

# LECTURE ON ENGINEERING DRAWING

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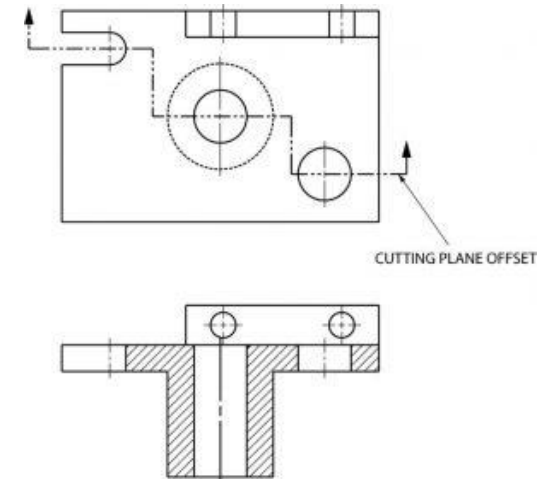
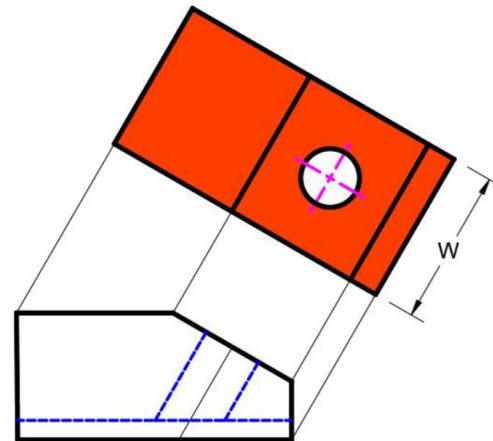
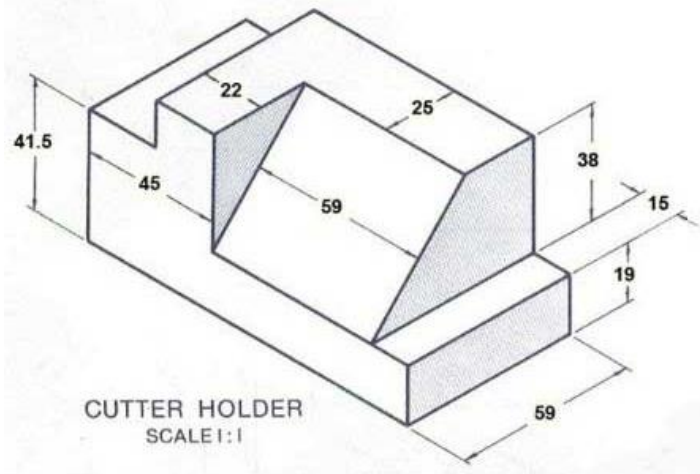
# LECTURE NOTE AVAILABILITY

- 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.

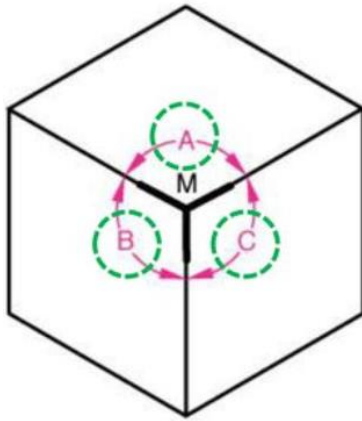


# TODAY'S TOPIC

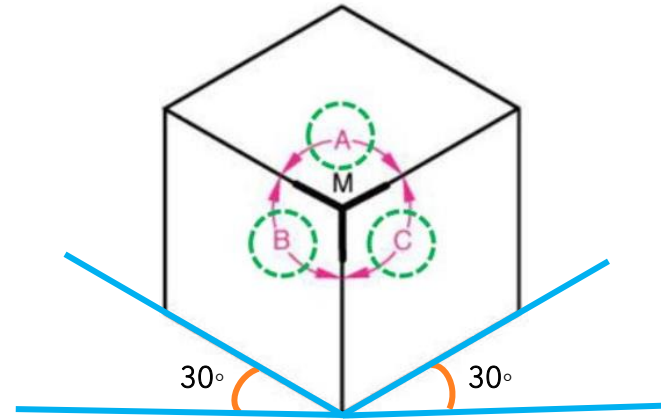
- Isometric View
- Auxiliary View
- Section View



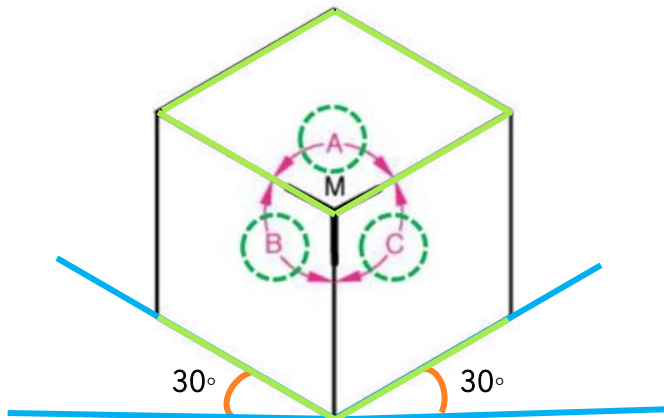
# ISOMETRIC VIEW



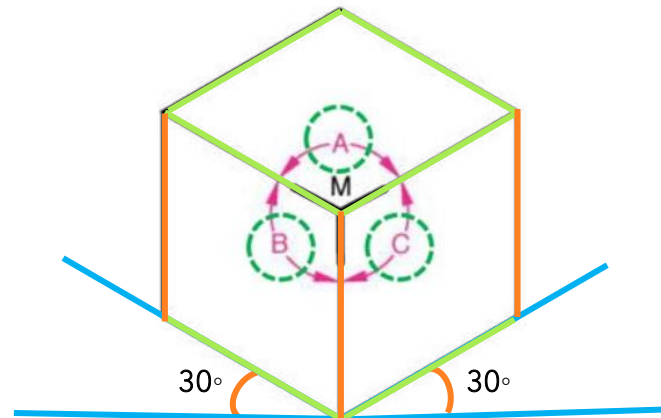
All angles are equal



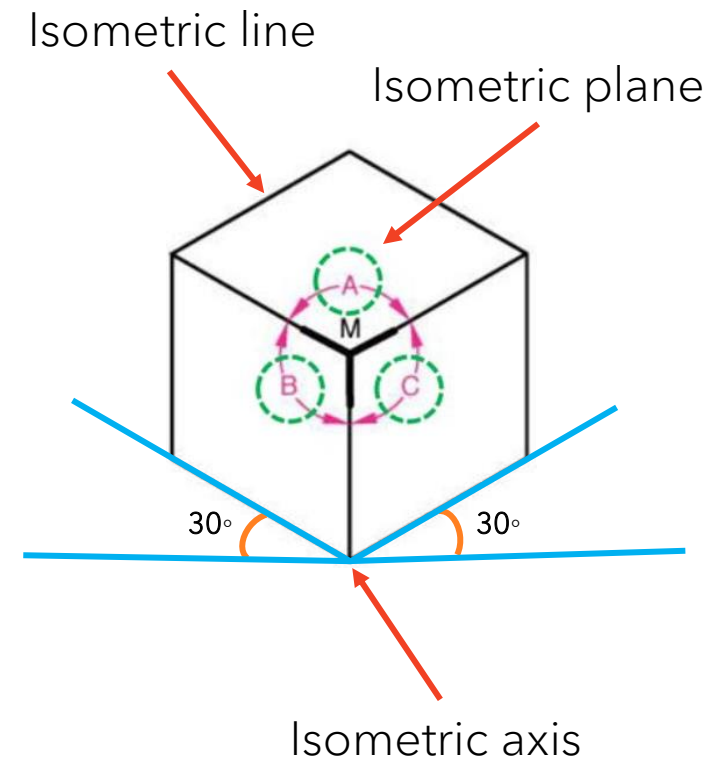
Horizontal edges are drawn at  $30^\circ$



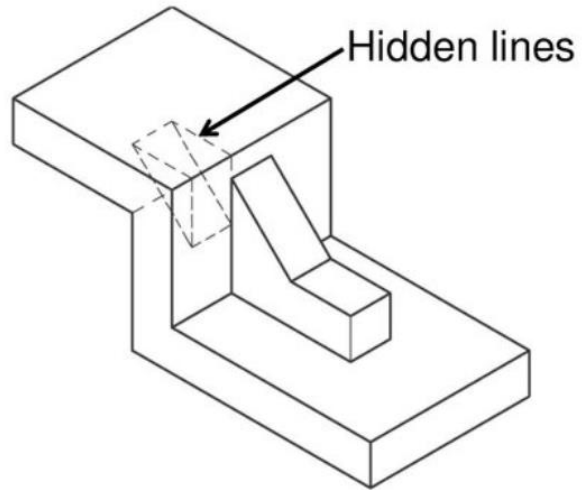
Parallel edges **appear** as **parallel lines**



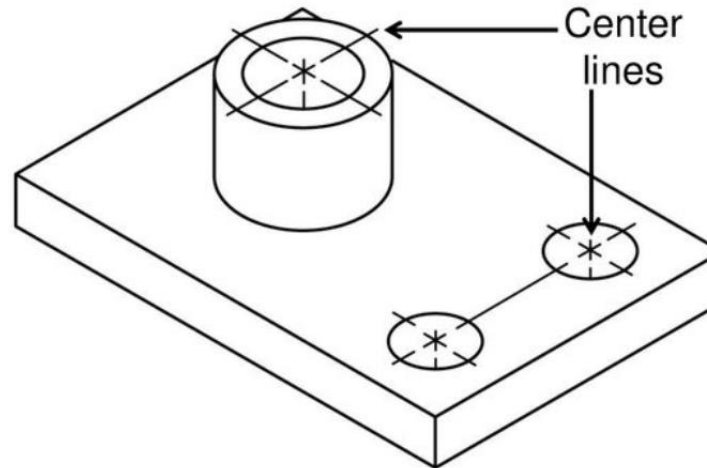
Vertical edges are **drawn** as **vertical lines**



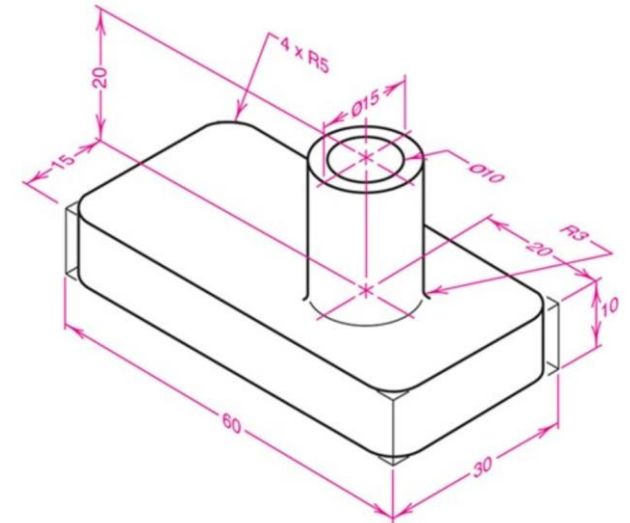
# ISOMETRIC VIEW (CONT'D)



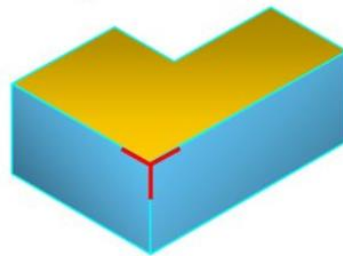
Hidden lines are omitted unless absolutely needed



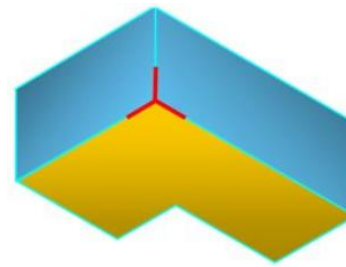
Center lines are drawn for showing symmetry



