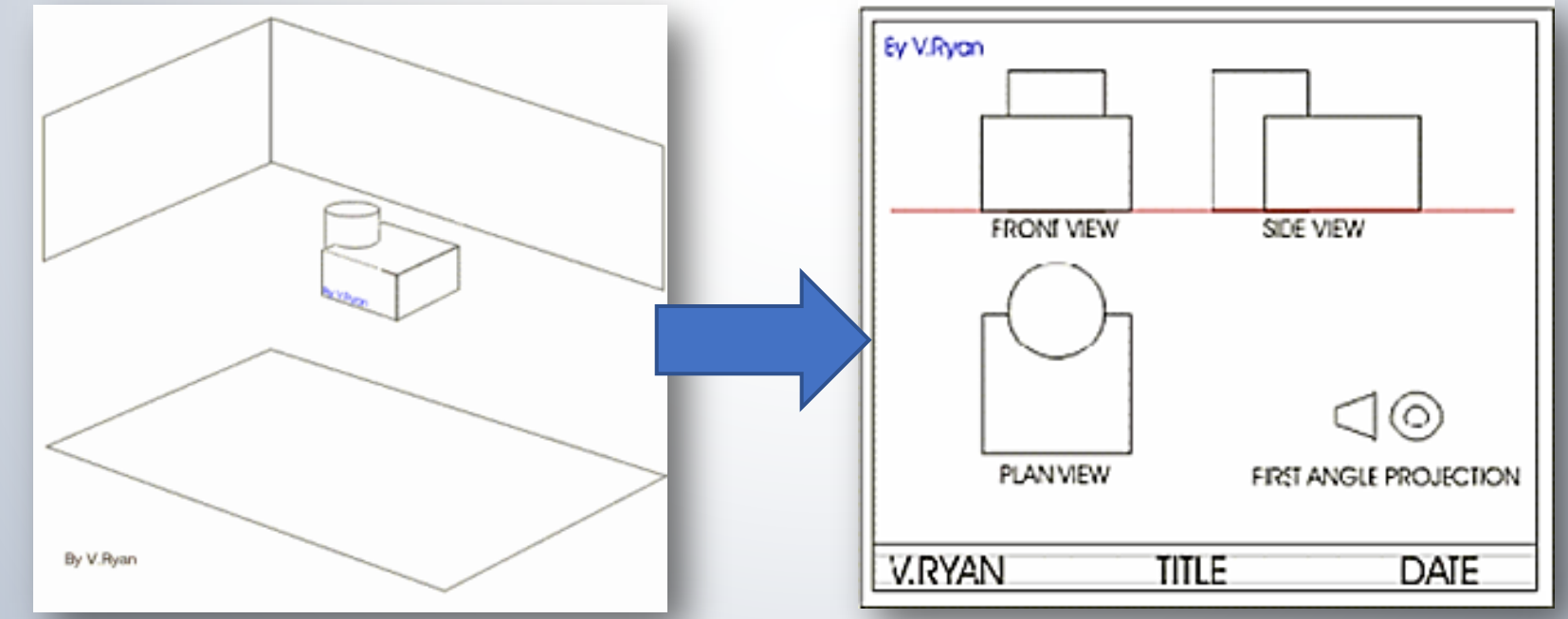
Computer-Aided Design

Principles of Projection and Orthographic Views

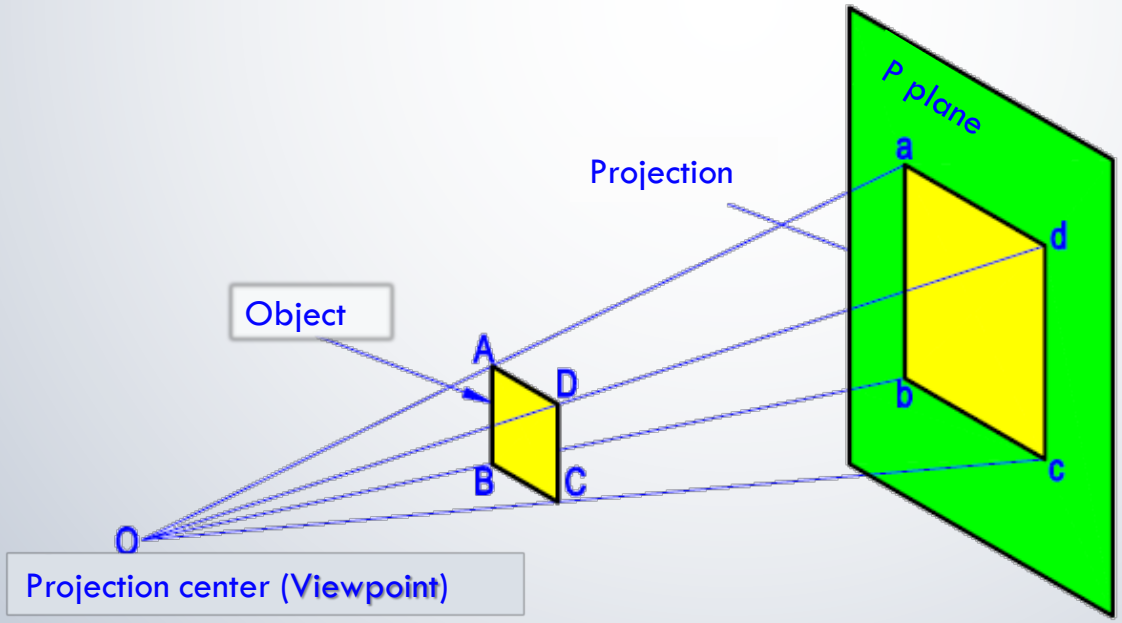
INTRODUCTION

- The three-dimensional shape of a part needs to be represented on the plane of two-dimensional paper.
- Sufficient number of projections, following the rules of projection are required.



PROJECTION

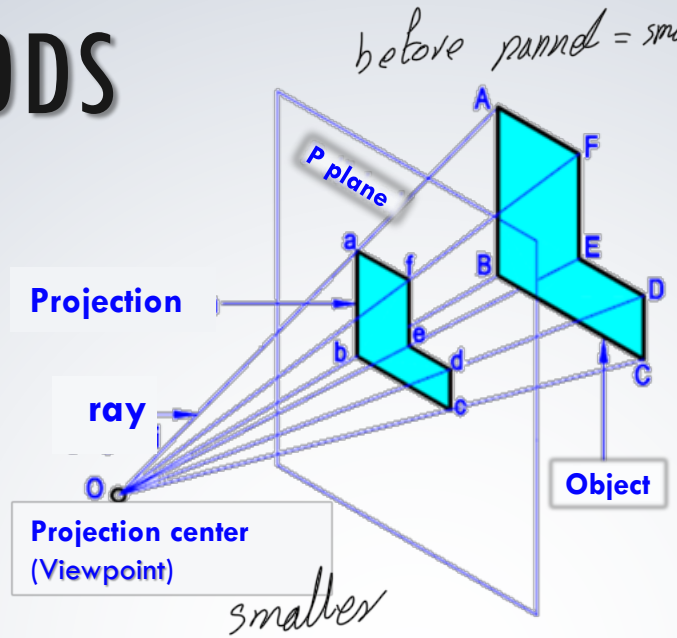
- To create a projection:
  - Object
  - Viewpoint
  - Projection plane are required.

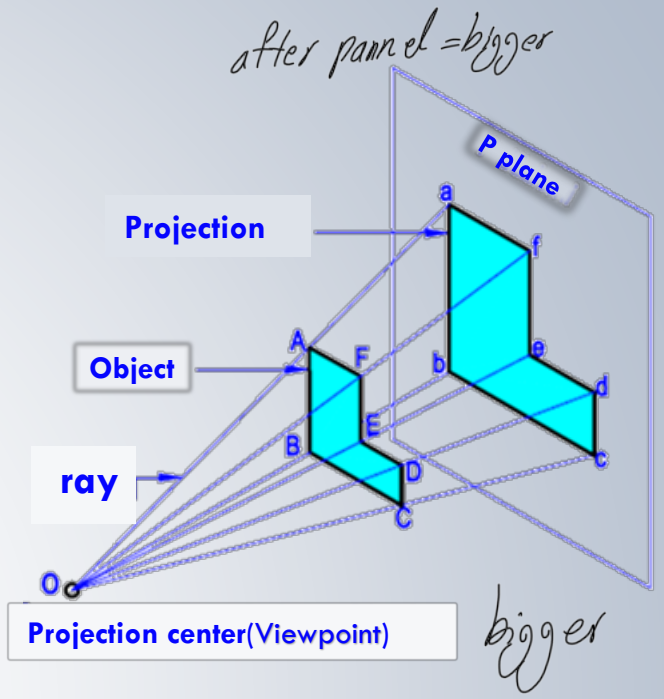


PROJECTION METHODS

realistic images

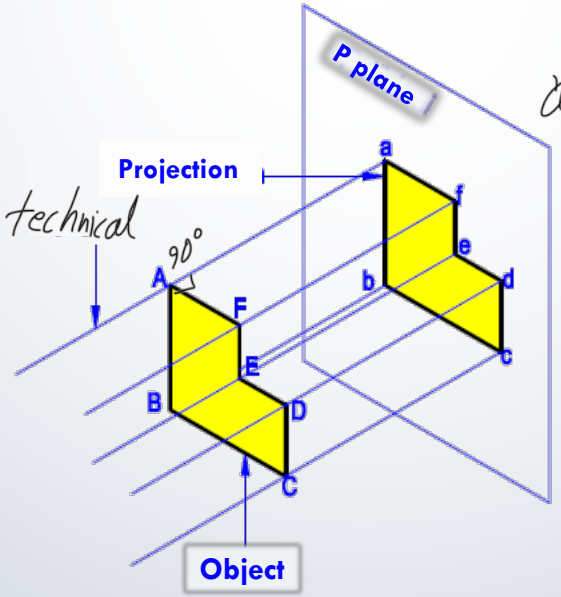
Central (conical) projection
(smaller - larger)



