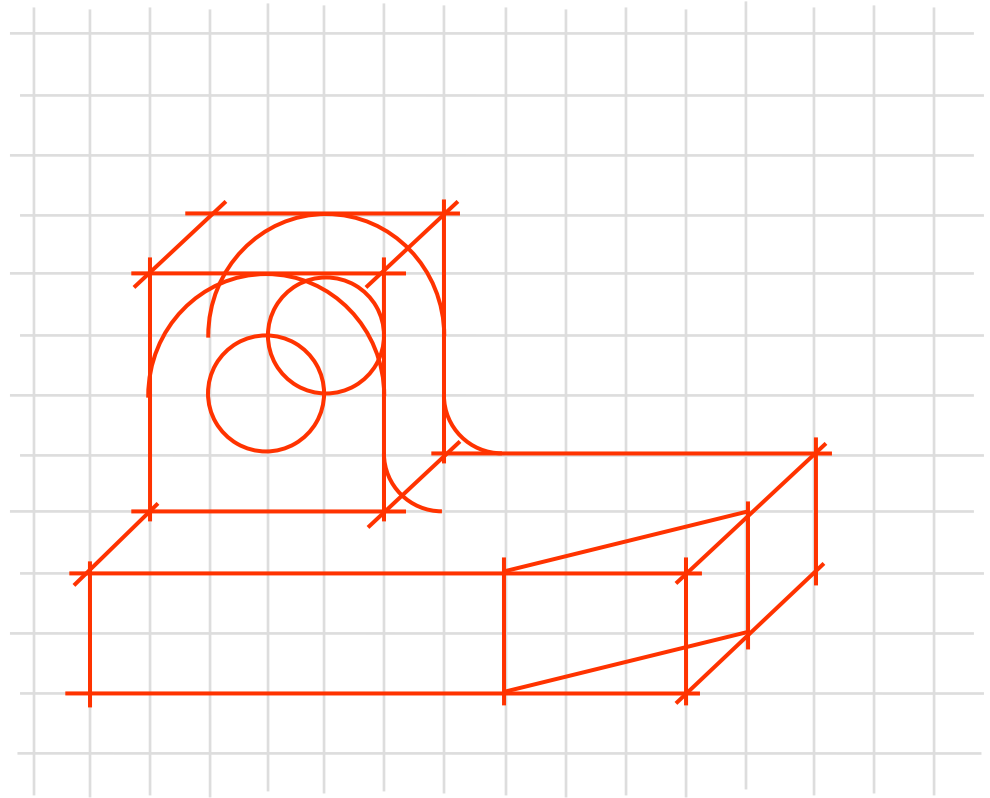
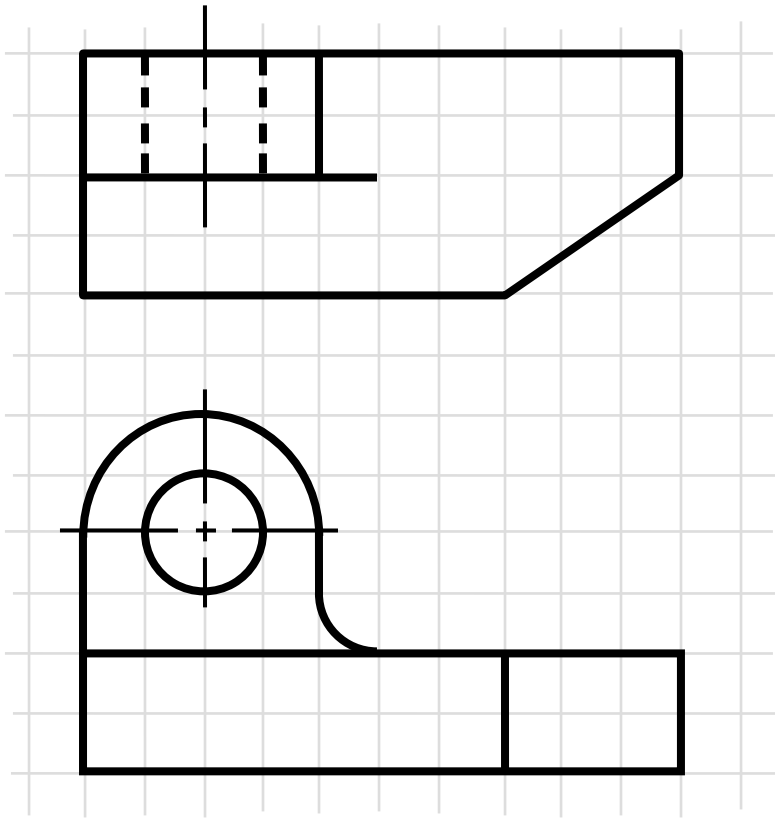
Pictorial drawing