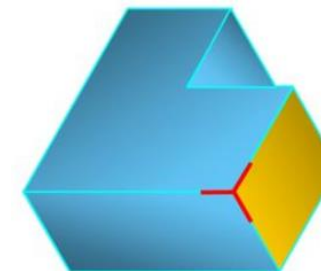
Aligned method is used for dimensioning



Regular  
Isometric



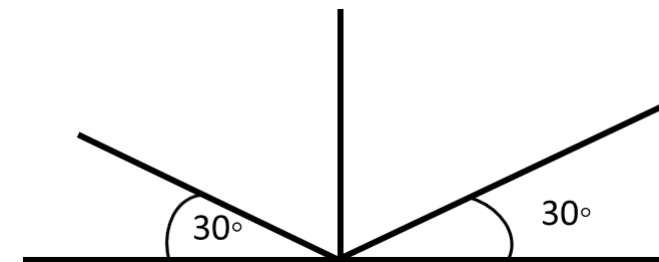
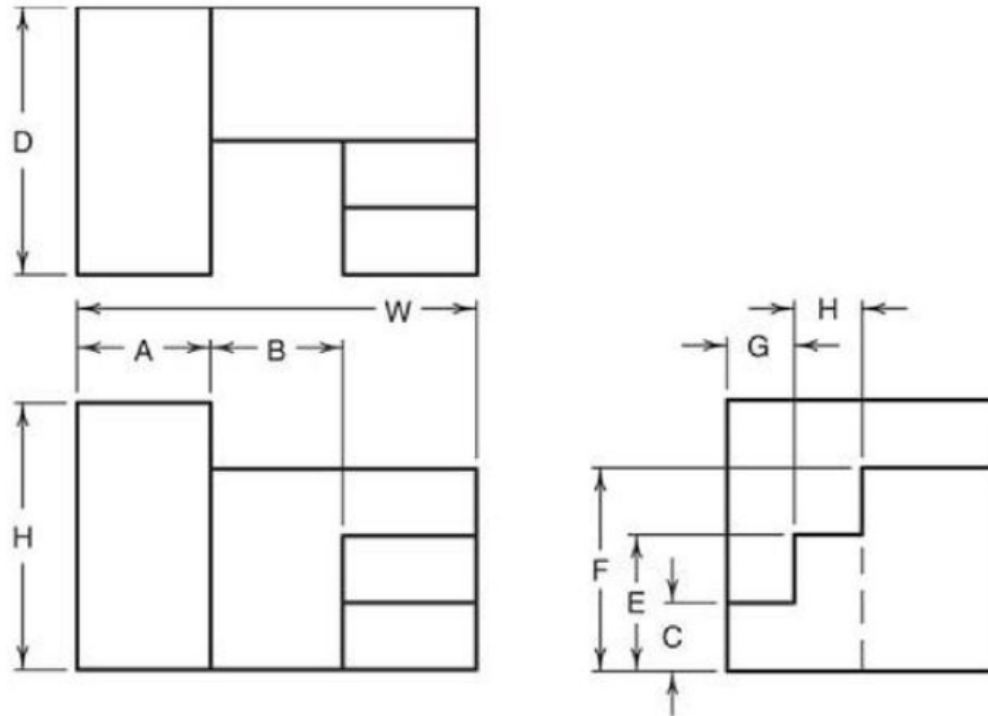
Reverse Axis  
Isometric



Long Axis  
Isometric

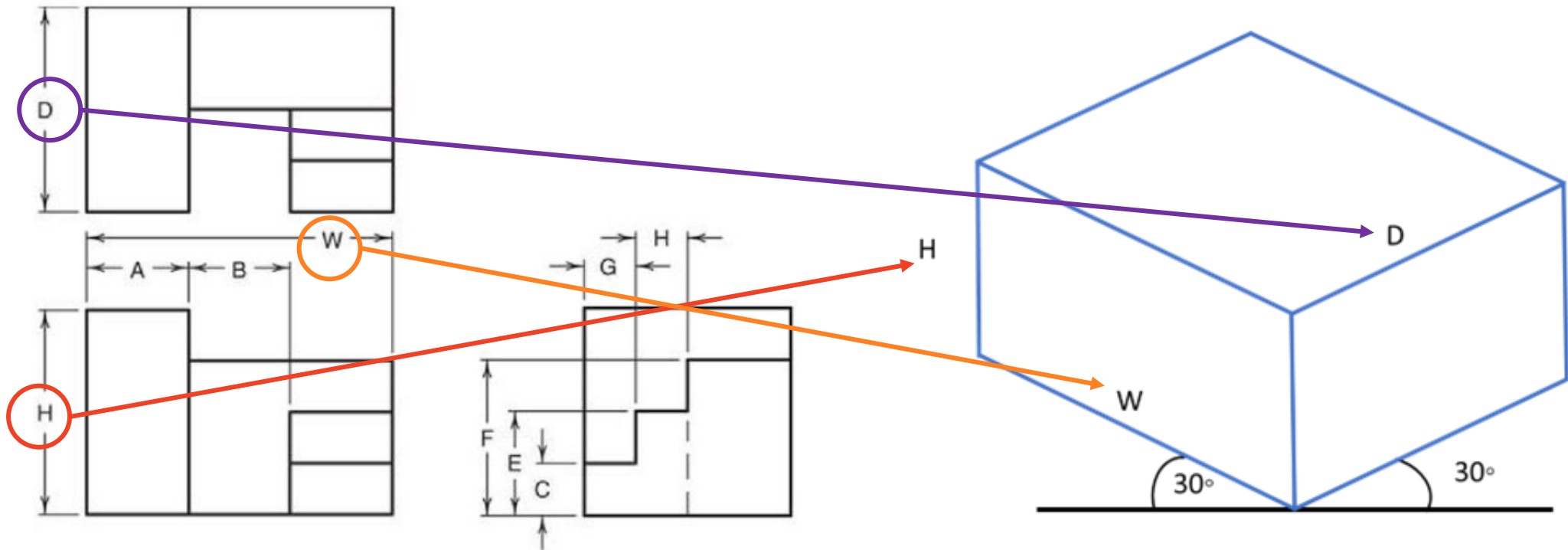
# CREATING ISOMETRIC DRAWING

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



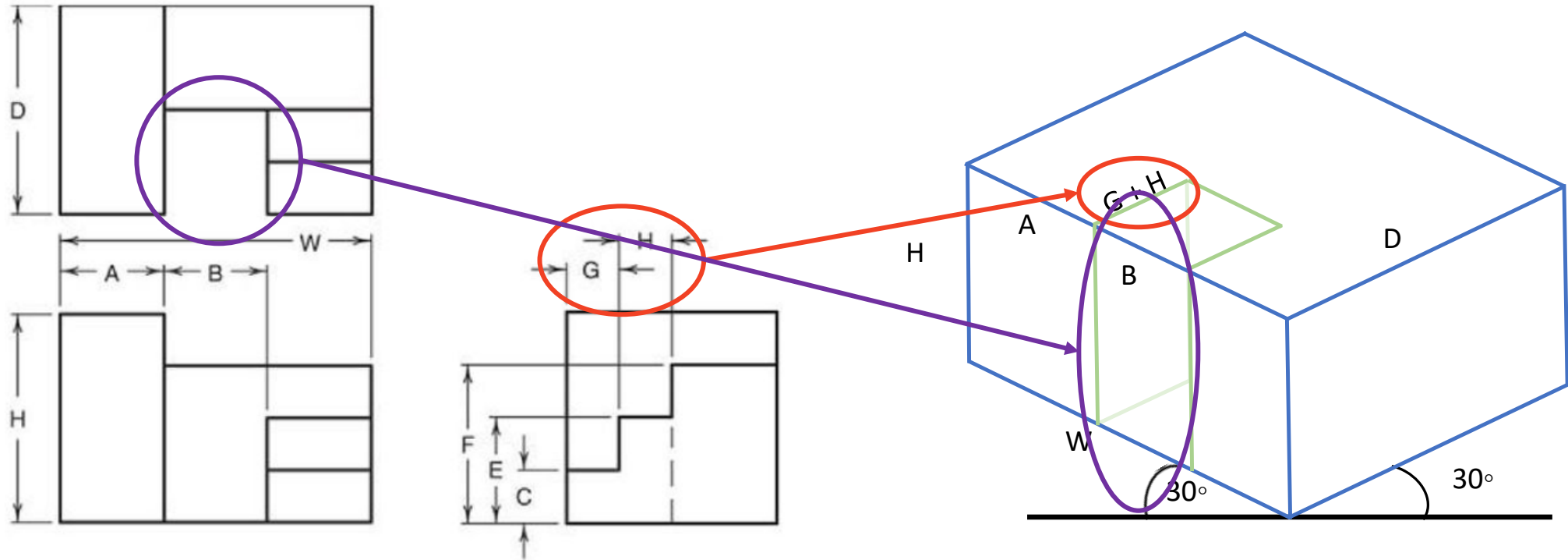
# CREATING ISOMETRIC DRAWING (CONT'D)

- 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)

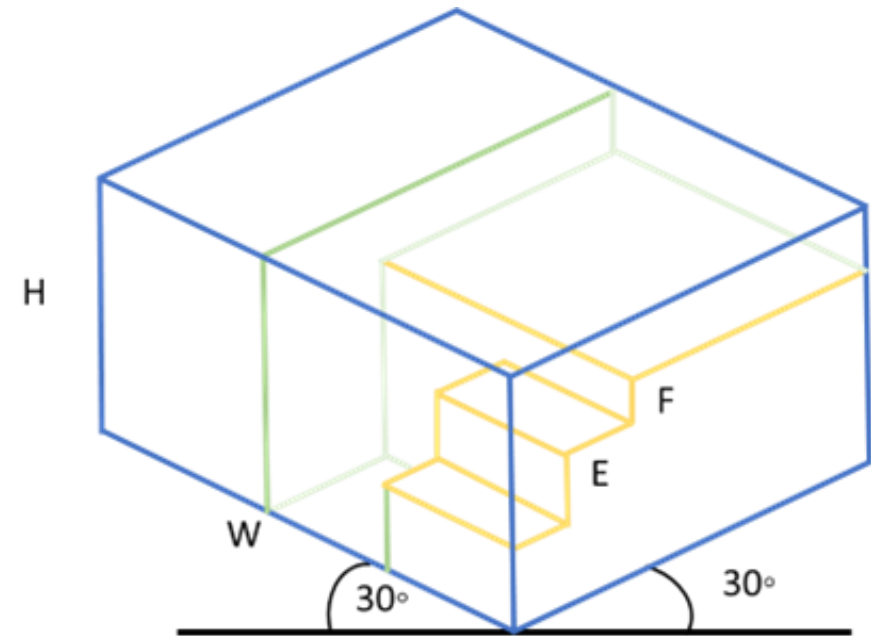
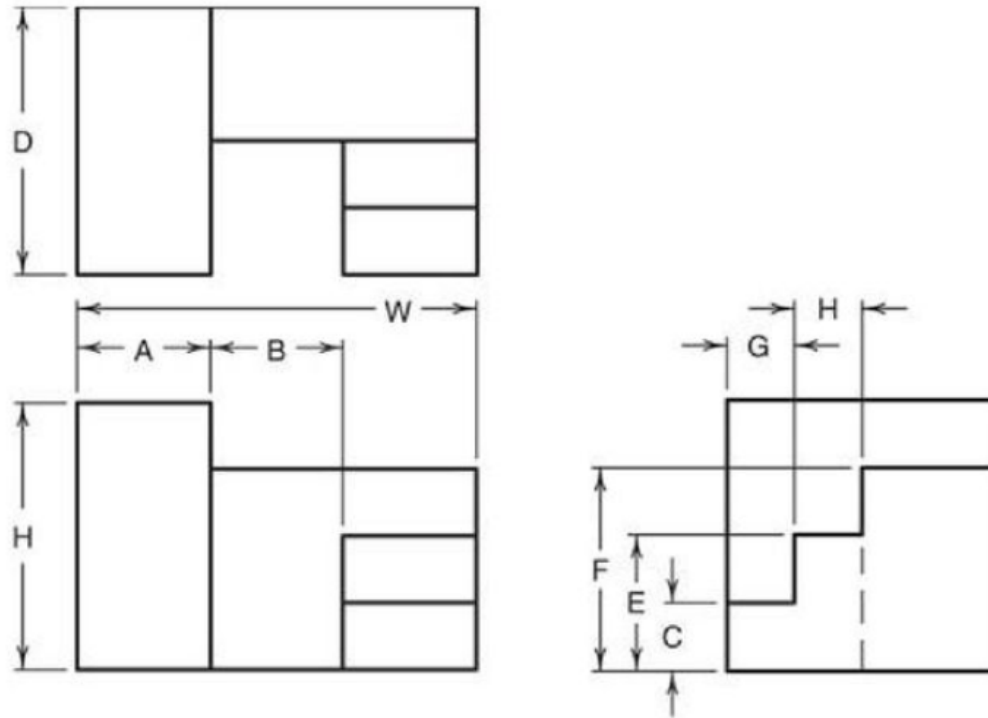
- Let's say the following multi-view sketch is given
- Step 3a: Transferring one feature as an example.