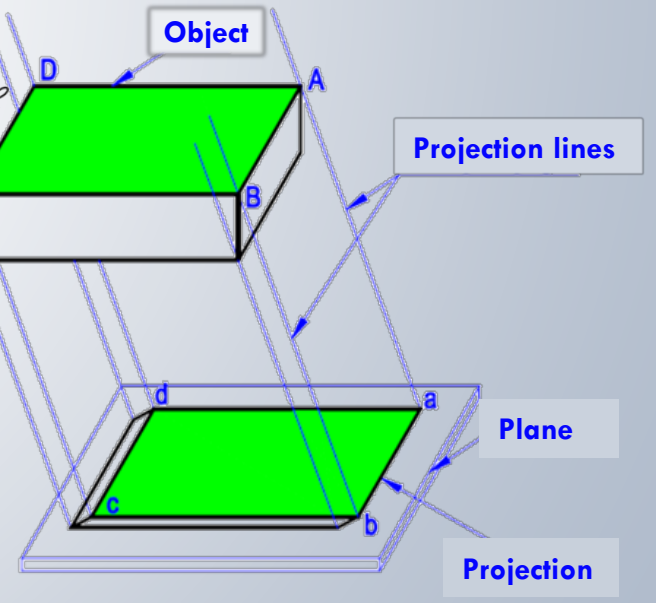


Parallel projection
(orthogonal - inclined)

used in drawing

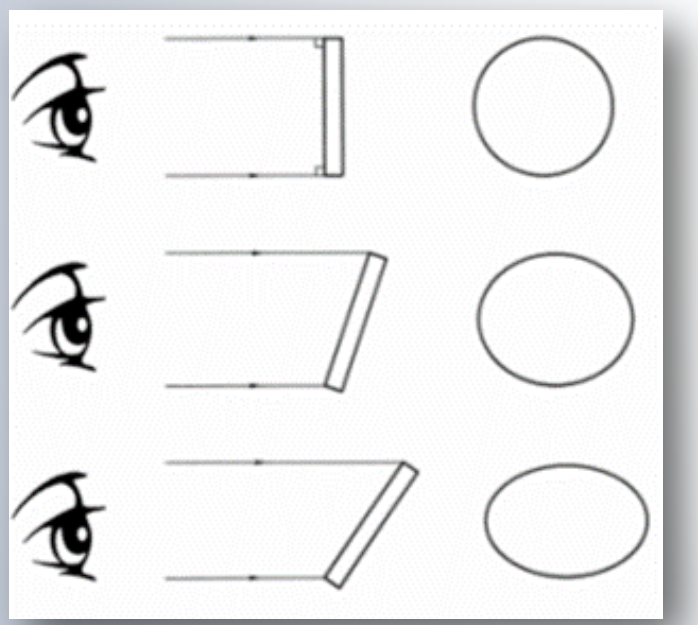


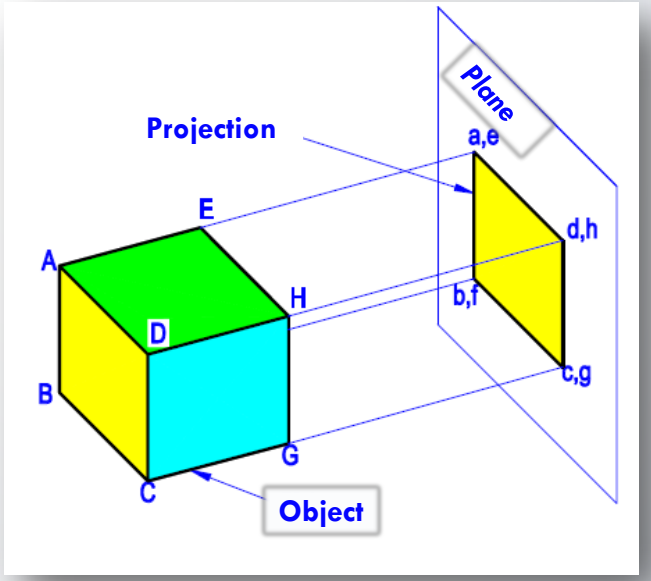
always same size & distance



PARALLEL ORTHOGONAL PROJECTION

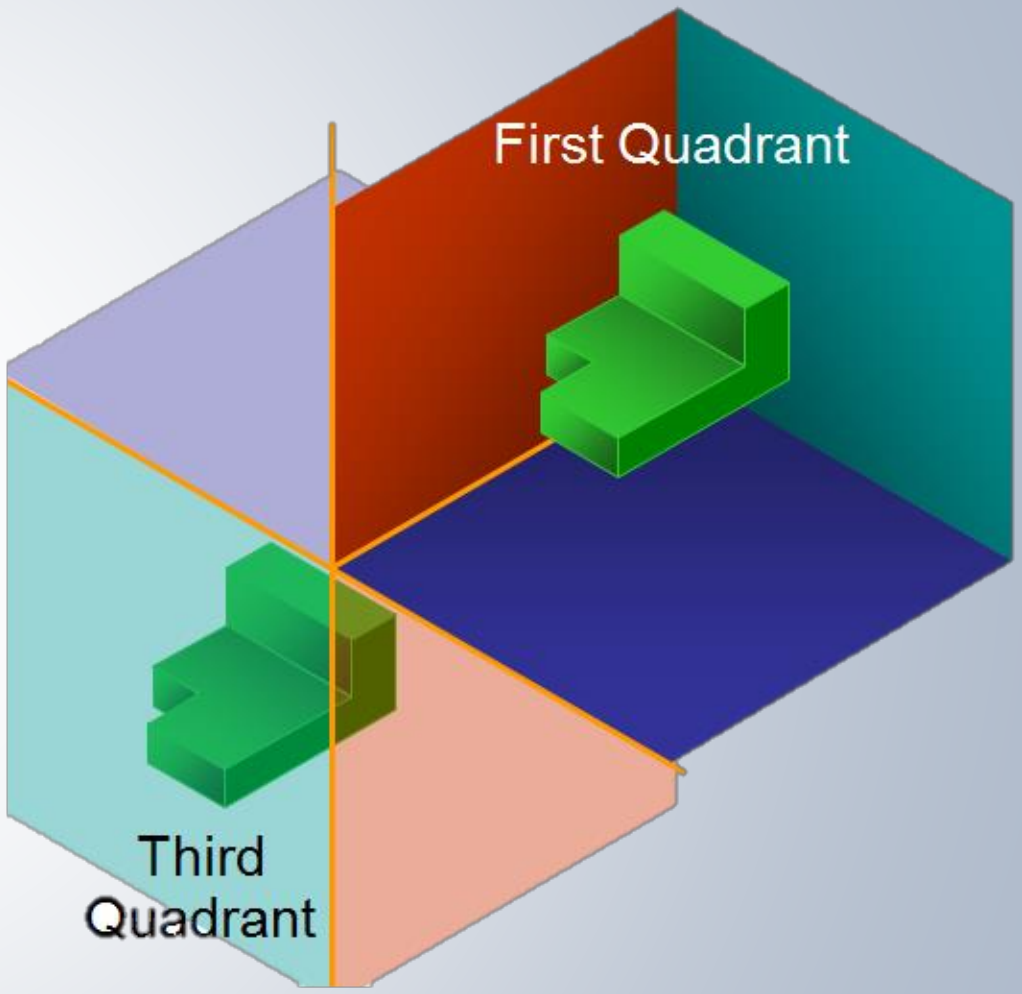
- By tilting the object according to the direction of view, the obtained forms will not display real dimensions.



