

# LECTURE ON ENGINEERING DRAWING

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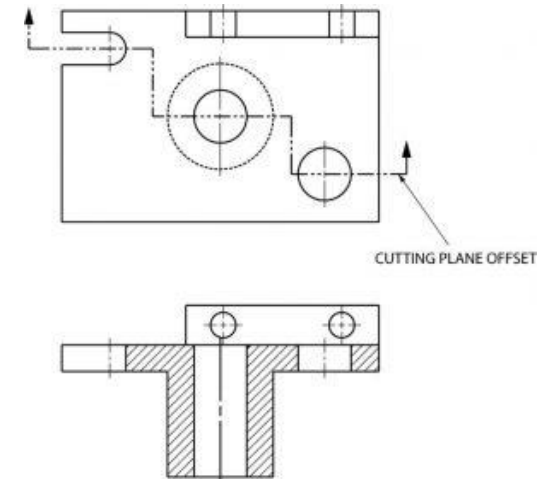
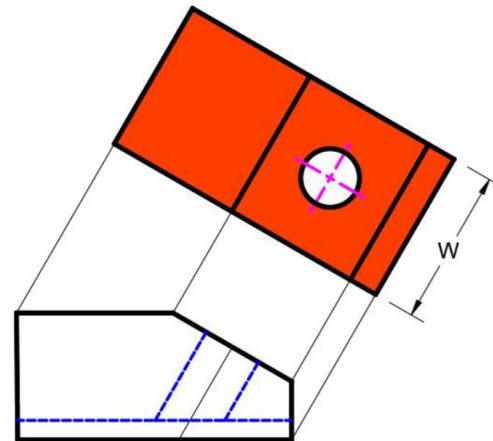
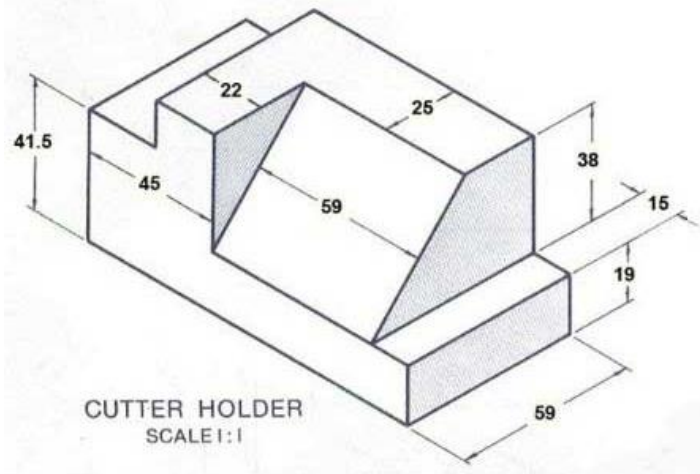
# LECTURE NOTE AVAILABILITY

- Access the detailed lecture note on web through: <https://tinyurl.com/yc46xbmr>
- Scan this QR code to access the detailed lecture note on your phone.
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- Scan this QR code to access this presentation file on your phone.

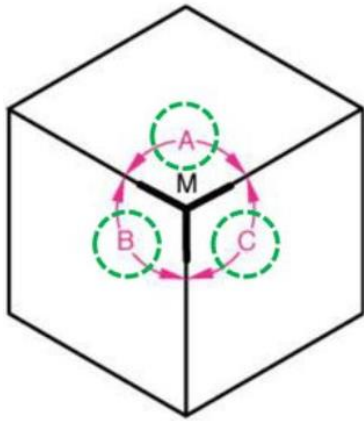


# TODAY'S TOPIC

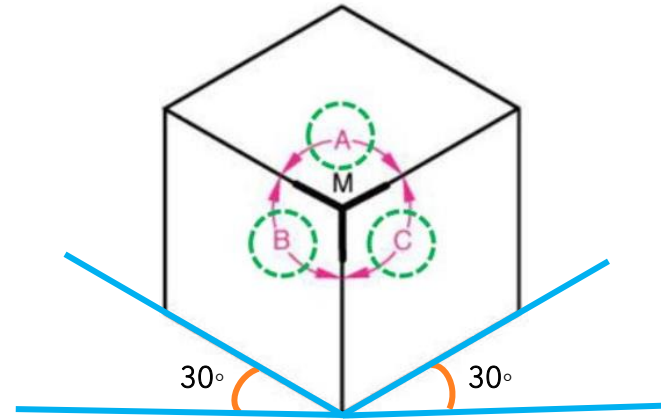
- Isometric View
- Auxiliary View
- Section View



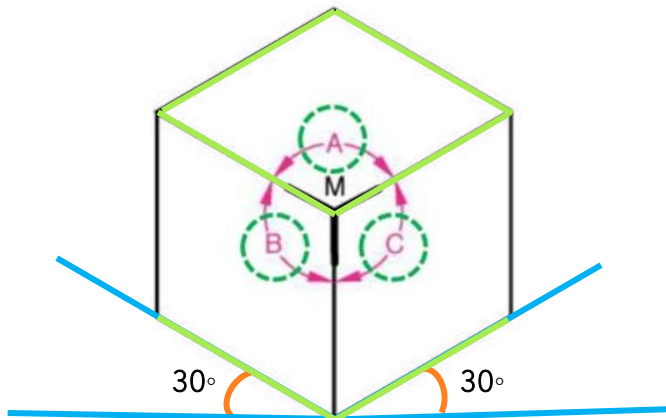
# ISOMETRIC VIEW



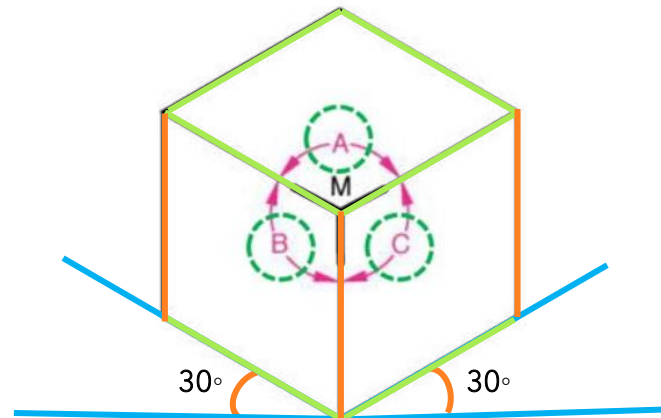
All angles are equal



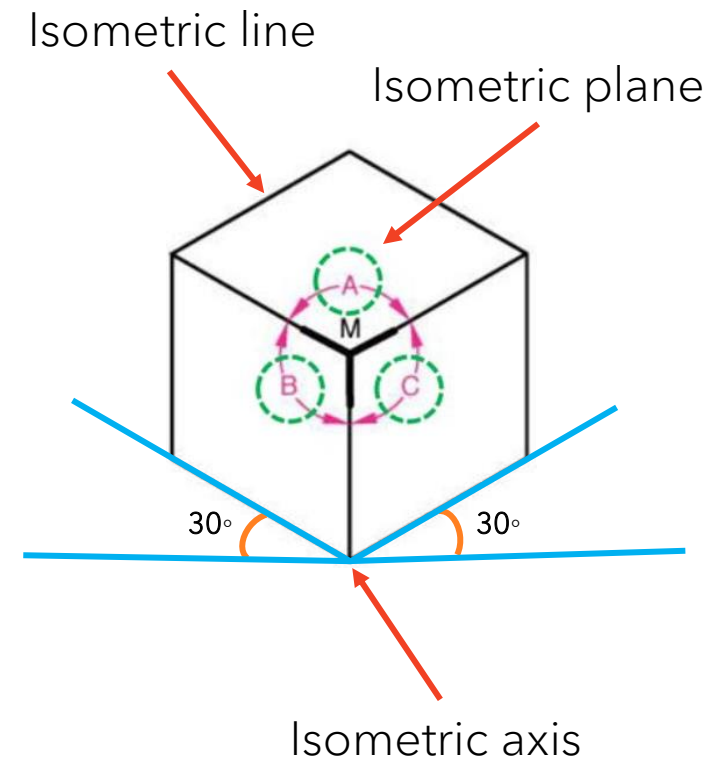
Horizontal edges are drawn at  $30^\circ$



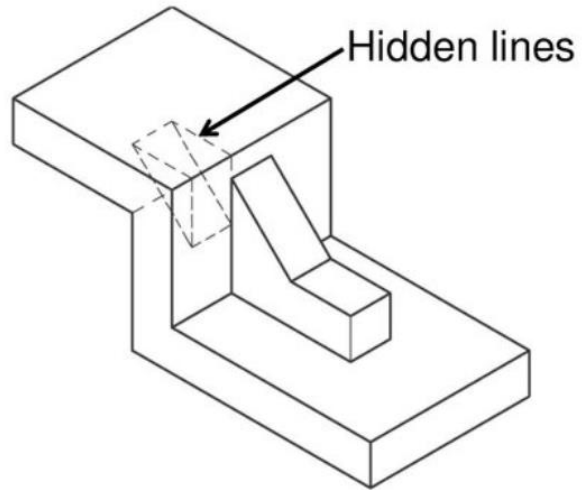
Parallel edges **appear** as **parallel lines**



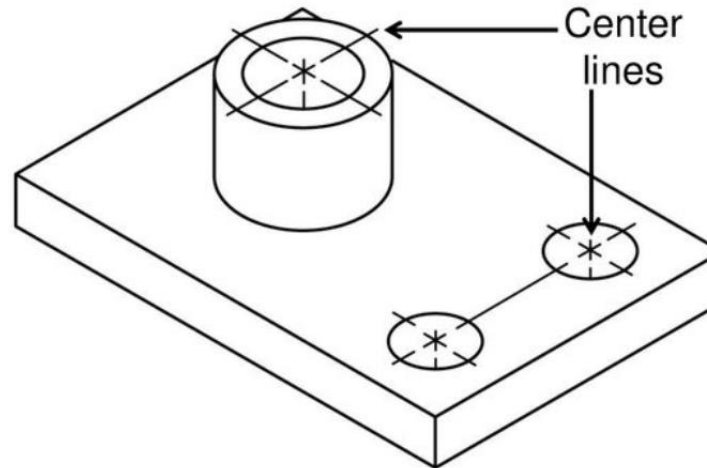
Vertical edges are **drawn** as **vertical lines**



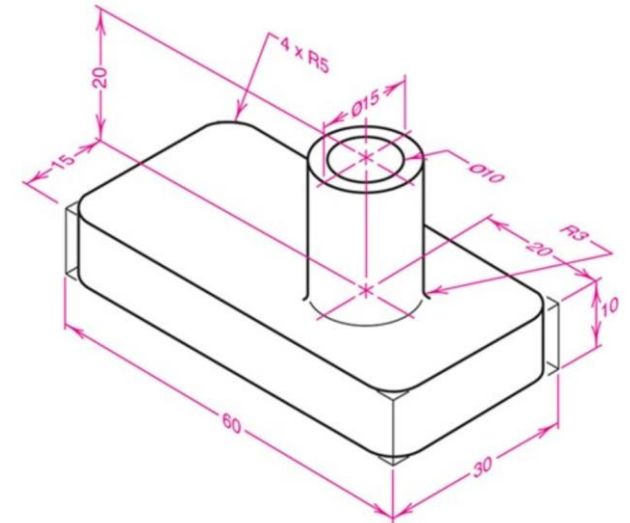
# ISOMETRIC VIEW (CONT'D)



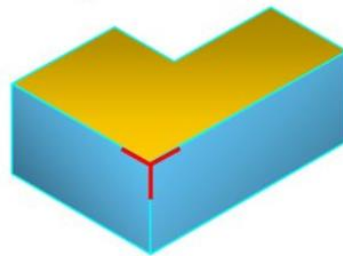
**Hidden lines** are omitted unless absolutely needed



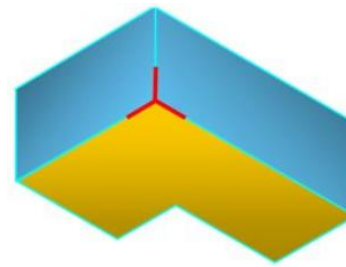
**Center lines** are drawn for showing symmetry



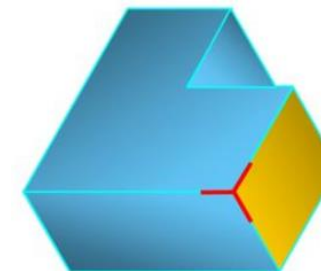
**Aligned method** is used for dimensioning