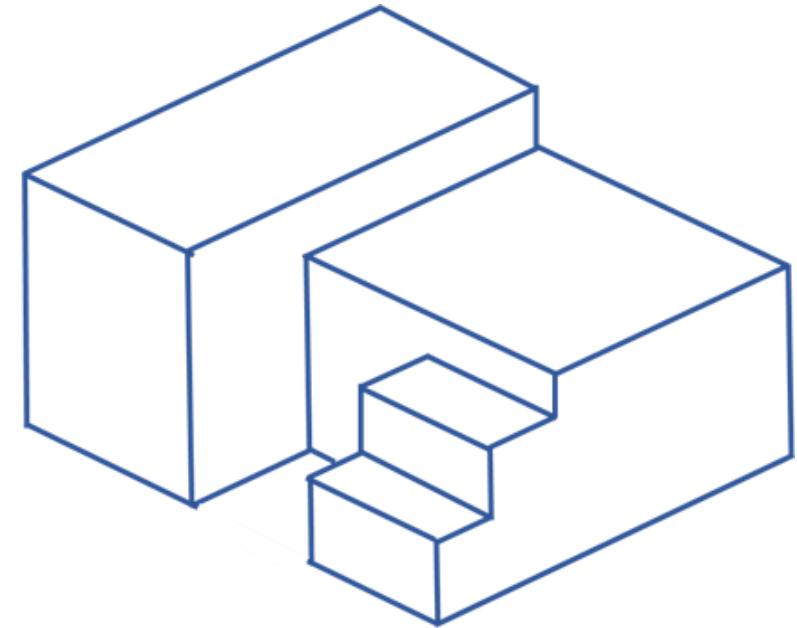
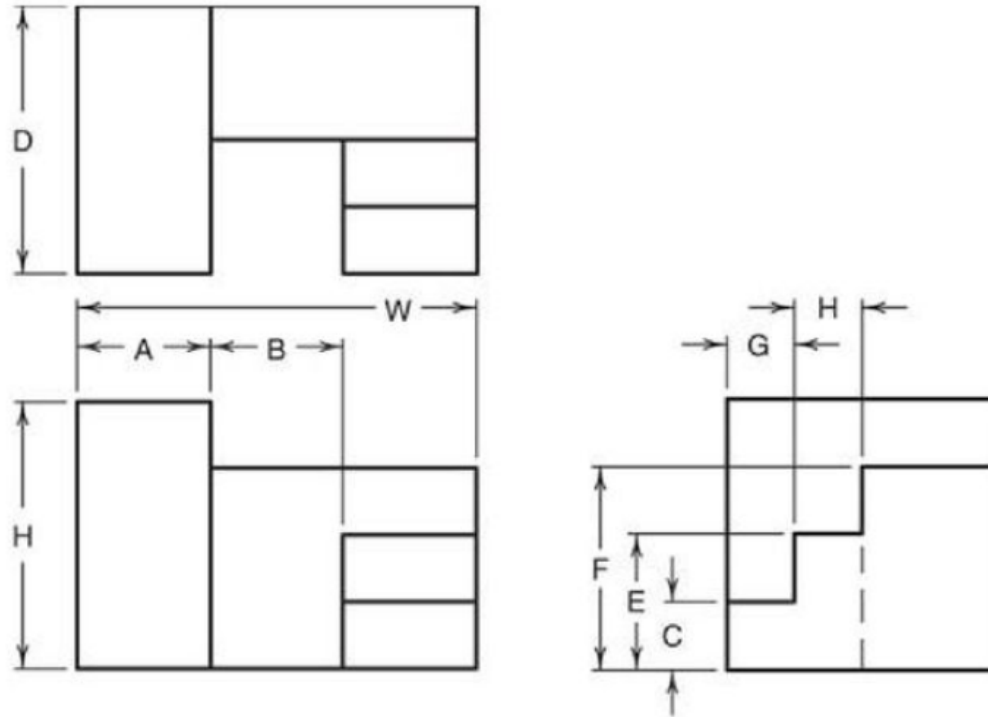
# CREATING ISOMETRIC DRAWING (CONT'D)

- 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.

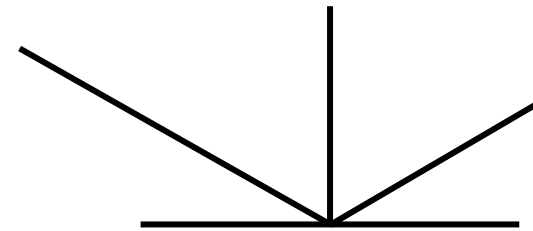
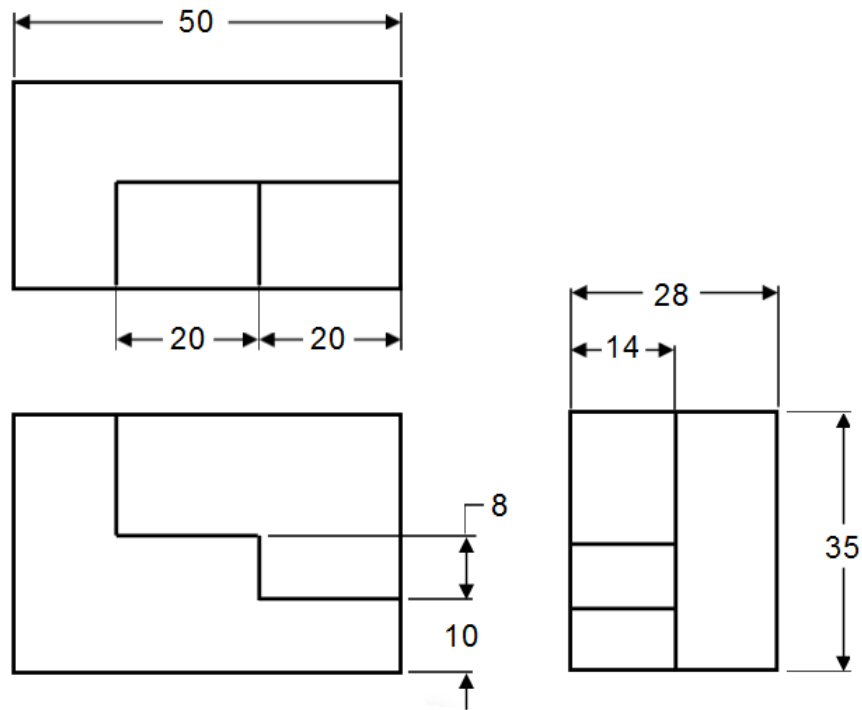


# CREATING ISOMETRIC DRAWING (CONT'D)

- Let's do another one

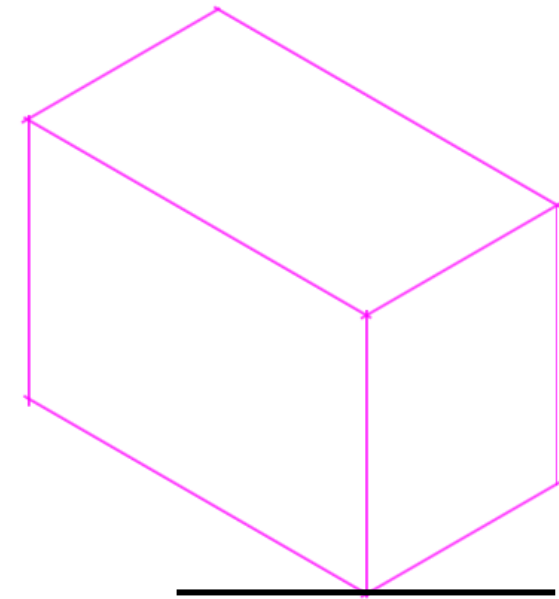
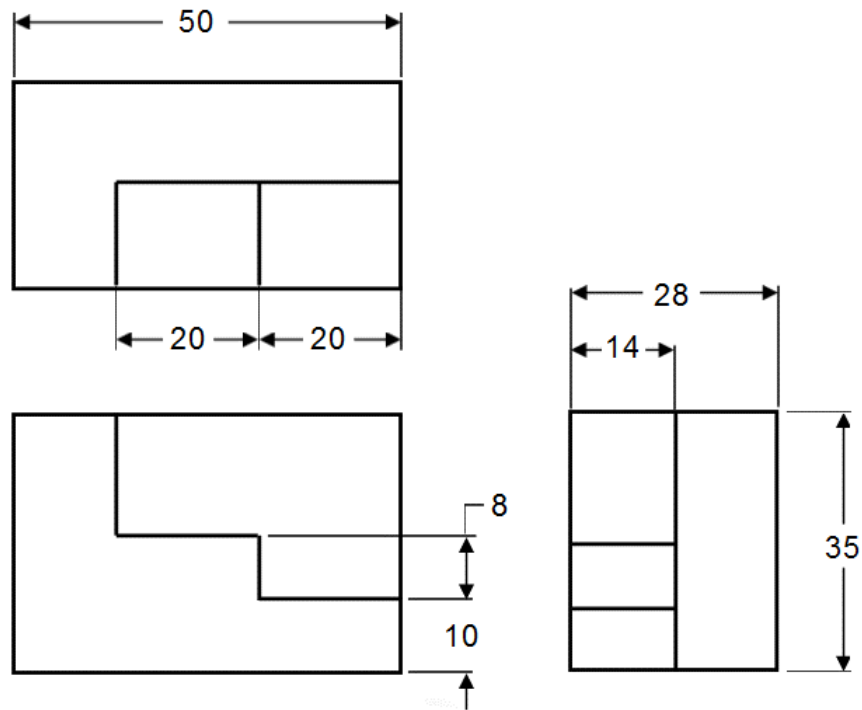
# CREATING ISOMETRIC DRAWING (CONT'D)

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



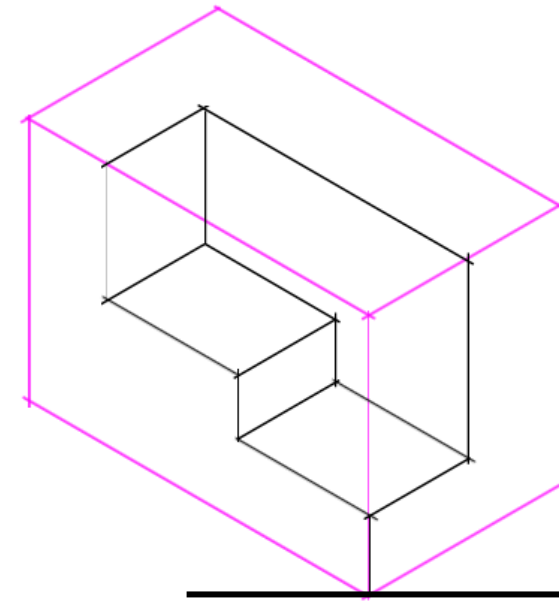
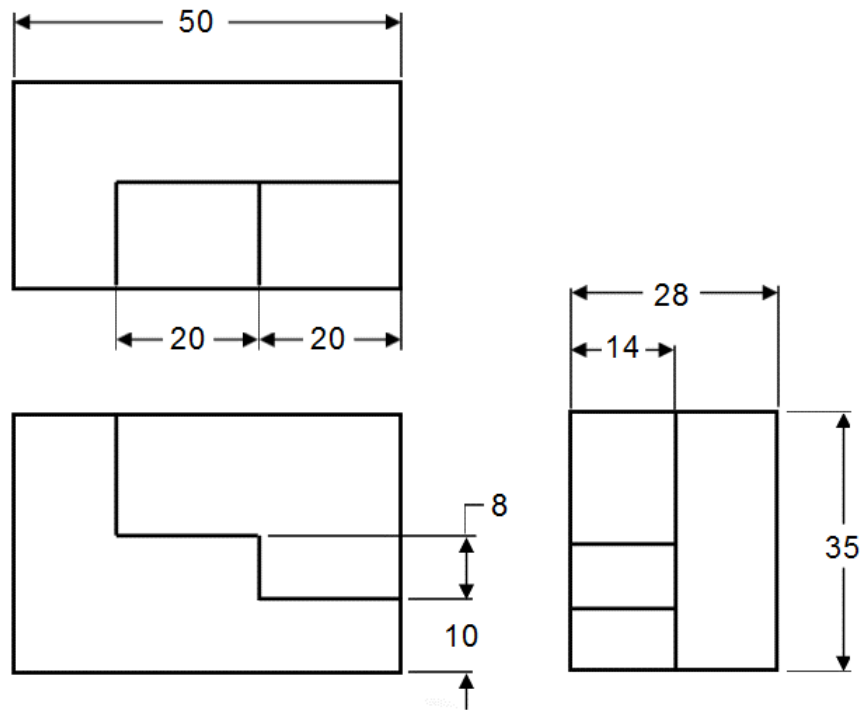
# CREATING ISOMETRIC DRAWING (CONT'D)