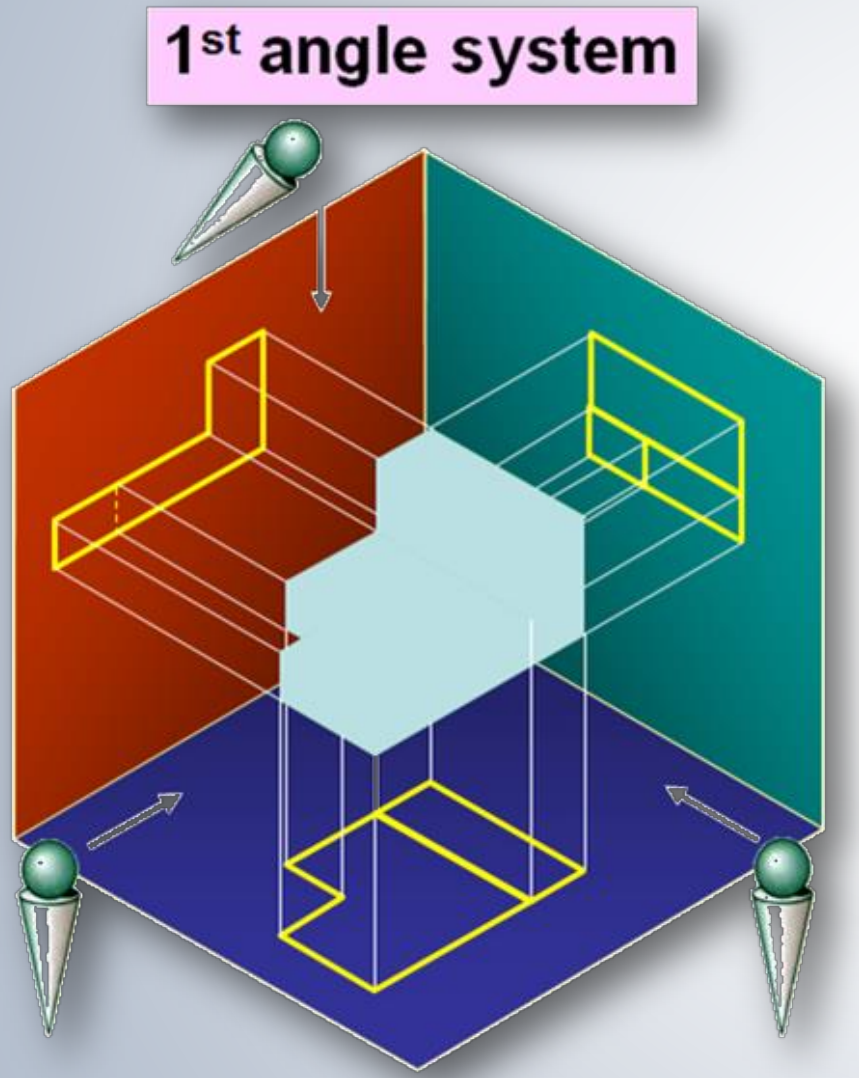


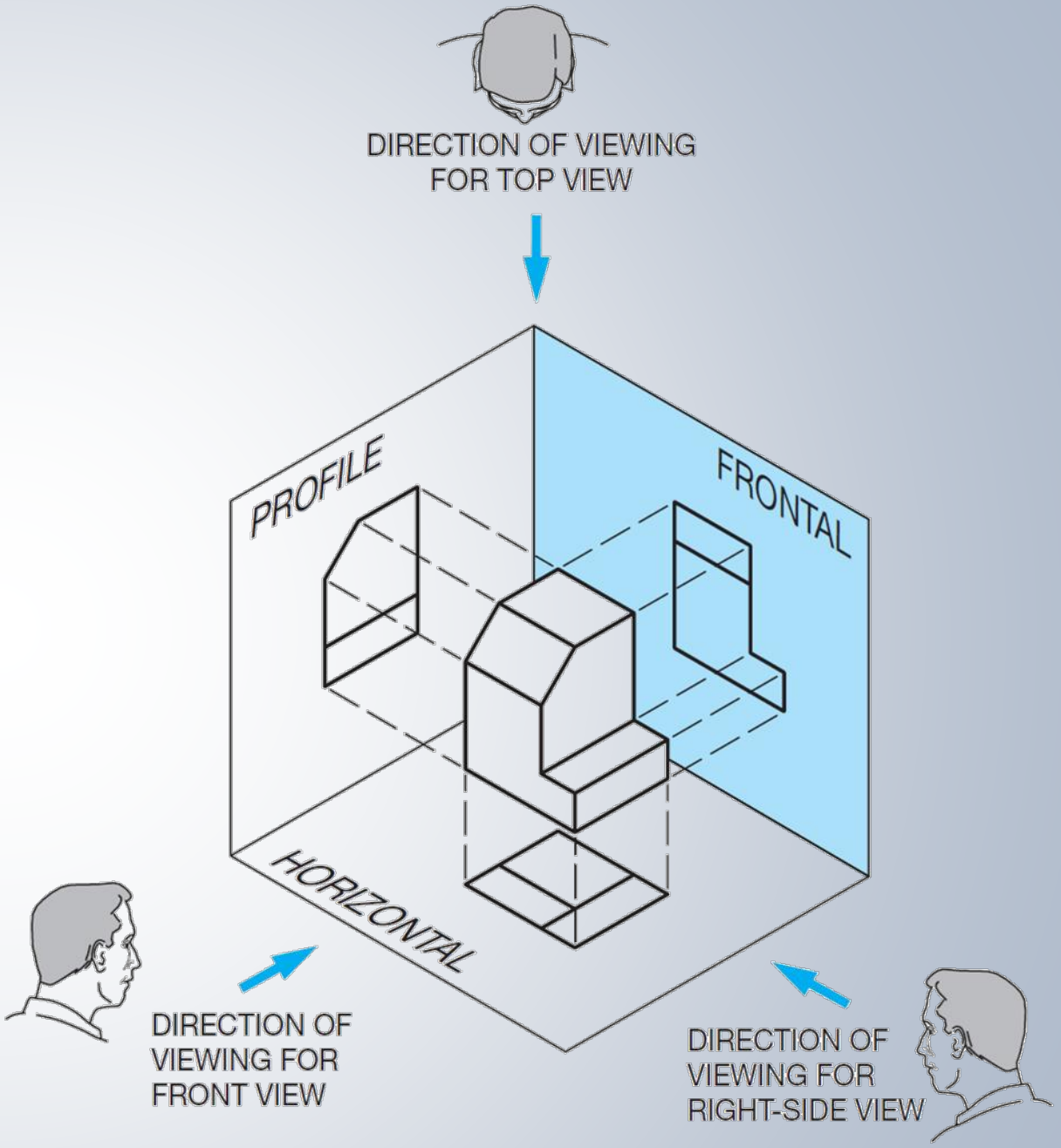
PROJECTION SYSTEMS

- Views are drawn according to the first and third quadrants.
- Europe and Türkiye is based on first quadrant: First Angle Projection or ISO-E Method always use
- In North America, third quadrant is taken as basis: Third Angle Projection or ISO-A Method.



FIRST ANGLE PROJECTION





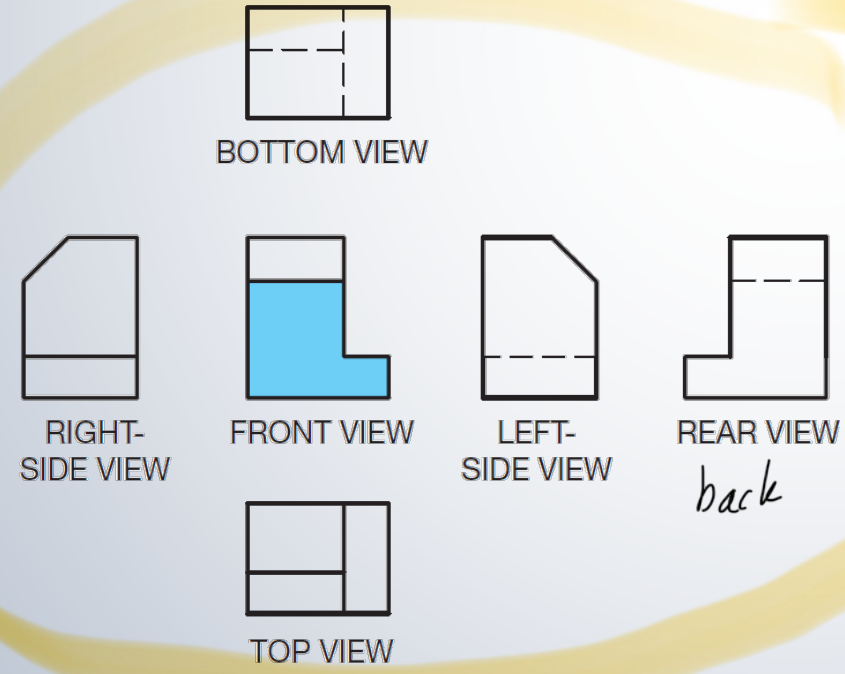
(A) OBJECT LOCATED IN FIRST QUADRANT BETWEEN THE OBSERVER AND THE PLANE OF PROJECTION

FIRST ANGLE PROJECTION

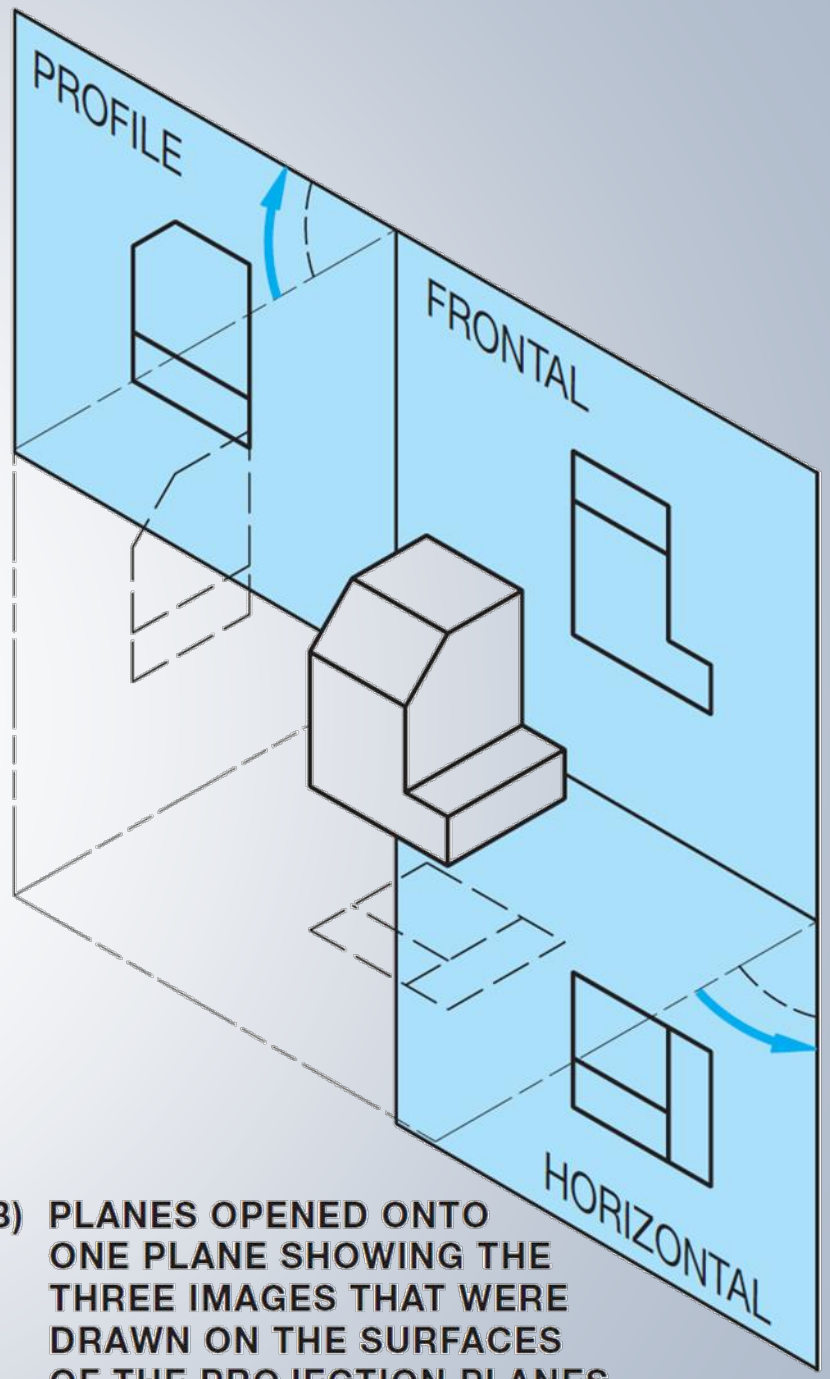
- The top view is placed below the front view.
- The bottom view is placed above the front view.
- The left view is placed on the right of the front view.
- The right view is placed on the left of the front view.
- The rear view is placed at the extreme left or right, whichever is convenient.

