Chapter 5

Pictorial Projection

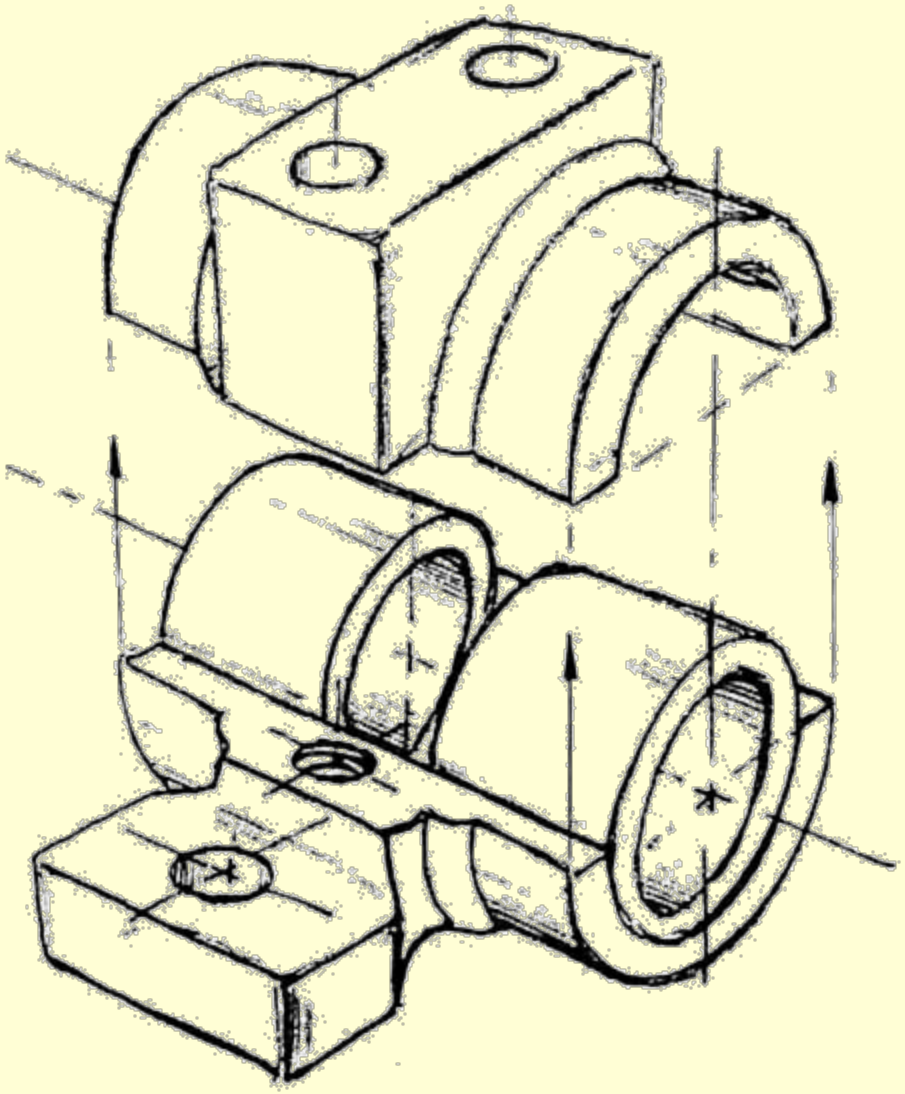
Objectives

After completing this chapter, the students will be able to

- ***Create*** freehand sketches using the correct sketching techniques.
- ***Explain*** the difference between ***axonometric*** and ***oblique*** projection.
- ***Explain*** the difference between ***isometric projection*** and ***isometric sketch (or draw)***.
- ***Create*** an ***isometric*** and ***oblique sketches*** from an actual object and given multiview drawing.

Topics

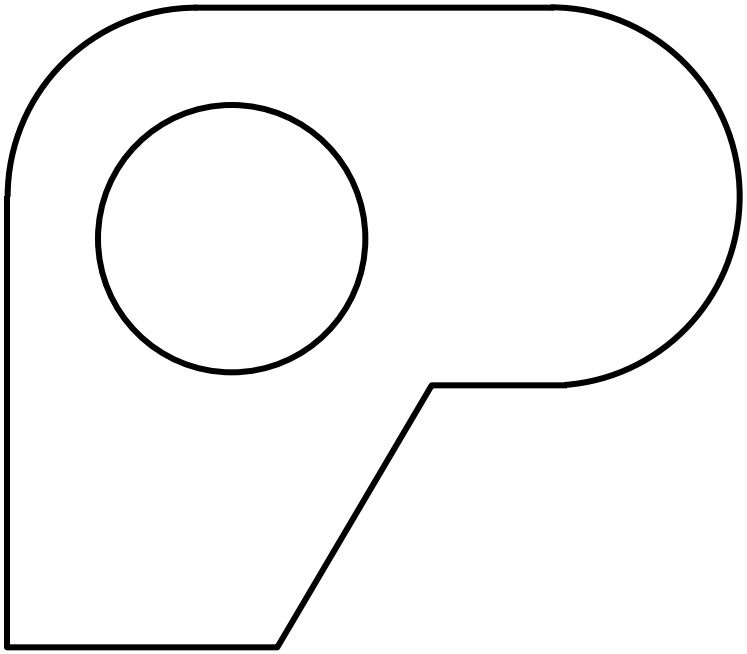
- Freehand sketch
- Pictorial projections
  - Axonometric
  - Oblique
- Isometric sketch
- Oblique sketch



Freehand Sketching

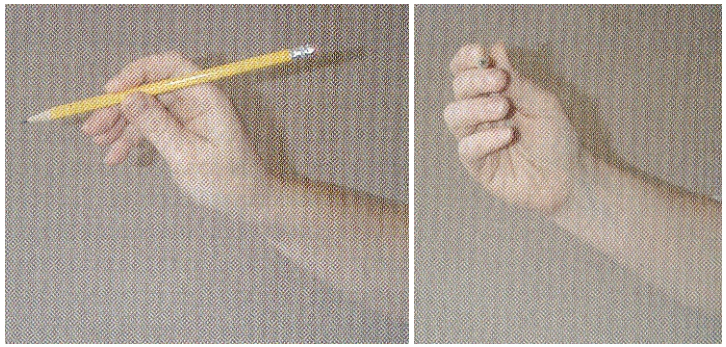
Basic geometry

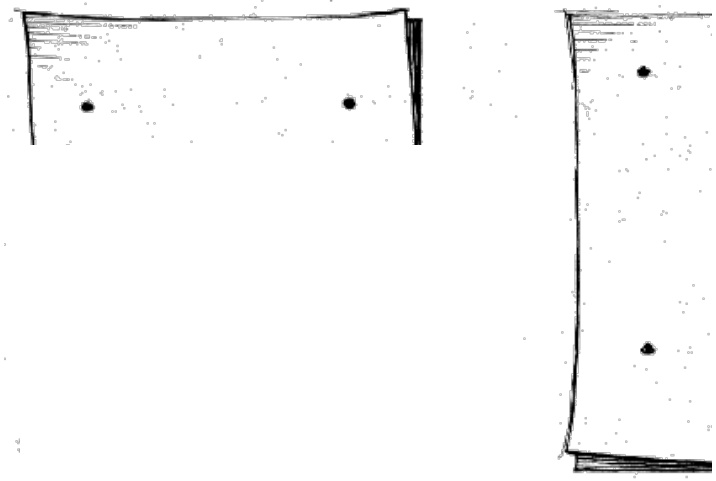
- ***Straight line*** : Horizontal, vertical and Inclined.
- ***Arc & Circle***



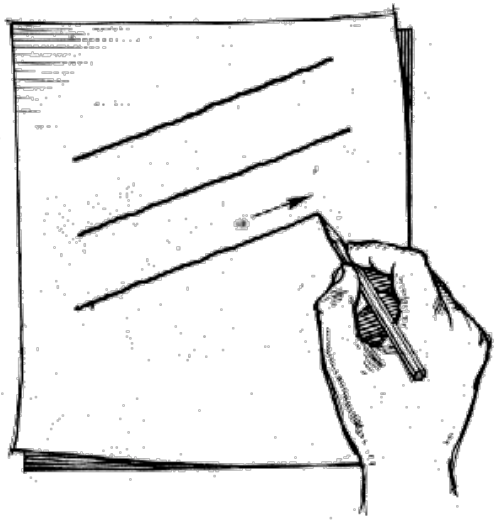
Sketching Lines

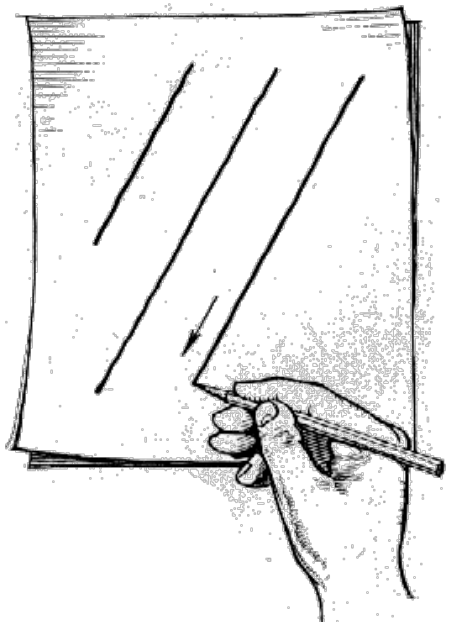
1. Hold the pencil naturally.
2. Spot the *beginning* and *end* points.
3. Swing the pencil back and forth between the points, barely touching the paper until the direction is clearly established.
4. Draw the line firmly with a free and easy wrist-and-arm motion.

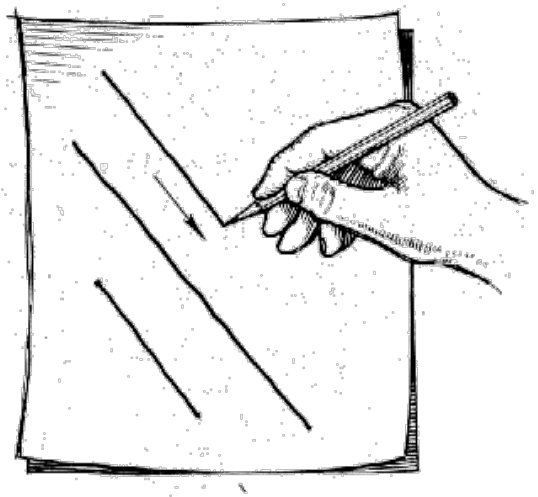




Sketching Lines

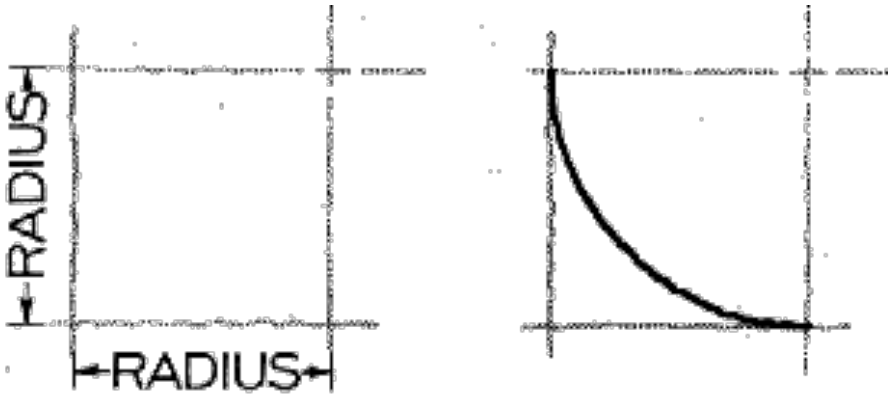




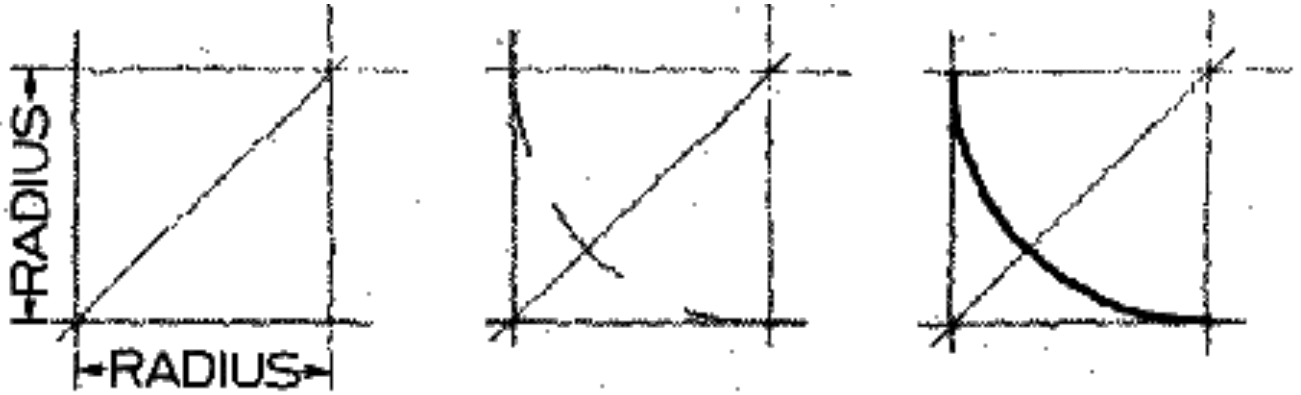


Sketching Arc

Method 1 :
Starting with a square



Method 2 :
Starting with a center line

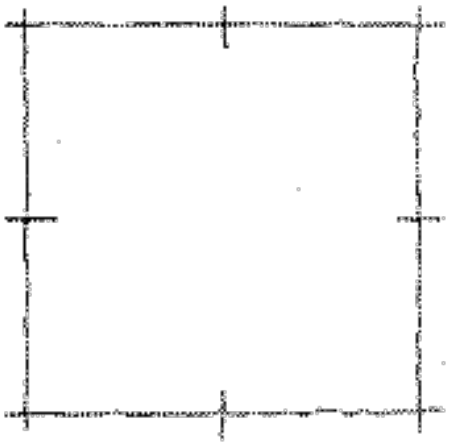


Sketching a Small Circle

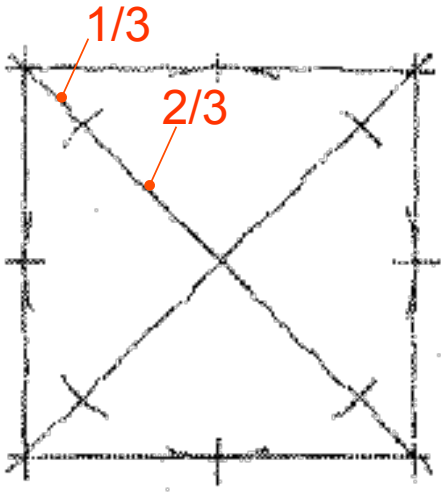
Method 1 : Starting with a square

1. Lightly sketching the square and marking the mid-points.
2. Draw light diagonals and mark the estimated radius.
3. Draw the circle through the eight points.