Regular  
Isometric



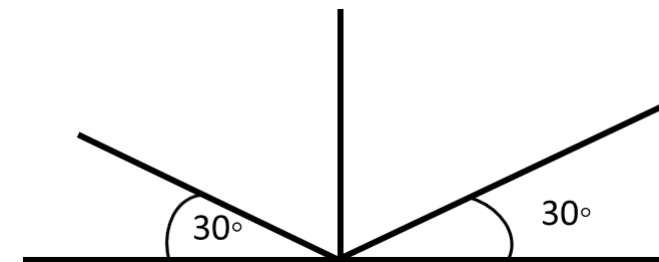
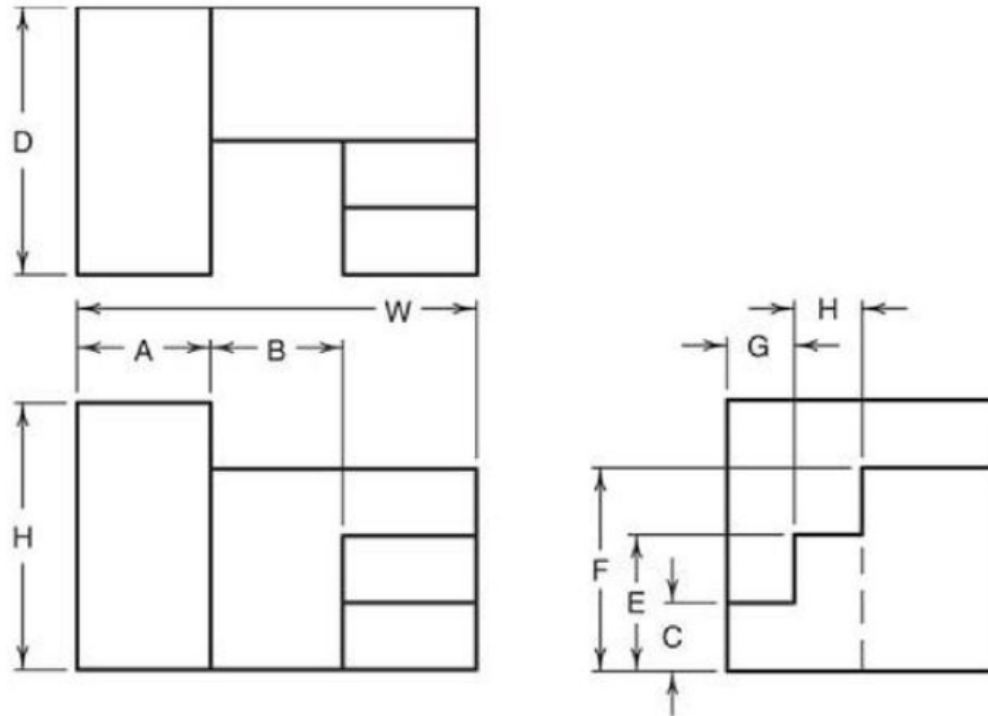
Reverse Axis  
Isometric



Long Axis  
Isometric

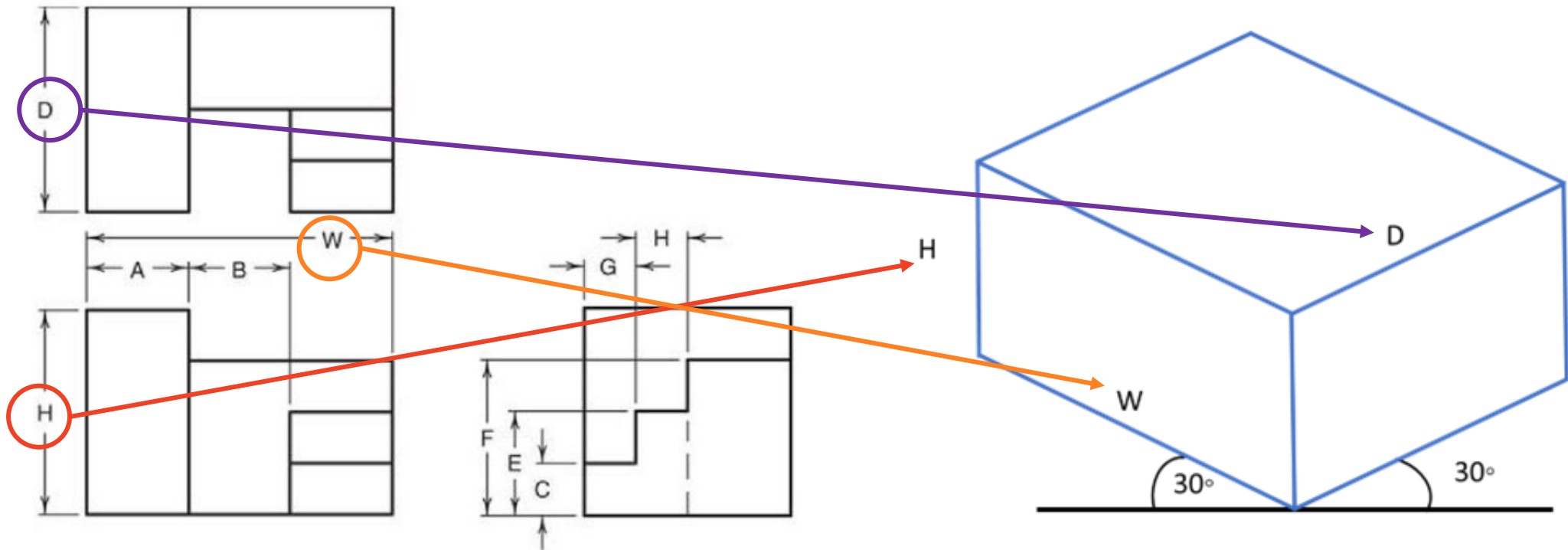
# CREATING ISOMETRIC DRAWING

- Let's say the following multi-view sketch is given
- Step 1: We identify origin and draw the isometric axes.



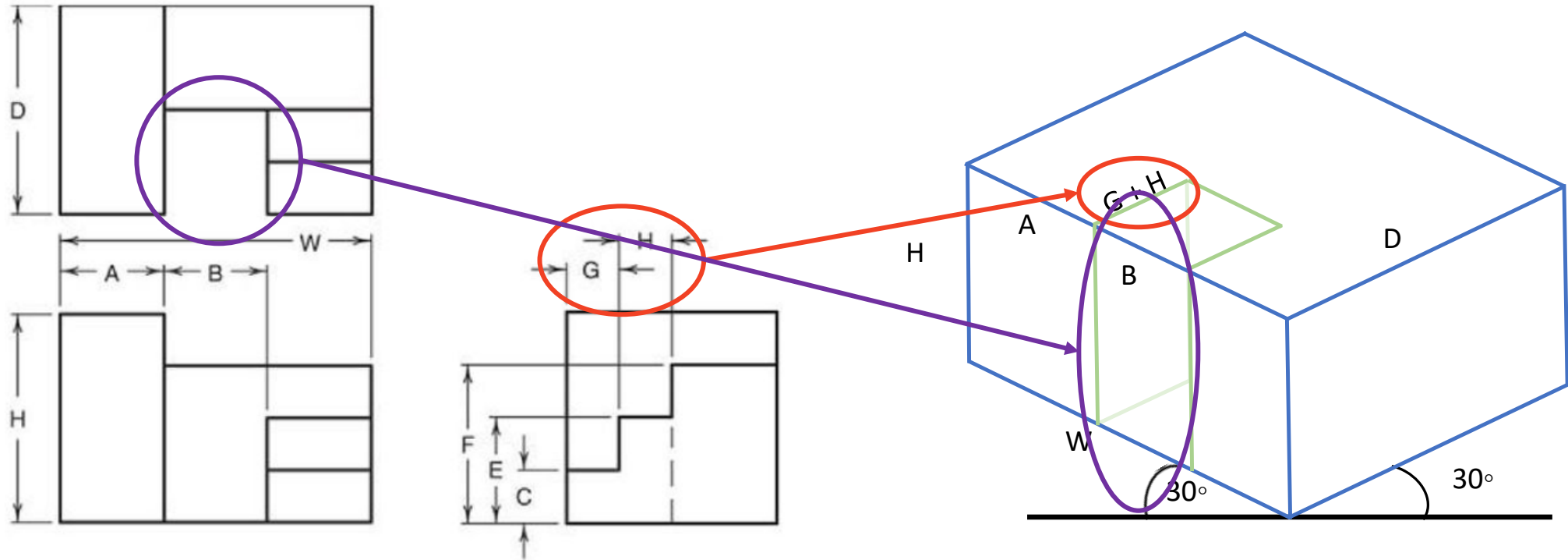
# CREATING ISOMETRIC DRAWING (CONT'D)

- Let's say the following multi-view sketch is given
- Step 2: Create the Isometric Planes (The bounding box) using the major dimensions (W, H, D)



# CREATING ISOMETRIC DRAWING (CONT'D)

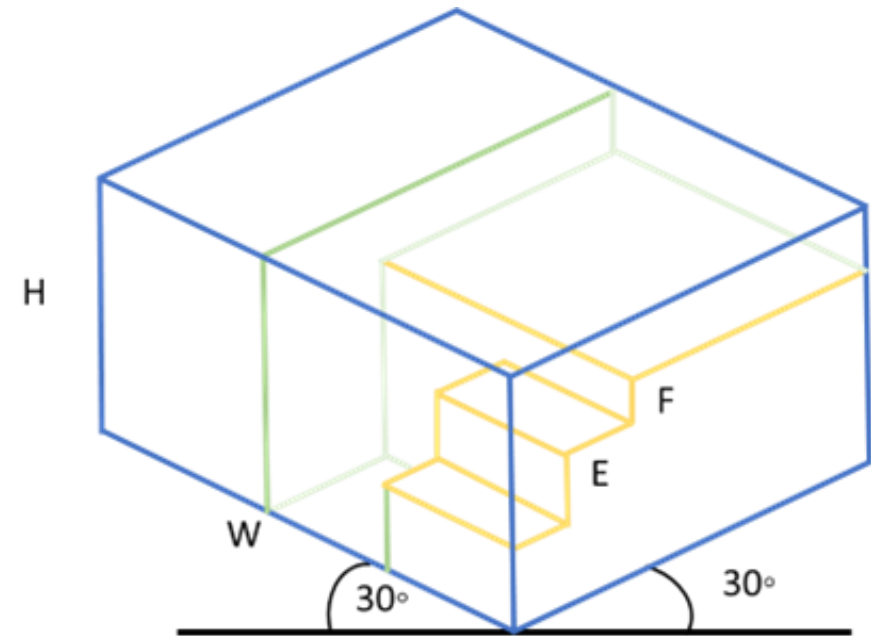
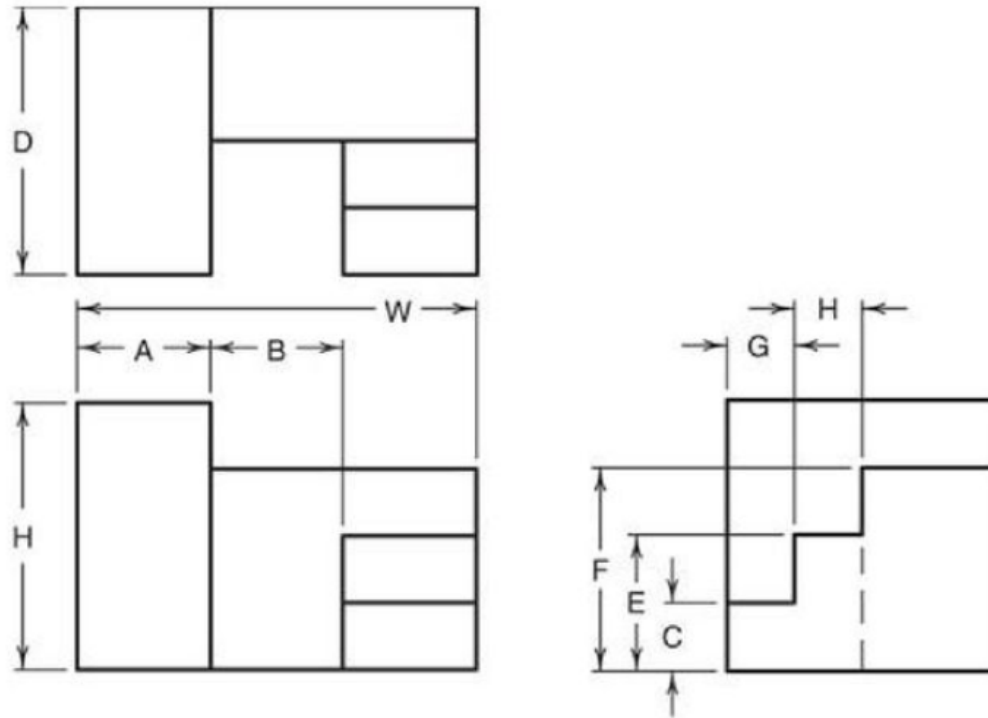
- Let's say the following multi-view sketch is given
- Step 3a: Transferring one feature as an example.