important

all you need to know about view

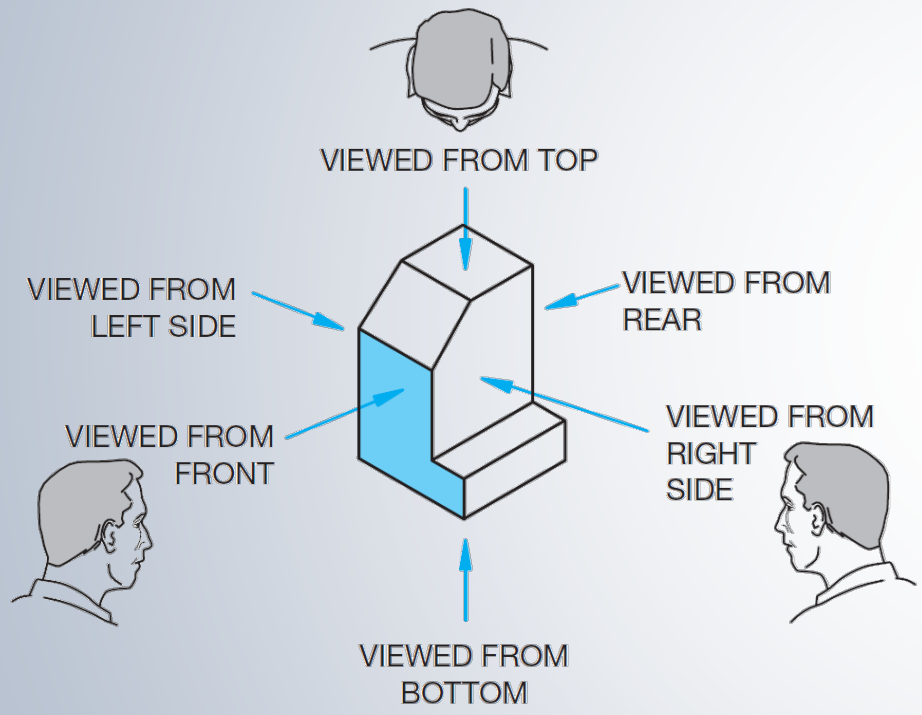


(C) THE SIX PRINCIPAL VIEWS

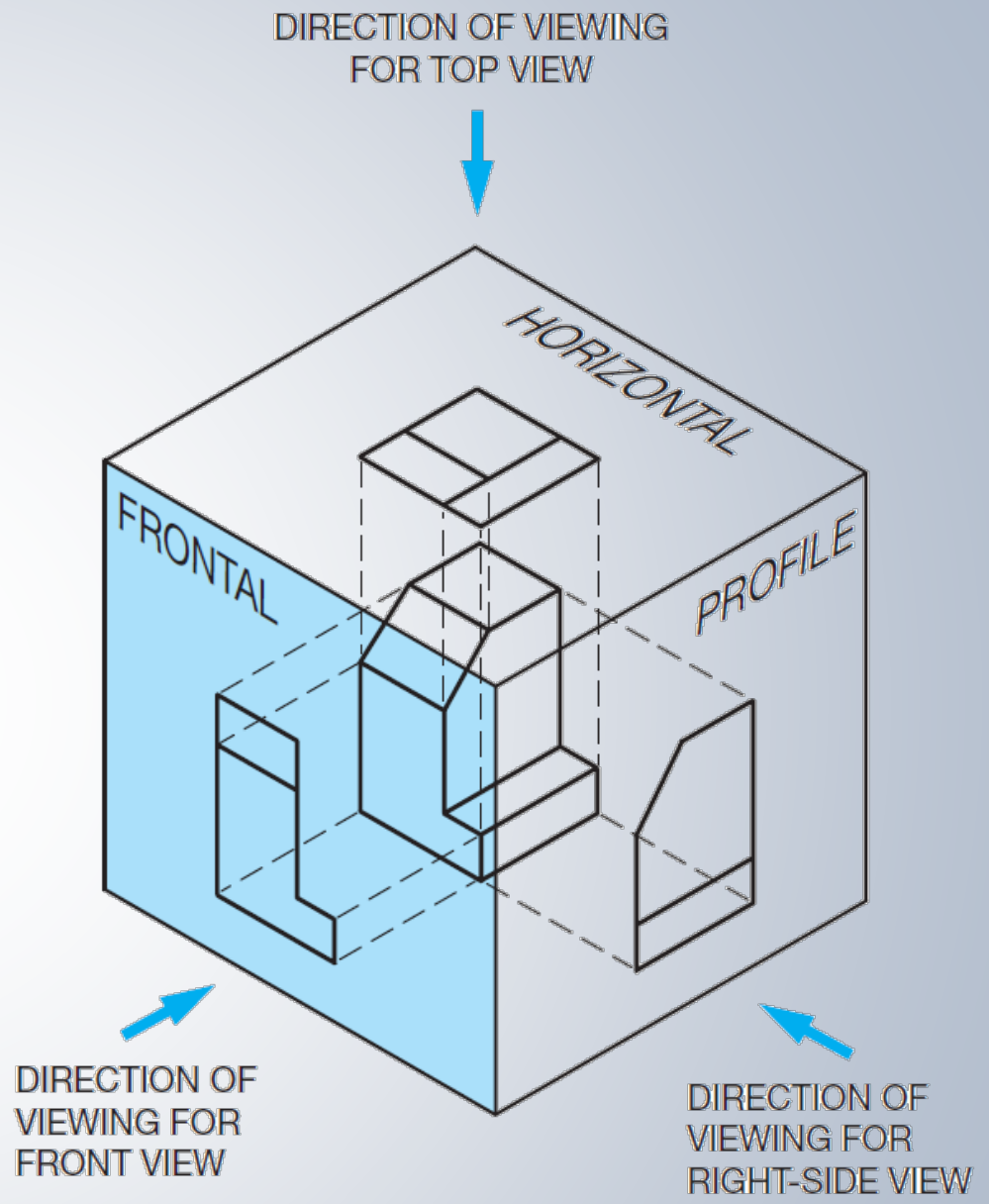


(B) PLANES OPENED ONTO ONE PLANE SHOWING THE THREE IMAGES THAT WERE DRAWN ON THE SURFACES OF THE PROJECTION PLANES

THIRD ANGLE PROJECTION



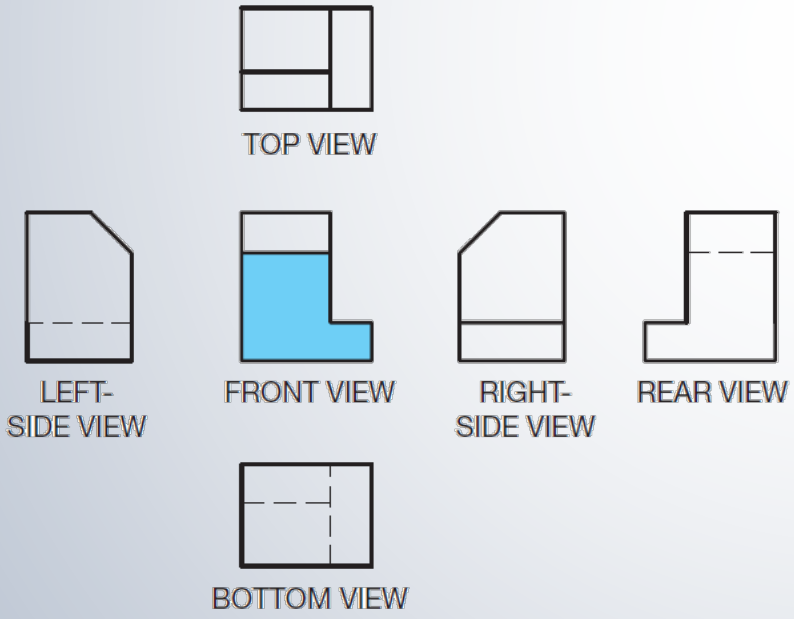
(A) OBSERVING THE OBJECT FROM DIFFERENT POSITIONS



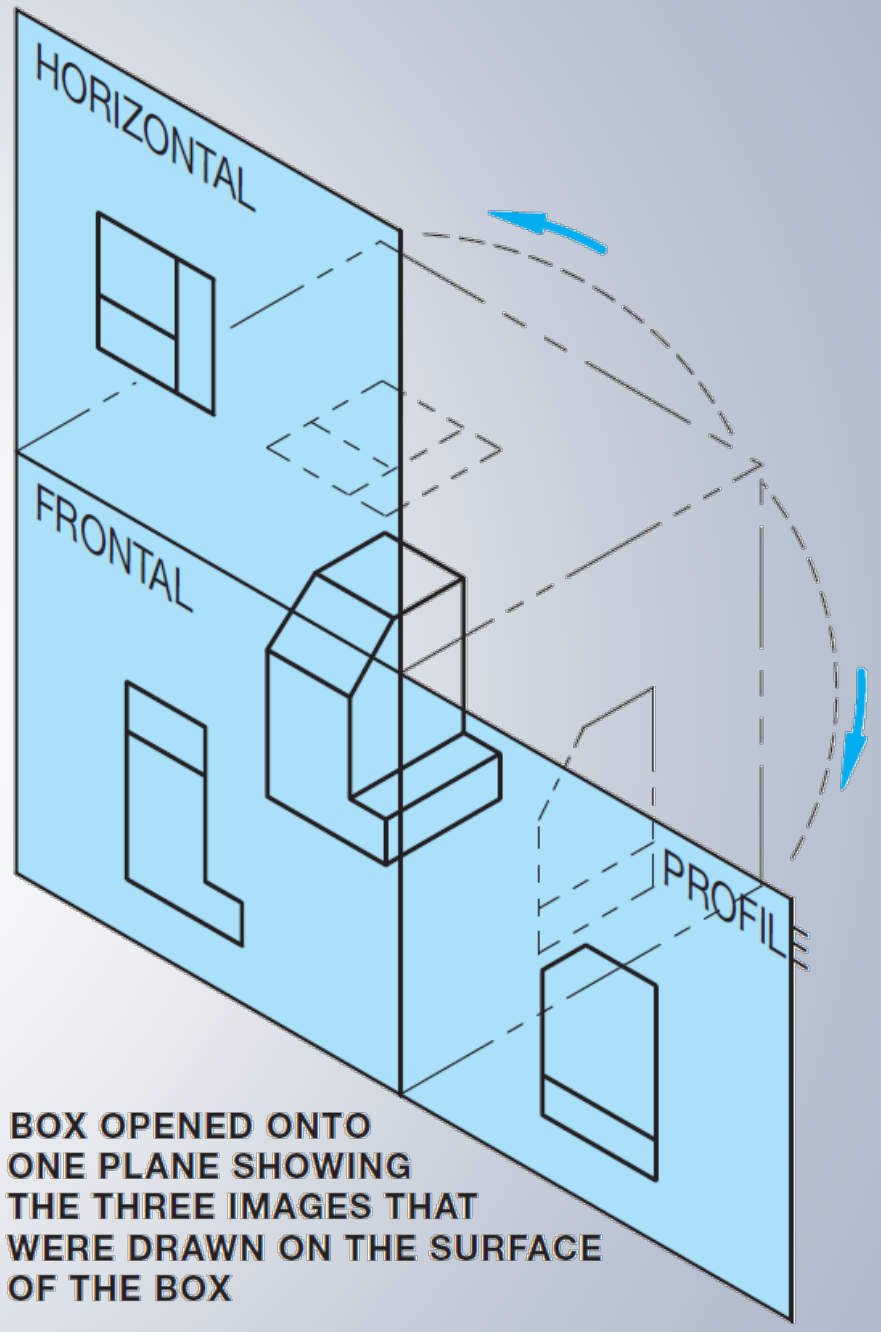
(B) OBJECT ENCLOSED IN A GLASS BOX AND IMAGES OF OBJECT DRAWN ON SURFACES OF BOX

THIRD ANGLE PROJECTION

- The top view is placed above.
- The bottom view is placed underneath.
- The left view is placed on the left.
- The right view is placed on the right.
- The rear view is placed at the extreme left or right, whichever is convenient.