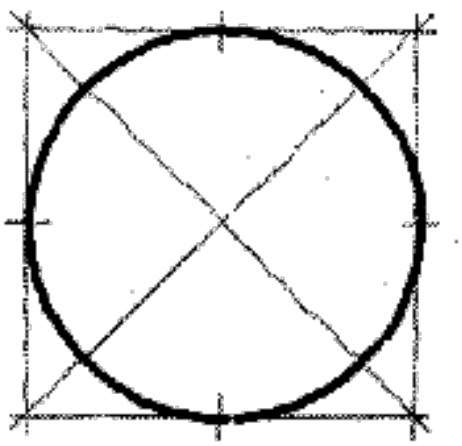
Step 1



Step 2



Step 3

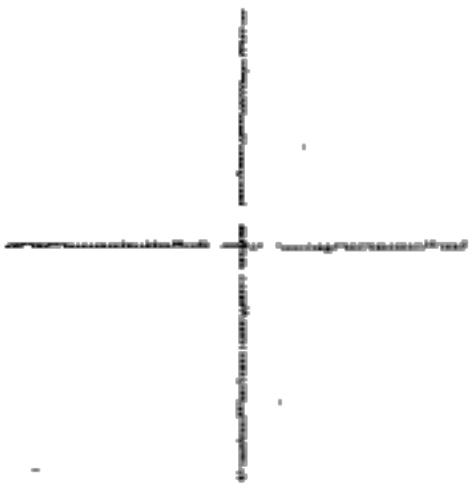


Sketching a Small Circle

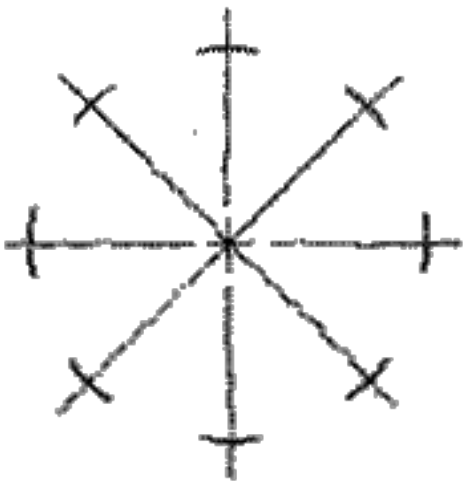
Method 2 : Starting with center line

1. Lightly draw a center line.
2. Add light radial lines and mark the estimated radius.
3. Sketch the full circle.

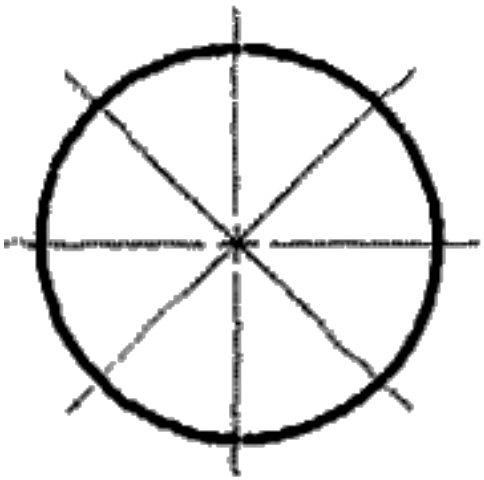
Step 1



Step 2



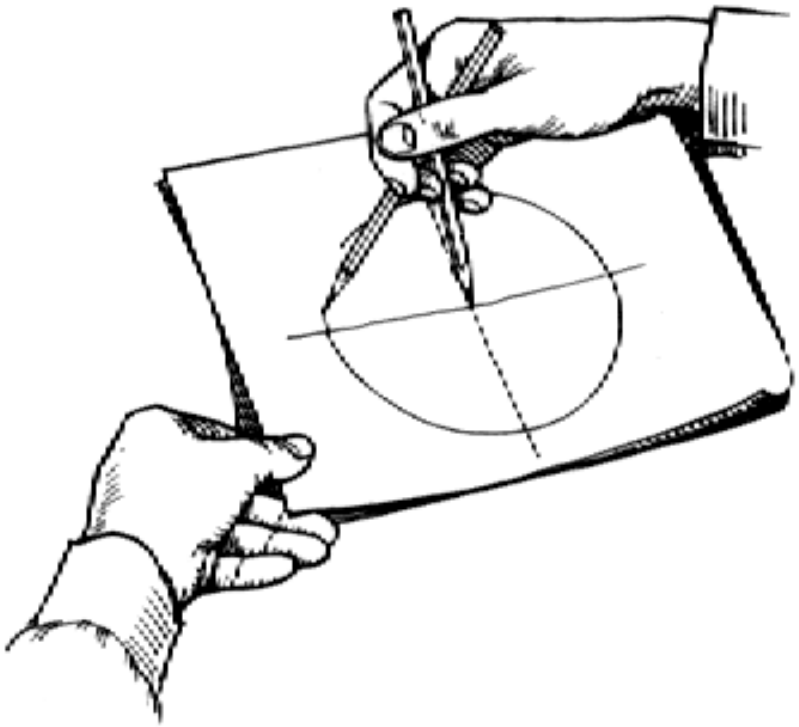
Step 3



Sketching a Large Circle

1. Place the pencil' s tip at the center as a pivot, and set the pencil point at the radius-distance from the center.

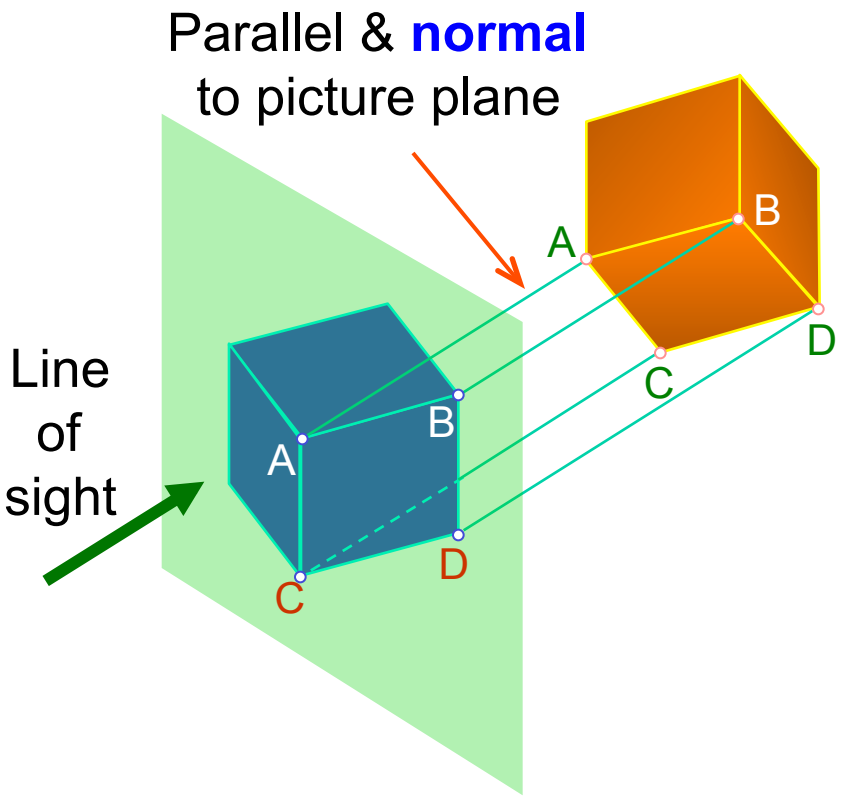
2. Hold the hand in this position and rotate the paper.



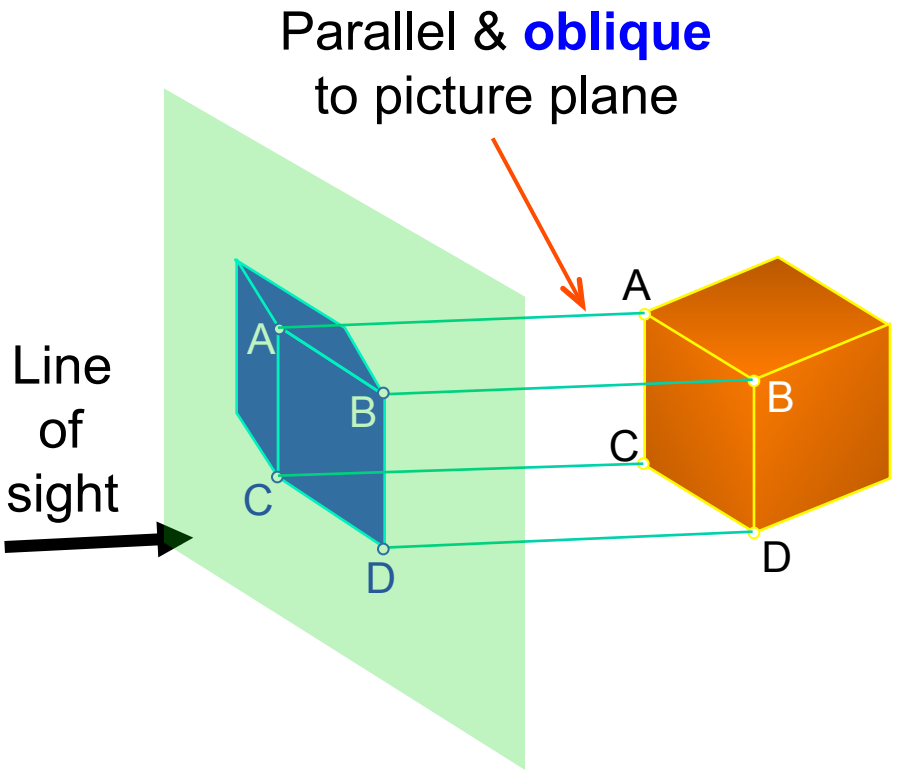
Pictorial Projections

Pictorial Projection

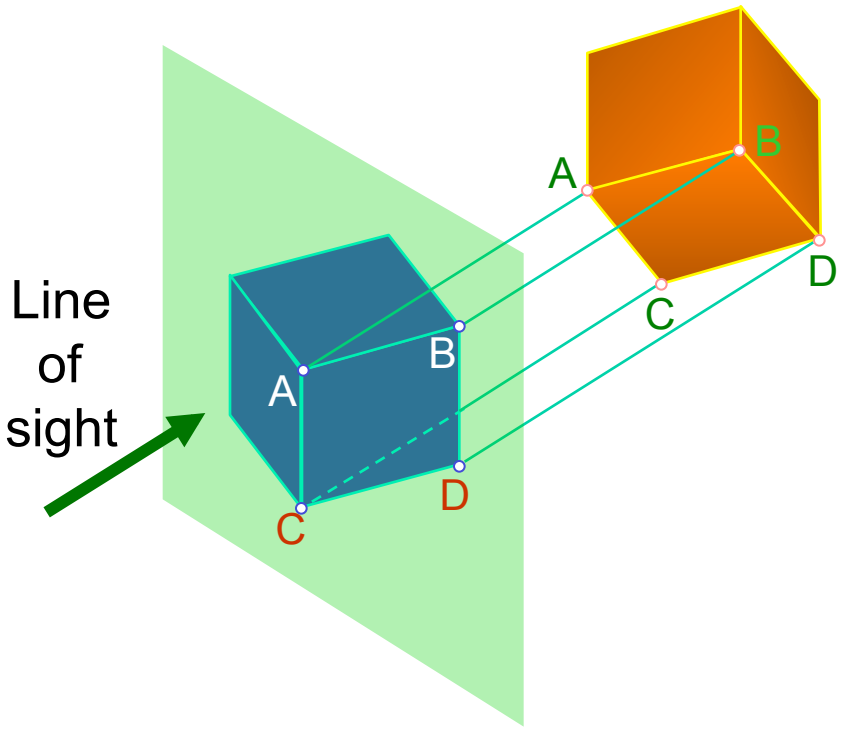
Axonometric Projection



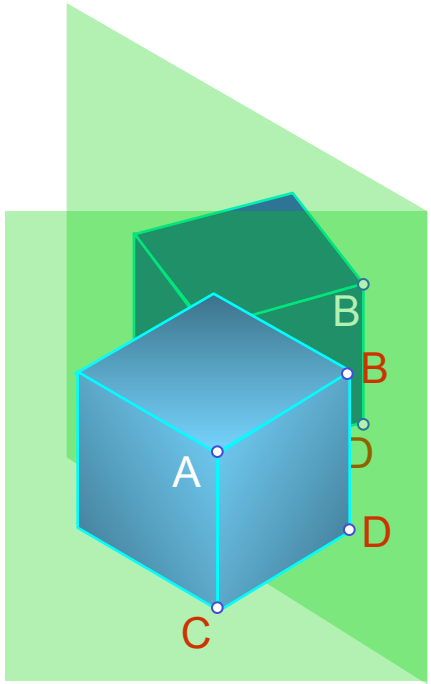
Oblique Projection



Axonometric Projection

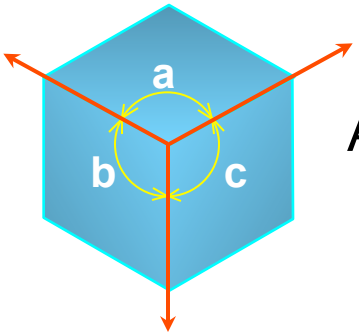


Axonometric Projection



Type of axonometric drawing

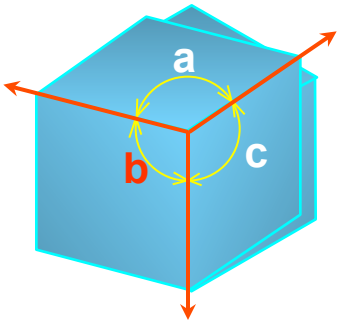
1. Isometric



Axonometric axis

All angles are equal.