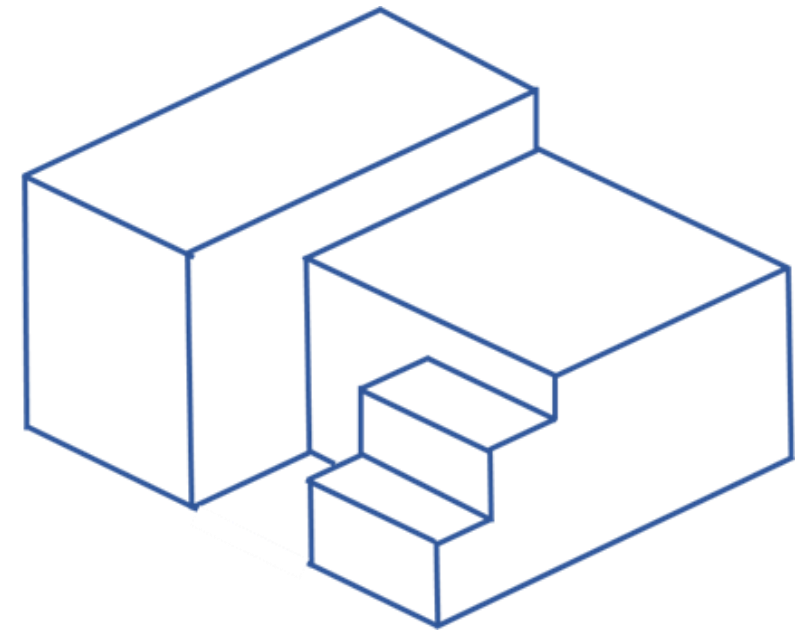
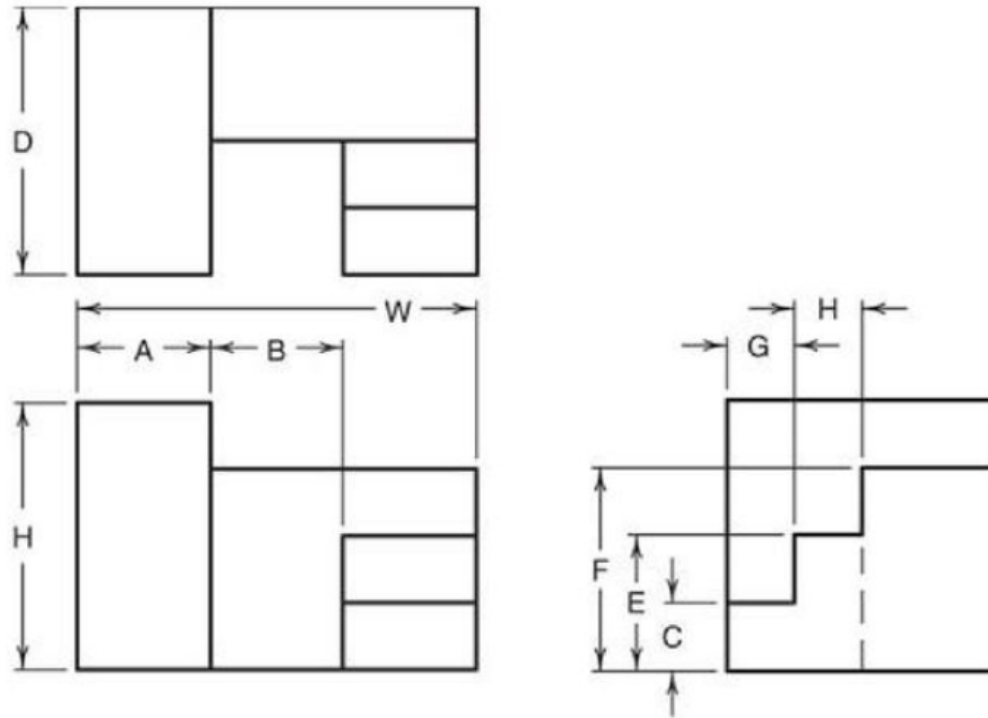
# CREATING ISOMETRIC DRAWING (CONT'D)

- Let's say the following multi-view sketch is given
- Step 3b: Transferring all the features (Remaining ones).



# CREATING ISOMETRIC DRAWING (CONT'D)

- Let's say the following multi-view sketch is given
- Step 4: Remove all the construction or boundary lines and darken the visible lines to get the final view.

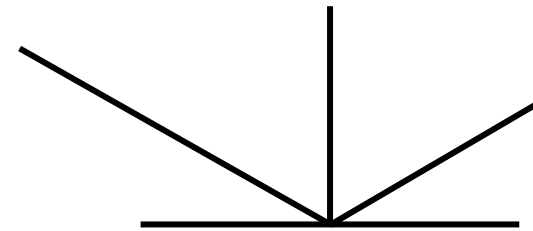
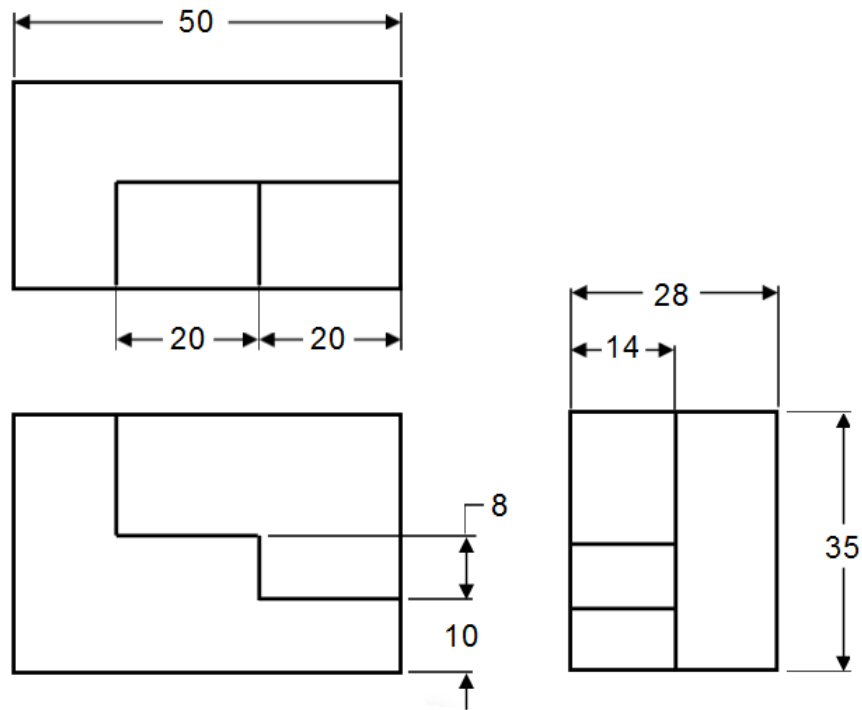


# CREATING ISOMETRIC DRAWING (CONT'D)

- Let's do another one

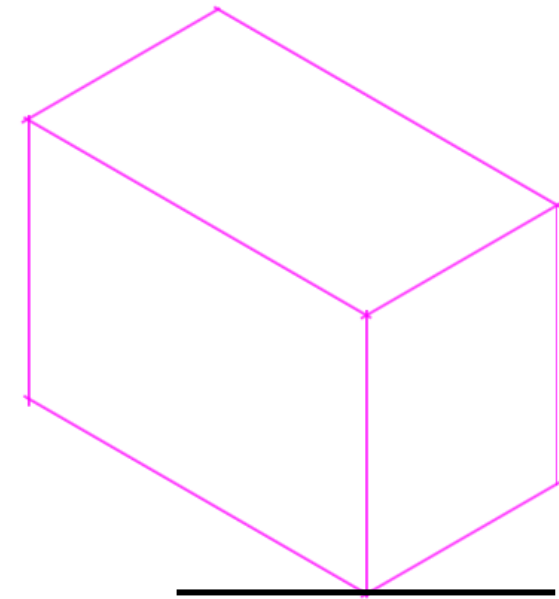
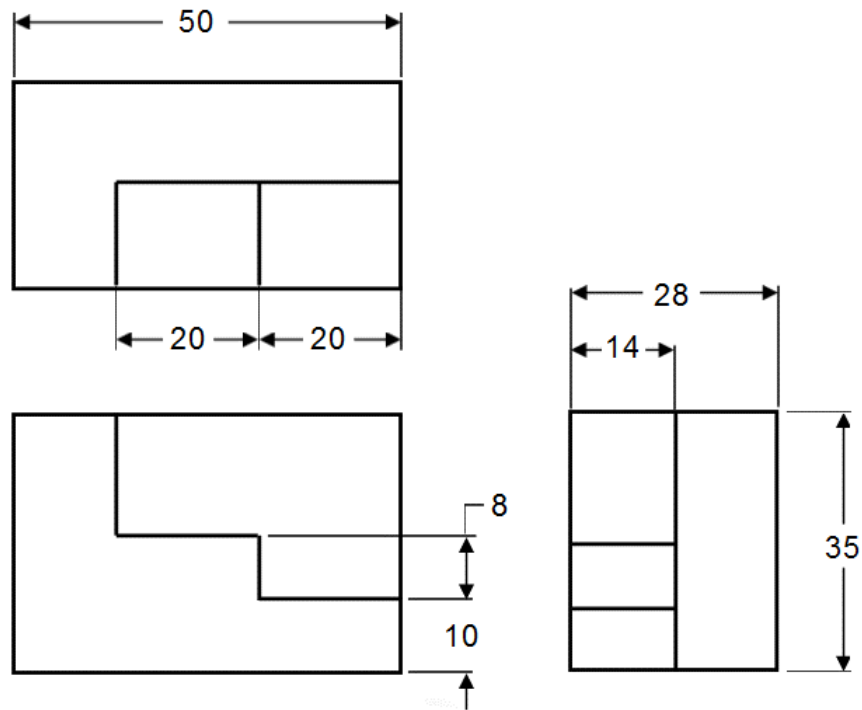
# CREATING ISOMETRIC DRAWING (CONT'D)

- Let's say the following multi-view sketch is given
- Step 1: We identify origin and draw the isometric axes.



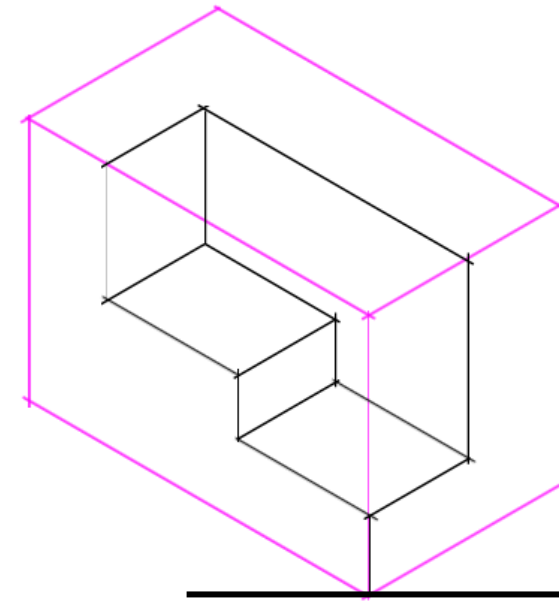
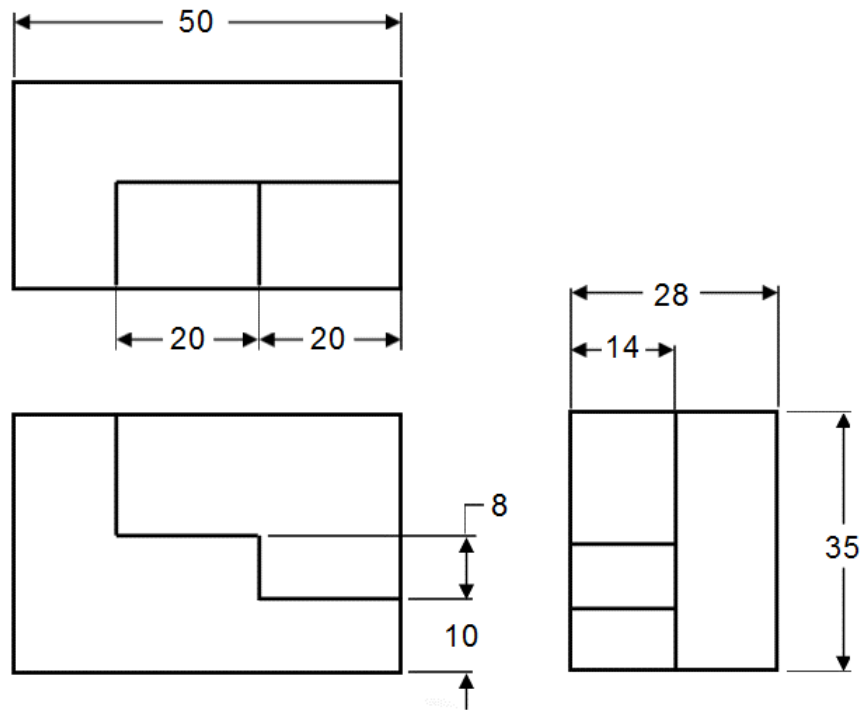
# CREATING ISOMETRIC DRAWING (CONT'D)

- Let's say the following multi-view sketch is given
- Step 2: Create the Isometric Planes



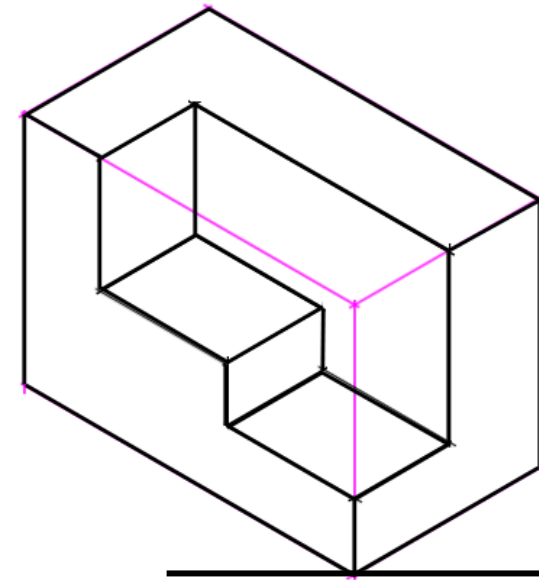
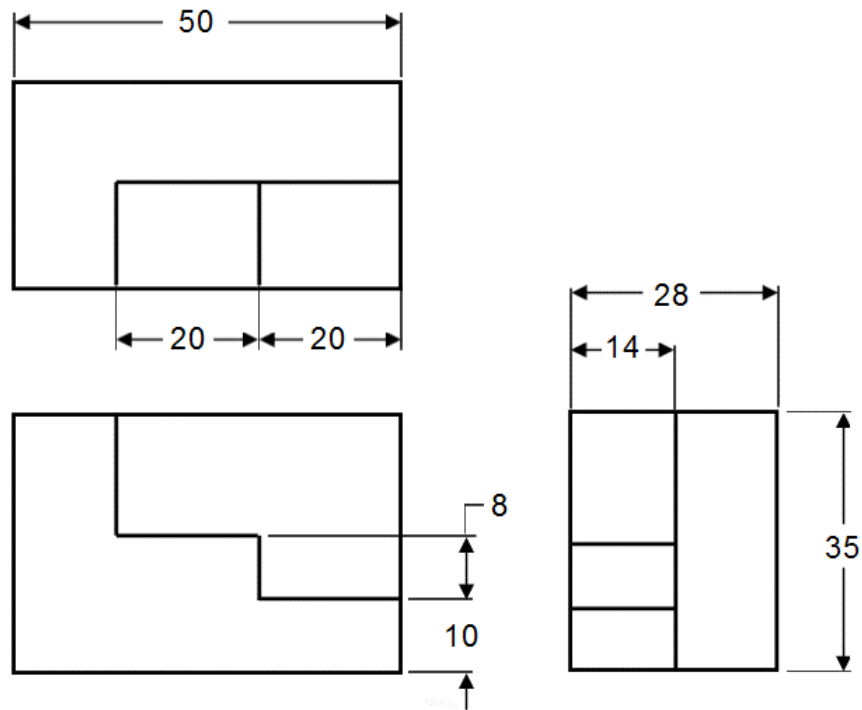
# CREATING ISOMETRIC DRAWING (CONT'D)