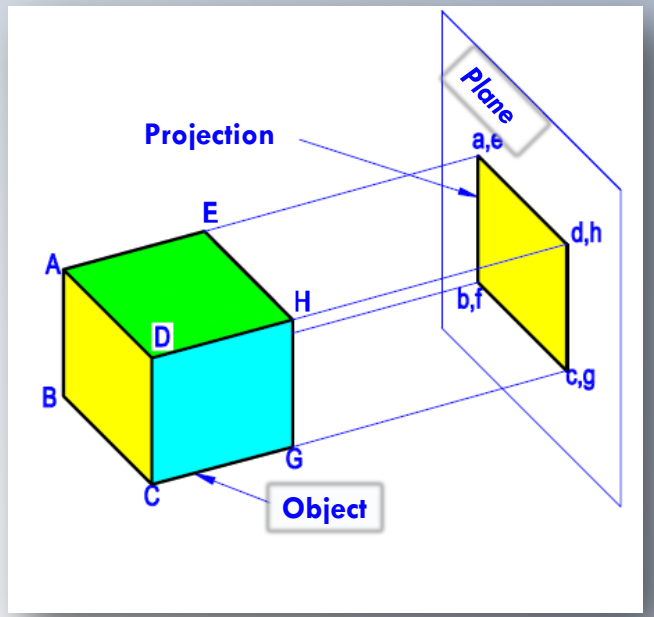


(D) THE SIX PRINCIPAL VIEWS



(C) BOX OPENED ONTO ONE PLANE SHOWING THE THREE IMAGES THAT WERE DRAWN ON THE SURFACE OF THE BOX

VIEWS ~ GENERAL RULES

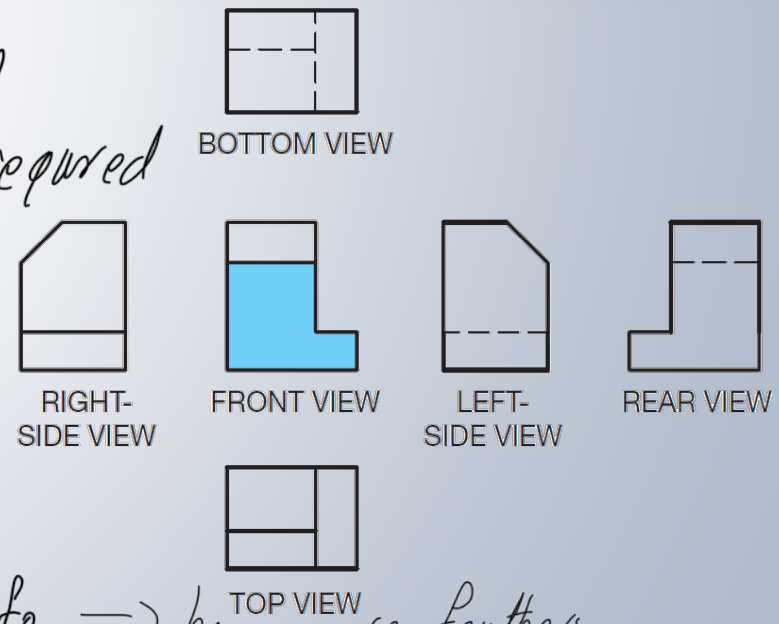


- 2D views are obtained by orthogonal projections parallel to planes arranged symmetrically.
- Six views according to their orientation may be required for full representation (not all of them)
- The number of necessary and sufficient views should be minimal, details should not be repeated.
- The main view should be determined as that gives the most information.
- The main view is usually the front view showing in the manufacturing, function or assembly position.
- Other views are positioned according to the main view and projection method.

only draw required number of views

usually front is main

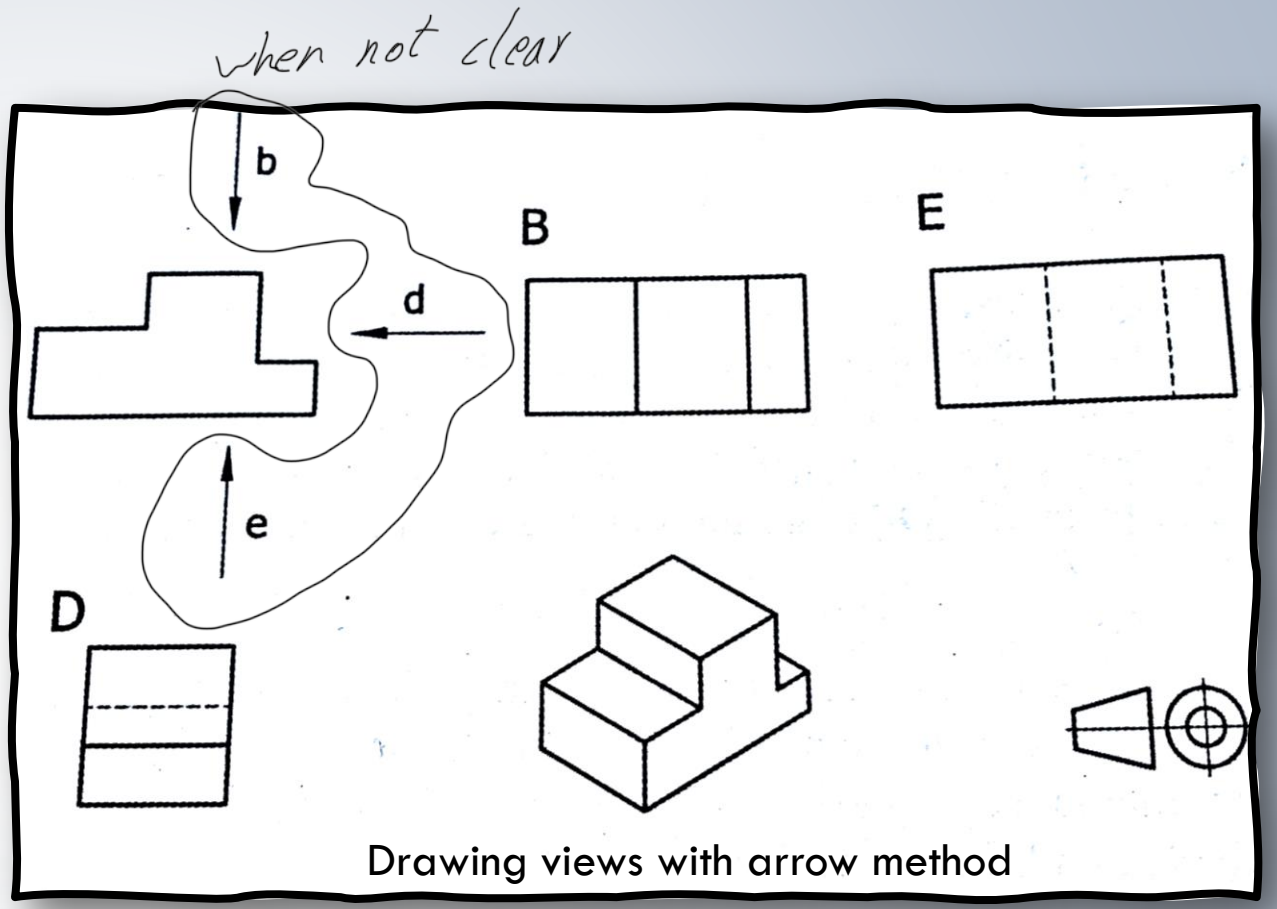
main => gives most info => have more feathers



(C) THE SIX PRINCIPAL VIEWS

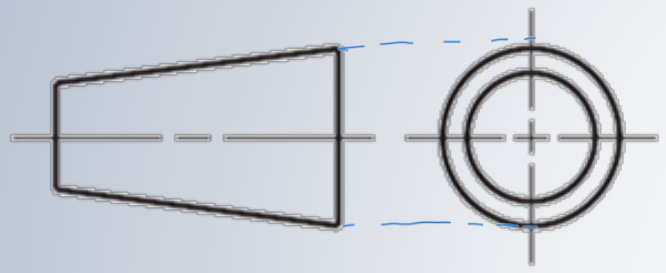
ARROW METHOD

- Different views can be arranged independently when first and third angle systems are not suitable
- Every aspect except the main view is indicated by a letter
- The view direction is represented by a lowercase letter, and the view is represented by a capital letter on the upper left.