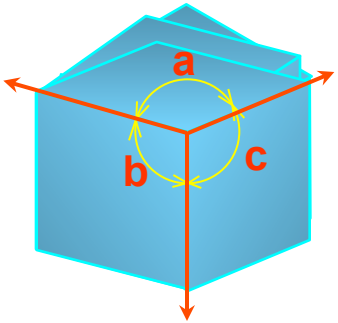
2. Dimetric



Axonometric axis

Two angles are equal.

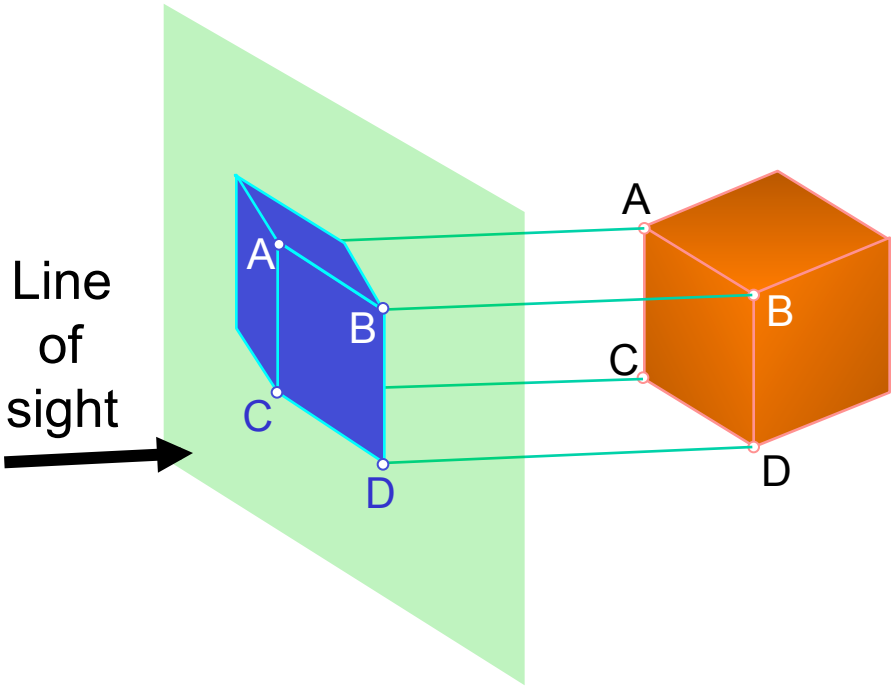
3. Trimetric



Axonometric axis

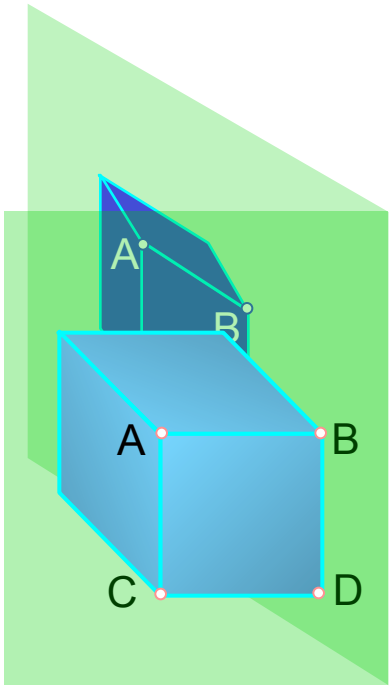
None of angles are equal.

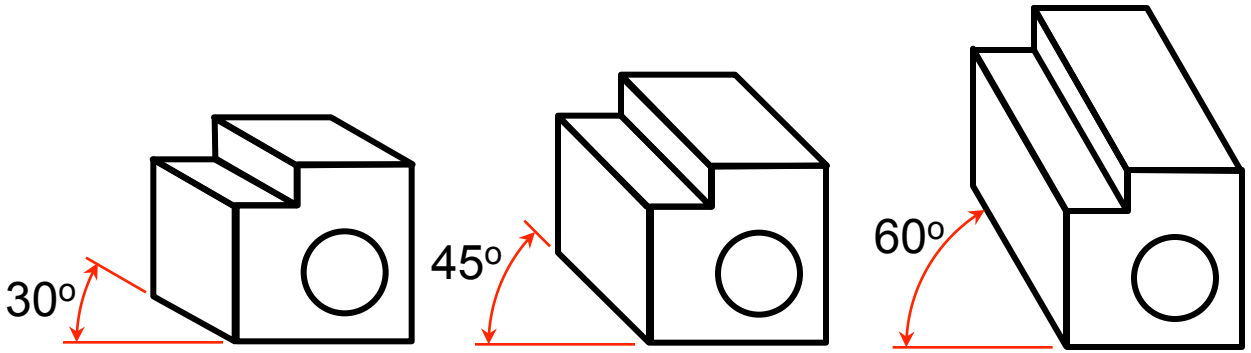
Oblique Projection



Oblique Projection

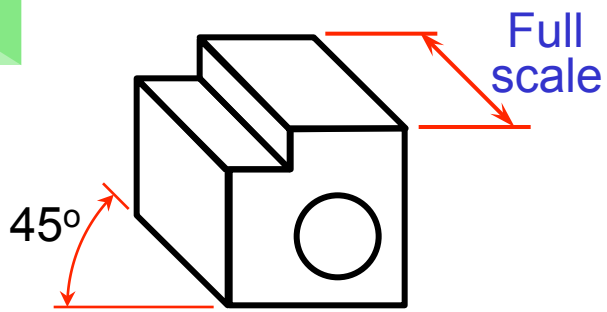
Oblique drawing angle



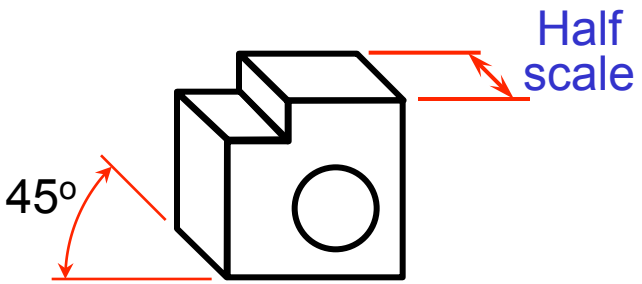


Type of Oblique drawing

1) Cavalier

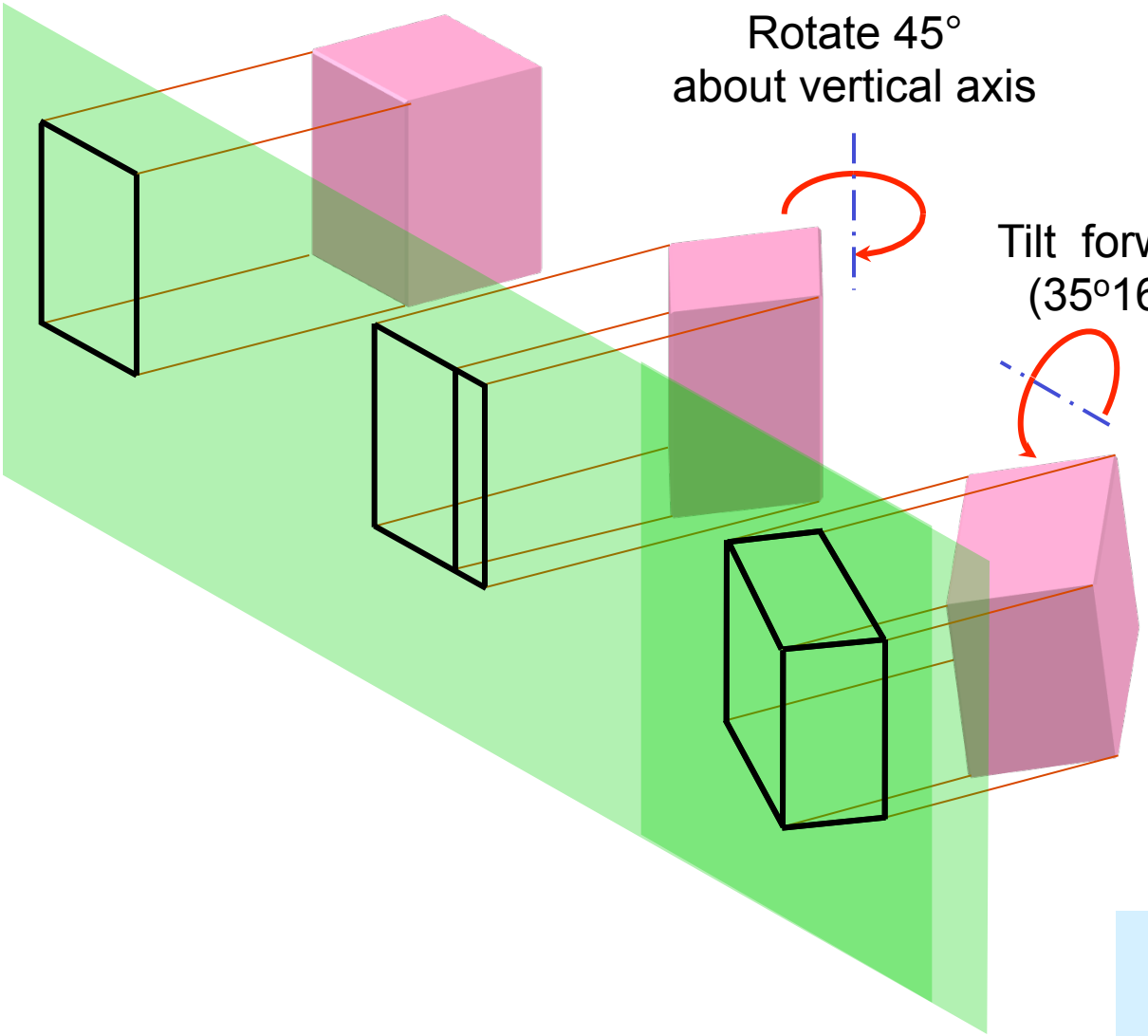


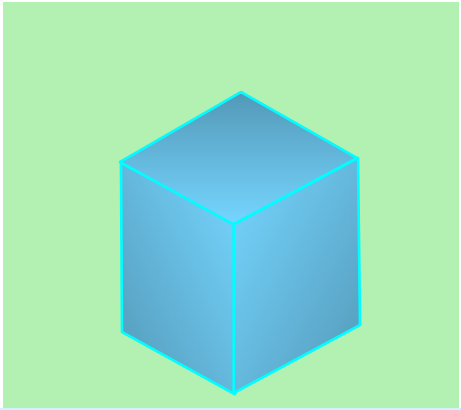
2) Cabinet



Isometric projection vs. Isometric sketch

Isometric Projection



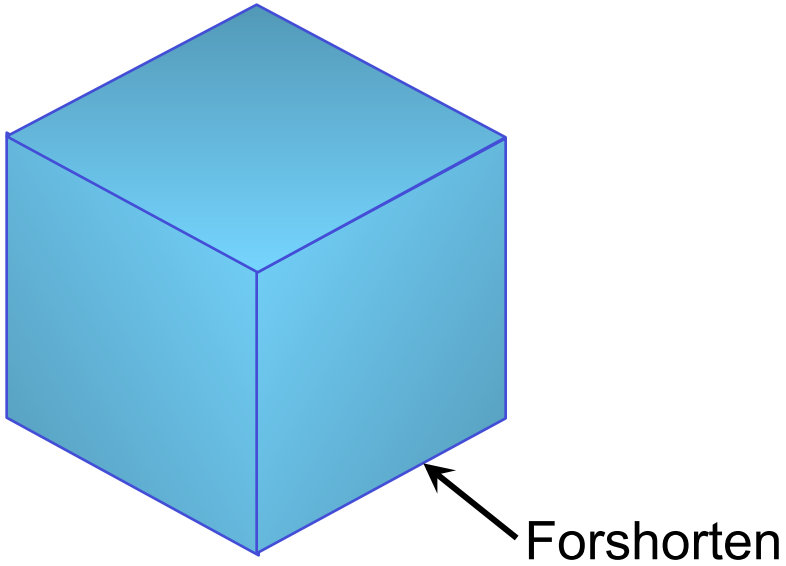


All edges ***foreshorten*** about 0.8 time.

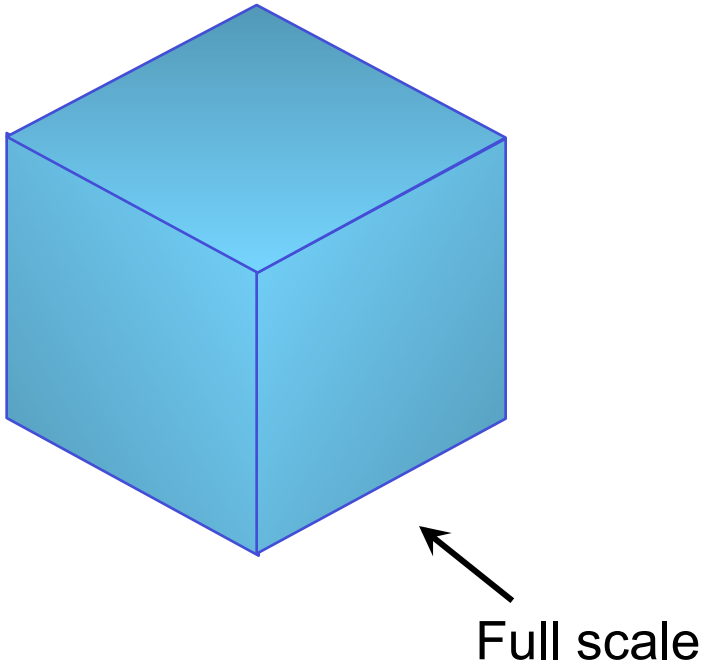
Isometric sketch

Isometric sketch is an isometric view that is drawn in ***full size***.