- Let's say the following multi-view sketch is given
- Step 3: Transferring all the features



# CREATING ISOMETRIC DRAWING (CONT'D)

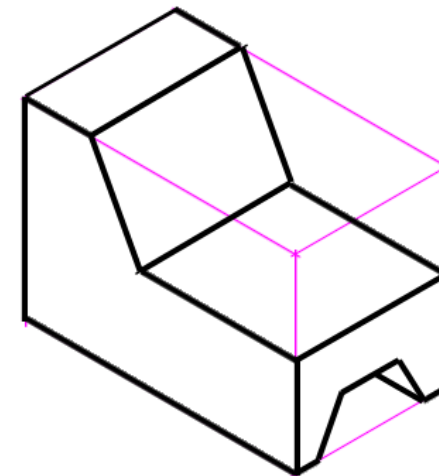
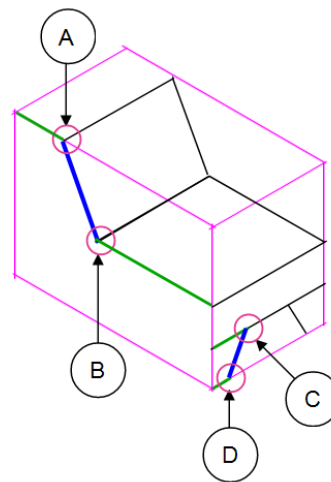
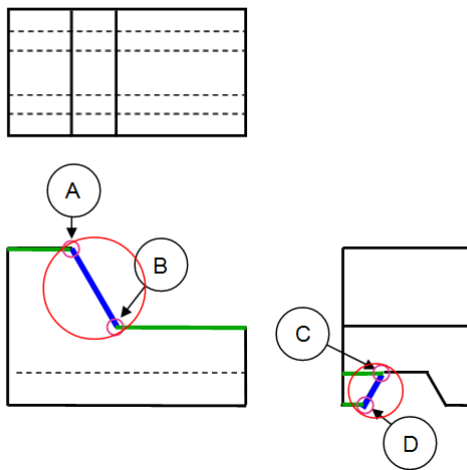
- Let's say the following multi-view sketch is given
- Step 4: Remove all the construction or boundary lines and darken the visible lines to get the final view.



# CREATING ISOMETRIC DRAWING (CONT'D)

- Considerations:
  - i. Non-isometric lines and surfaces are not true to size in isometric perspective
  - ii. Dimensions of inclined lines and surfaces are determined by using their coordinates which must be located on isometric lines.
  - iii. In Isometric drawing Circles translate to Arcs.

Details (*for point i & ii*):

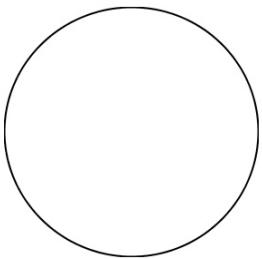




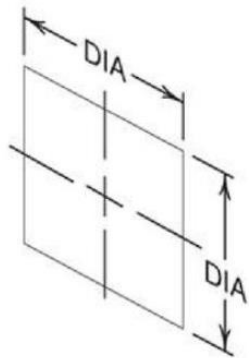
# CREATING ISOMETRIC DRAWING (CONT'D)

- Considerations:
  - i. Non-isometric lines and surfaces are not true to size in isometric perspective
  - ii. Dimensions of inclined lines and surfaces are determined by using their coordinates which must be located on isometric lines.
  - iii. In Isometric drawing Circles translate to ellipse.

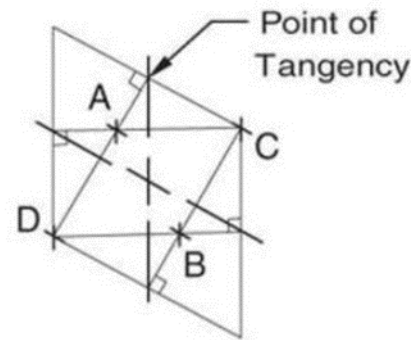
Details (*for point iii*):



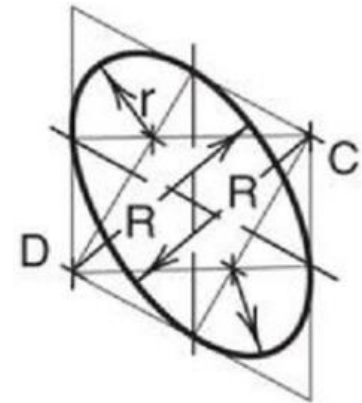
Circle in 2D  
space



Draw equilateral  
parallelogram



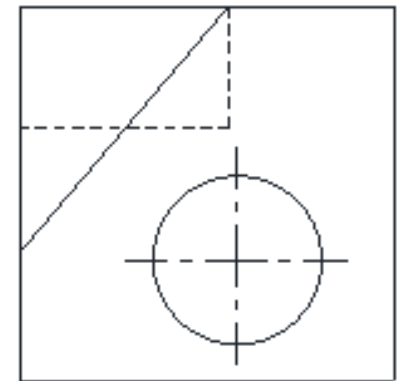
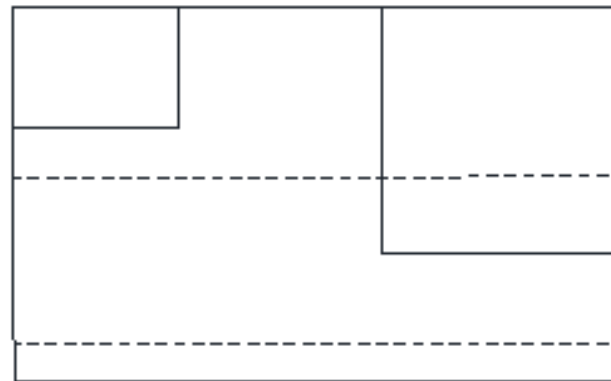
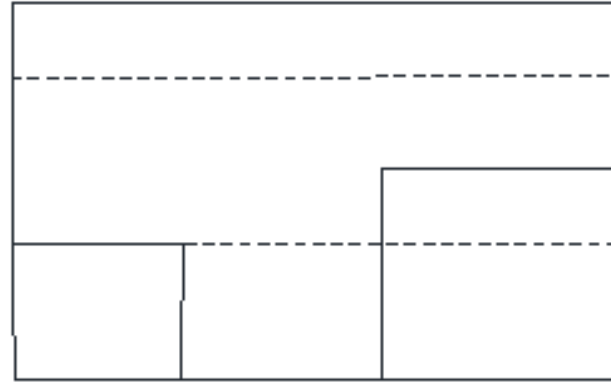
Join midpoint of edge to  
endpoint of opposite side



Draw small arc with radius " $r$ "  
Draw large arc with radius " $R$ "

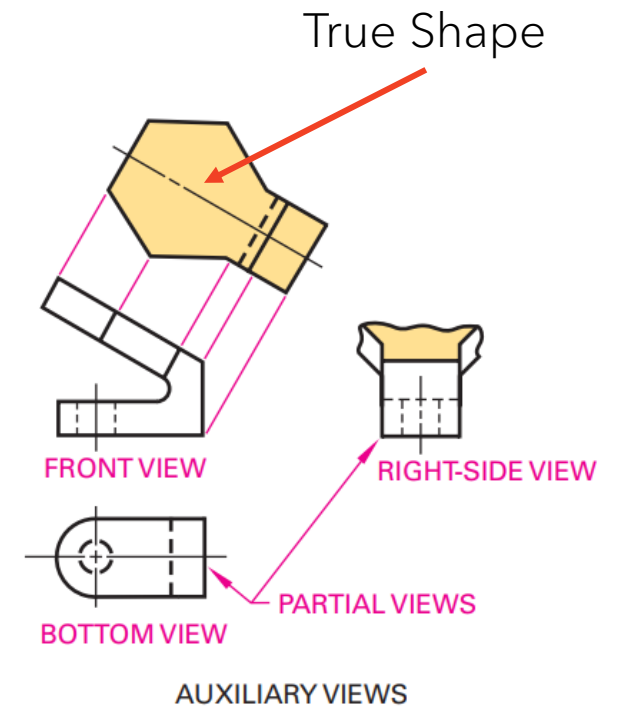
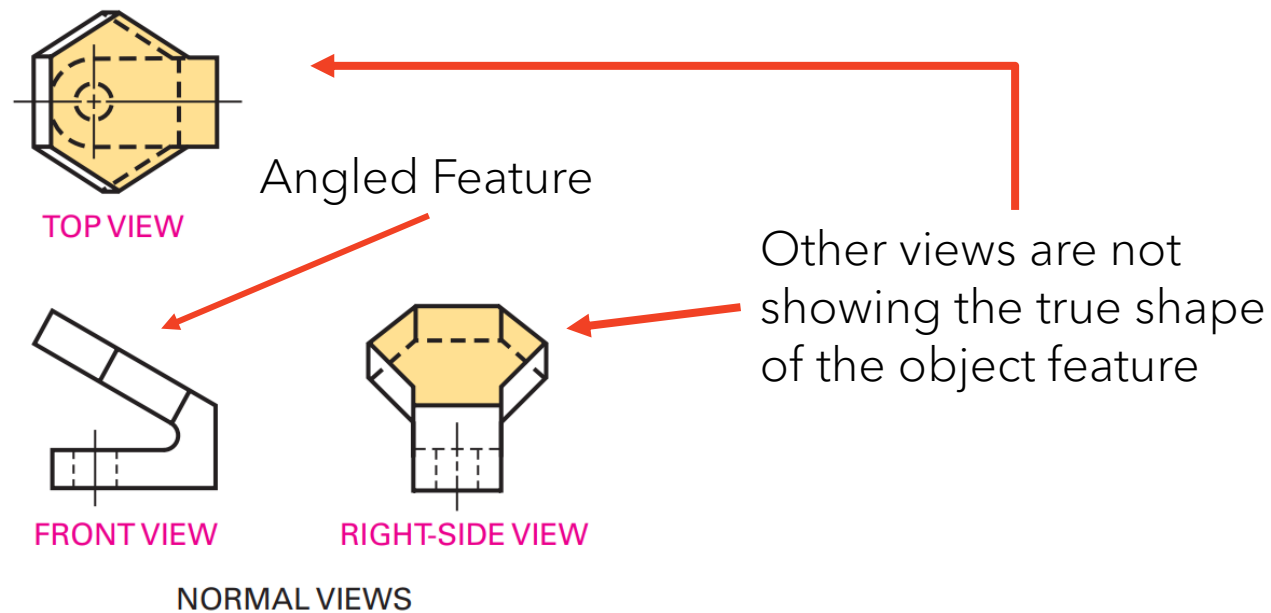
# ISOMETRIC VIEW: PRACTICE TIME

- Student Practice
- Task Time: 2 min
- Additional practice problem can be found on page 5 & 6 of the detailed lecture note.

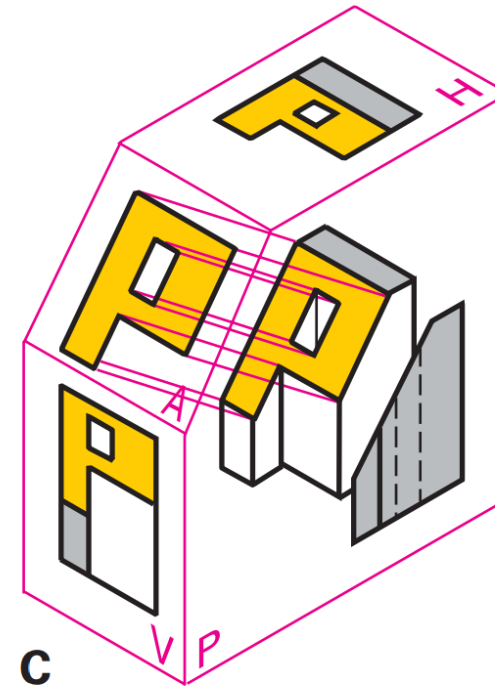
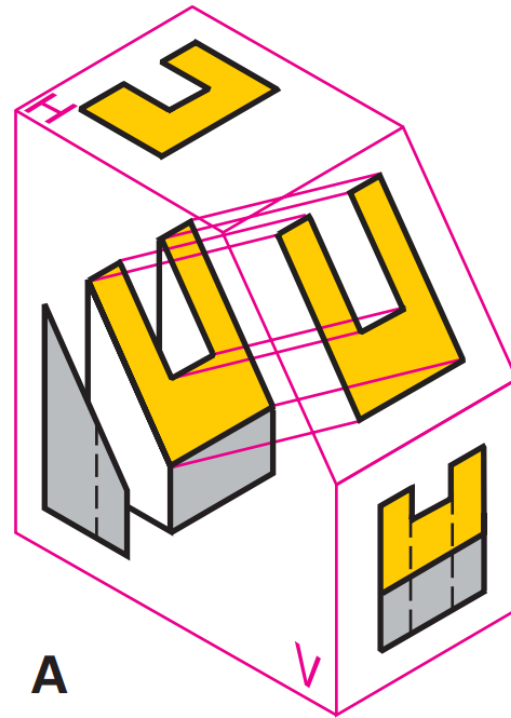


# AUXILIARY VIEW

- Used to show objects features which is not parallel to the main view.
- Usually used to show angles or oblique features.