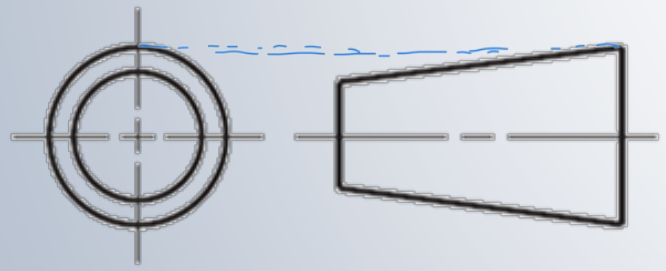
Drawing views with arrow method

PROJECTION SYMBOLS



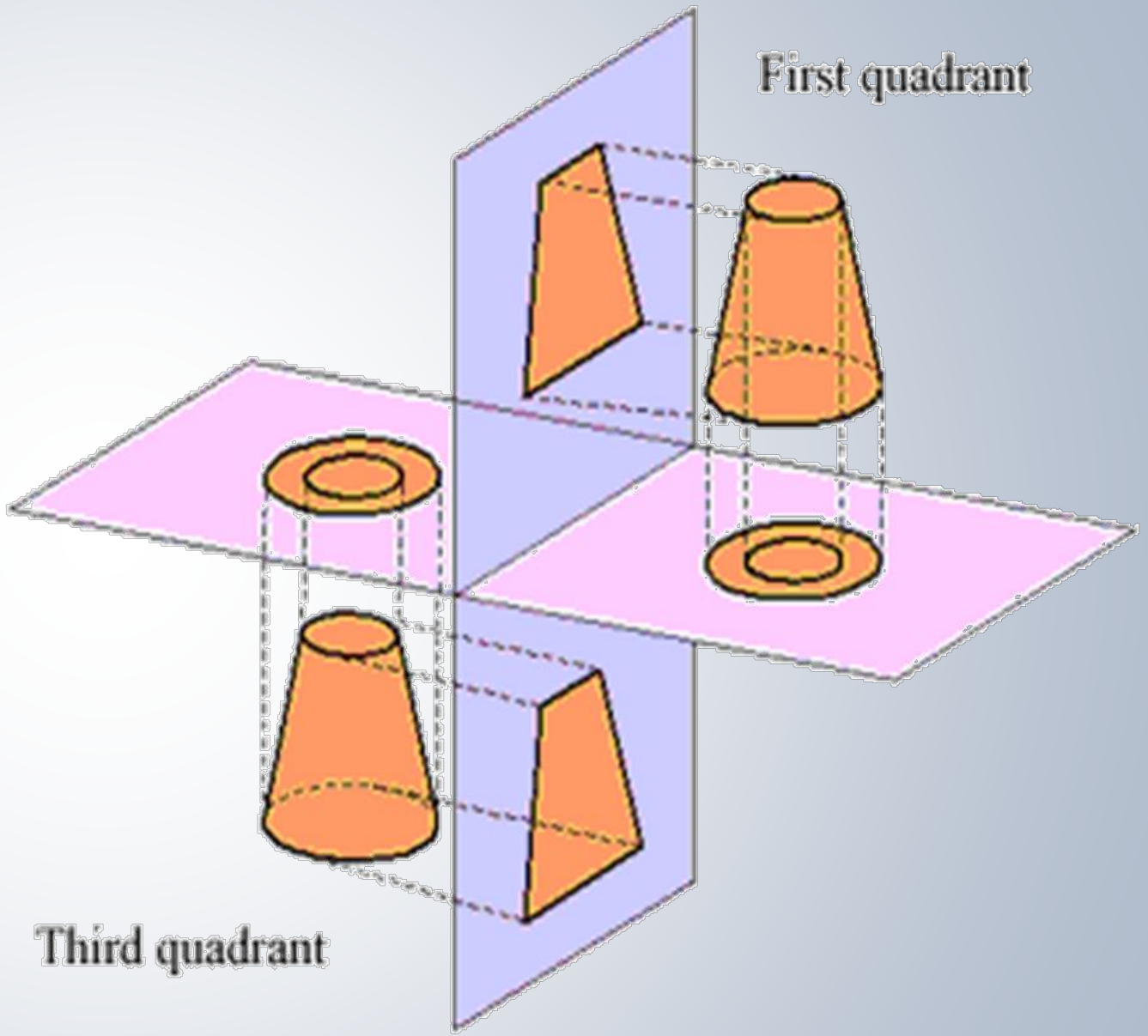
(A) FIRST ANGLE

draw according to first Angle rule

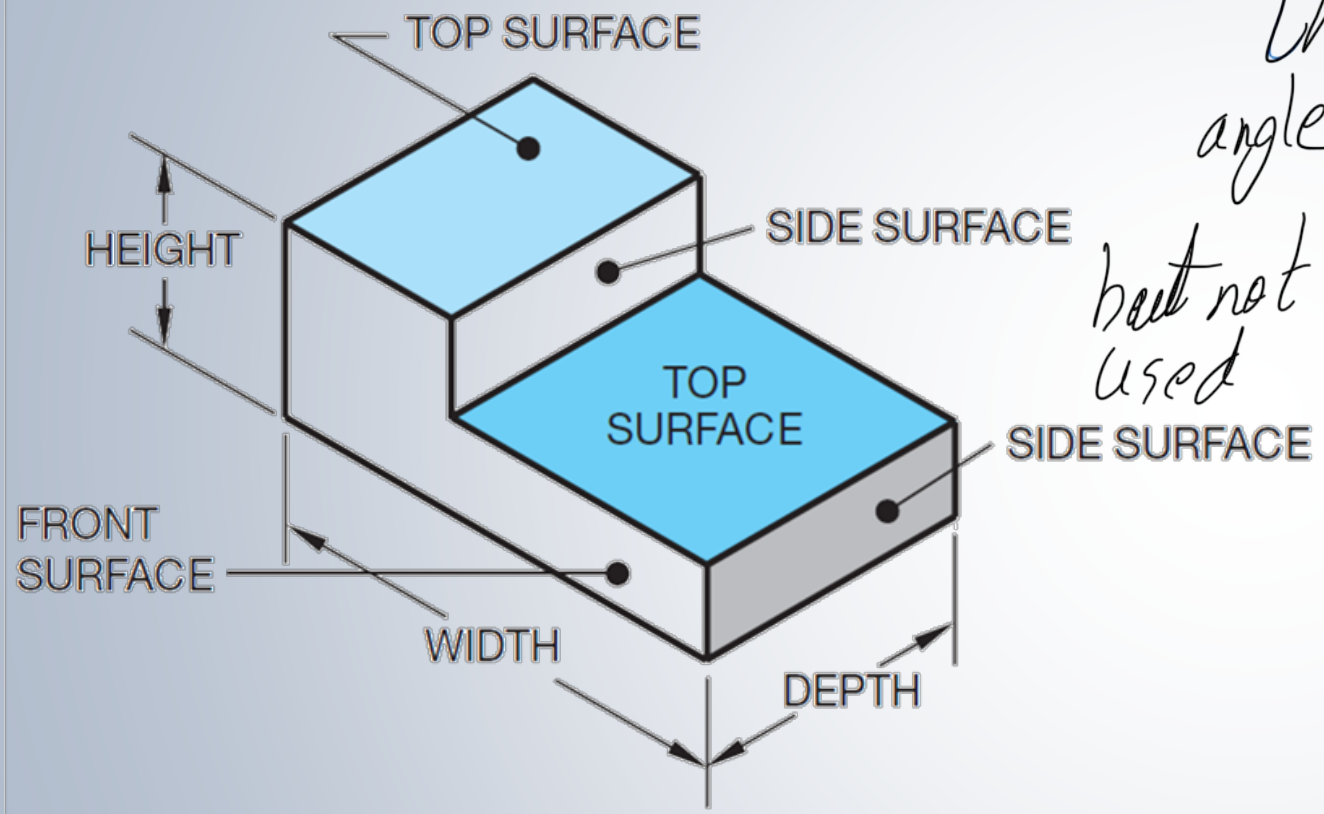


(B) THIRD ANGLE

draw according to 3rd angle rule

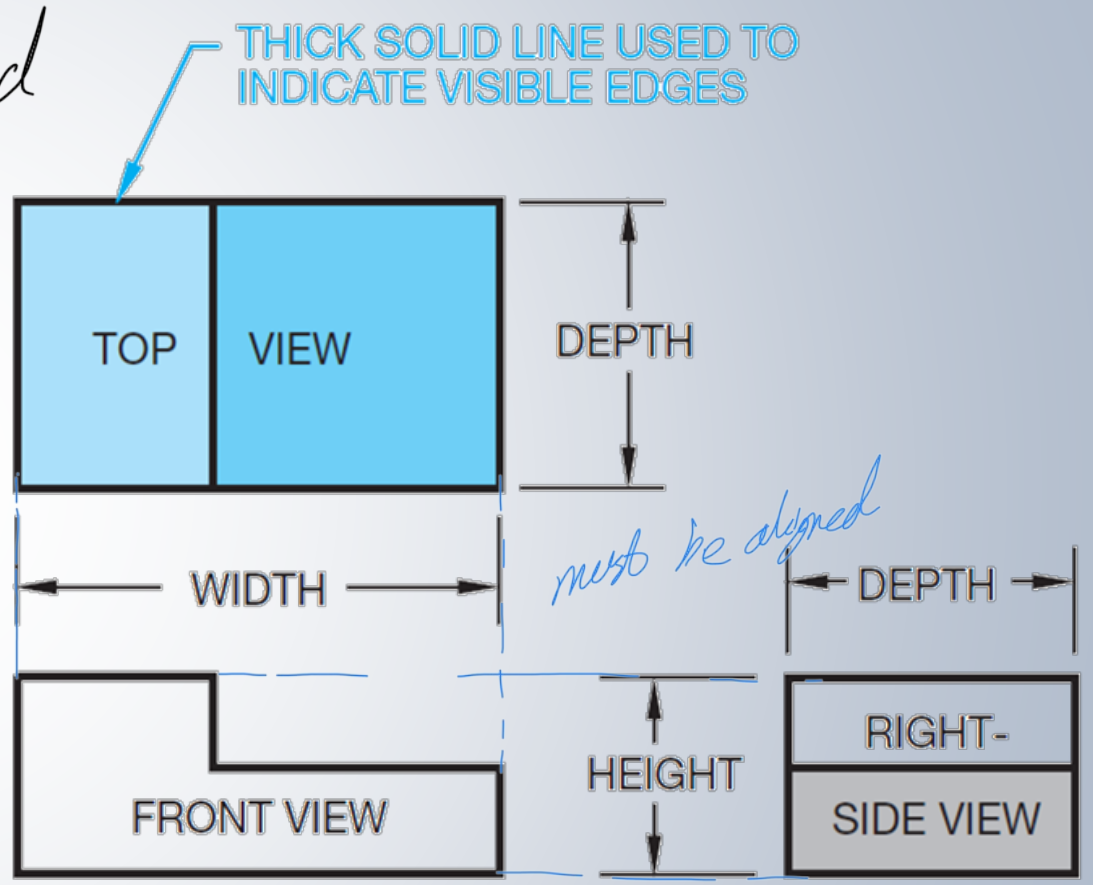


PICTORIAL ~ ORTOGRAPHIC PROJECTION DRAWING

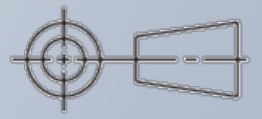


(A) PICTORIAL DRAWING
(ISOMETRIC PROJECTION)

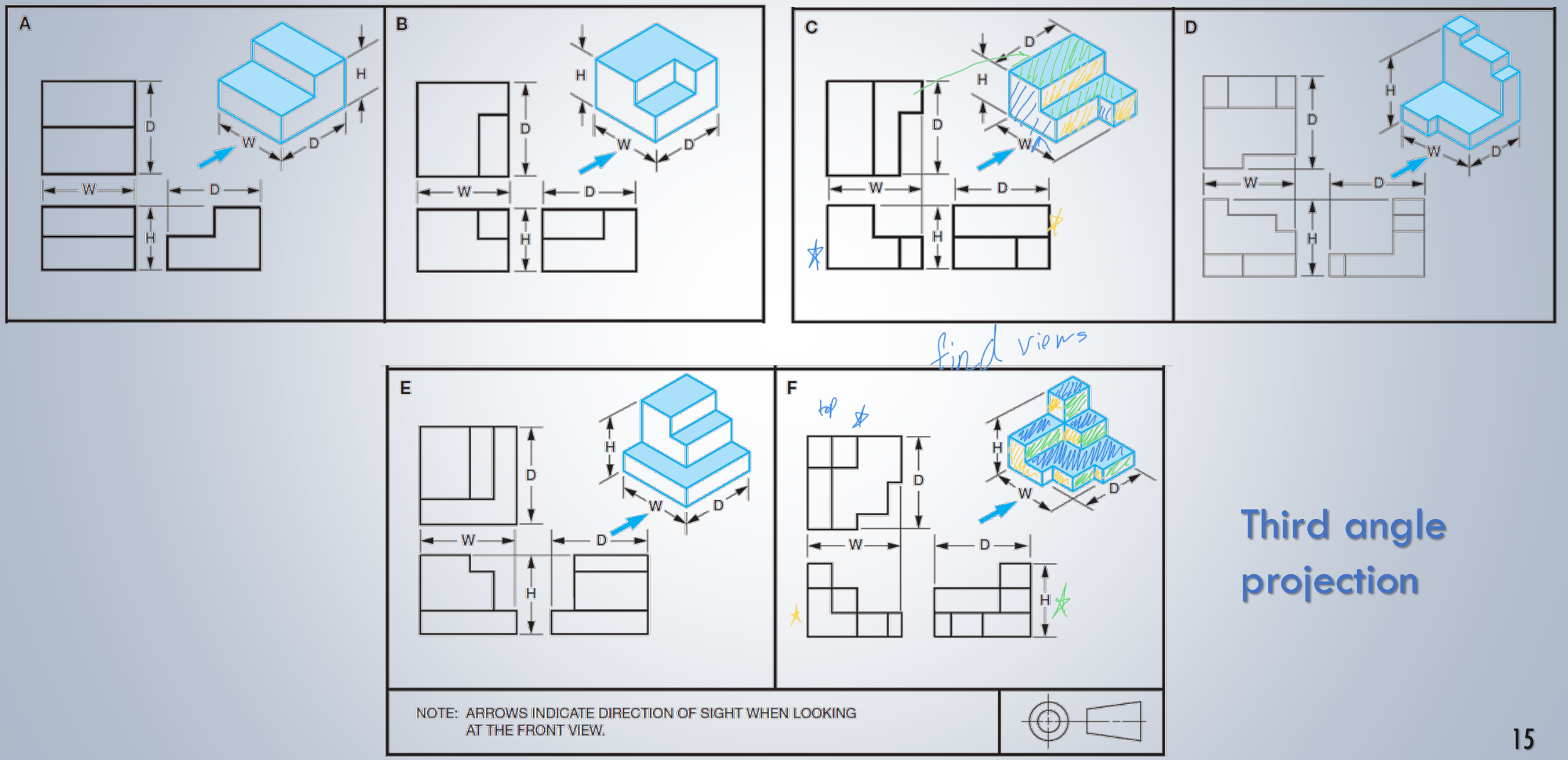
Third angle but not used



(B) ORTHOGRAPHIC PROJECTION DRAWING
(THIRD-ANGLE PROJECTION)