Isometric projection
(True projection)



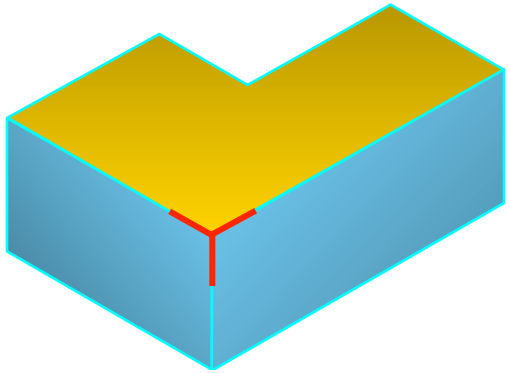
Isometric drawing
(Full size)



Orientation of Isometric Axes

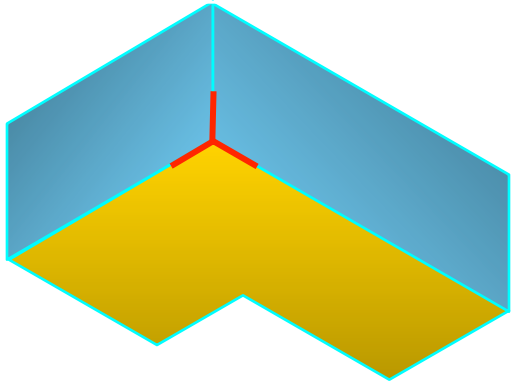
Isometric axes can be arbitrarily oriented to create different views of a single object.

Regular isometric



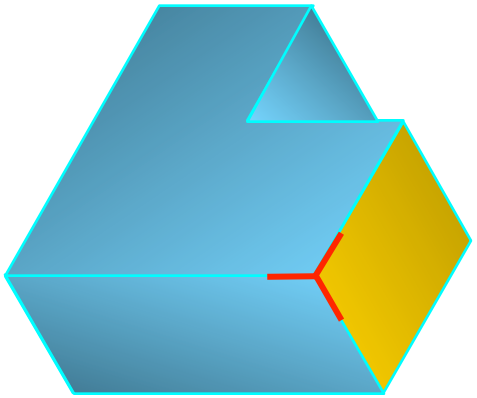
View point is looking down on the top of the object.

Reverse axis isometric



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

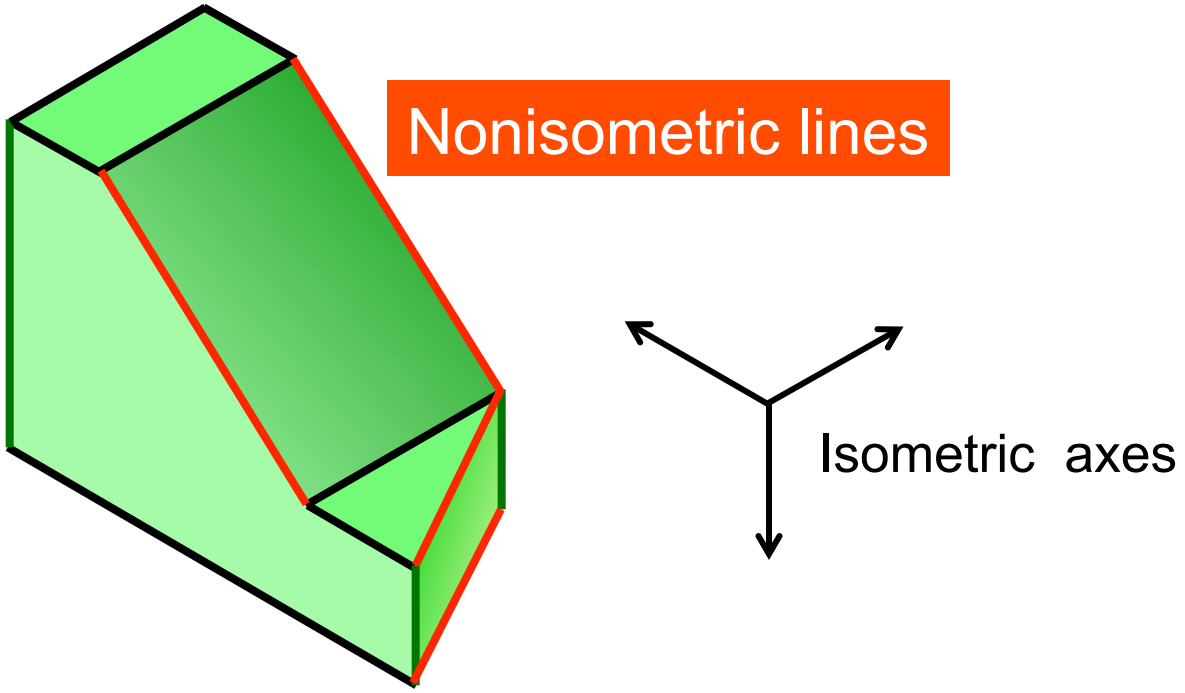
Long axis isometric



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

Distance in Isometric Sketch

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



Isometric Sketching

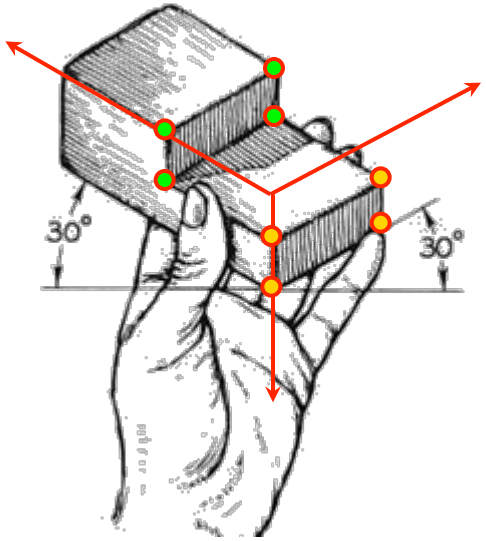
Sketch from an actual object

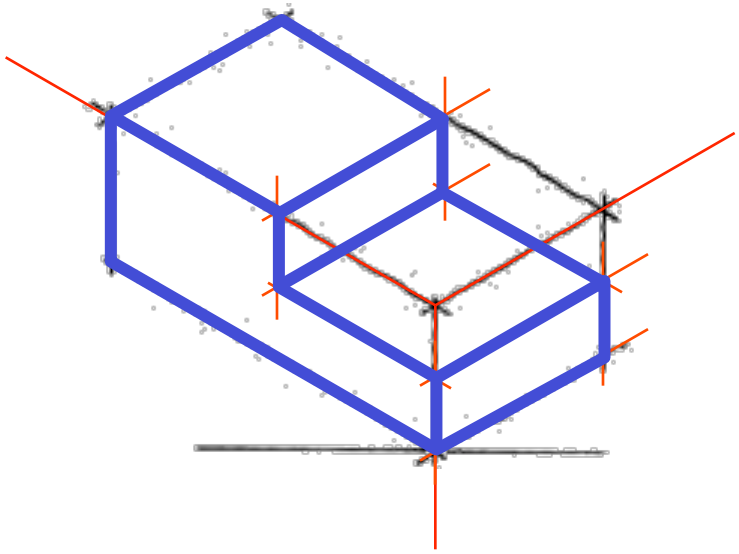
1. Place the object in the position which its shape and features are clearly seen.
2. Define an isometric axis.
3. Sketching the enclosing box (or cylinder).
4. Estimate the size an and relationship of each details.
5. Darken all visible lines.

Sketch from an actual object

STEPS

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





Sketch from an actual object

STEPS

1. Positioning object.
2. Select isometric axis.
3. Sketch enclosing box.
4. Add details.
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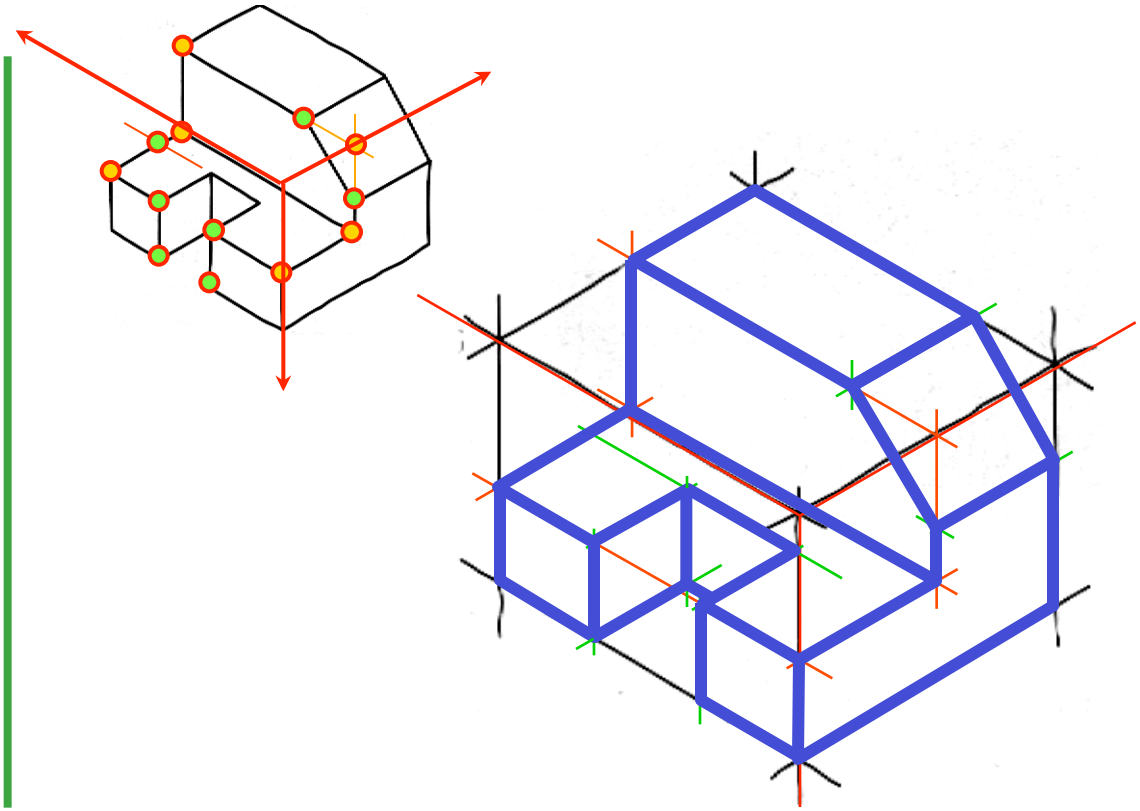
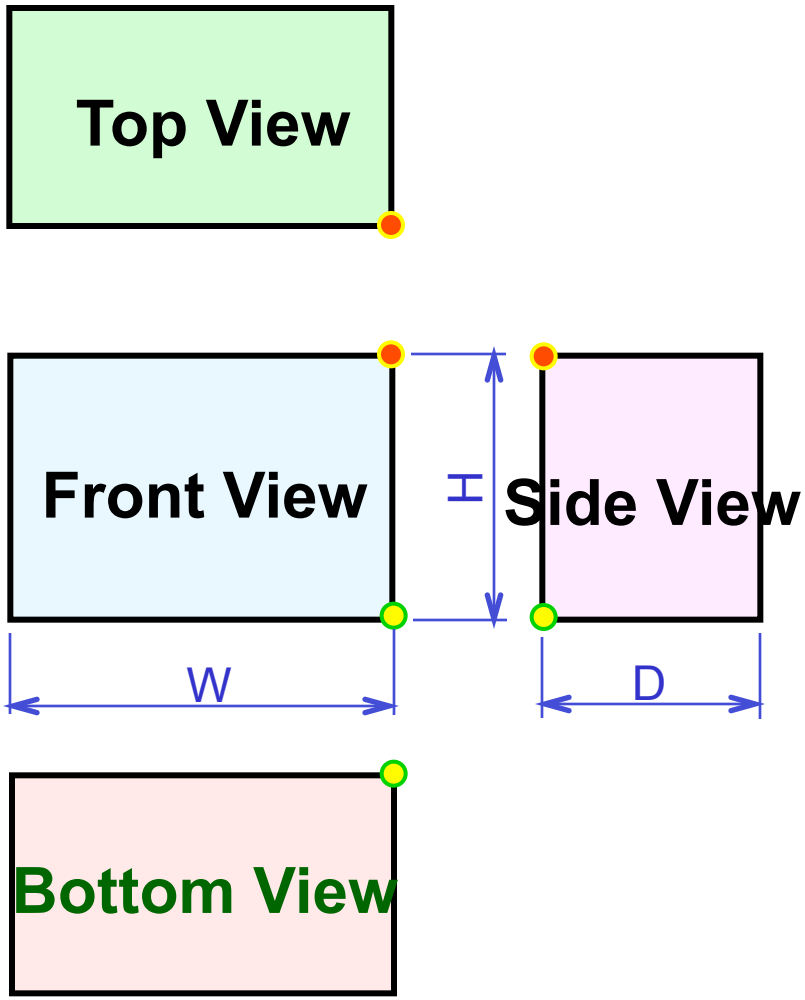