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



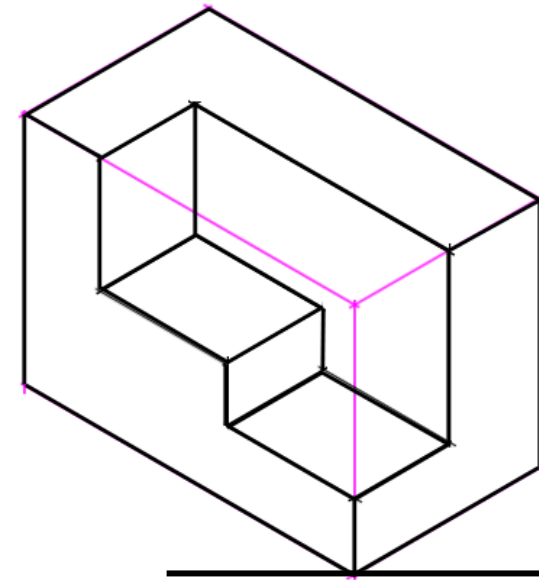
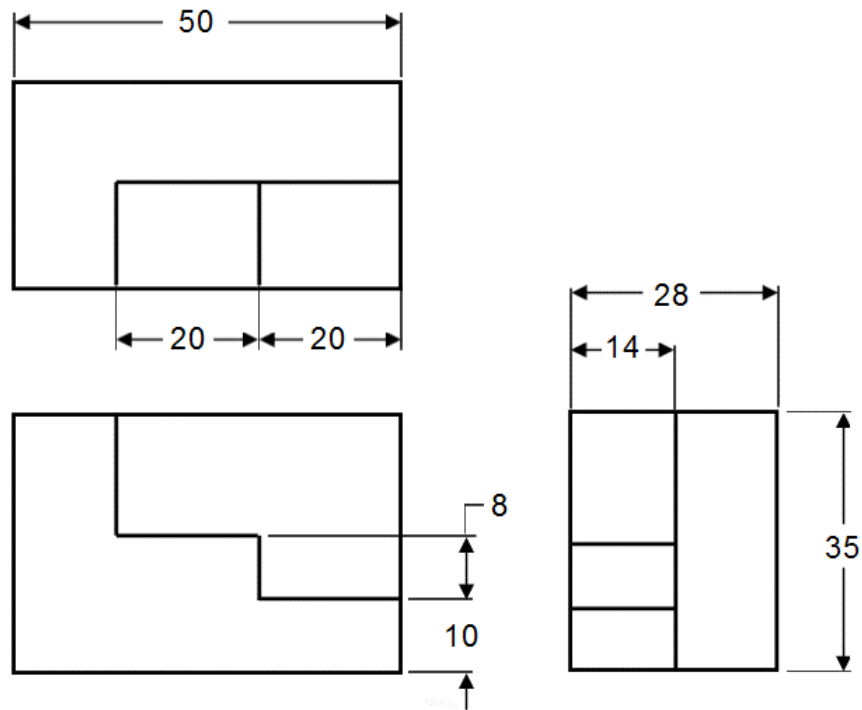
# CREATING ISOMETRIC DRAWING (CONT'D)

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



# CREATING ISOMETRIC DRAWING (CONT'D)

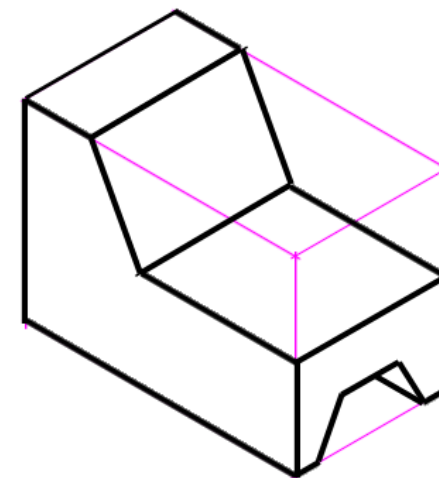
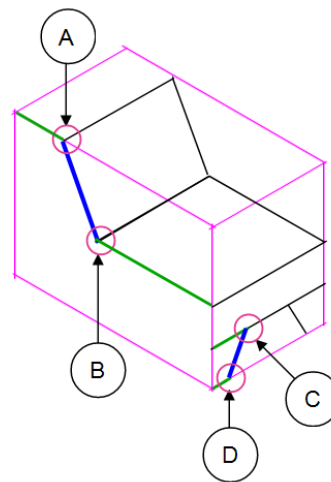
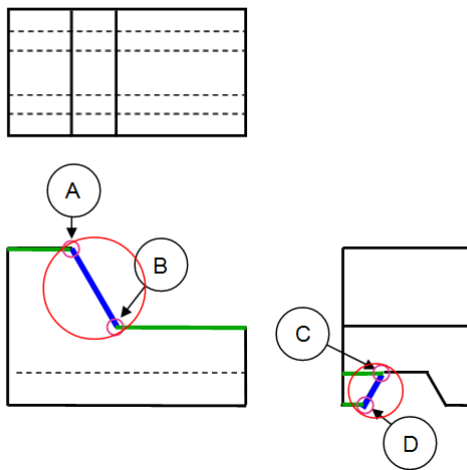
- Let's say the following multi-view sketch is given
- Step 4: Remove all the construction or boundary lines and darken the visible lines to get the final view.



# 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*):

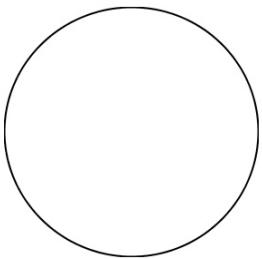




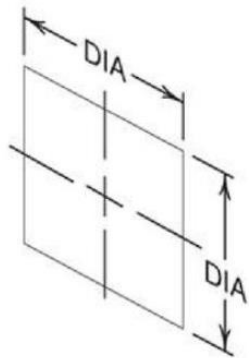
# CREATING ISOMETRIC DRAWING (CONT'D)

- 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.

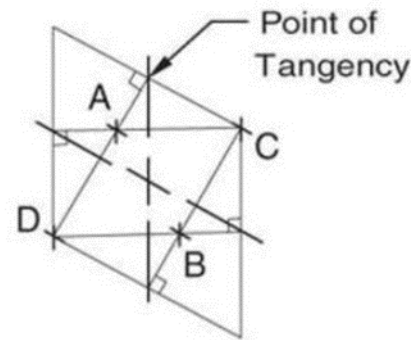
Details (*for point iii*):



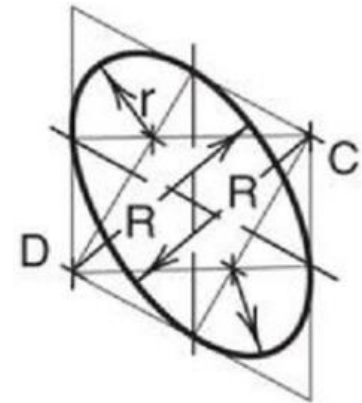
Circle in 2D  
space



Draw equilateral  
parallelogram



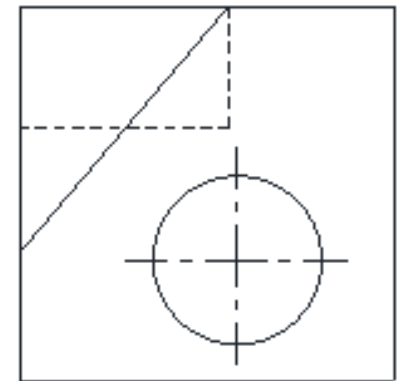
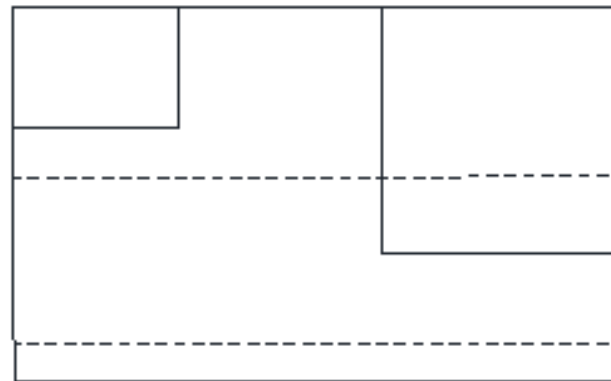
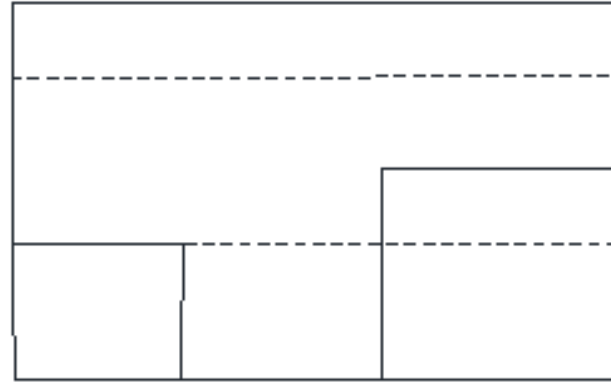
Join midpoint of edge to  
endpoint of opposite side



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

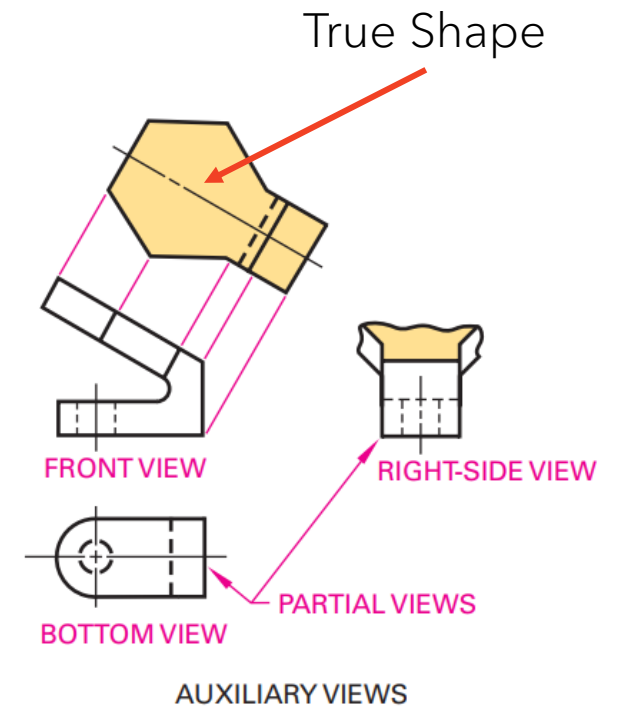
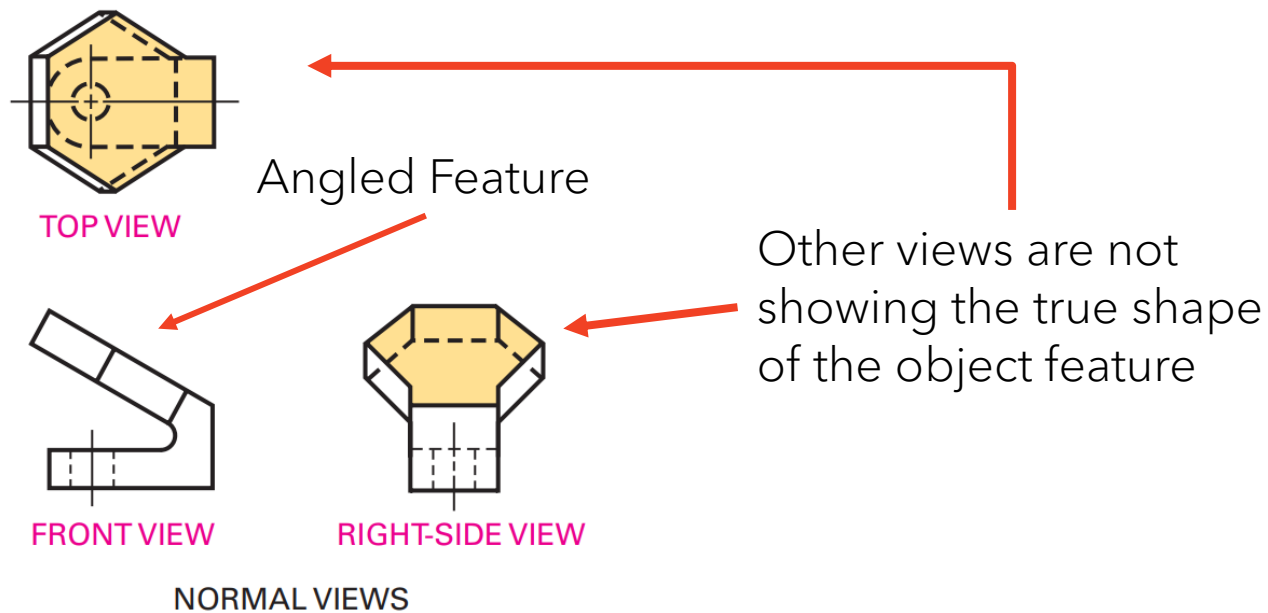
# ISOMETRIC VIEW: PRACTICE TIME

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

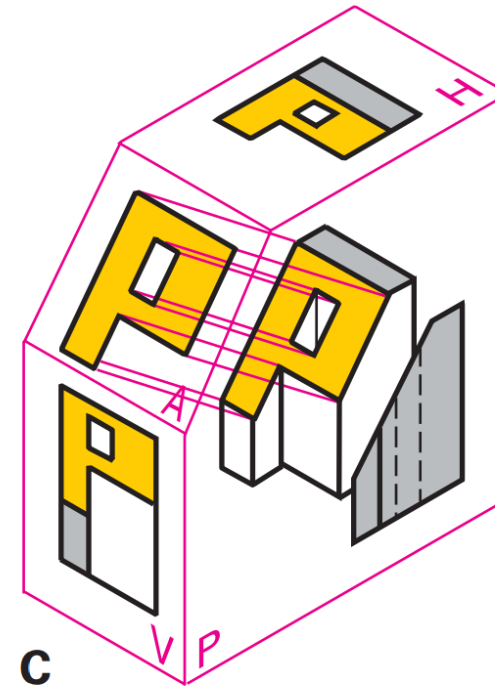
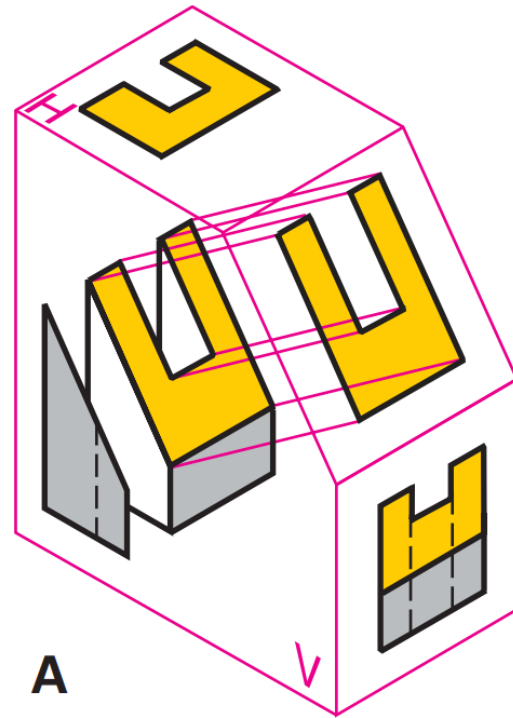