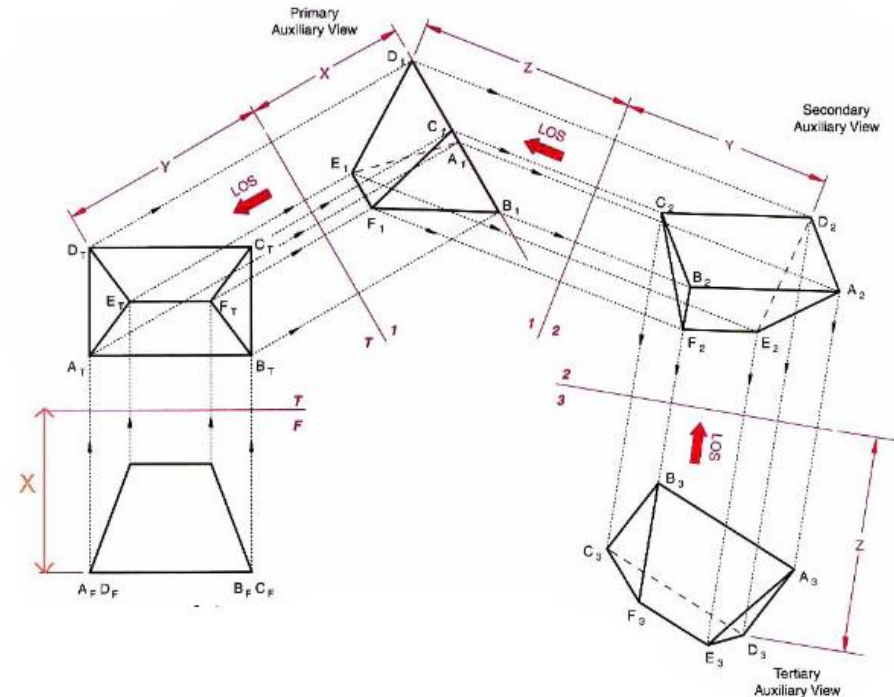
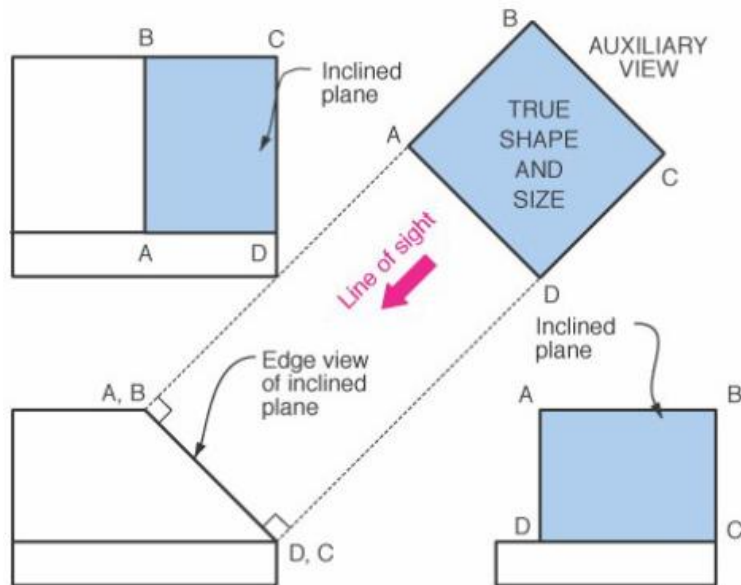


# AUXILIARY VIEW (WITH RESPECT TO OTHER VIEWS)



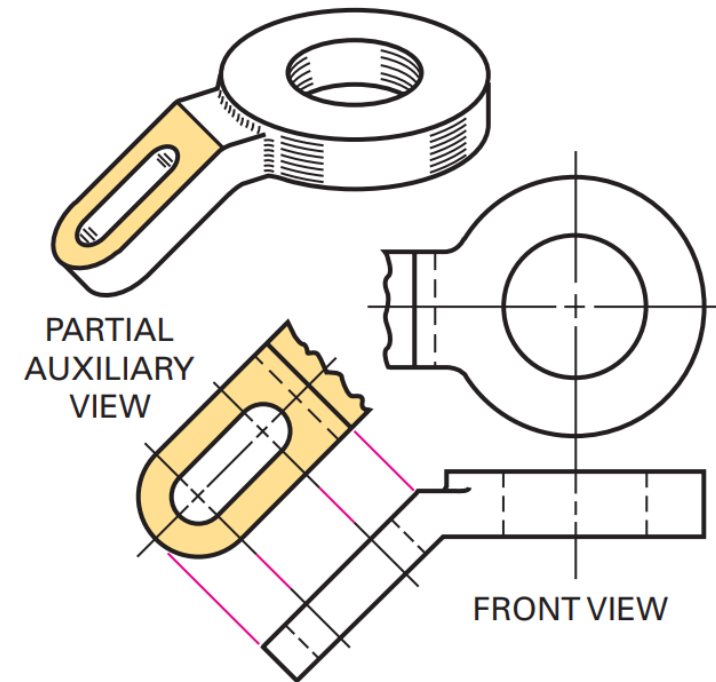
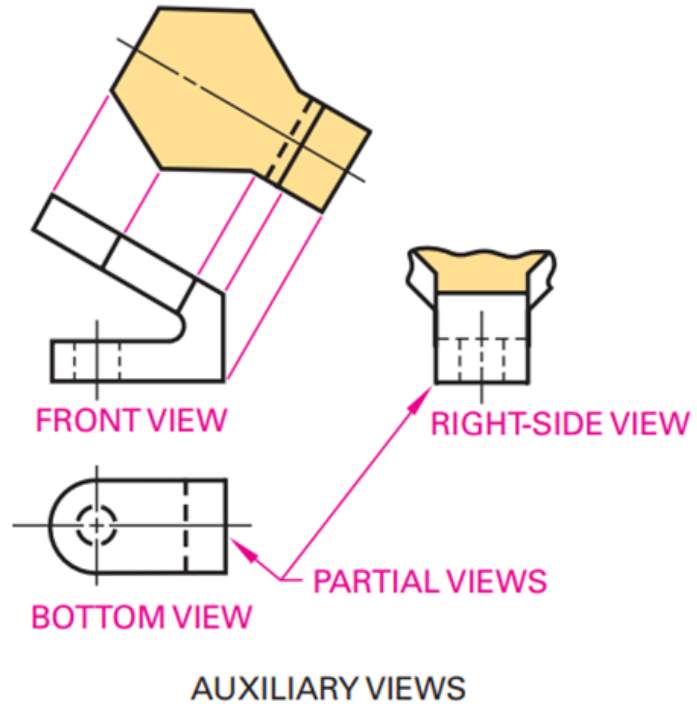
# AUXILIARY VIEW

- A primary auxiliary view is a single view projected from one of the six principal views.
- A secondary auxiliary view is a single view projected from a primary auxiliary view.
- A tertiary auxiliary view is a single view projected from a secondary or another tertiary auxiliary view.



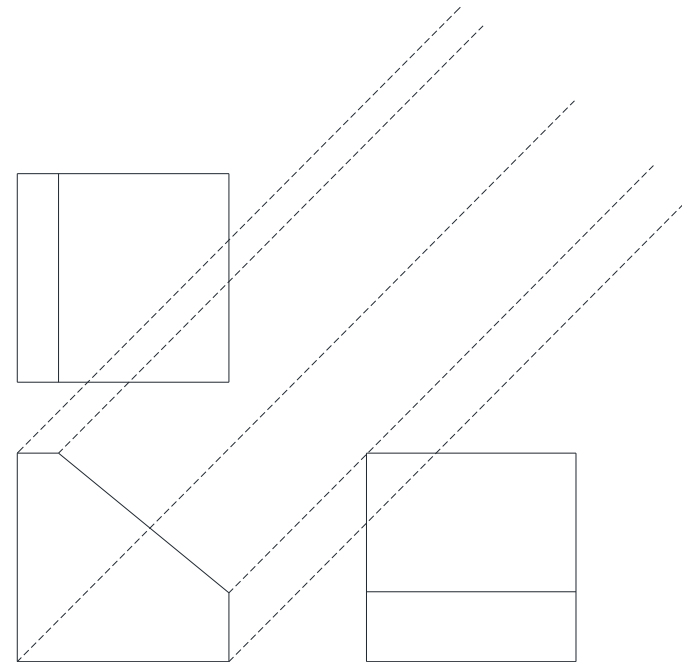
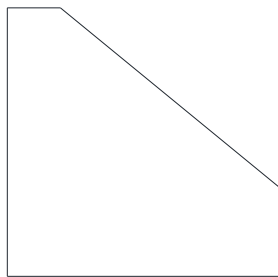
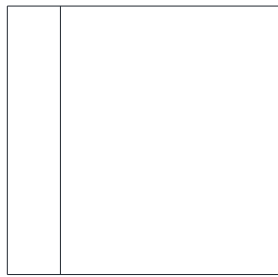
# TYPES OF AUXILIARY VIEWS

- Full Auxiliary View
- Partial Auxiliary View



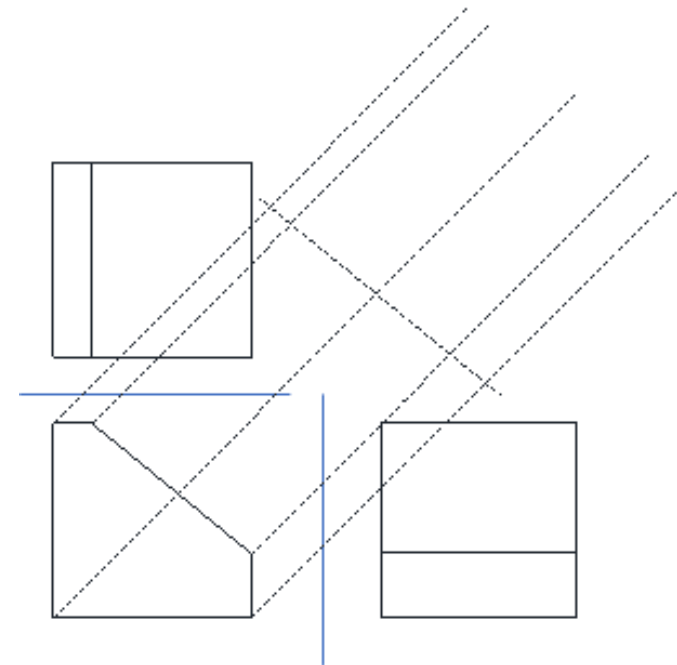
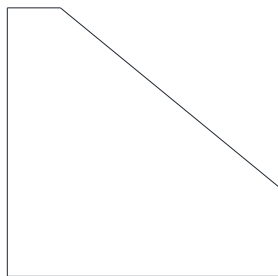
# CREATING AUXILIARY VIEW

- Let's say the following multi-view sketch is given
- Step 1: Draw projection lines for auxiliary view.



# CREATING AUXILIARY VIEW

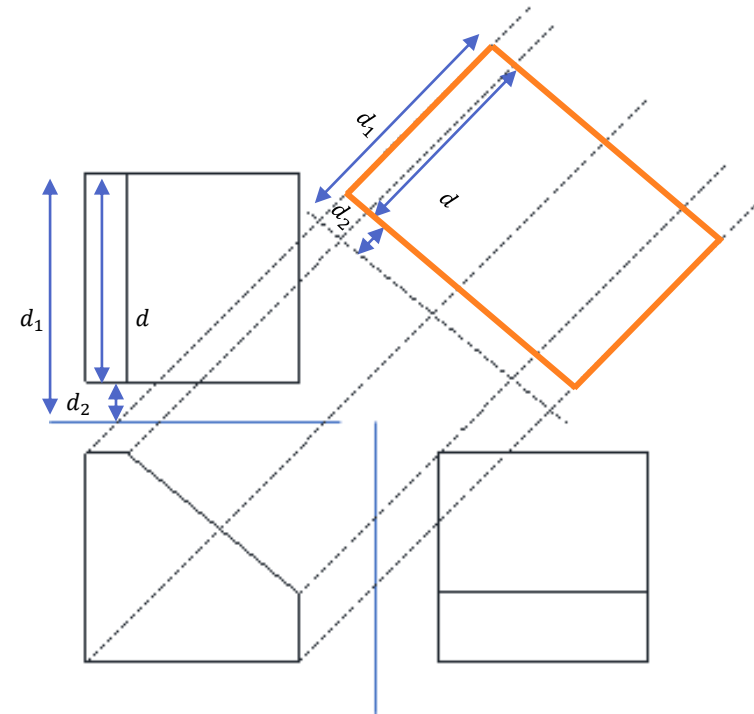
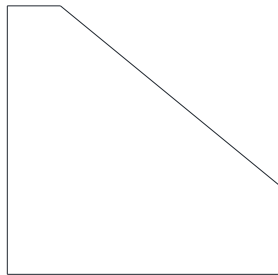
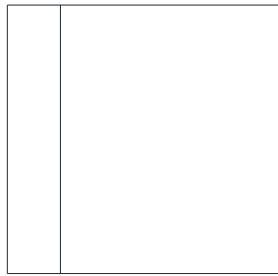
- Let's say the following multi-view sketch is given
- Step 2: Draw the outline of inclined face/fold line.