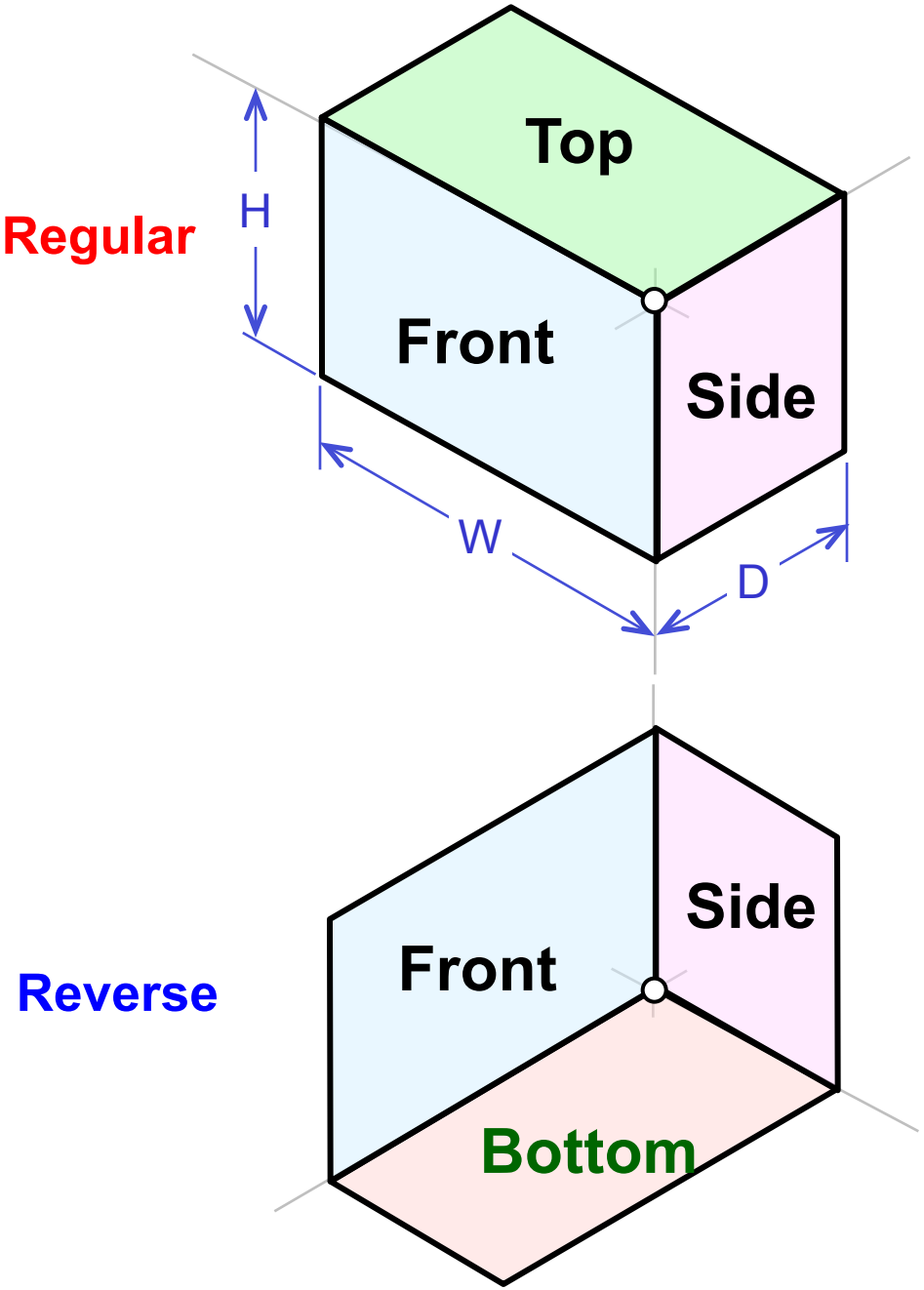
Note In isometric sketch/drawing), hidden lines are ***omitted*** unless they are absolutely necessary.

Sketch from multiview drawing

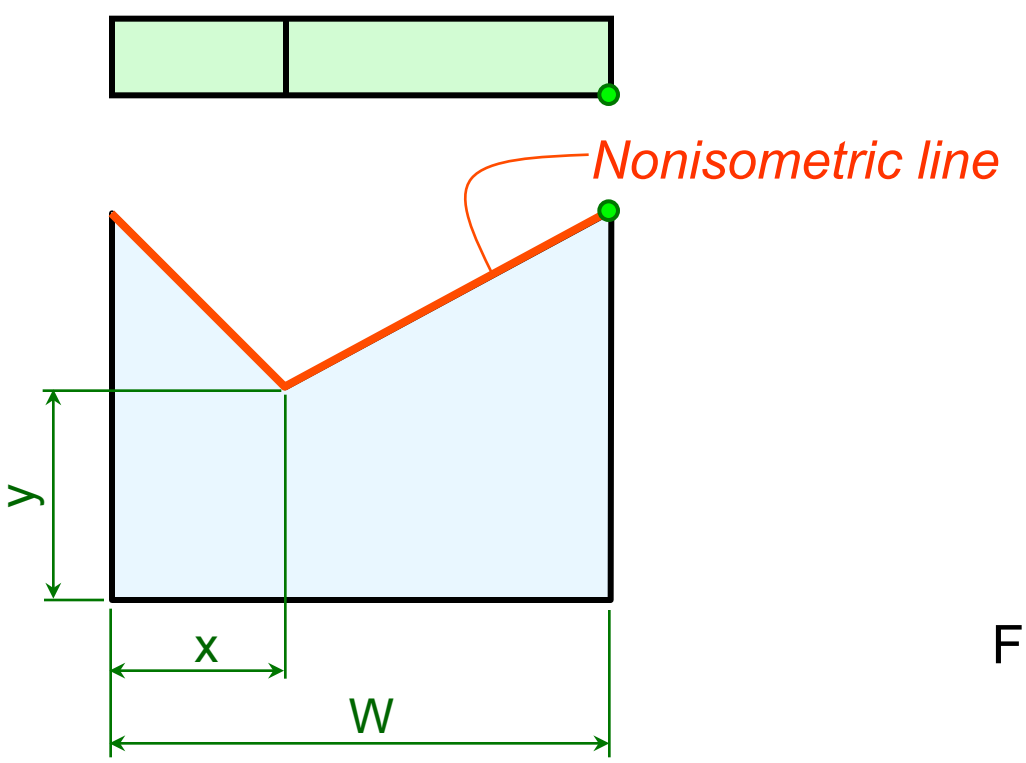
1. Interprete the ***meaning of lines/areas*** in multiview drawing.
2. Locate the lines or surfaces relative to isometric axis.

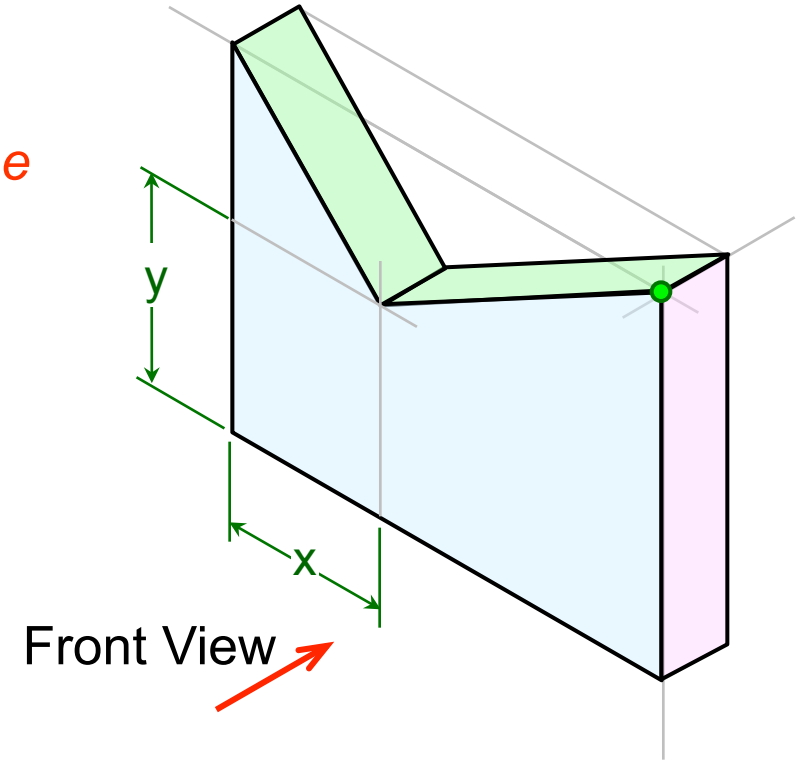
Example 1 : Object has only normal surfaces



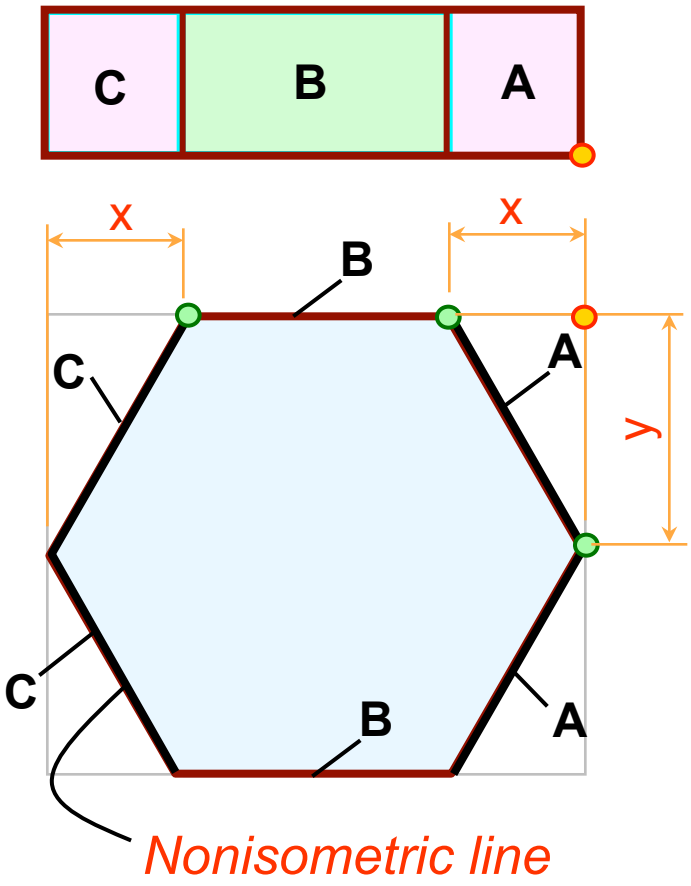


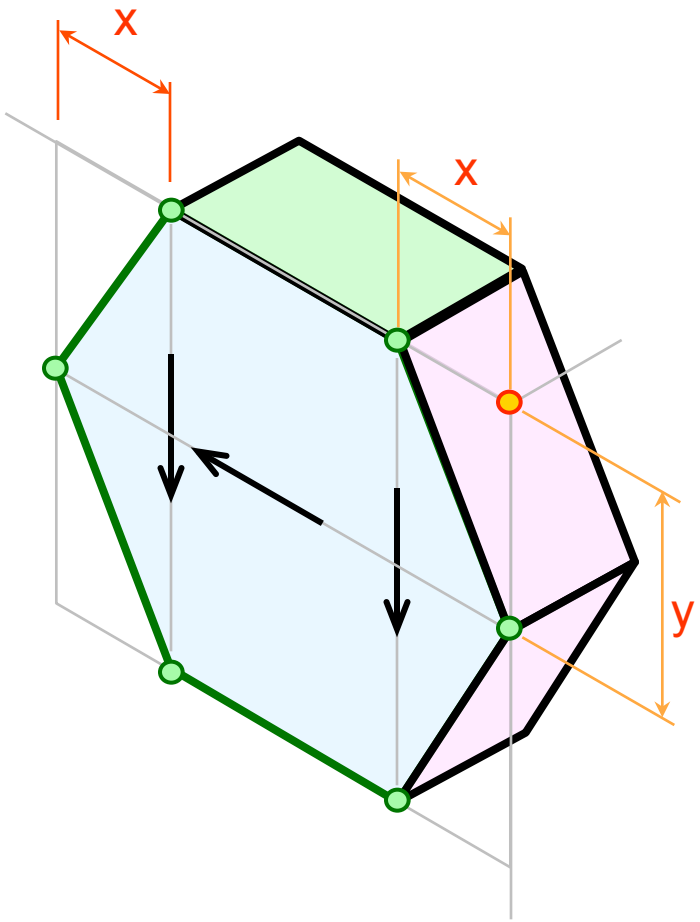
Example 2 : Object has inclined surfaces