# AUXILIARY VIEW

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

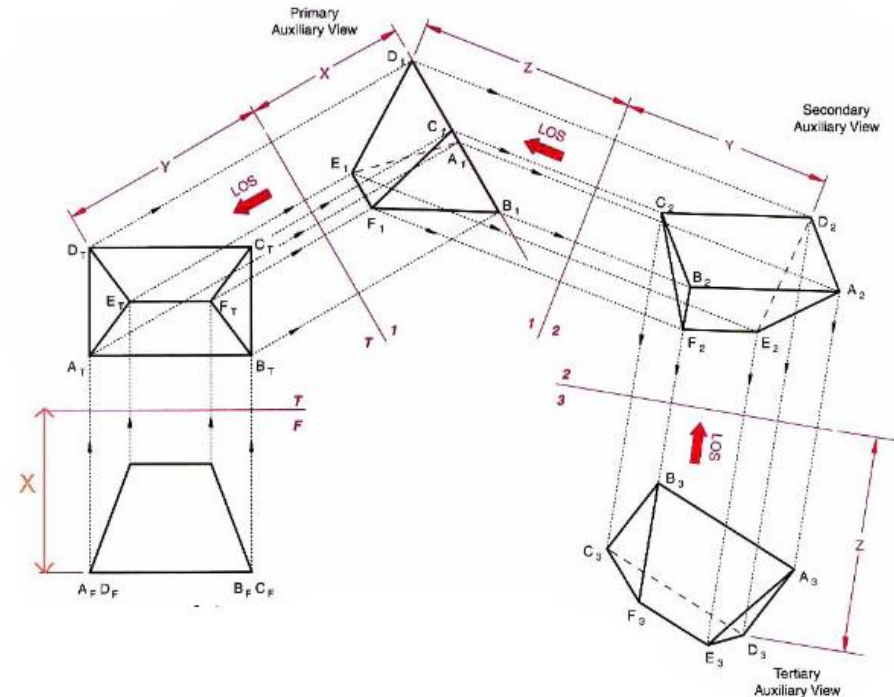
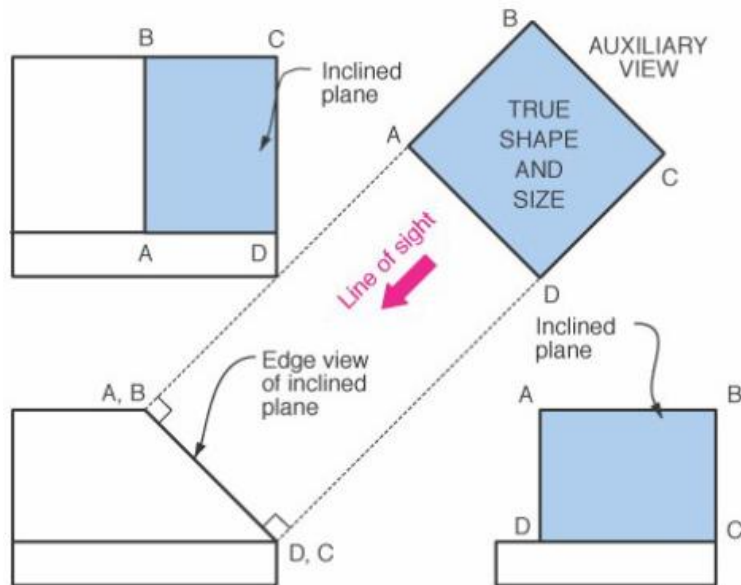


# AUXILIARY VIEW (WITH RESPECT TO OTHER VIEWS)



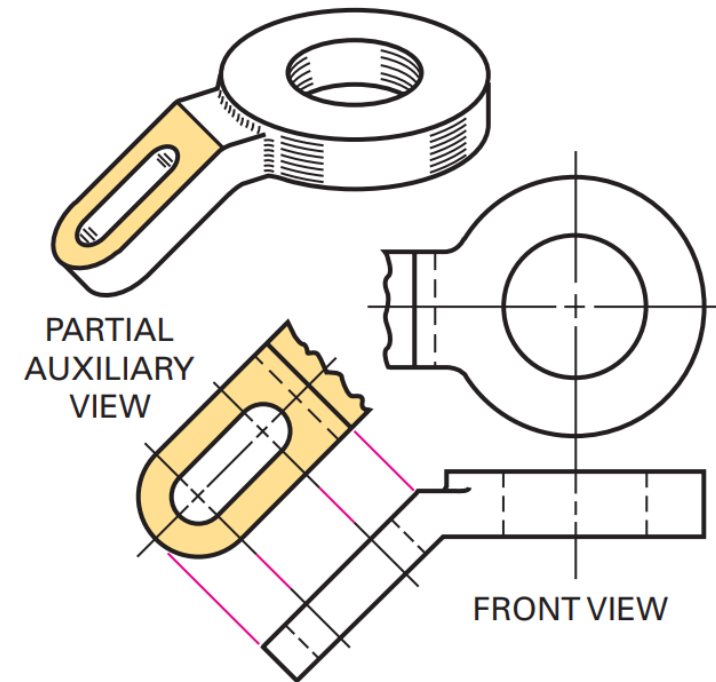
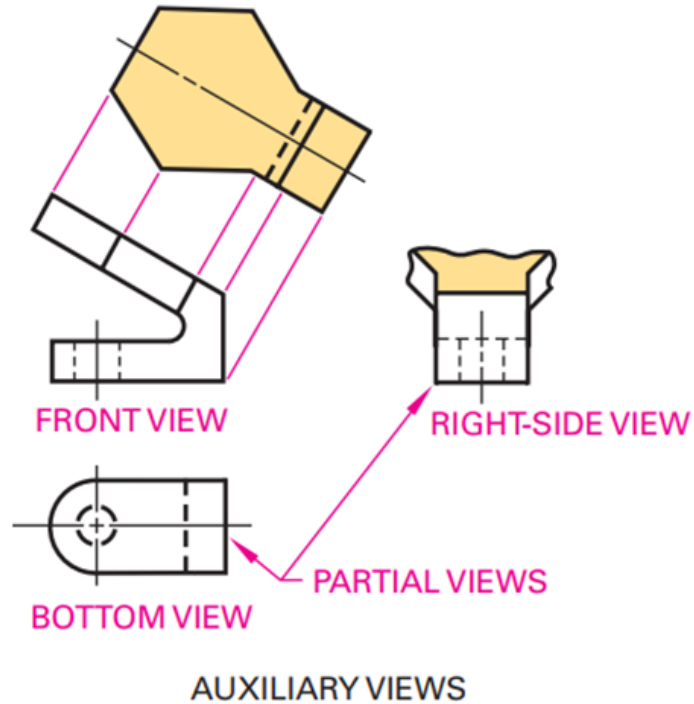
## AUXILIARY VIEW

- 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.



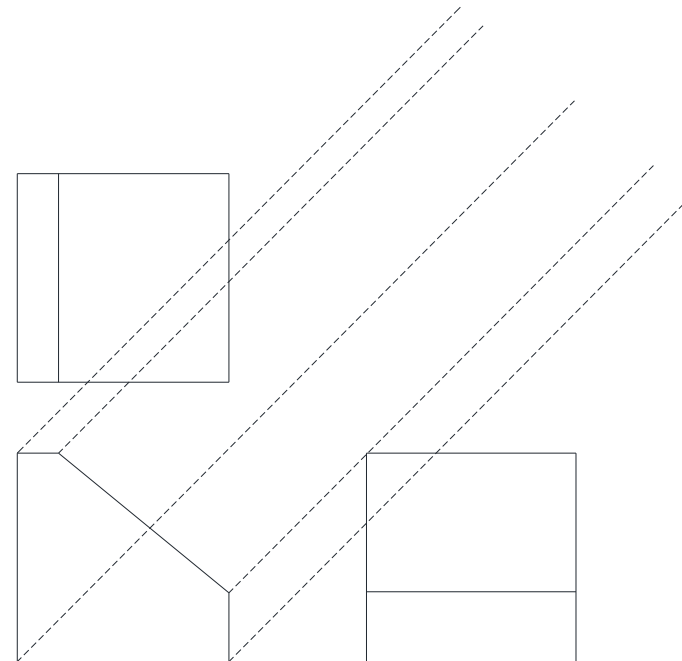
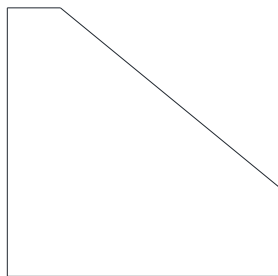
# TYPES OF AUXILIARY VIEWS

- Full Auxiliary View
- Partial Auxiliary View



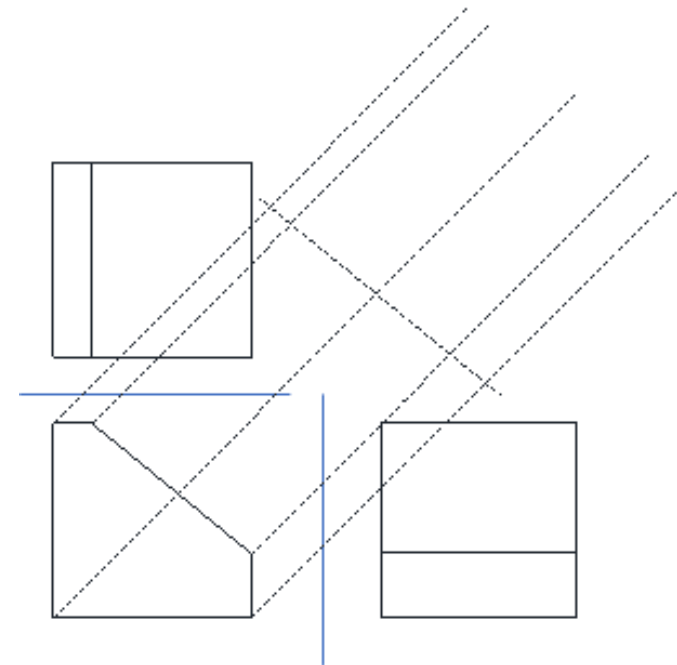
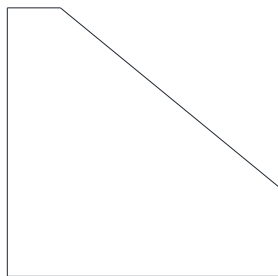
# CREATING AUXILIARY VIEW

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



# CREATING AUXILIARY VIEW

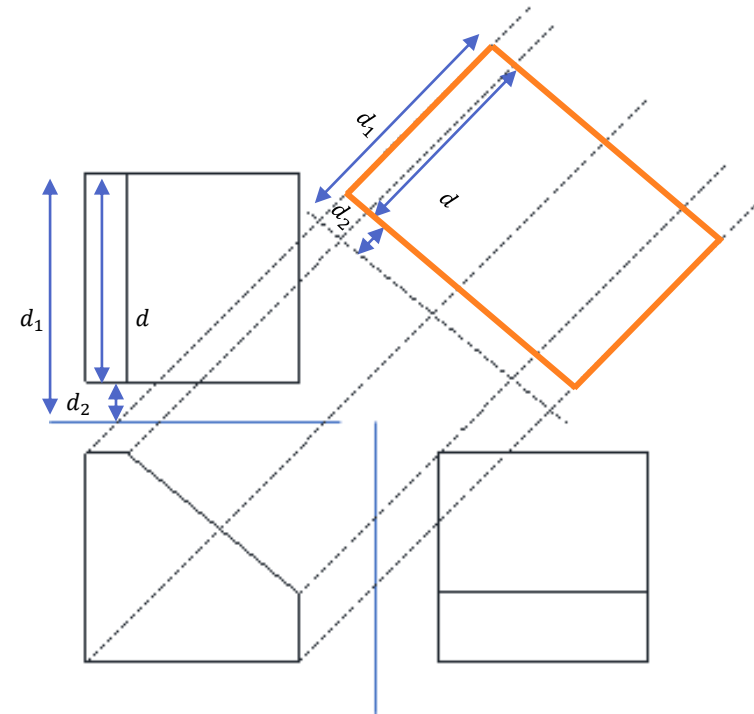
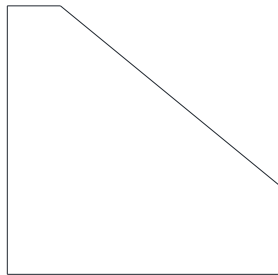
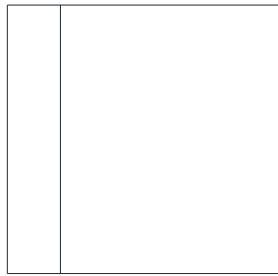
- Let's say the following multi-view sketch is given
- Step 2: Draw the outline of inclined face/fold line.