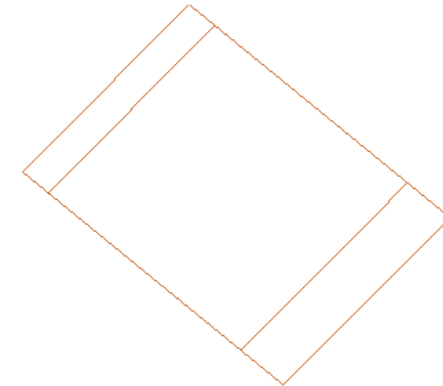
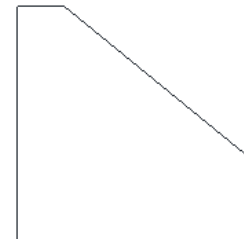
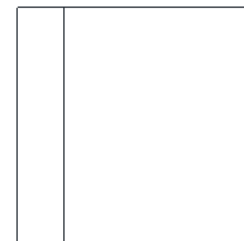
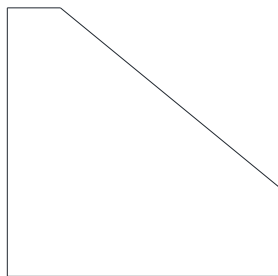
# CREATING AUXILIARY VIEW

- Let's say the following multi-view sketch is given
- **Step 3:** Transfer the distances from either top side view or side view. Once done, draw the lines.



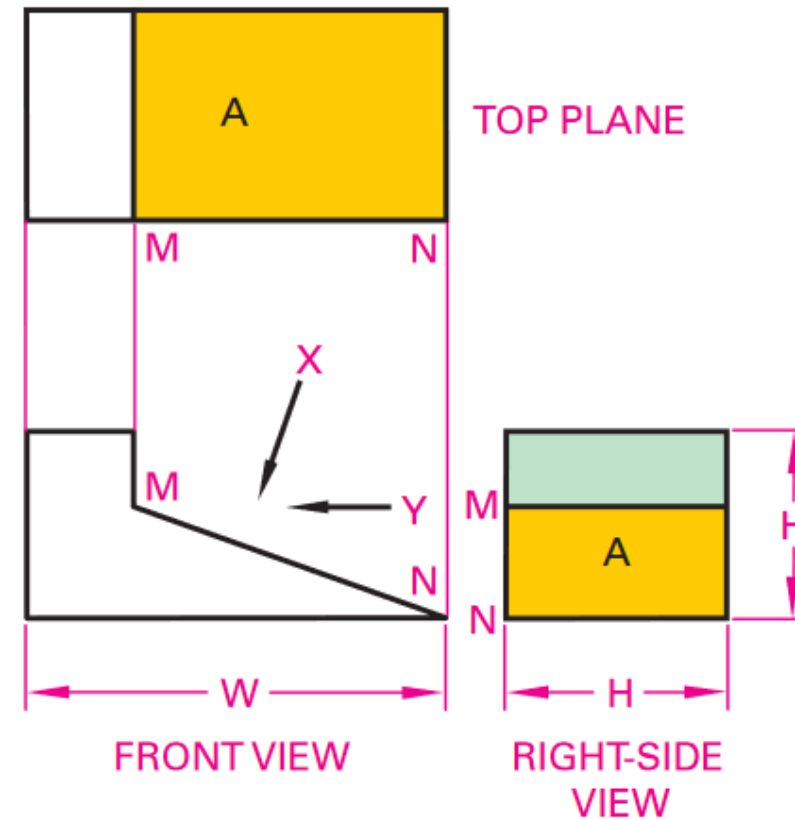
# CREATING AUXILIARY VIEW

- Let's say the following multi-view sketch is given
- Step 4: Remove the projection line to complete the auxiliary view.



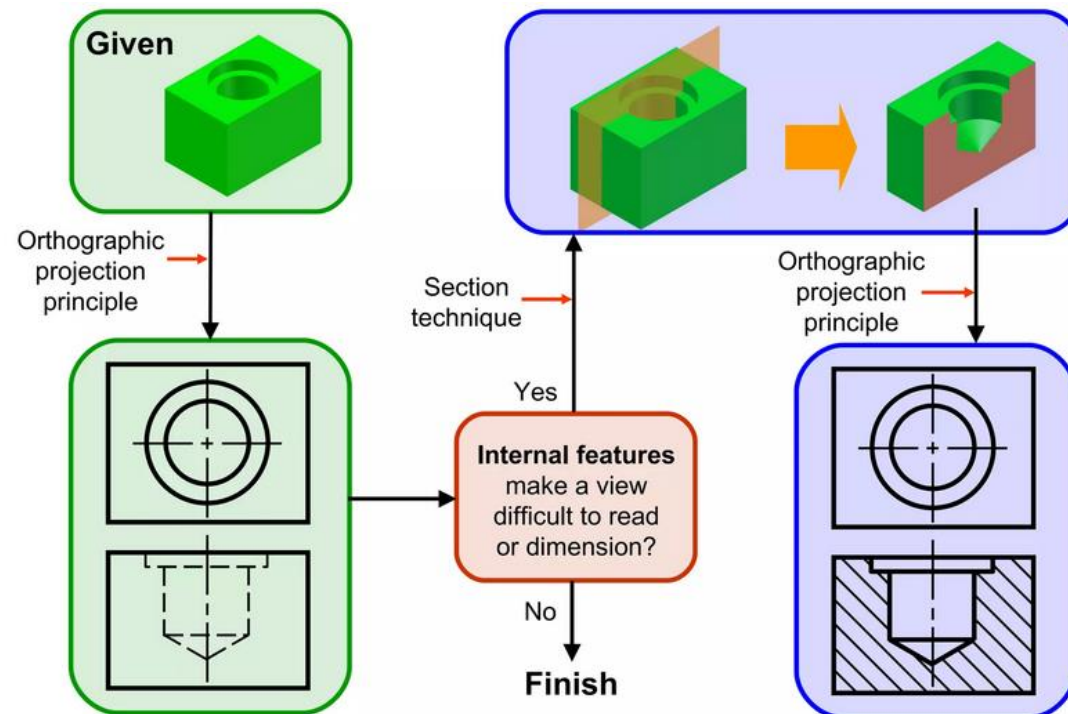
# AUXILIARY VIEW: PRACTICE TIME

- Student Practice
- Task Time: 2 min
- Additional practice problem can be found on page 10 of the detailed lecture note.

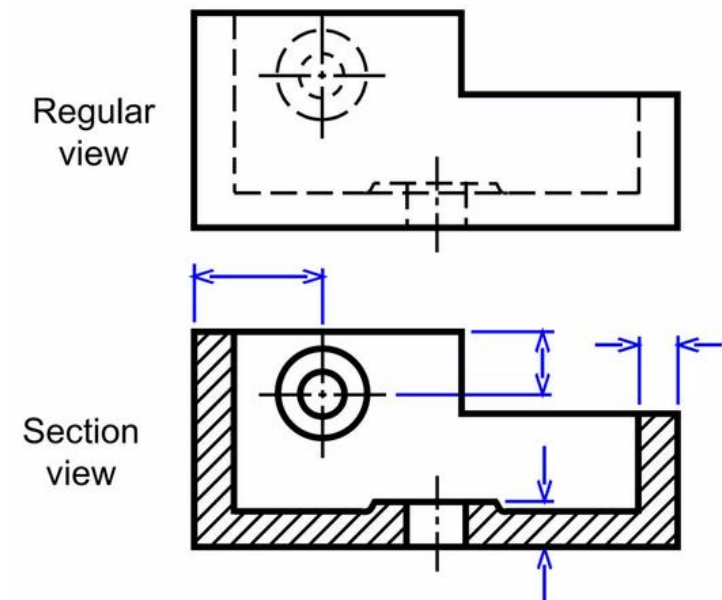


# SECTION VIEW

- A drawing that shows the internal structure of an object by cutting away a portion of it.
- Shows internal details.

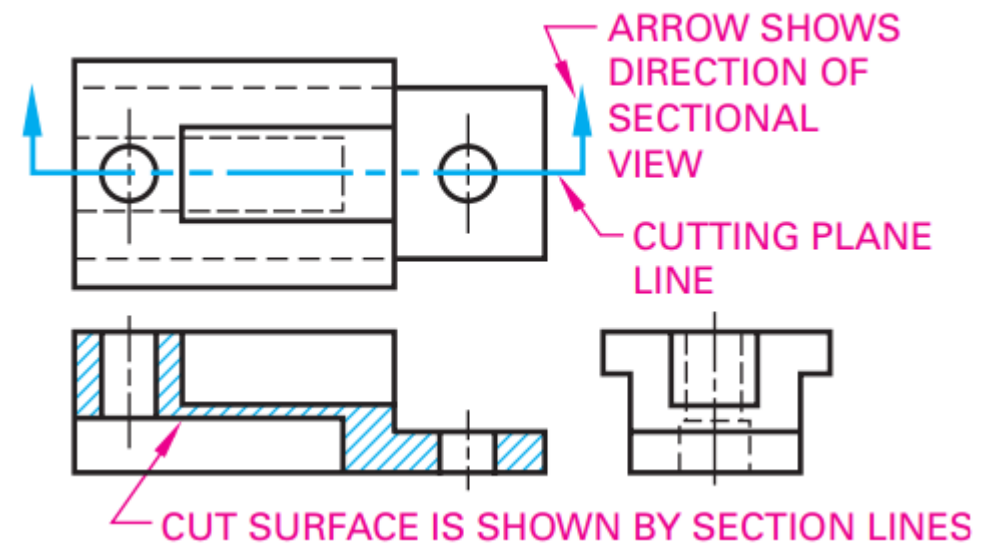
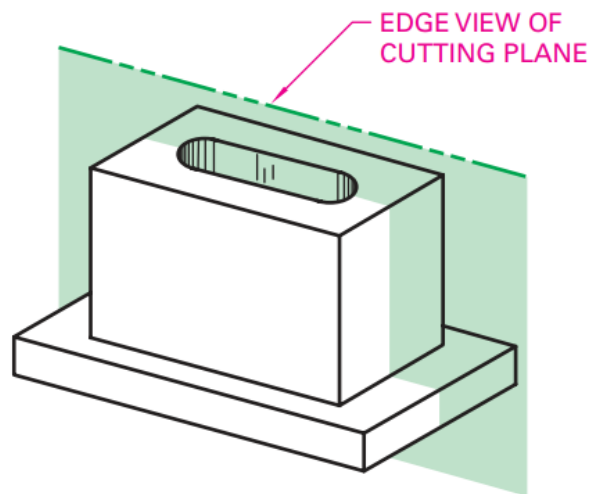


- Facilitates internal dimensioning.



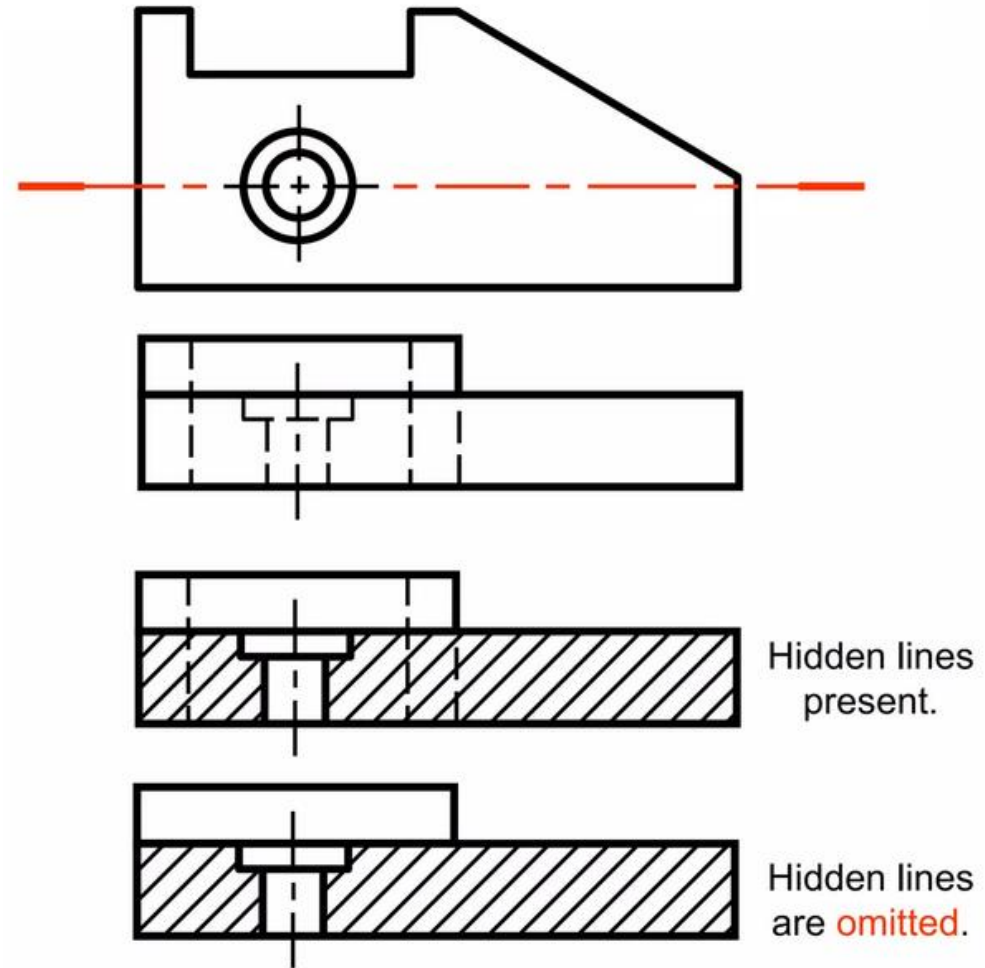
## SECTION VIEW: BASIC COMPONENTS (CONT'D)

- Cutting Plane: Cutting plane is an imaginary plane that cuts through the object.
- Cutting Plane Line: The edge view of cutting plane is the cutting plane line.
- View Direction: This is the line of sight or direction of the cutting plane which will be visible.