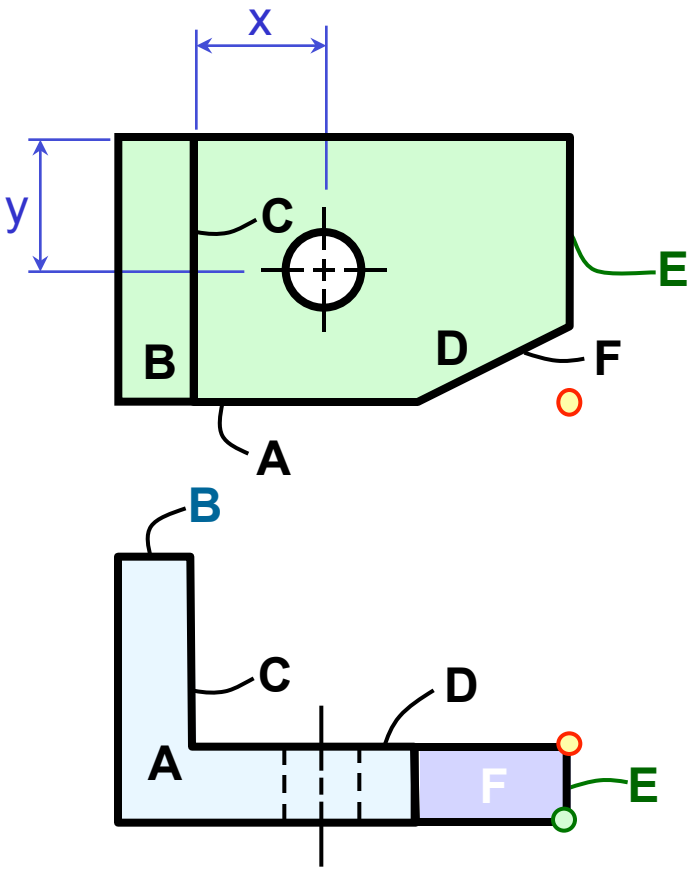


Example 3 : Object has inclined surfaces

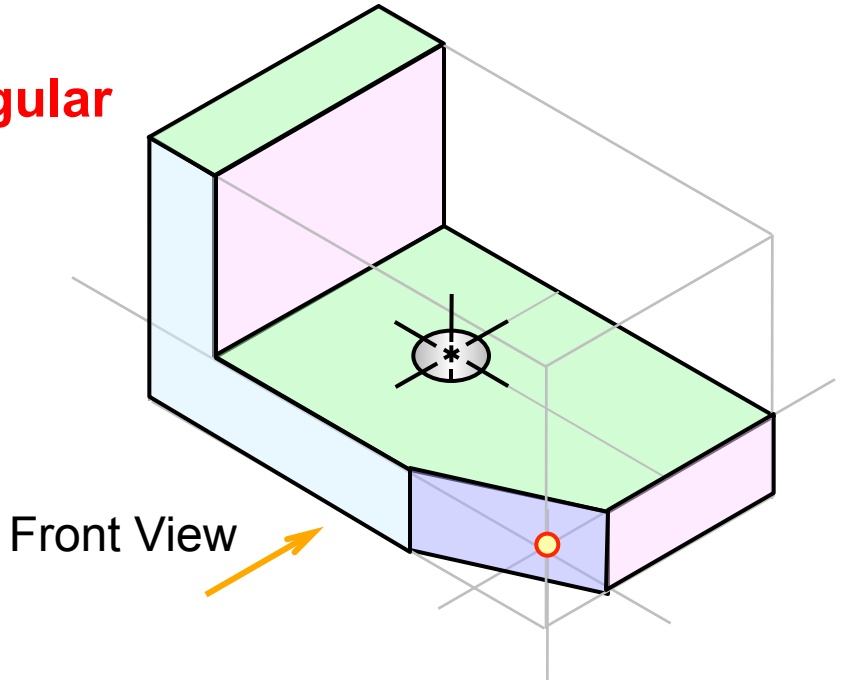




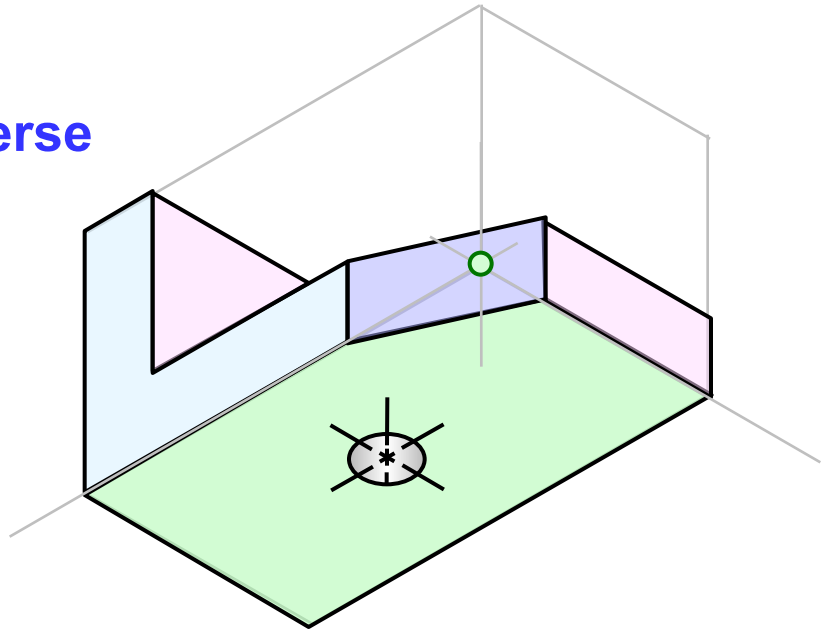
Example 4



Regular



Reverse

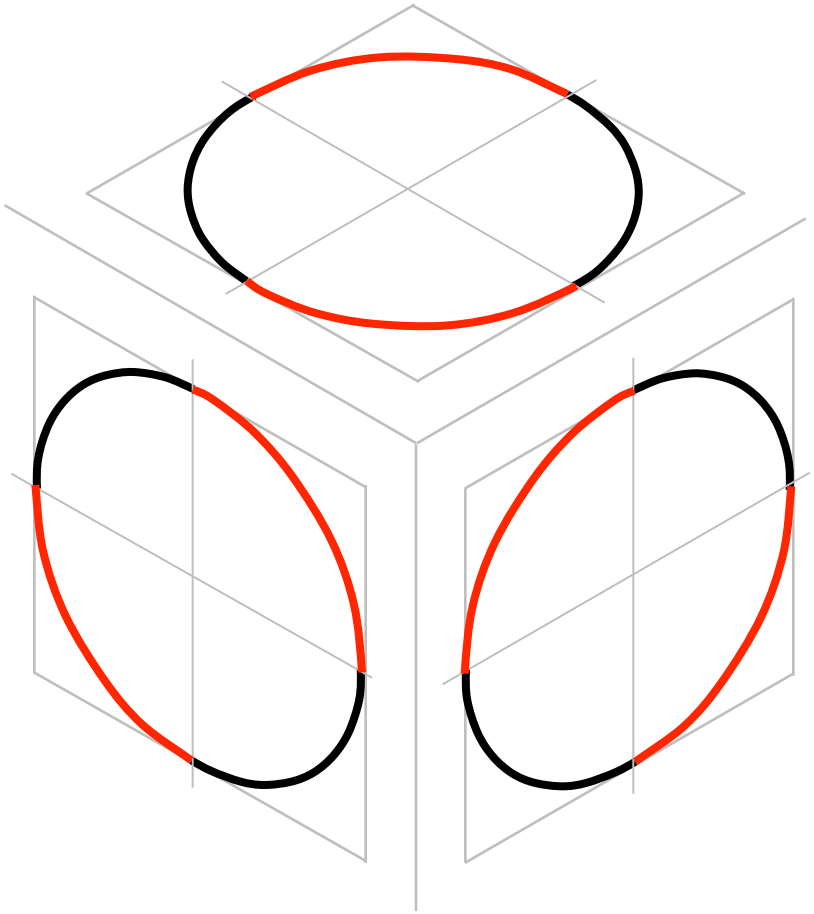


Isometric ellipse

- In isometric drawing, a circle appears as an ellipse.

Sketching Steps

1. Locate the center of an ellipse.
2. Construct an isometric square.
3. Sketch arcs that connect the tangent points.

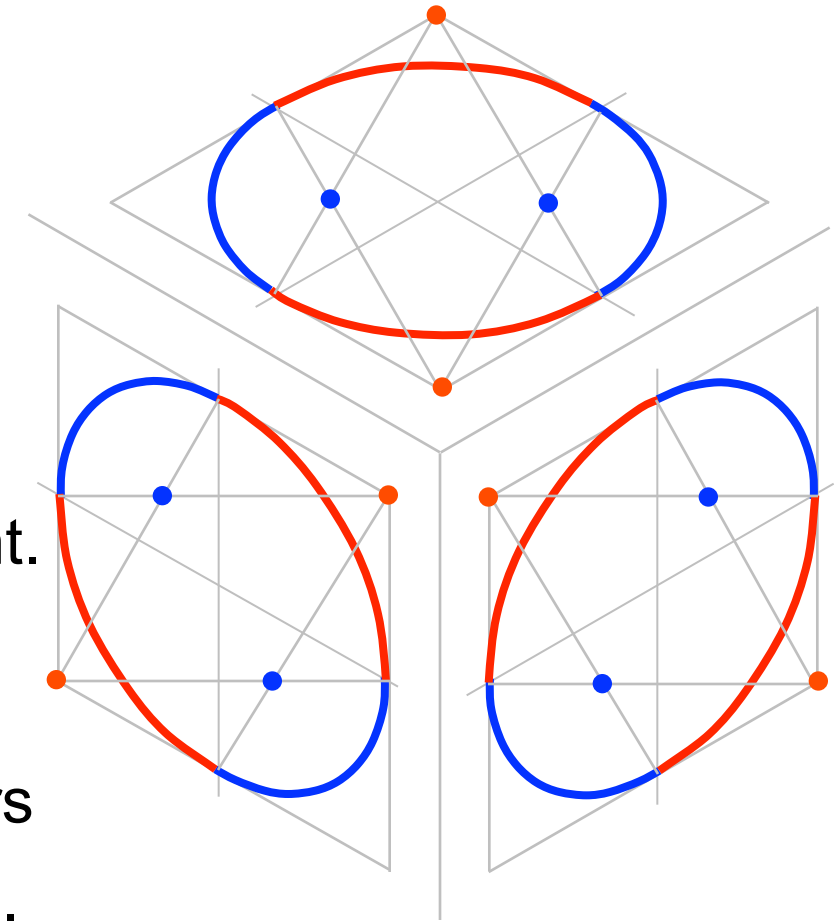


Isometric ellipse

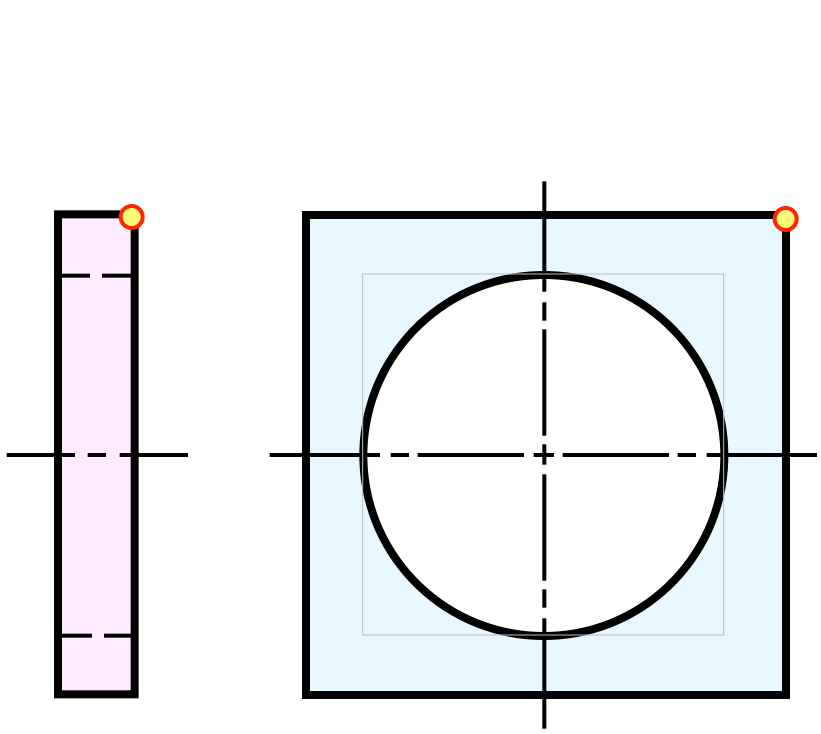
- ***Four-center*** method is usually used when drawn an isometric ellipse with drawing instrument.

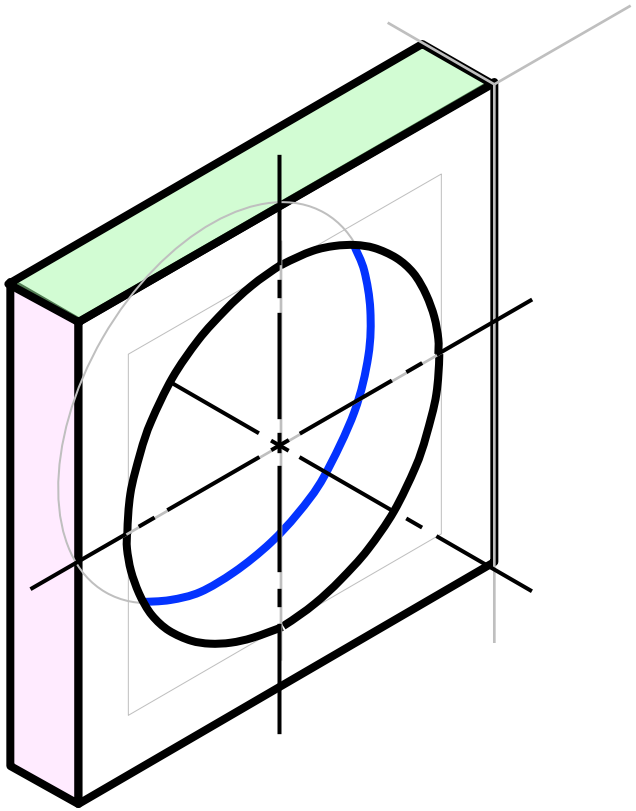
Sketching Steps

1. Locate the center of an ellipse.
2. Construct an isometric square.
3. Construct a perpendicular bisector from each tangent point.
4. Locate the four centers.
5. Draw the arcs with these centers and tangent to isometric square.