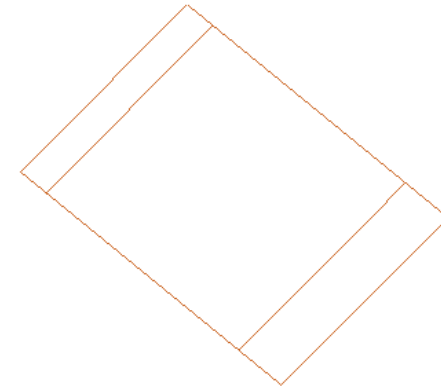
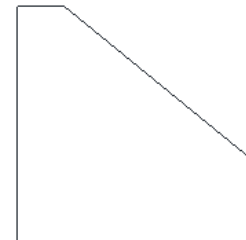
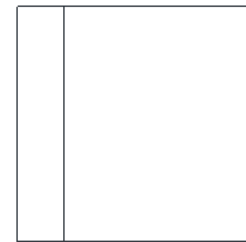
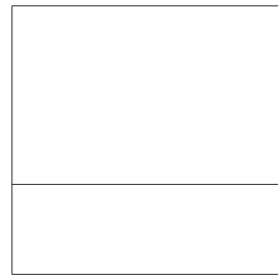
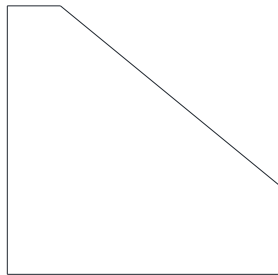
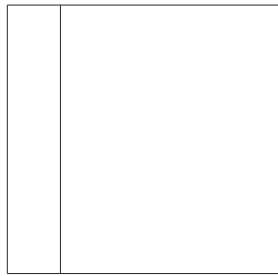
# CREATING AUXILIARY VIEW

- 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.



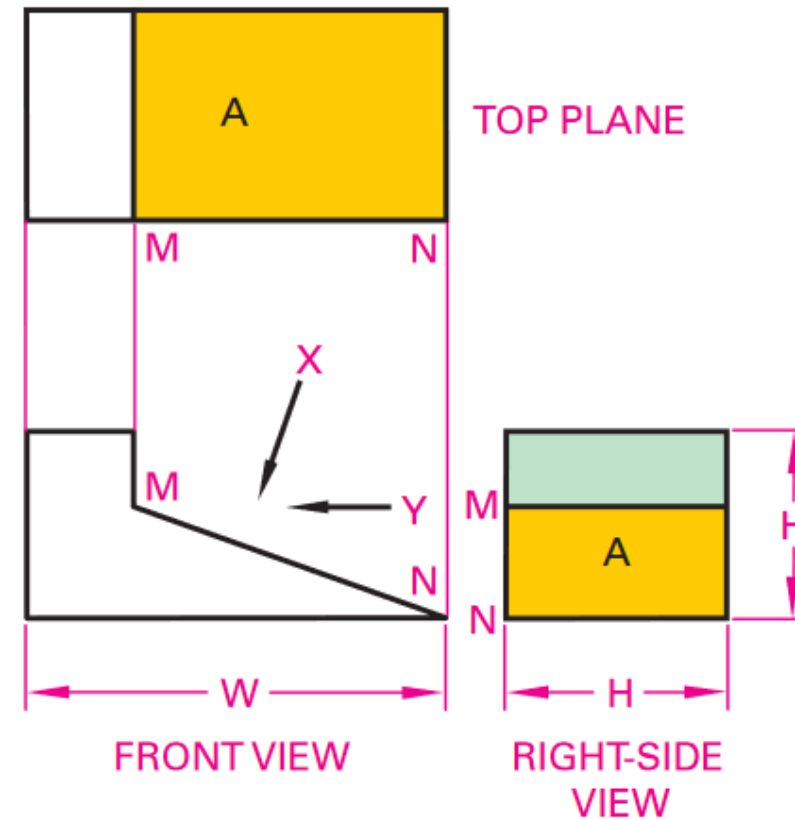
# CREATING AUXILIARY VIEW

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



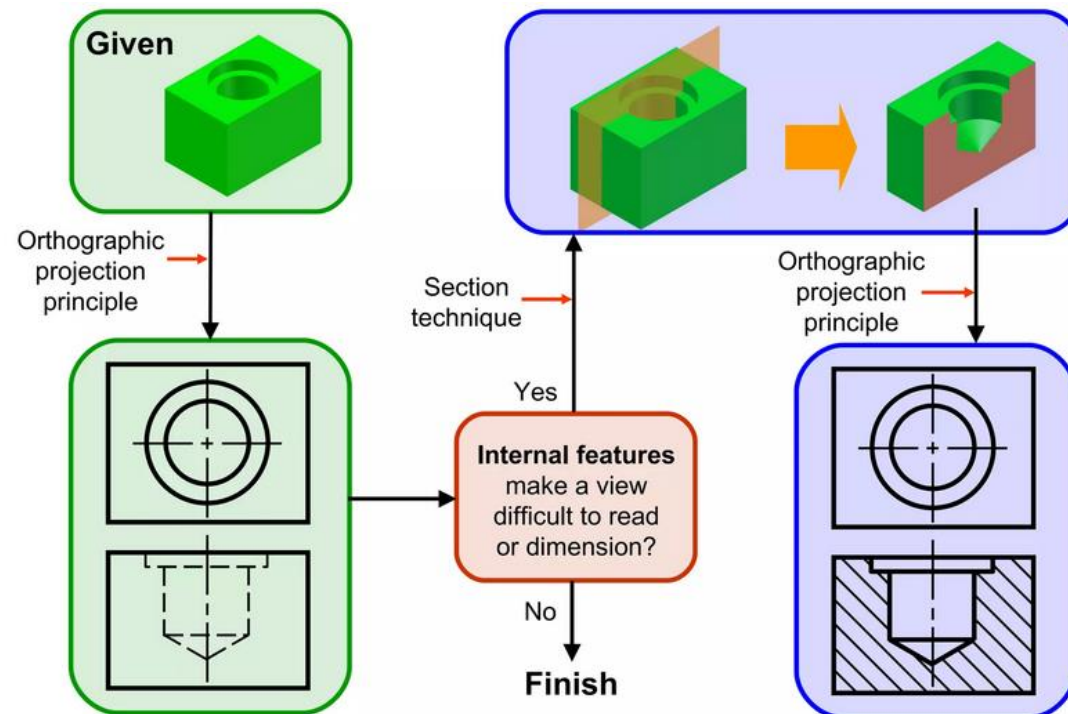
# AUXILIARY VIEW: PRACTICE TIME

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

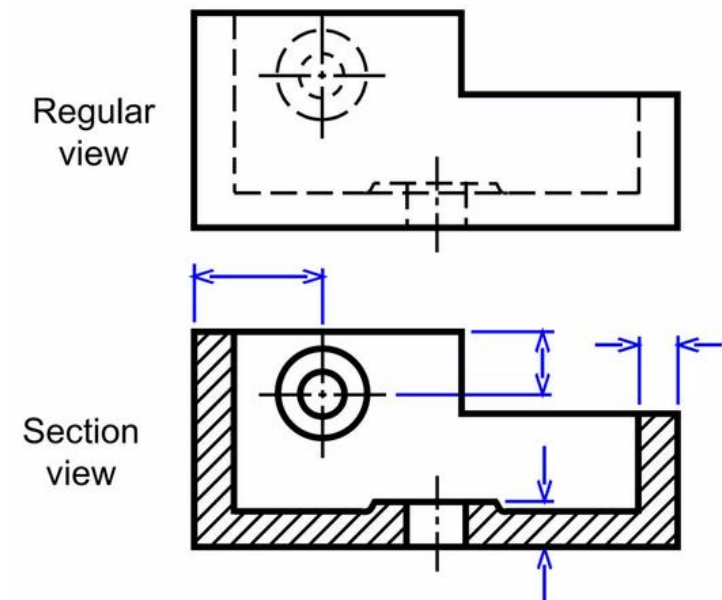


# SECTION VIEW

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

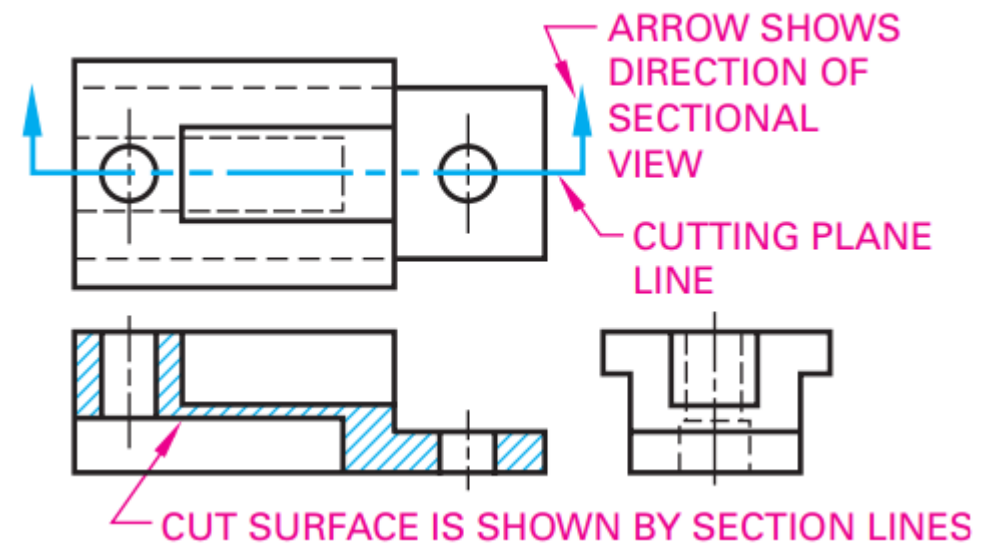
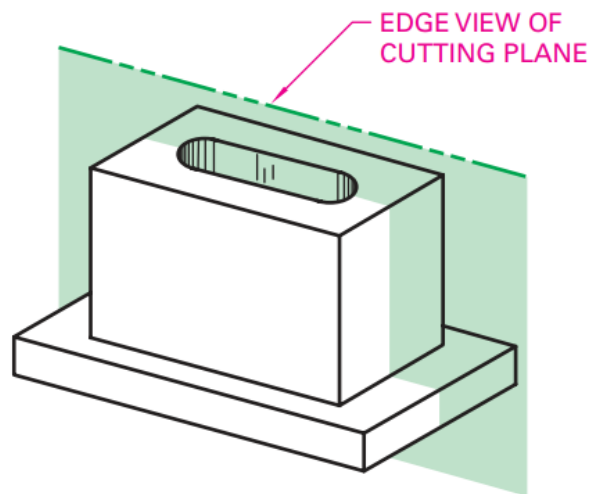


- Facilitates internal dimensioning.



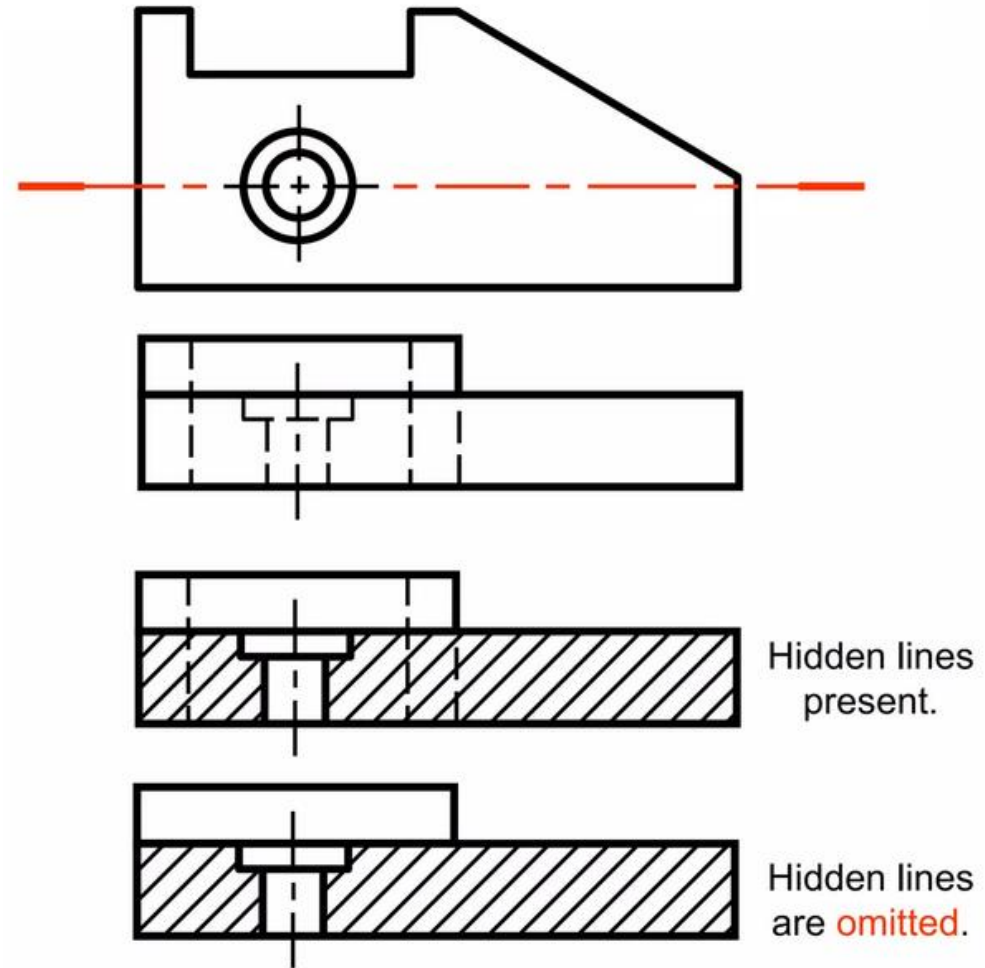
## SECTION VIEW: BASIC COMPONENTS (CONT'D)

- 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.