EXAMPLES

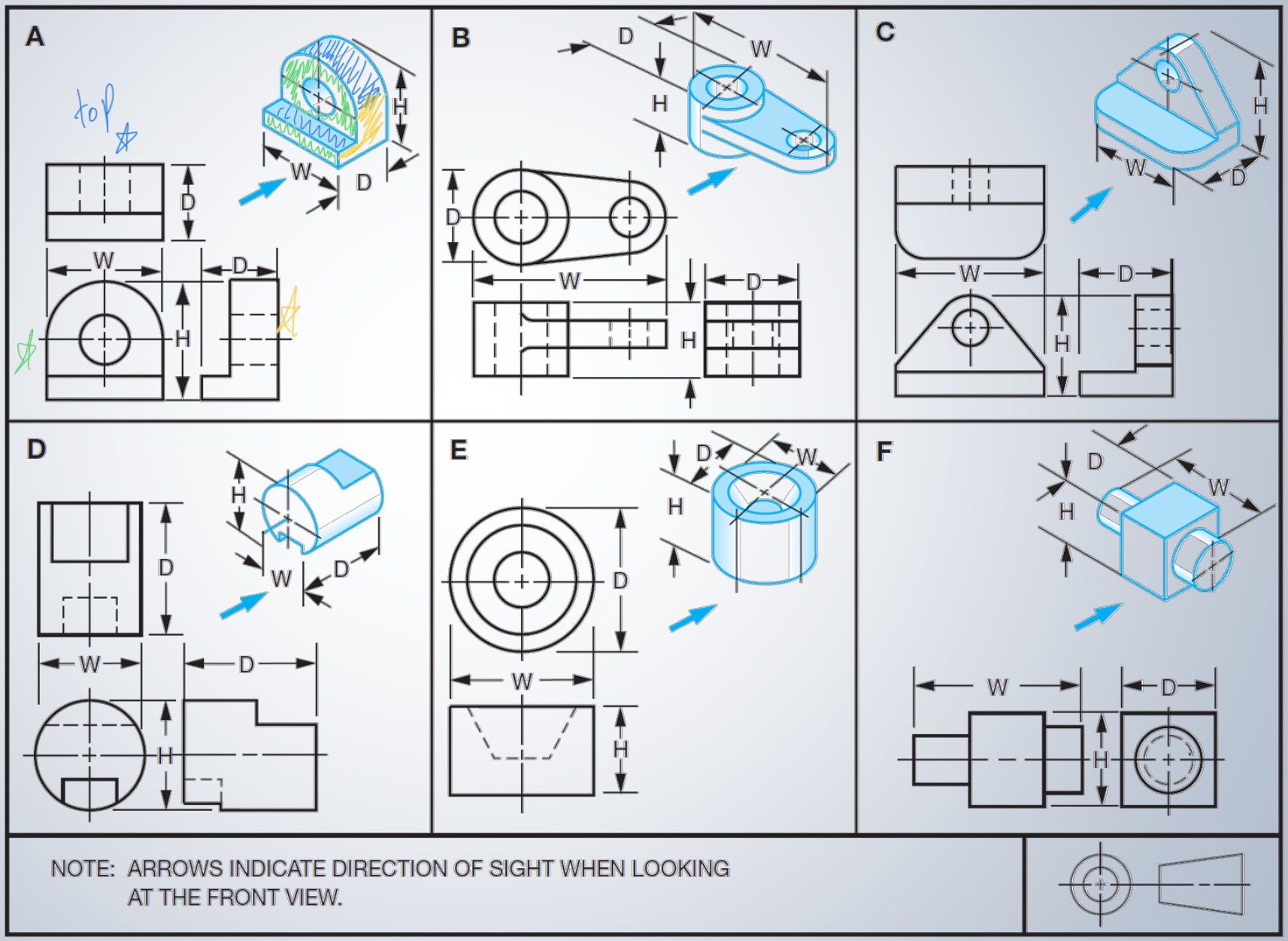


Third angle projection

EXAMPLES~CIRCULAR FEATURES

Third angle projection

Don't draw if No sharp edge

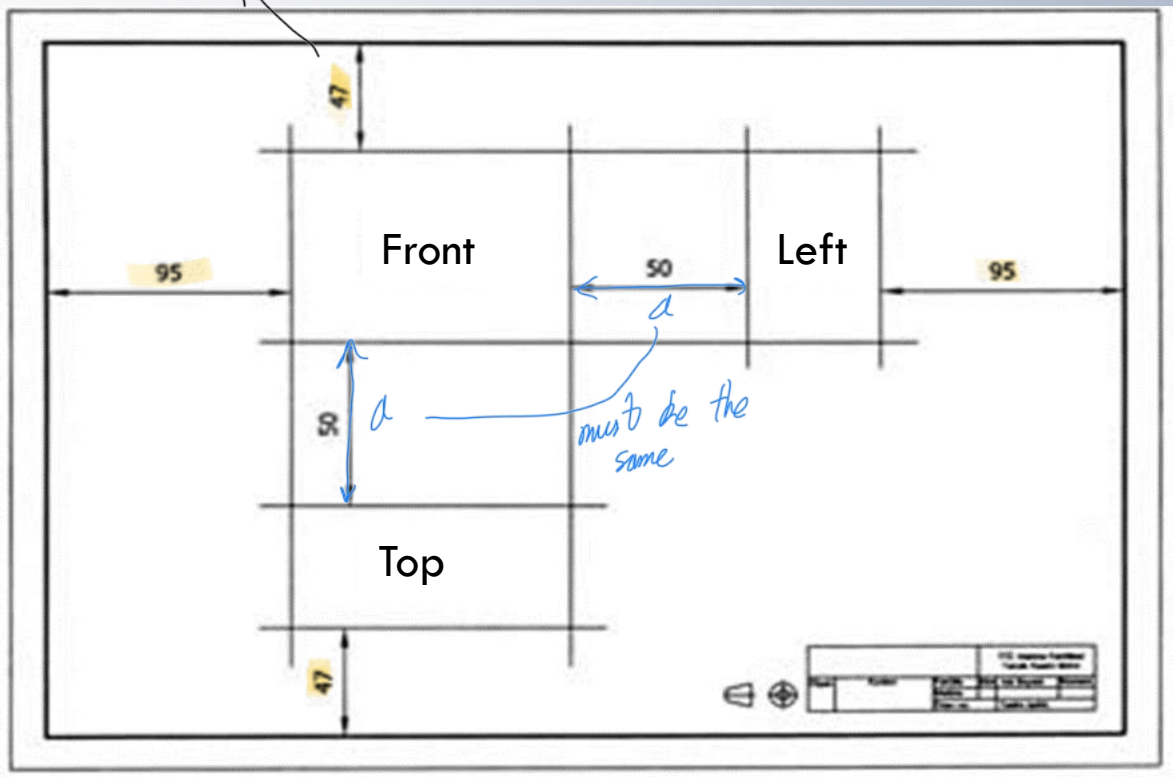


DRAWING VIEWS

being aligned at the middle of paper not required

- The main view (front) is usually drawn first
- Other views are placed according to the projection method.
- Views must be aligned
- Distances between views and distances to frames should be taken equal.
- Front view: The face showing the characteristic shape or the view with less hidden lines.
- Parts with features (depression, protrusions, holes, etc.) can be drawn in 3 or more views.
- Simple parts can be drawn in two views