Sketch from an object



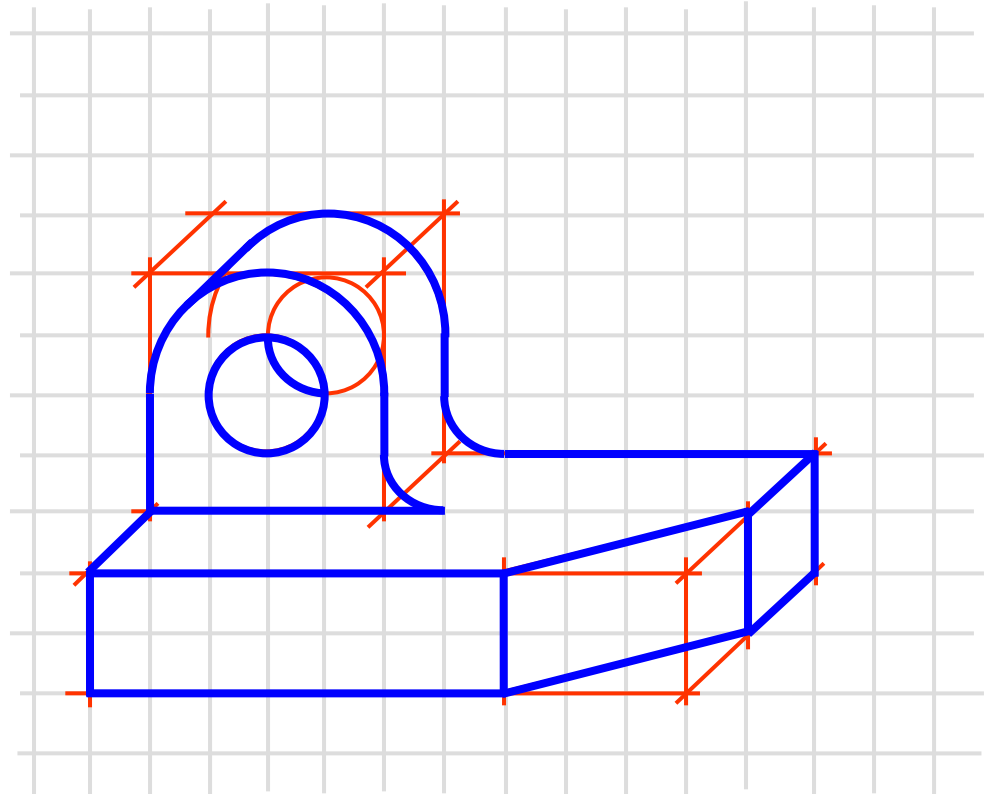
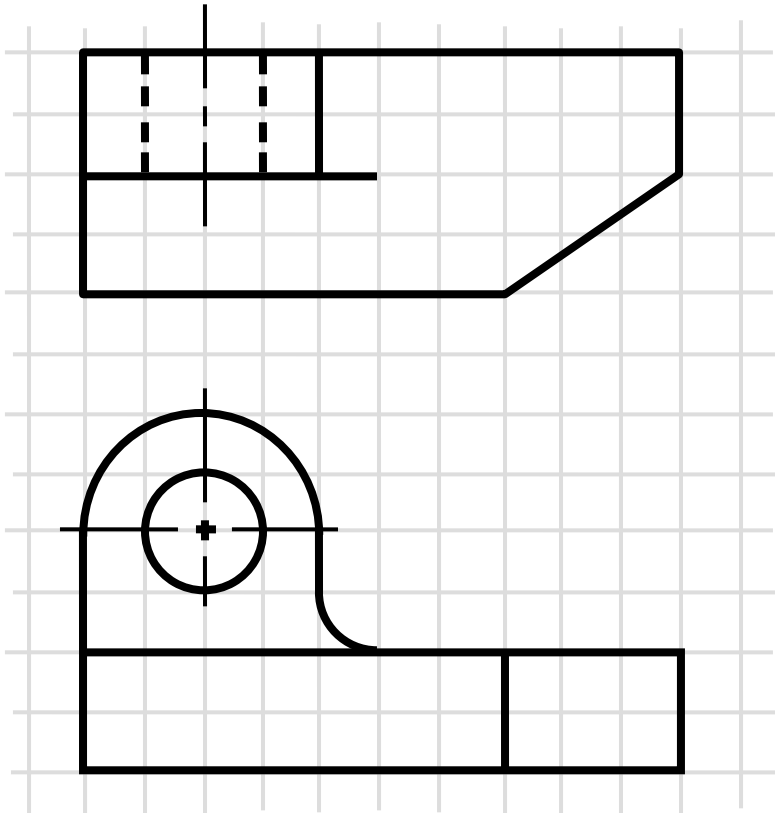
Pictorial drawing