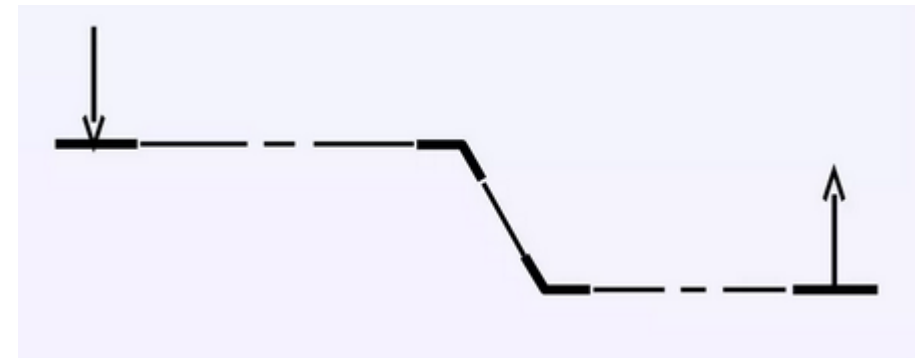
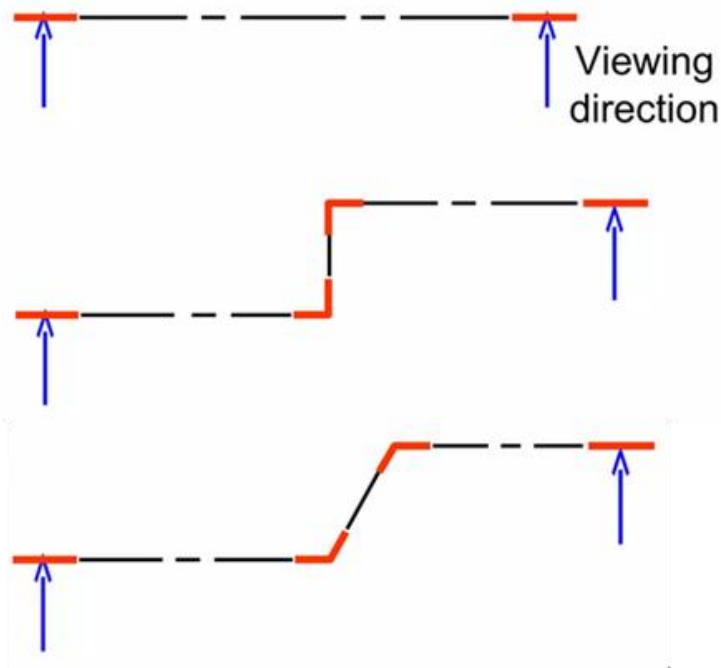
## SECTION VIEW: BASIC COMPONENTS (CONT'D)

- Hidden lines are usually omitted.



## SECTION VIEW: BASIC COMPONENTS (CONT'D)

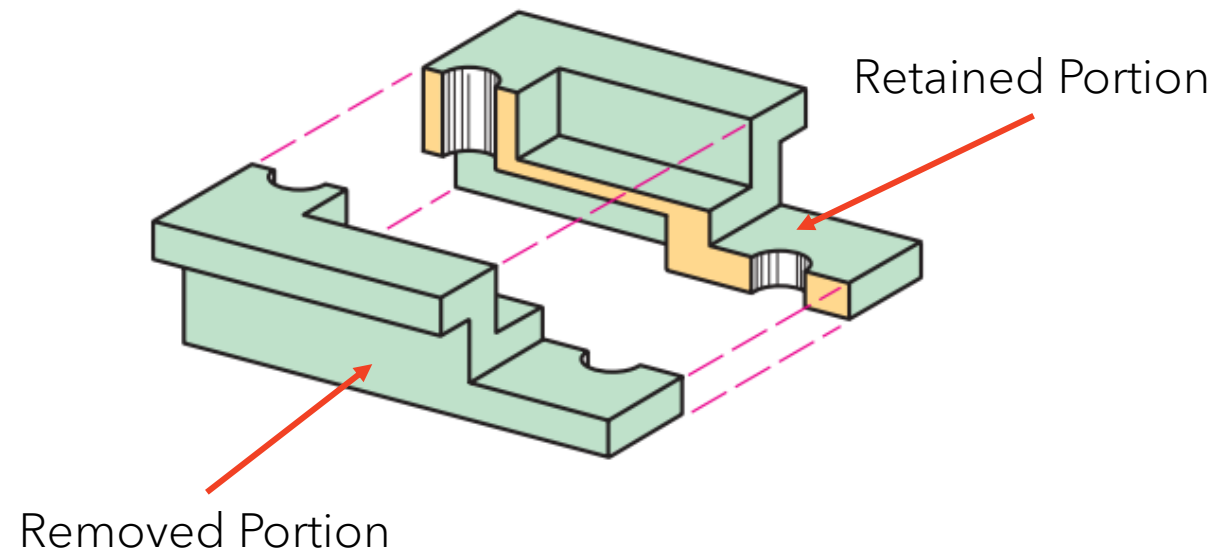
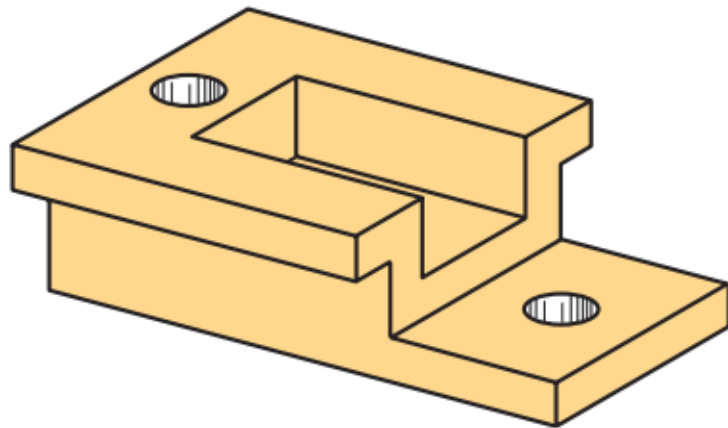
- Cutting plane line is presented by a chain line.
- Starts and Ends with visible line.
- Arrow is used to show the direction of view.



**Not Correct**  
Directions are conflicting

## SECTION VIEW: BASIC COMPONENTS (CONT'D)

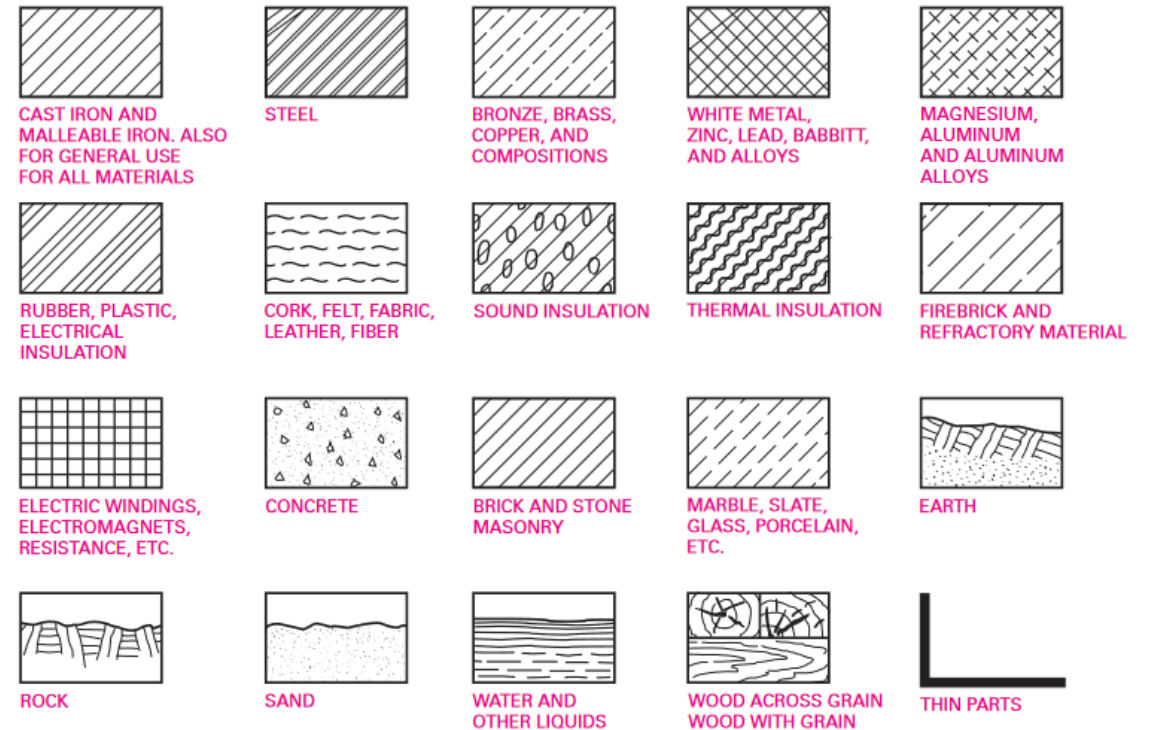
- **Removed Portion:** The cut-out portion of the object that is removed to expose the interior of the object.
- **Retained Portion:** The part of the cut-off object that is exposed to view.





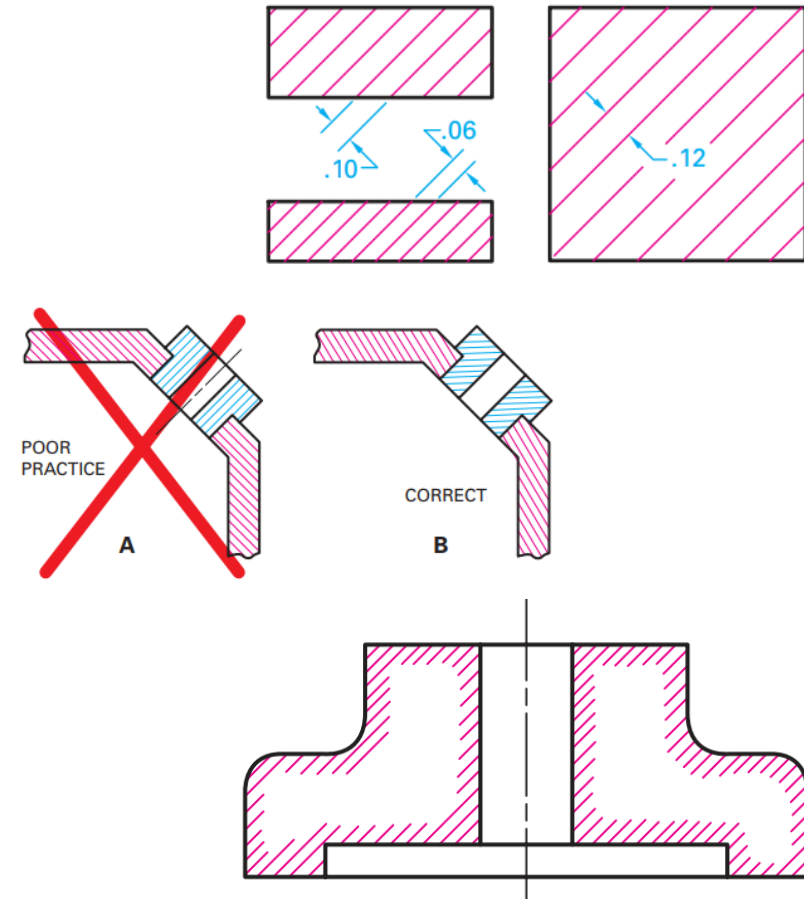
# SECTION VIEW: BASIC COMPONENTS (CONT'D)

- Hatching: The pattern of hatch lines used to indicate solid material.
- Hatching lines for different for different objects.
- A few samples of hatching line as per ASME.