Example 5

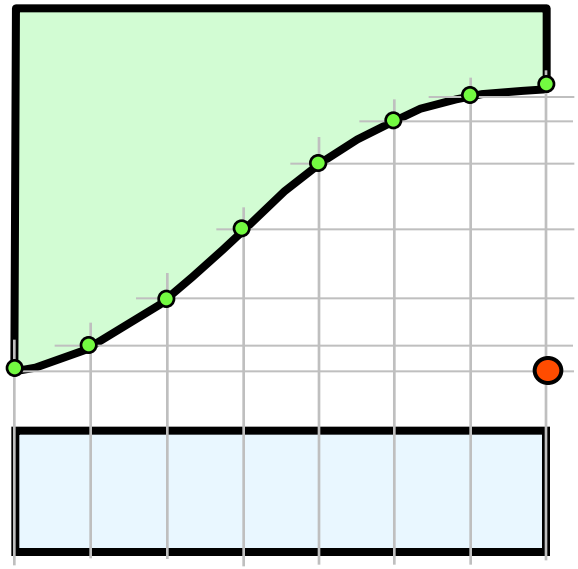


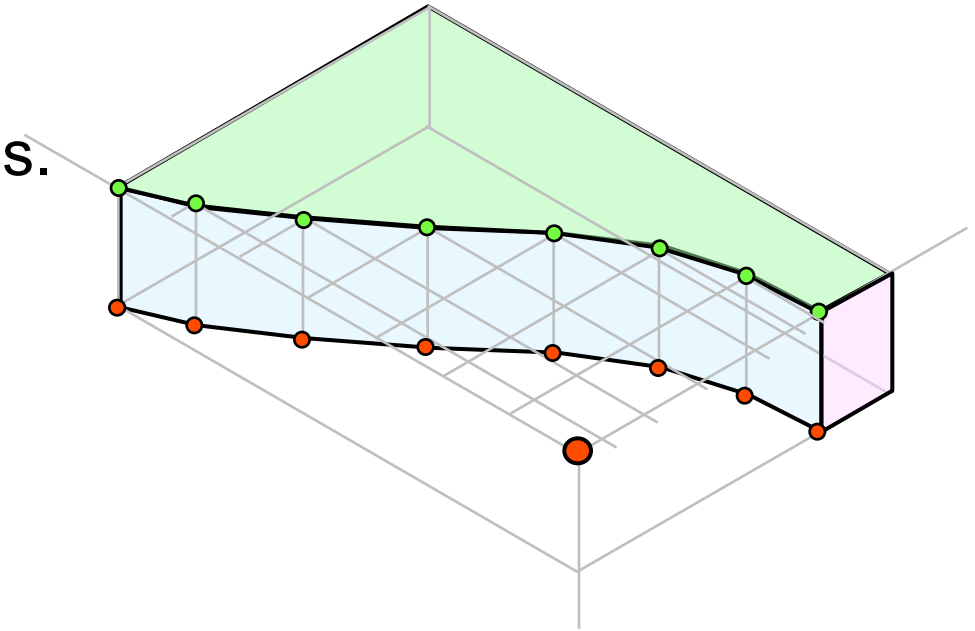


Irregular Curve in Isometric

Steps

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

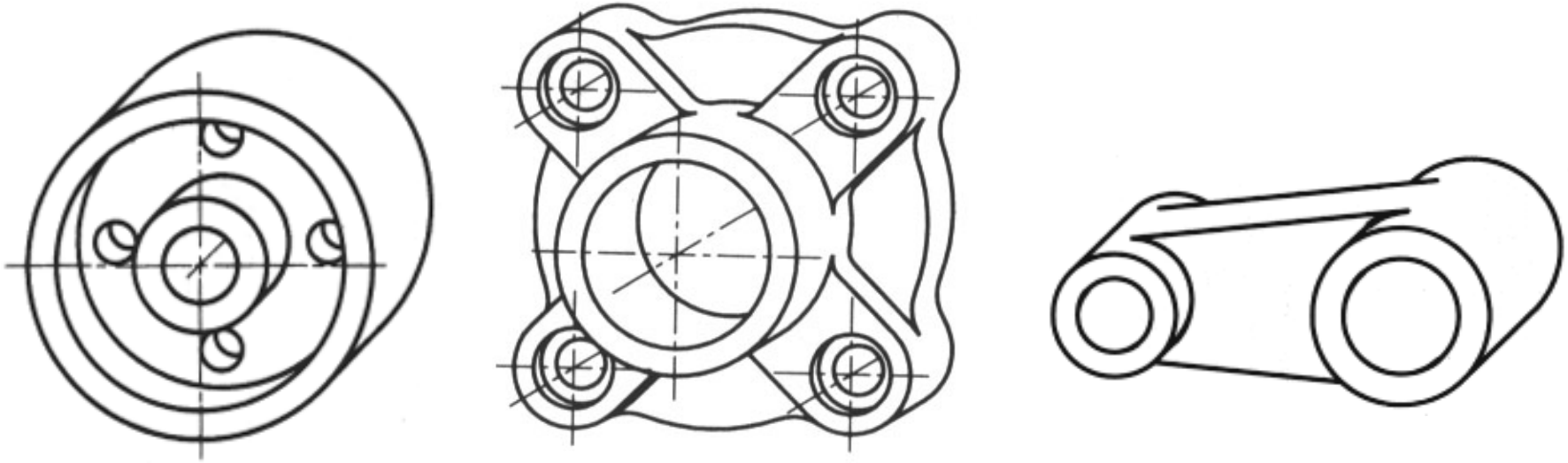




Oblique Sketching

Object Orientation Guidelines

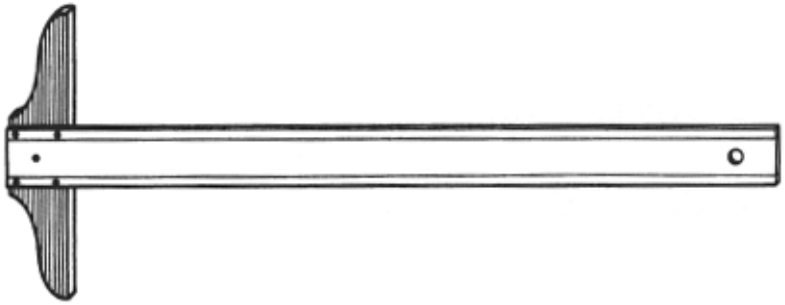
- Complex features (arc, hole, irregular shape surface) are placed parallel to frontal plane.



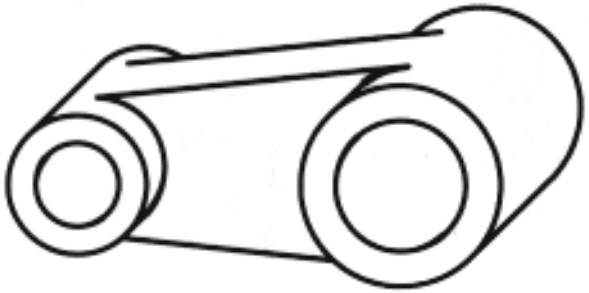
Object Orientation Guidelines

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

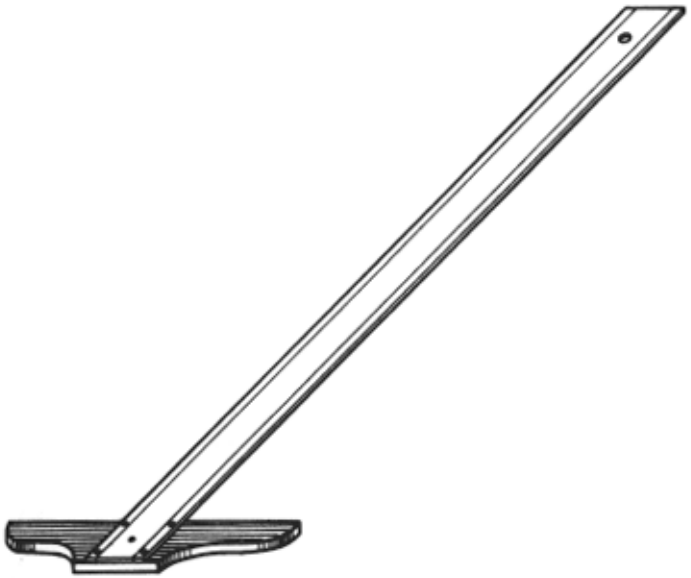
GOOD



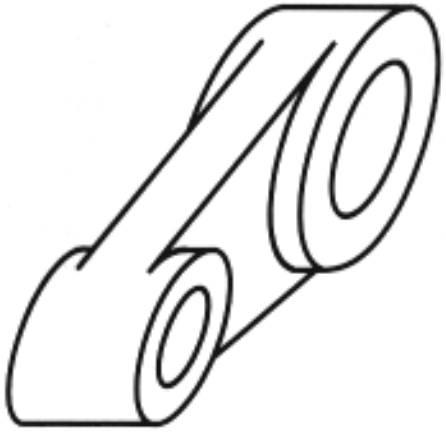
GOOD



WORSE

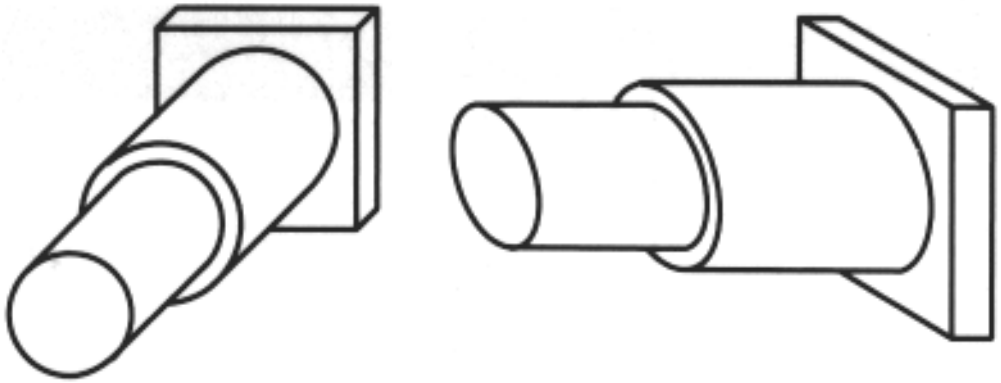


WORSE

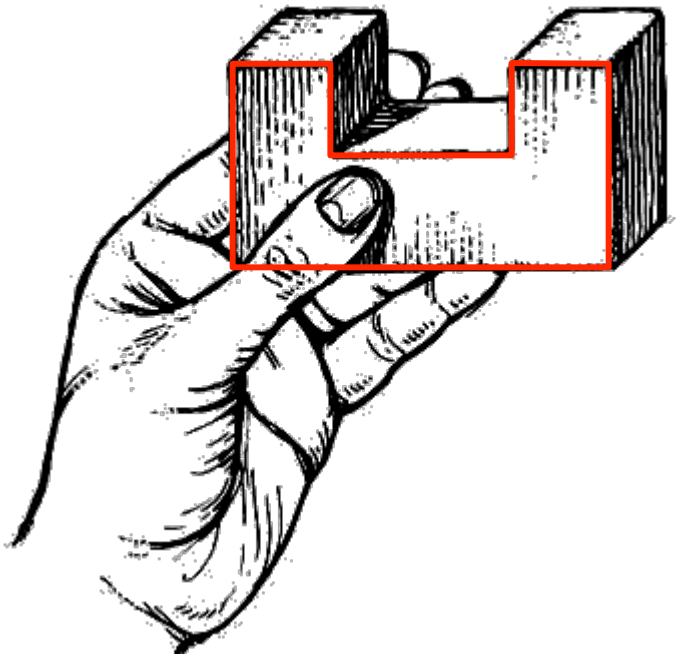


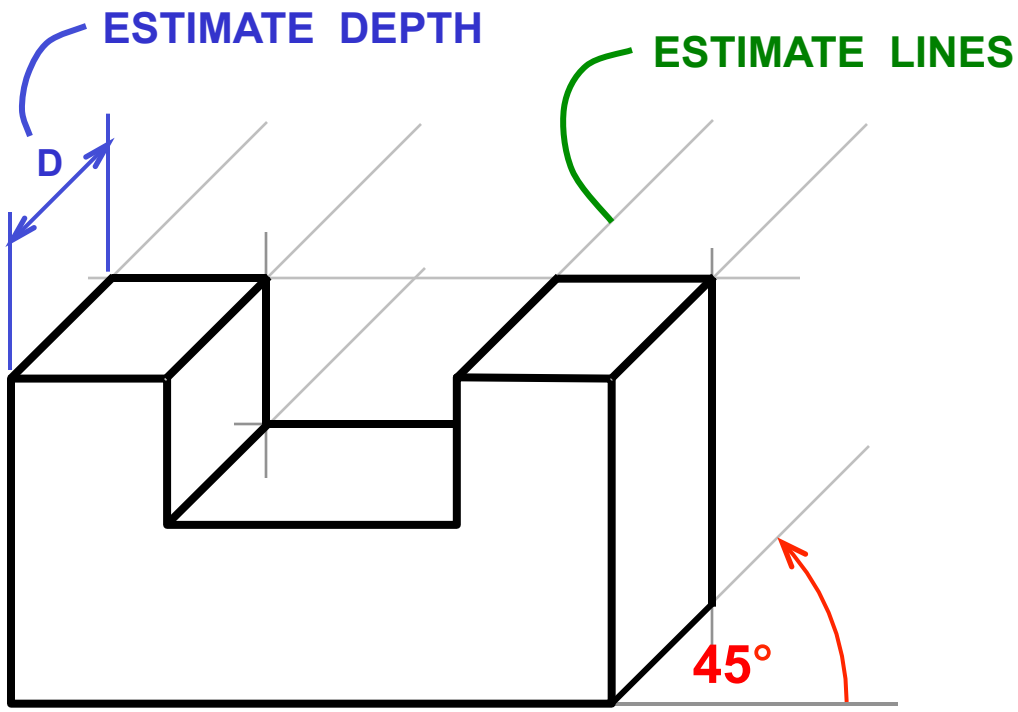
Object Orientation Guidelines

Which one is better ?