Sketch from Multiview drawing



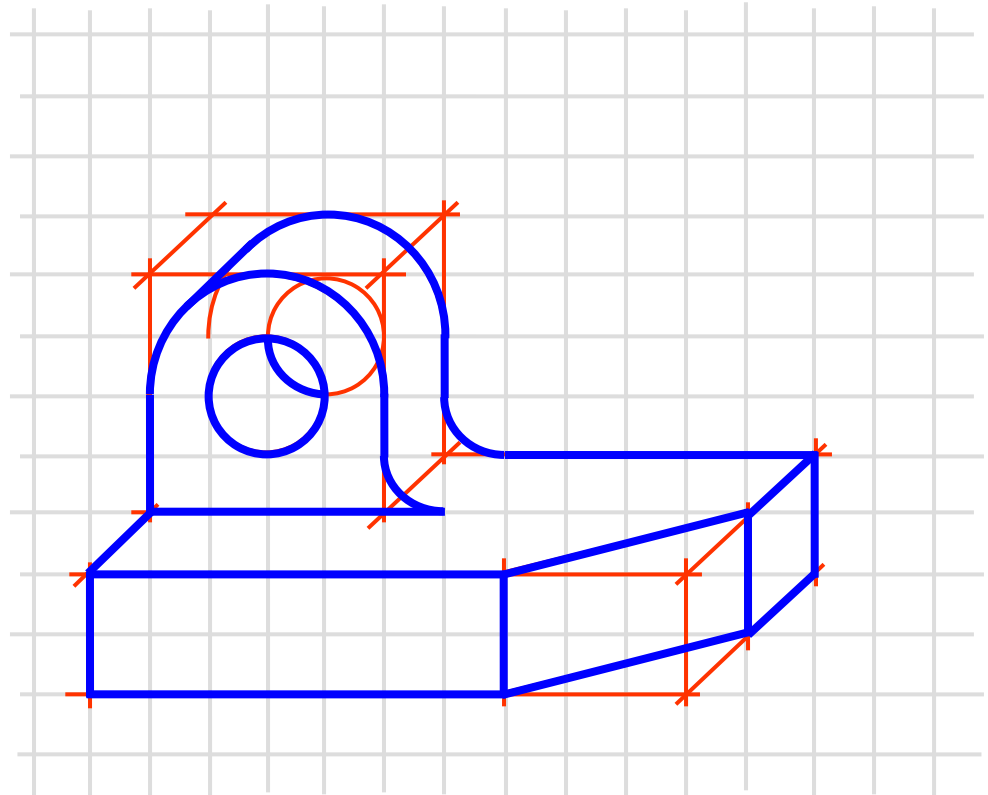
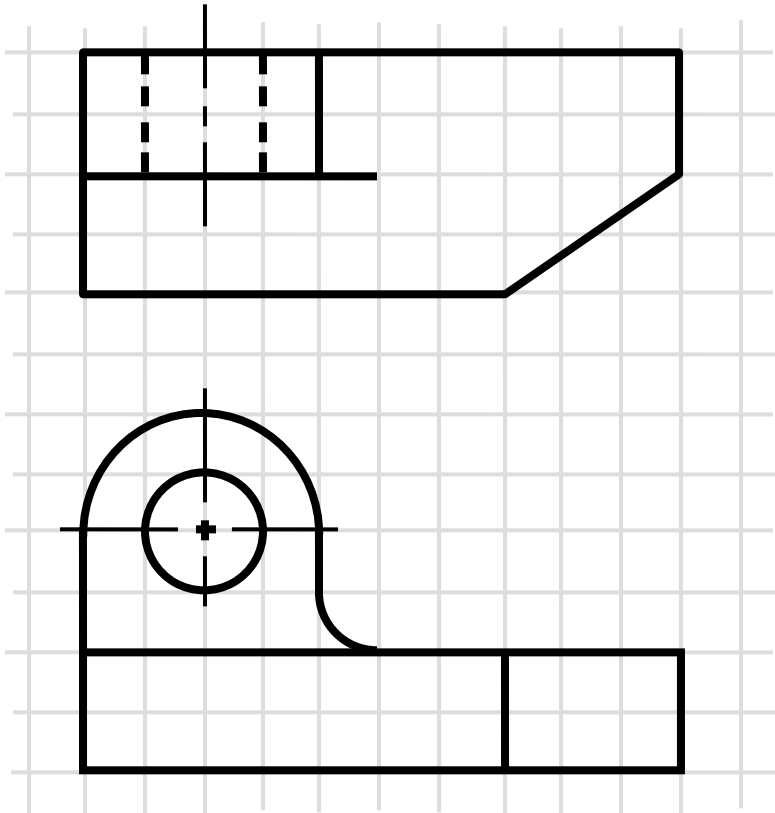
Pictorial drawing