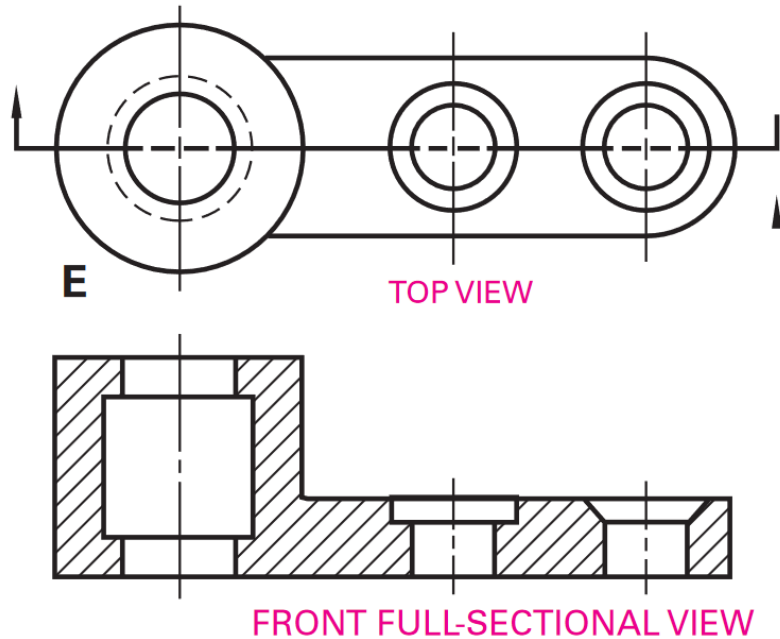
# SECTION VIEW: BASIC COMPONENTS (CONT'D)

- A few things to remember while doing section view:
  - The spacing between the lines in hatching will vary from 1.5mm to 3mm. They should not be too coarse/dense or uneven spacing/orientation.
  - The hatching line should not be drawn parallel or perpendicular to contour of the view.
  - For large sectioned area, one may save time by doing outline sectioning.
  - Gaps between feature segments must not be allowed (Sectioned part is not disjointed).

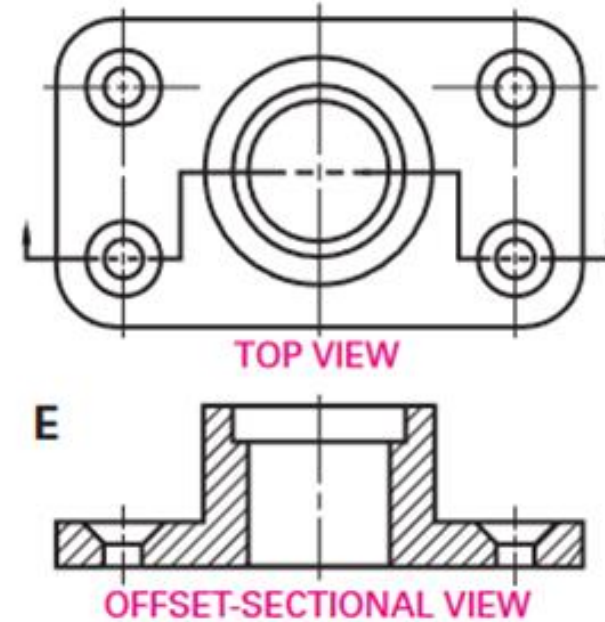


# TYPES OF SECTIONAL VIEW

- Full Section

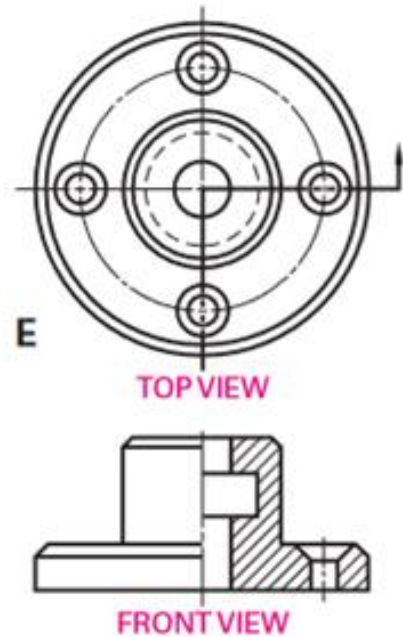


- Offset Section

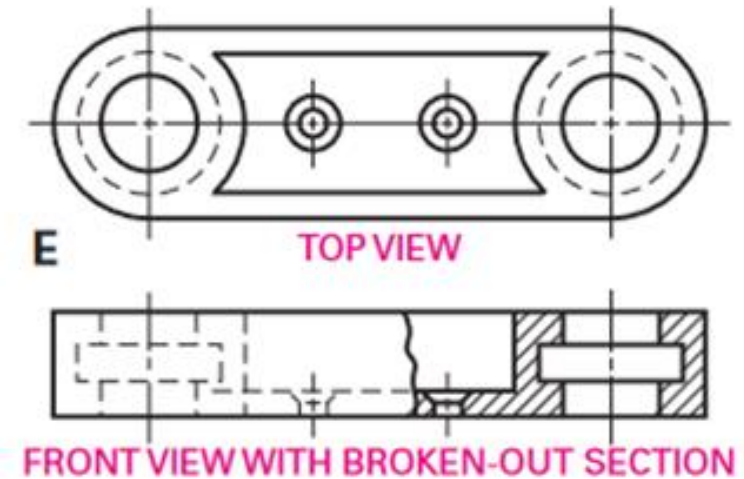


# TYPES OF SECTIONAL VIEW (CONT'D)

- Half Section

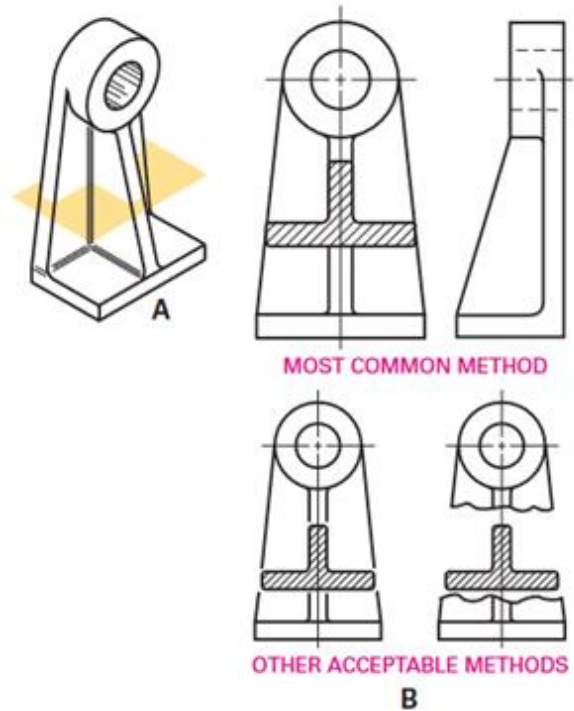


- Broken-out Section

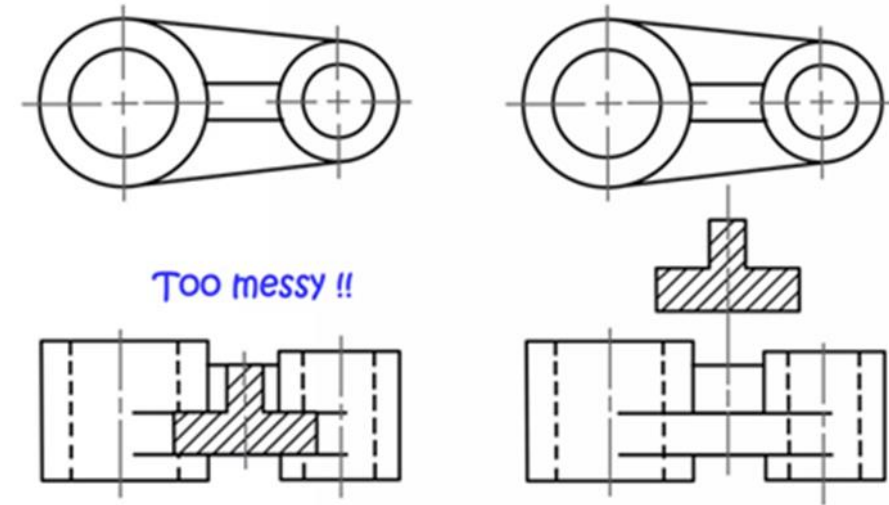


# TYPES OF SECTIONAL VIEW (CONT'D)

- Revolved Section

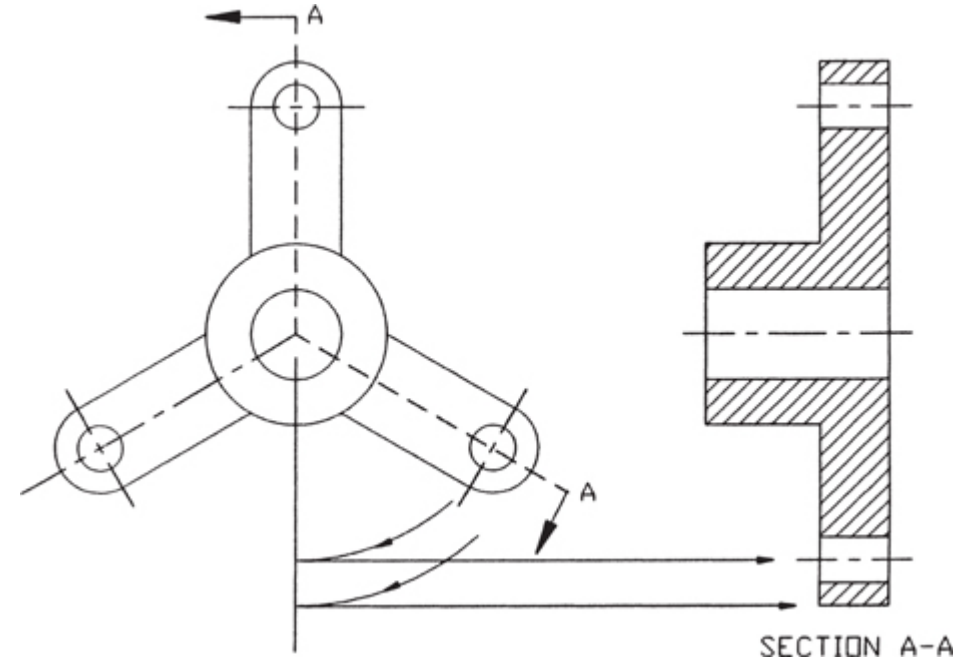
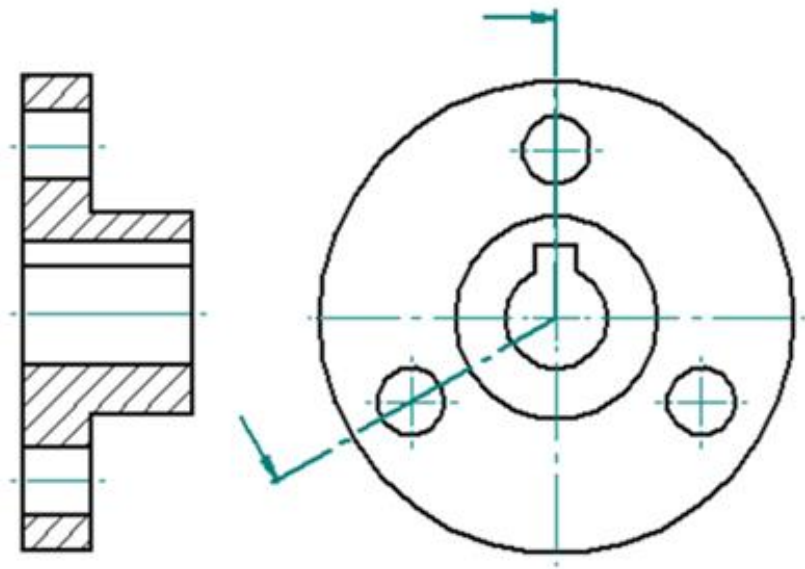


- Removed Section



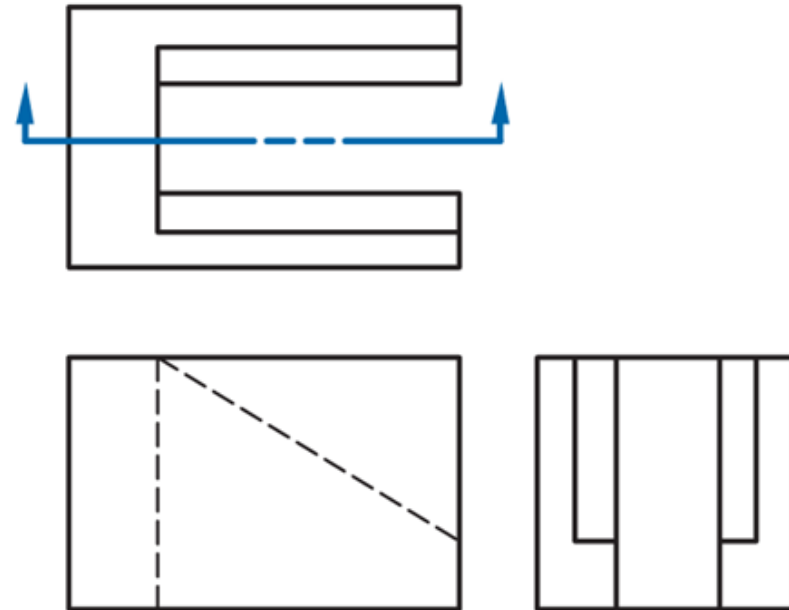
# TYPES OF SECTIONAL VIEW (CONT'D)

- Aligned Section



# SECTION VIEW: PRACTICE TIME

- Student Practice
- Task Time: 2 min
- Additional practice problem can be found on page 14 & 15 of the detailed lecture note.



# SUMMARY OF THIS LECTURE

- Isometric views are used to show an object in three dimensions but without showing the true size.
- Auxiliary views are used to show angled views of an object that cannot be seen in the main view.
- Section views are used to show the internal structure of an object by cutting away a portion of it.
- Understanding and being able to create these views is important in technical drawing and engineering