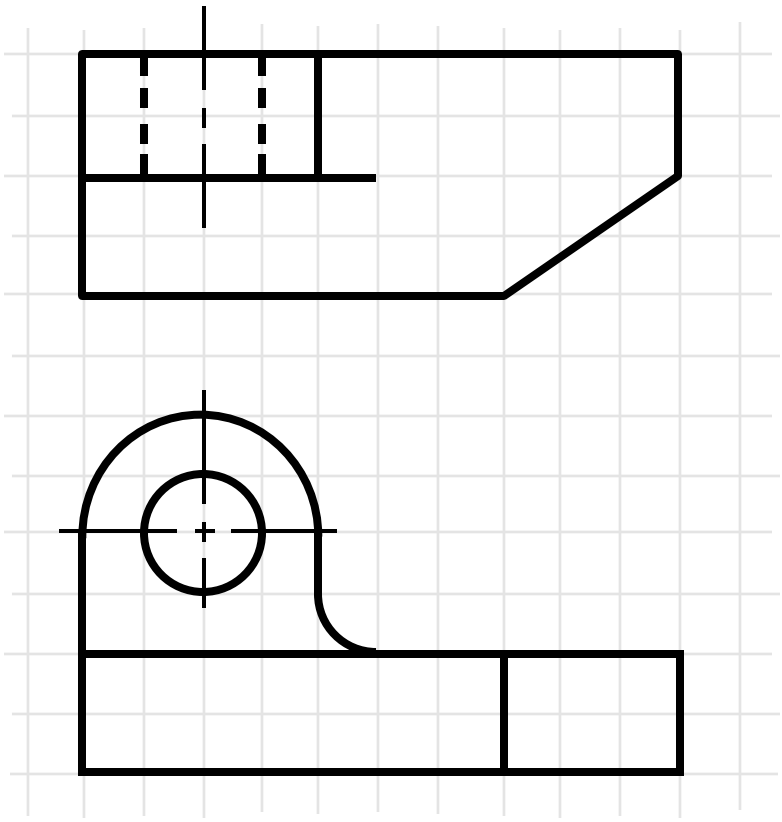
Sketch from actual object

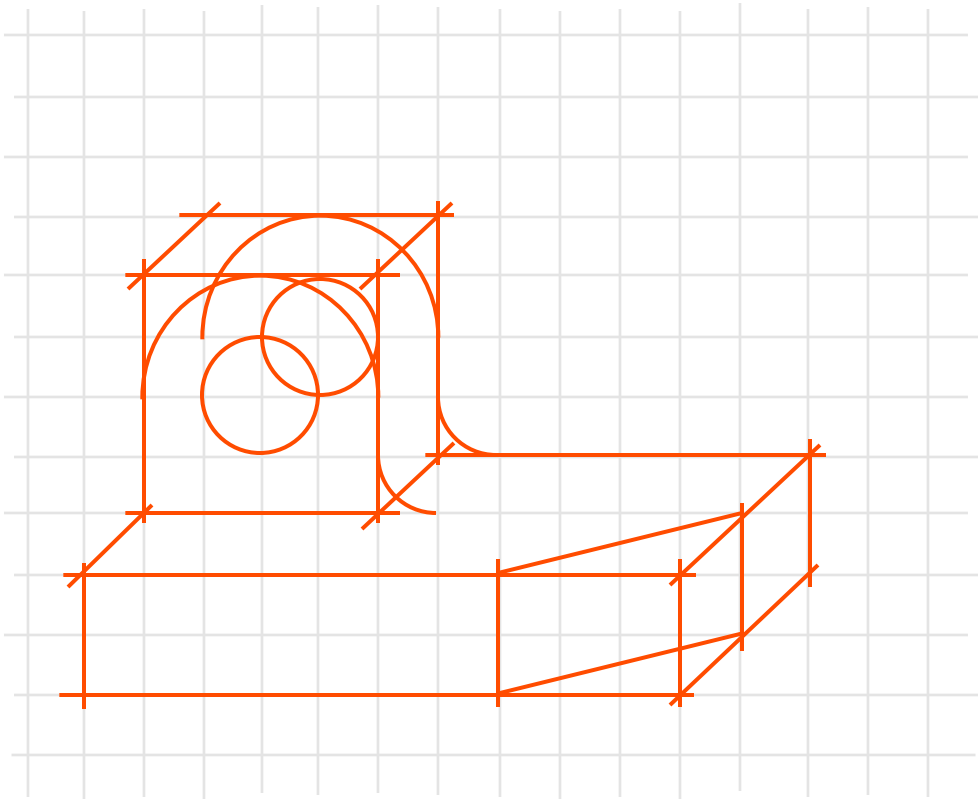




Sketch from multiview drawing

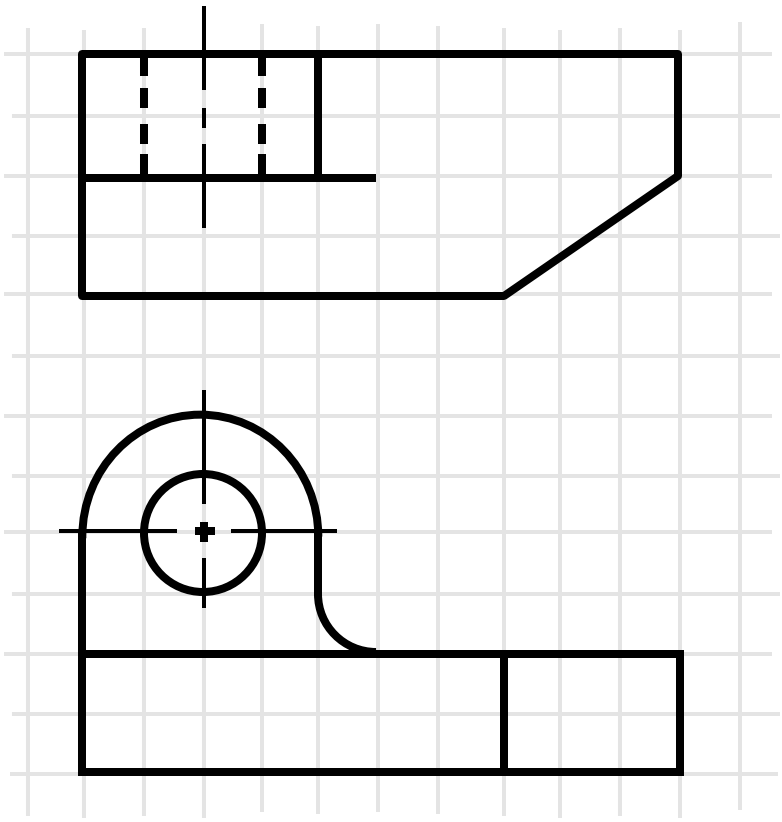
Example 1

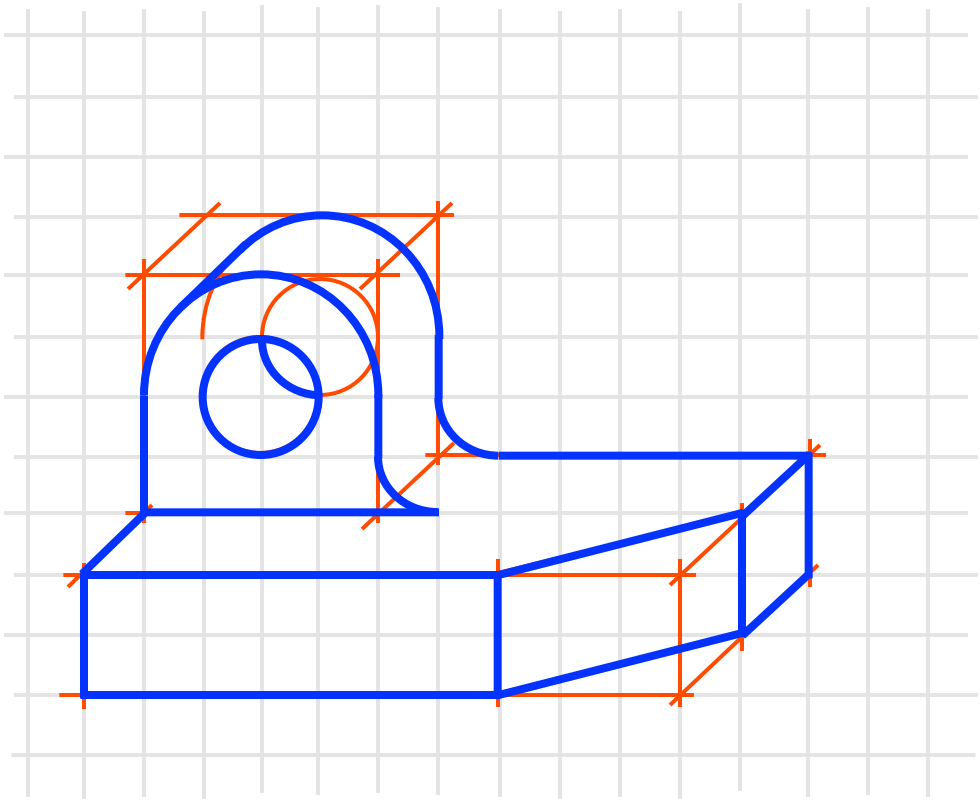




Sketch from multiview drawing

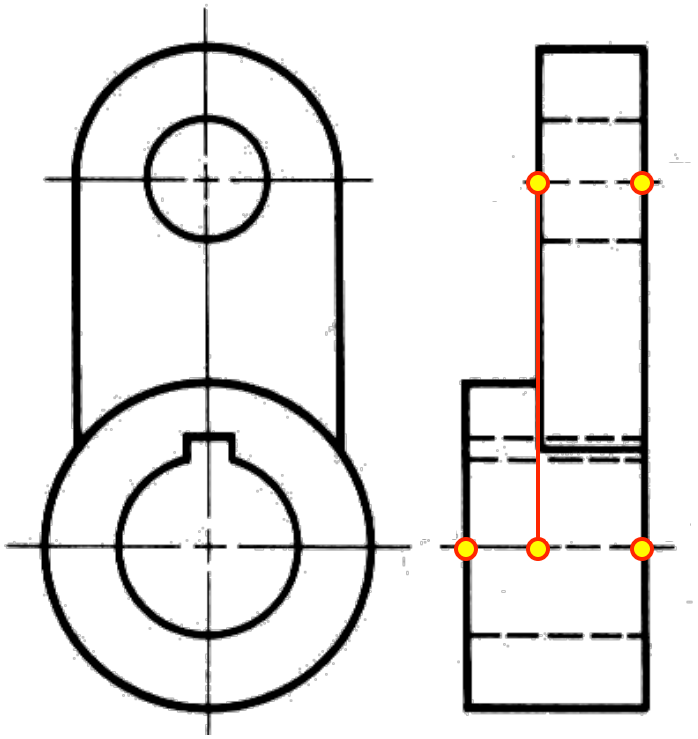
Example 1

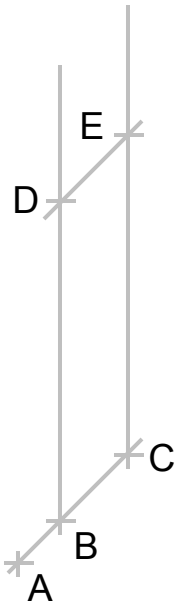




Sketch from multiview drawing

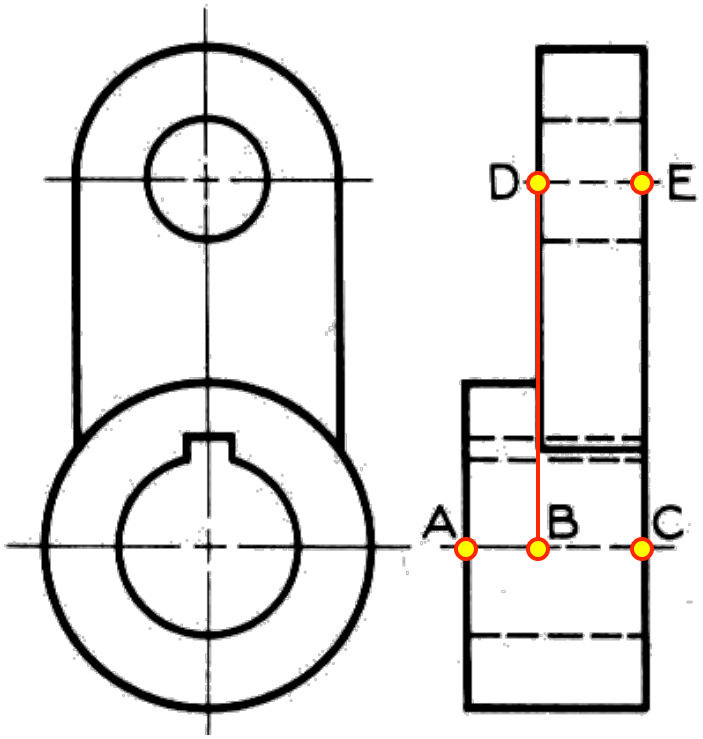
Example 2

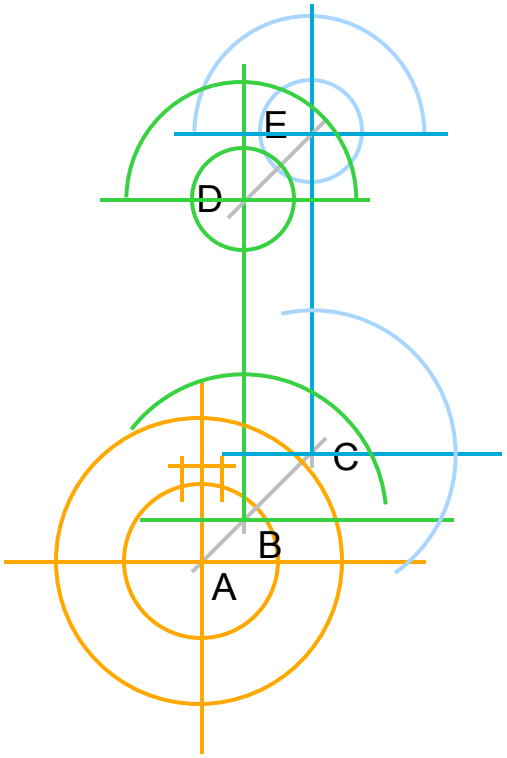




Sketch from multiview drawing

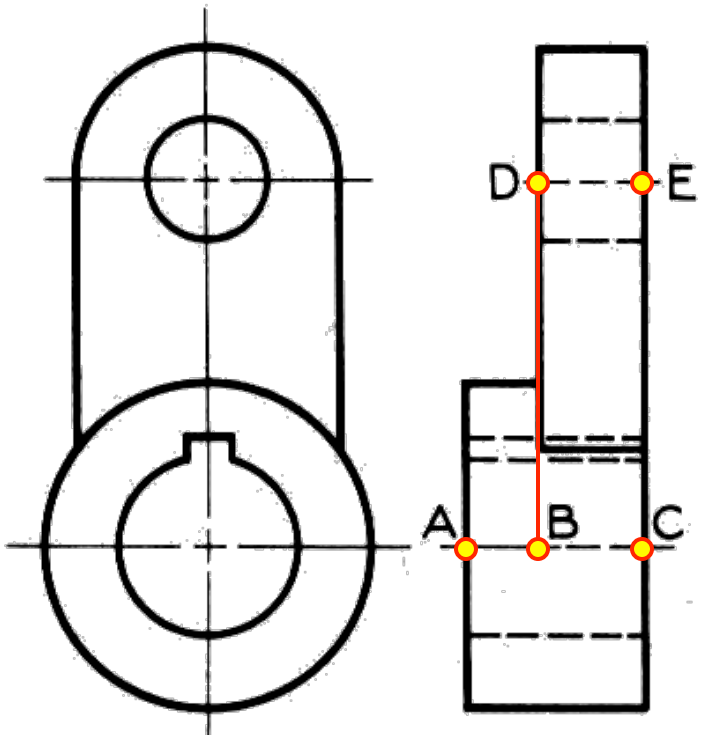
Example 2

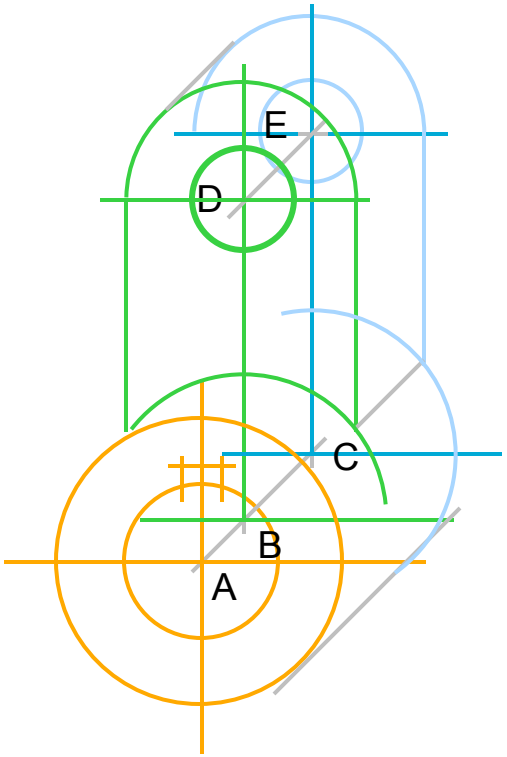




Sketch from multiview drawing

Example 2





Sketch from multiview drawing

Example 2