Sketch from Multiview drawing



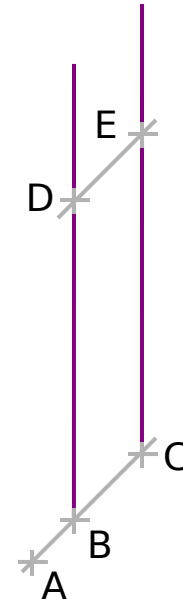
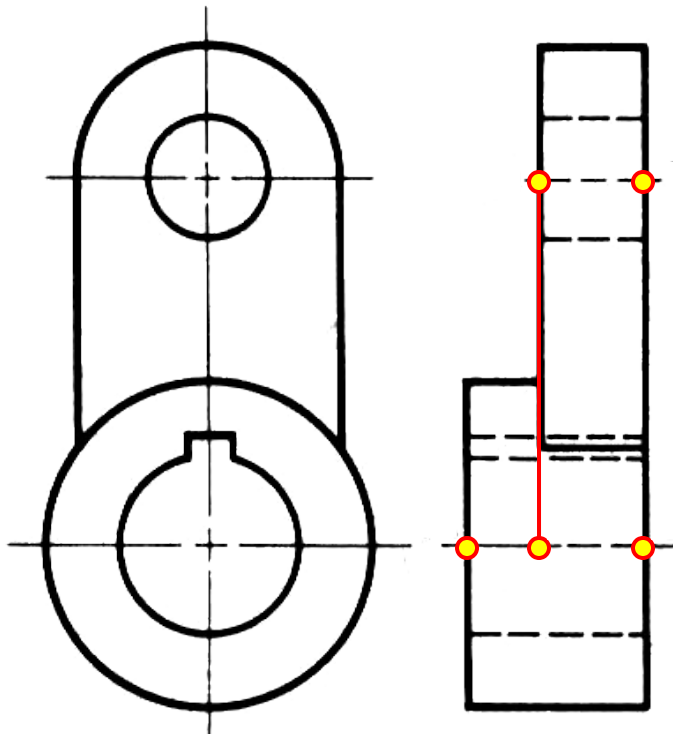
Pictorial drawing