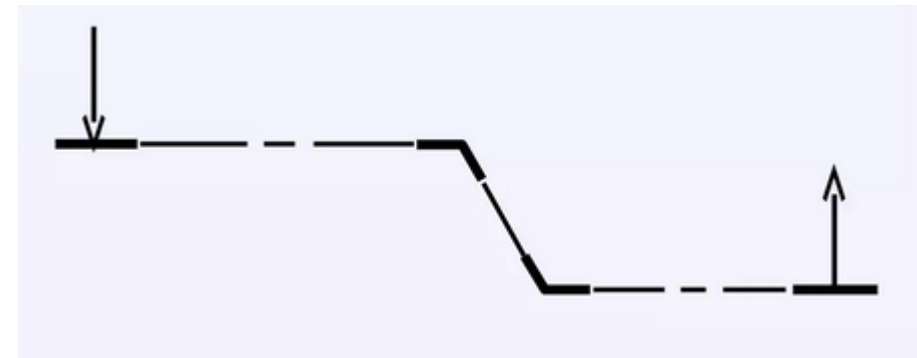
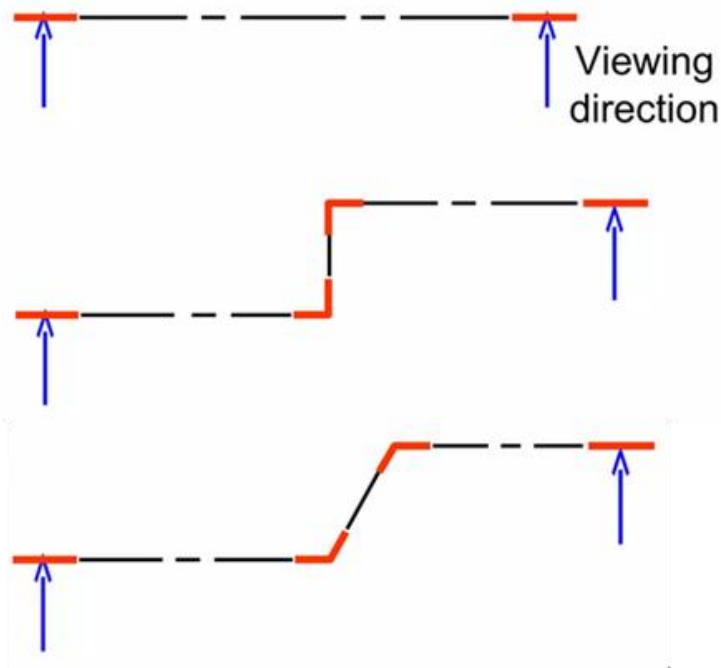
## SECTION VIEW: BASIC COMPONENTS (CONT'D)

- Hidden lines are usually omitted.



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

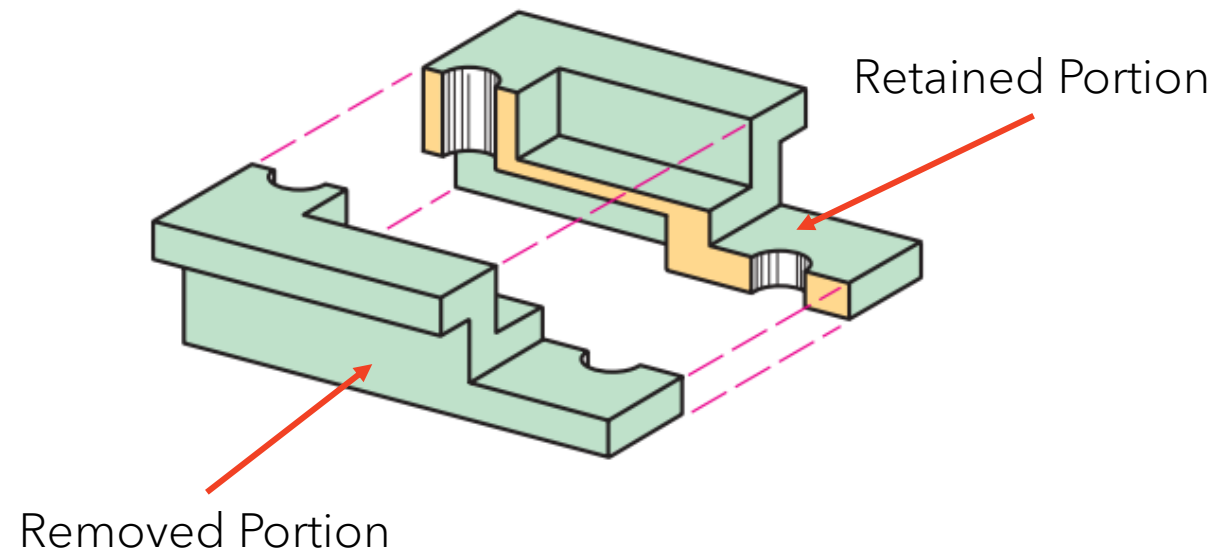
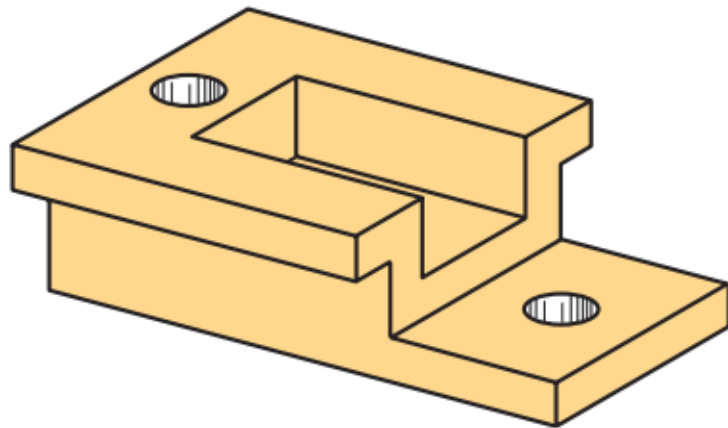
- Cutting plane line is presented by a chain line.
- Starts and Ends with visible line.
- Arrow is used to show the direction of view.



**Not Correct**  
Directions are conflicting

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

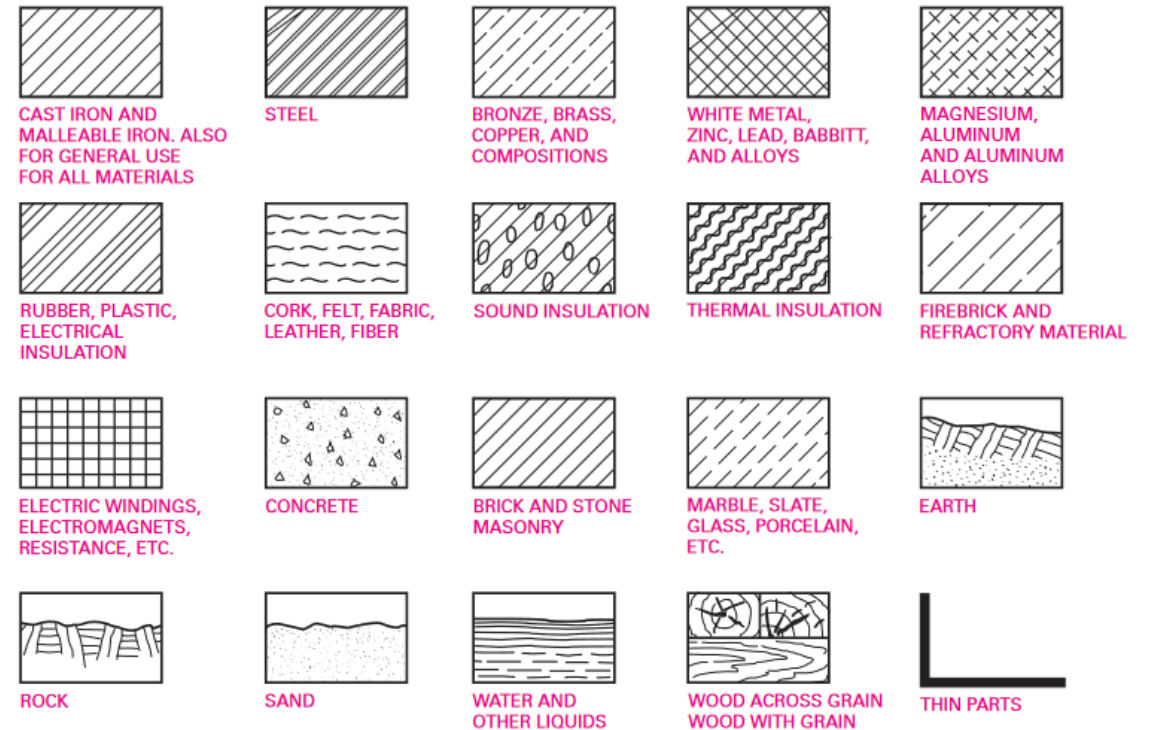
- **Removed Portion:** The cut-out portion of the object that is removed to expose the interior of the object.
- **Retained Portion:** The part of the cut-off object that is exposed to view.





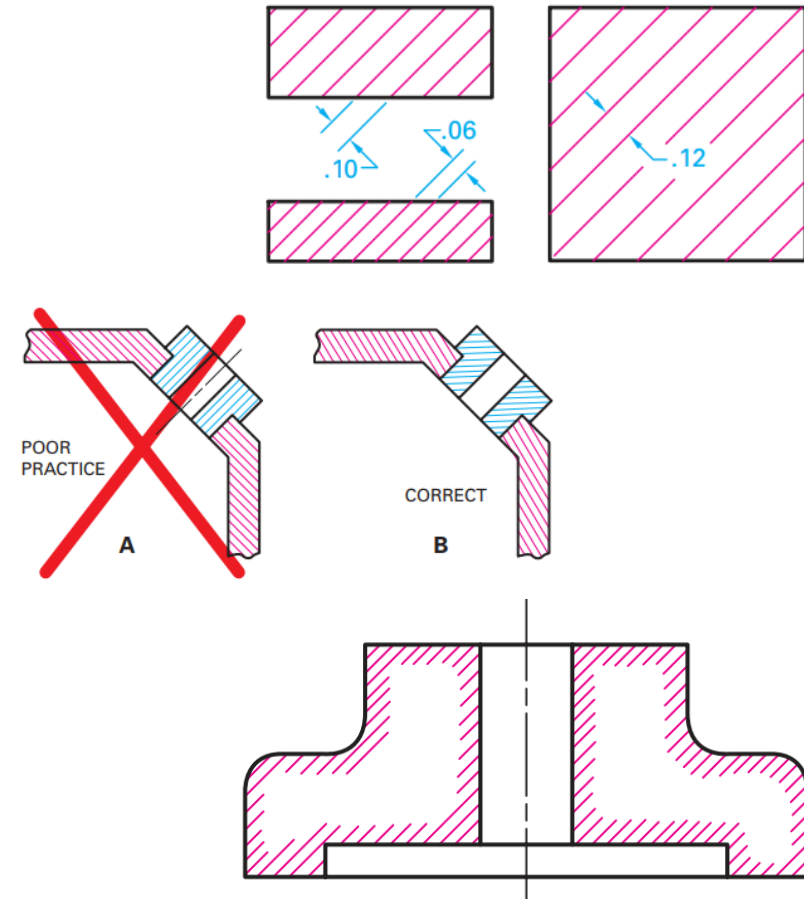
# SECTION VIEW: BASIC COMPONENTS (CONT'D)

- 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.