Sketch from Multiview drawing



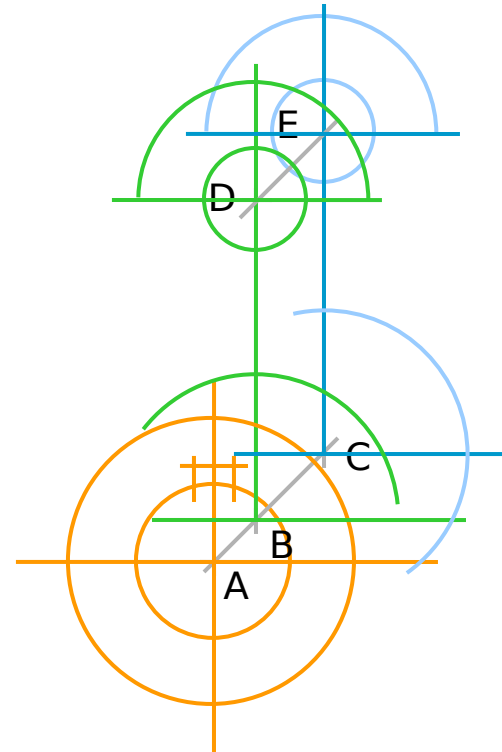
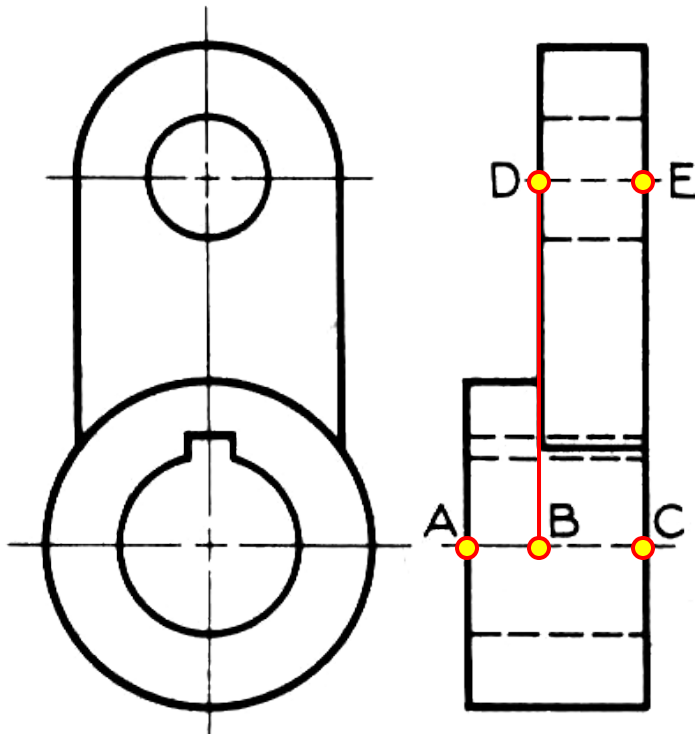
Pictorial drawing

Sketch from Multiview drawing



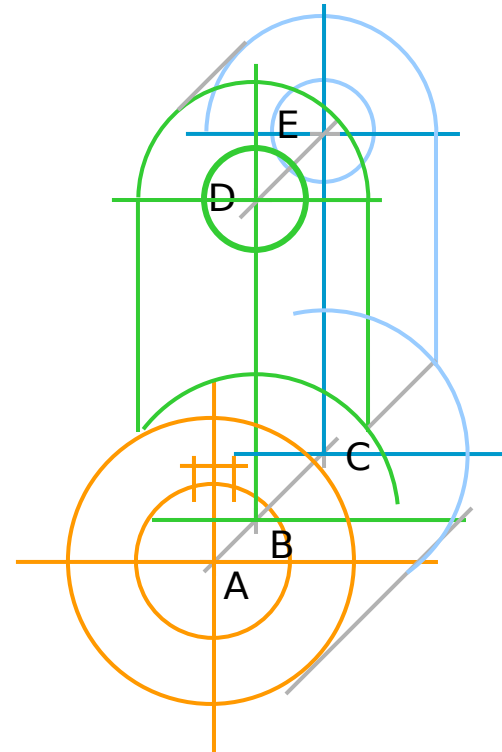
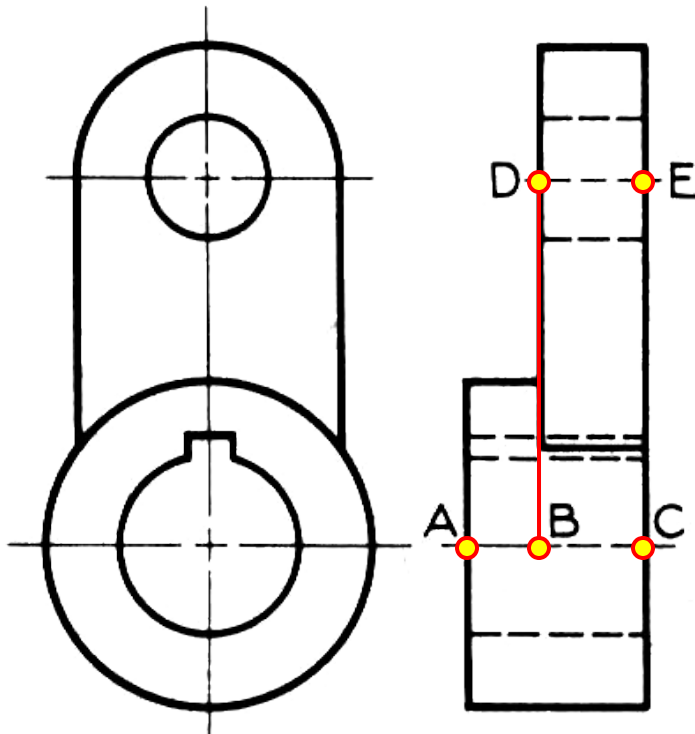
Pictorial drawing

Sketch from Multiview drawing



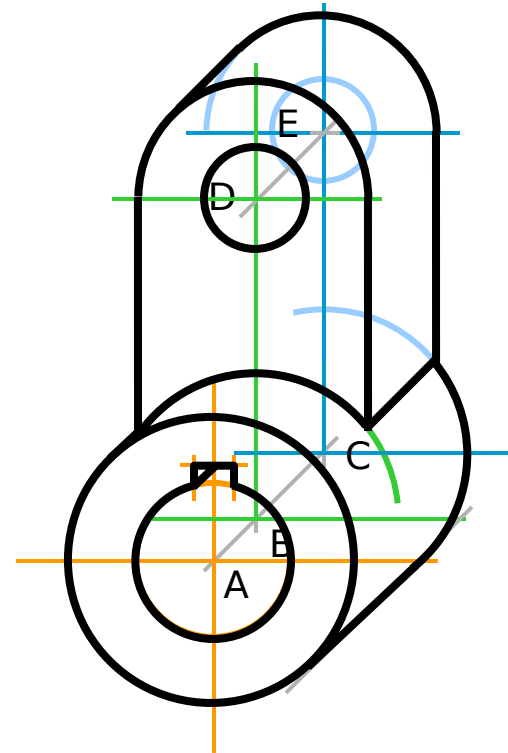
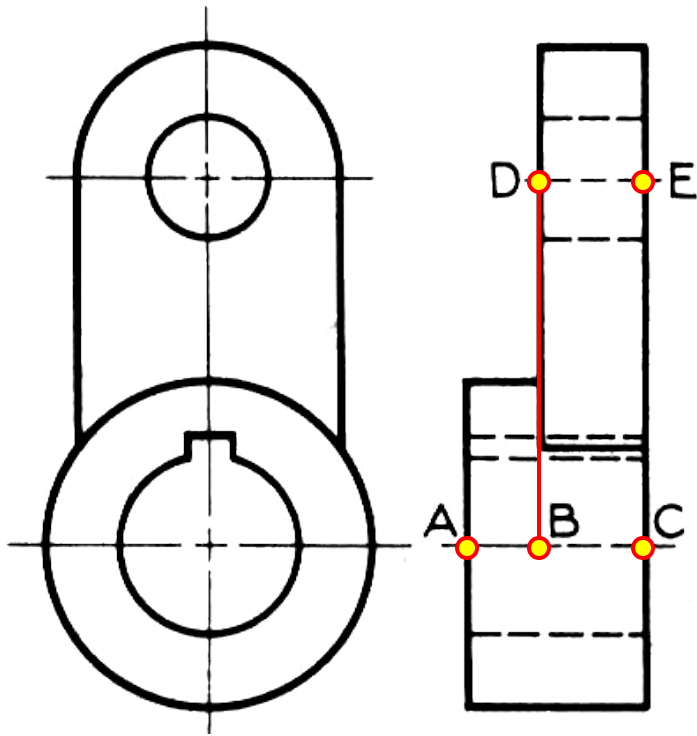
Pictorial drawing