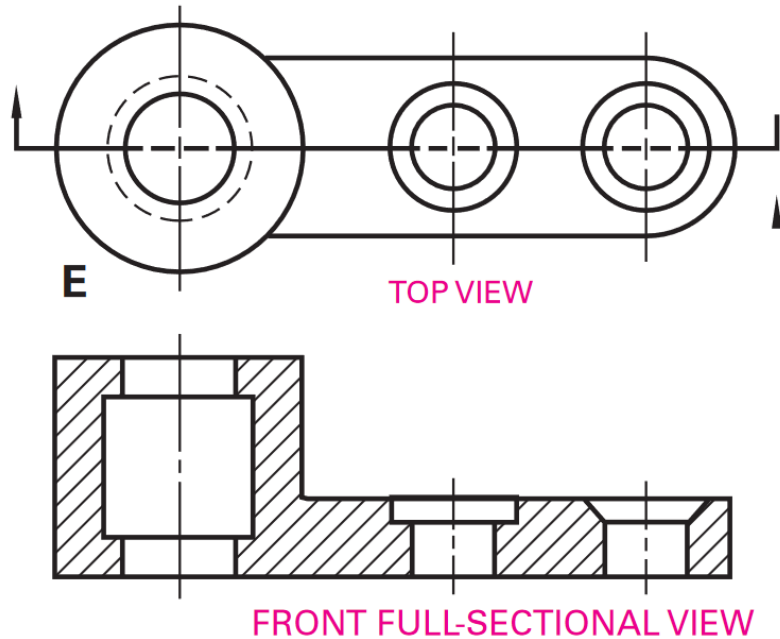
# SECTION VIEW: BASIC COMPONENTS (CONT'D)

- 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).

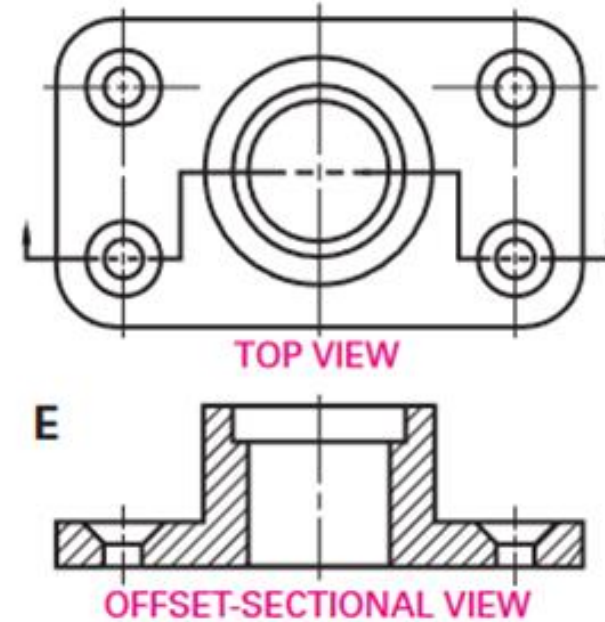


# TYPES OF SECTIONAL VIEW

- Full Section

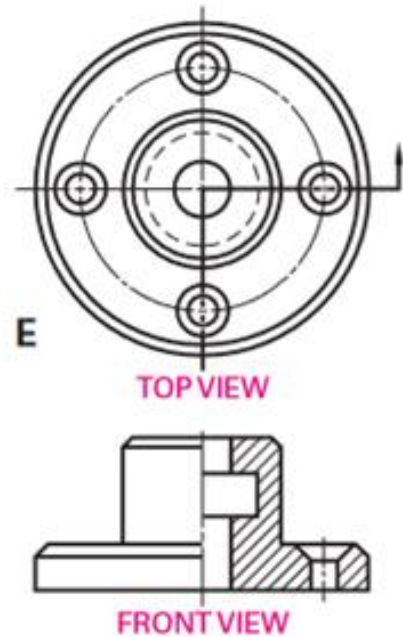


- Offset Section

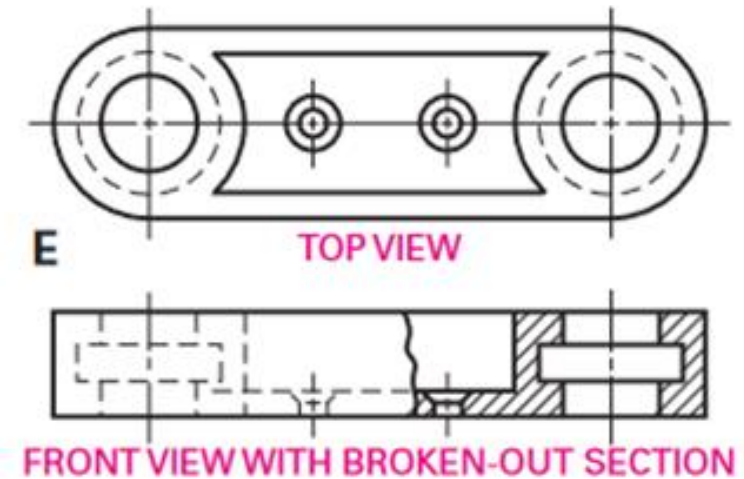


# TYPES OF SECTIONAL VIEW (CONT'D)

- Half Section

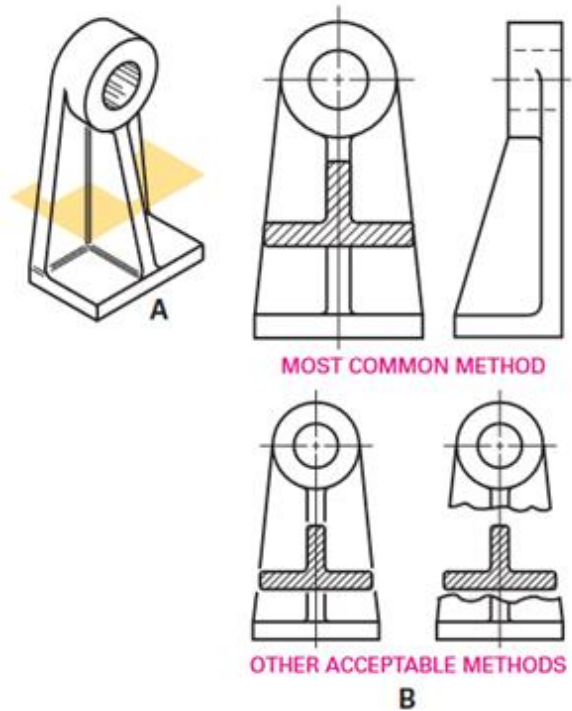


- Broken-out Section

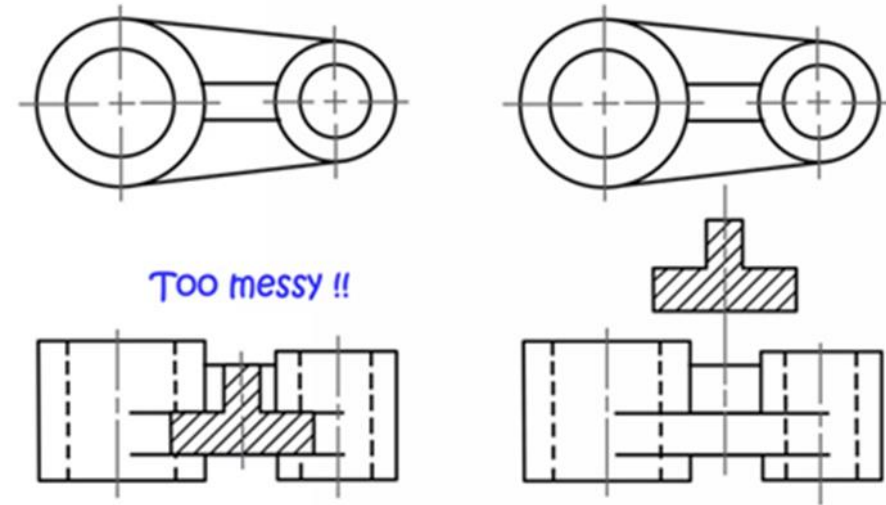


# TYPES OF SECTIONAL VIEW (CONT'D)

- Revolved Section

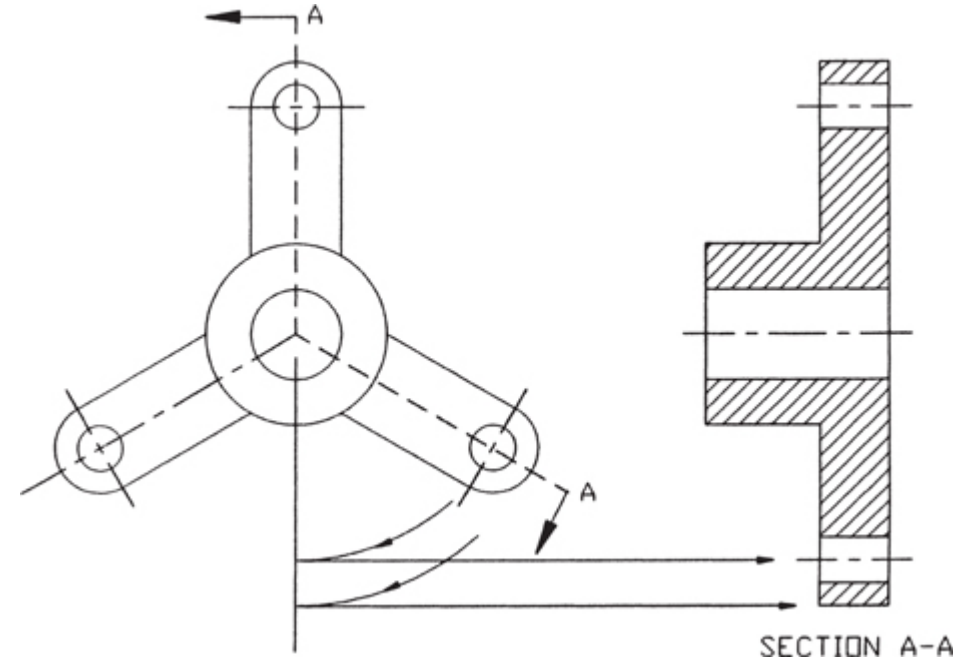
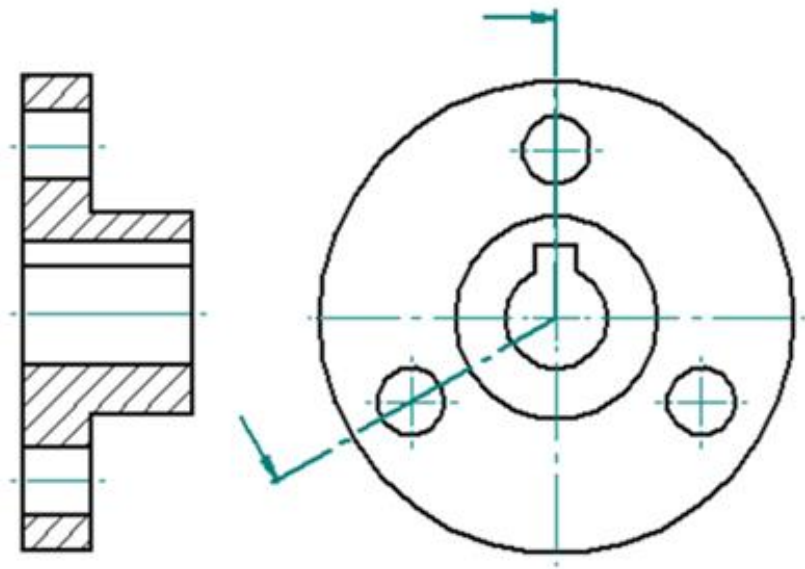


- Removed Section



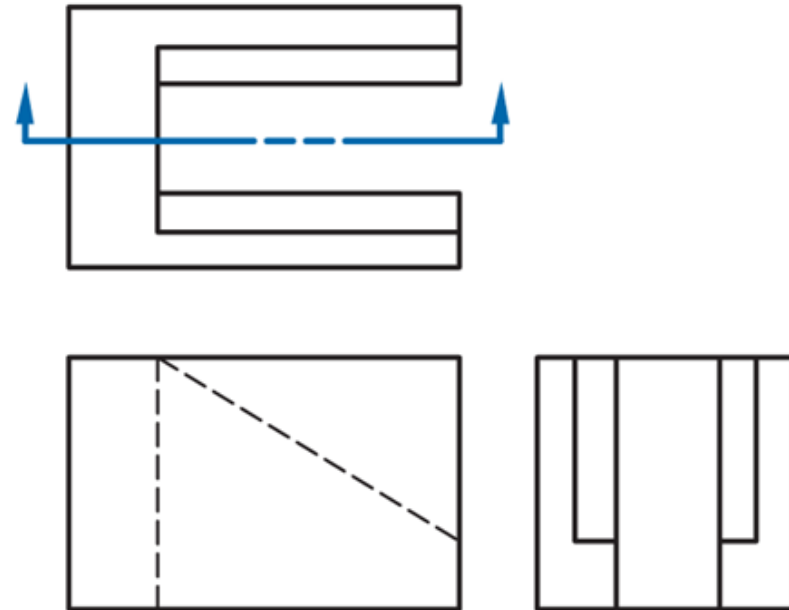
# TYPES OF SECTIONAL VIEW (CONT'D)

- 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