Sketch from Multiview drawing



Pictorial drawing

Sketch from Multiview drawing



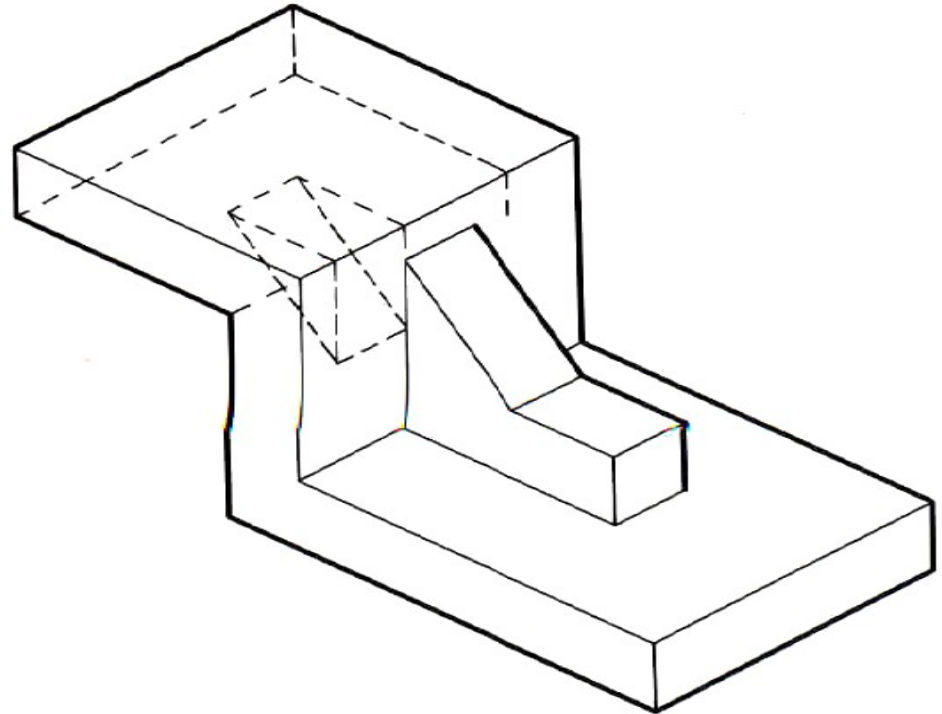
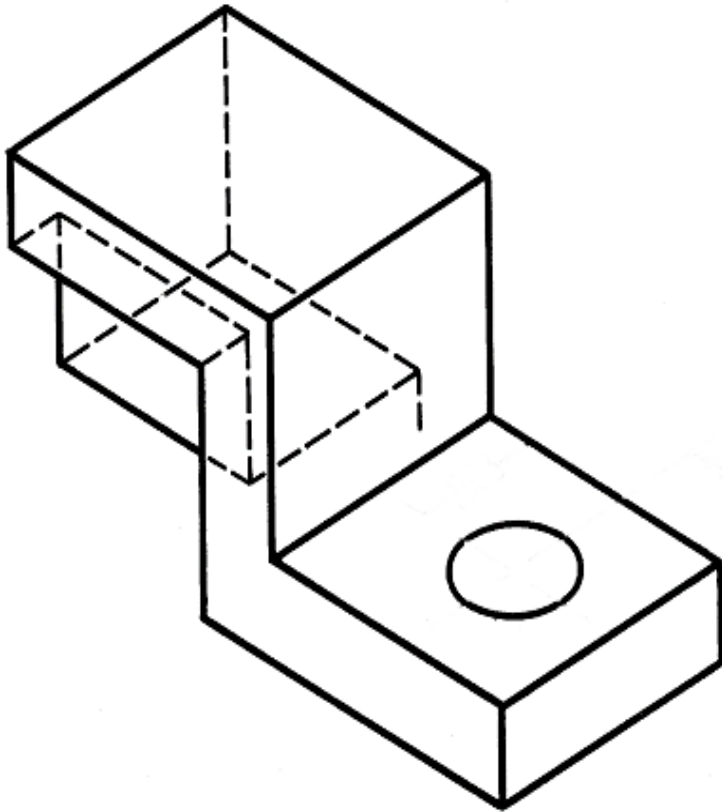
Pictorial drawing

Hidden Lines in Pictorial Drawing

- In pictorial drawings, hidden lines are **omitted** unless they are **absolutely** necessary to completely describe the object. Most pictorial drawings will not have hidden lines.
- To avoid using hidden lines, choose the most **descriptive viewpoint**. However, if an pictorial viewpoint **can not clearly depicts** all the major features, hidden lines may be used.

Pictorial drawing

Hidden Lines in Pictorial Drawing



Thank You
Any Question?