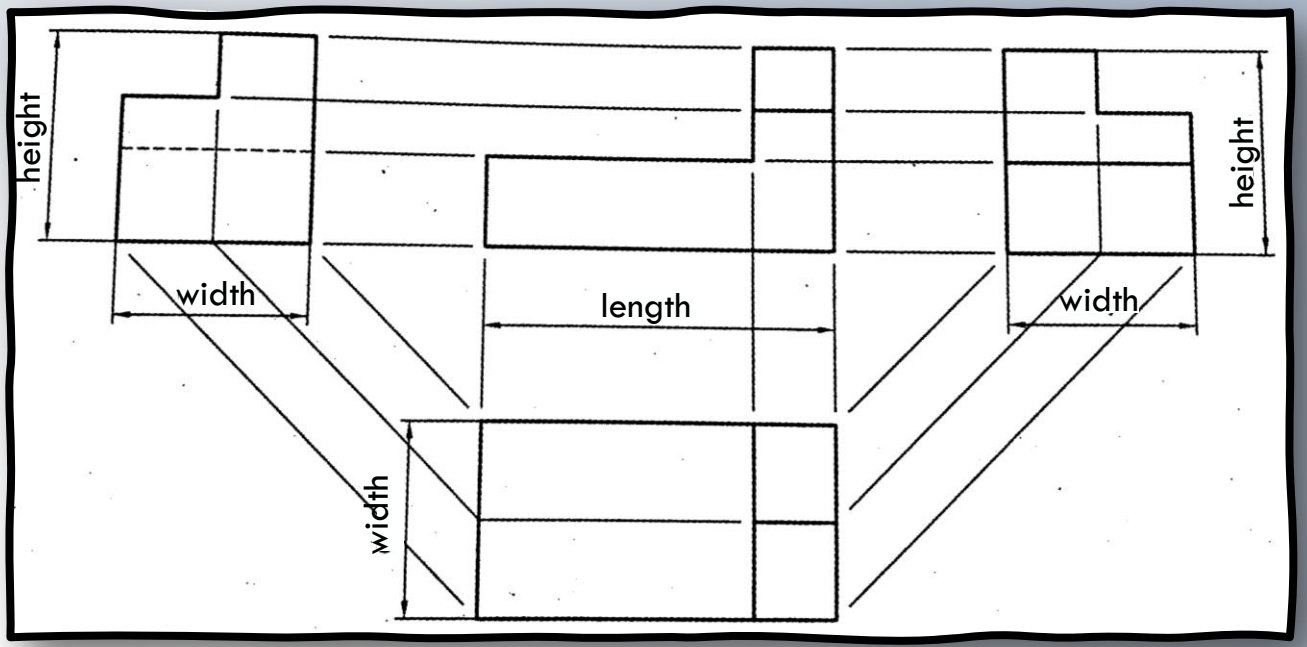
First angle projection



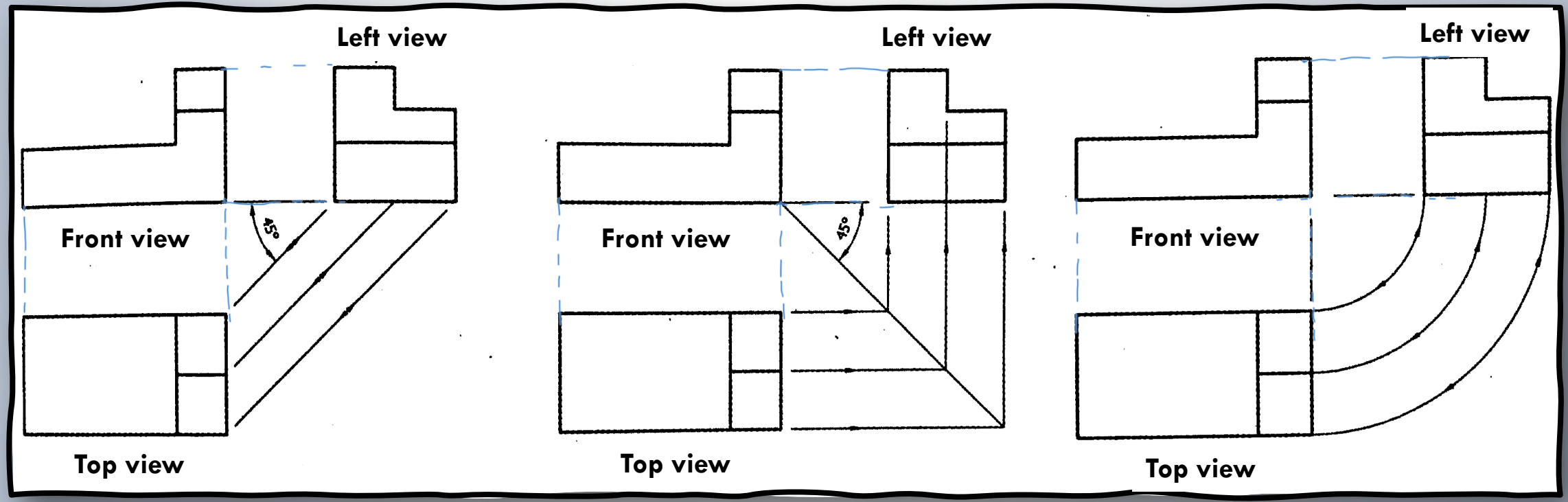
OBTAINING A VIEW WITH THE TRANSFER RULE

Explain later

- The views must be aligned so that the respective height or width value does not change
- Projection lines and 45° miter line

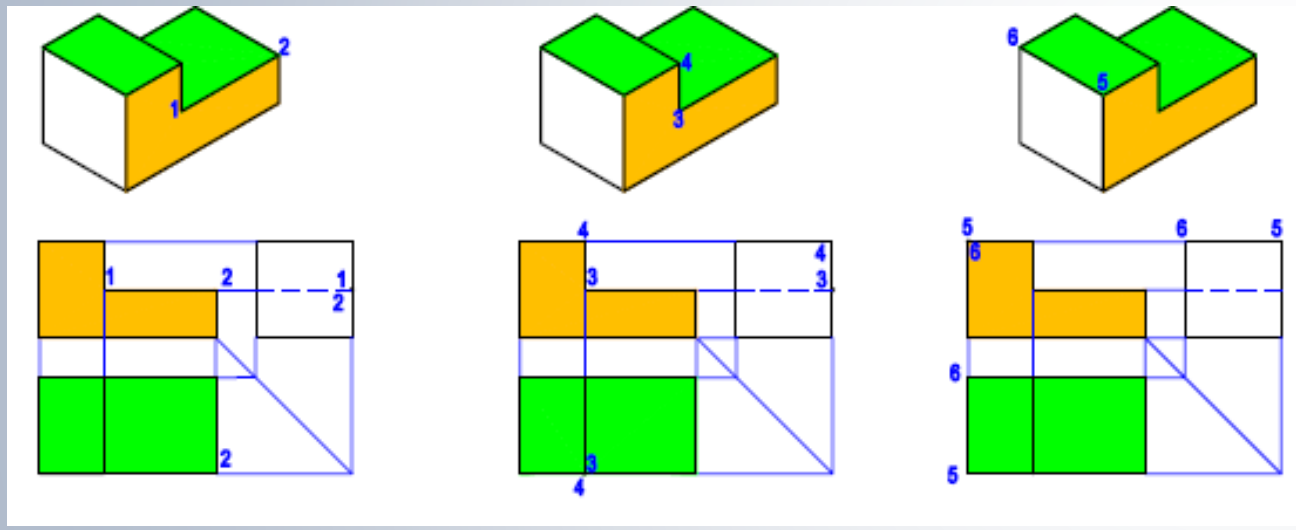


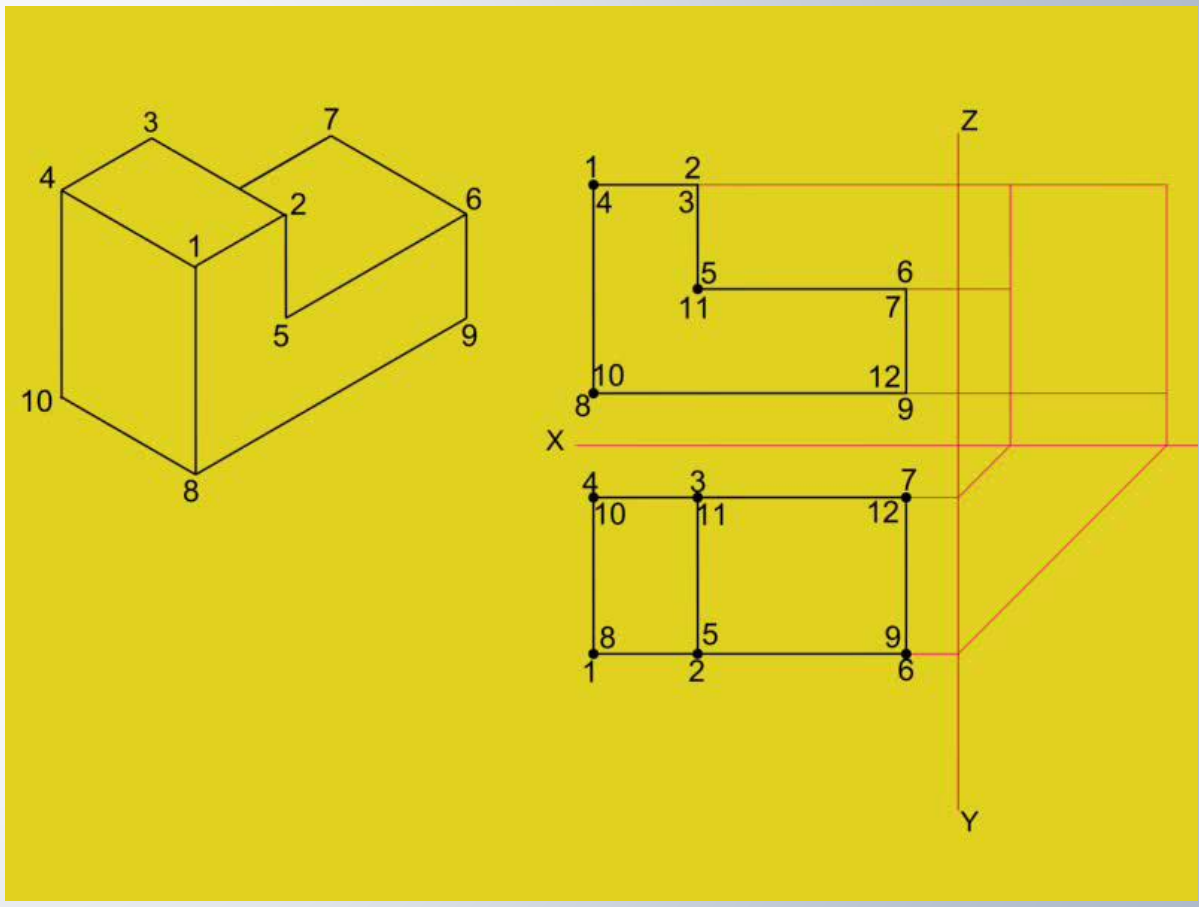
Three different transfer rules



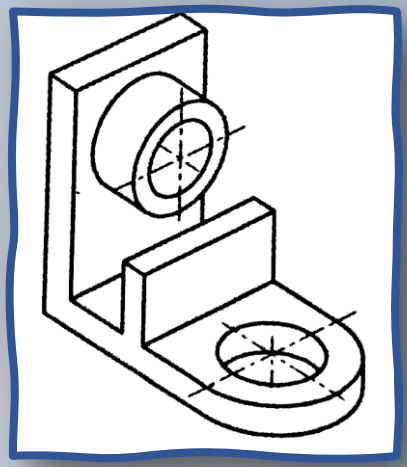
OBTAINING A VIEW WITH THE TRANSFER RULE

Projections of a line on the object

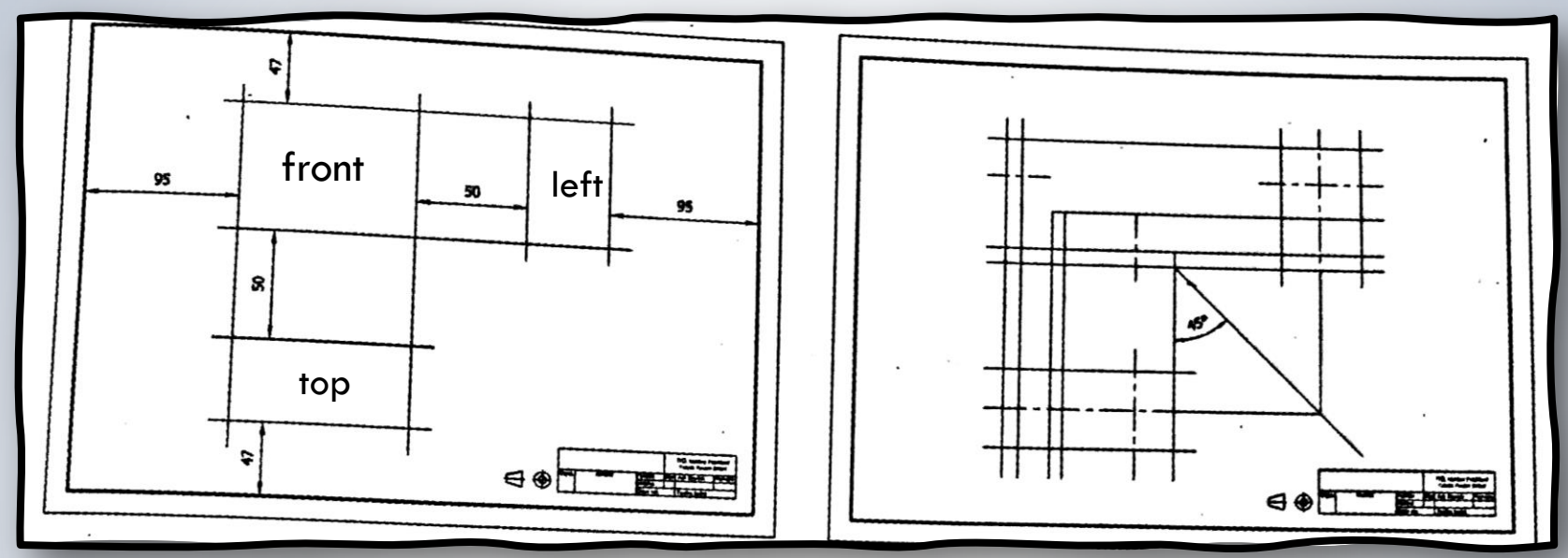




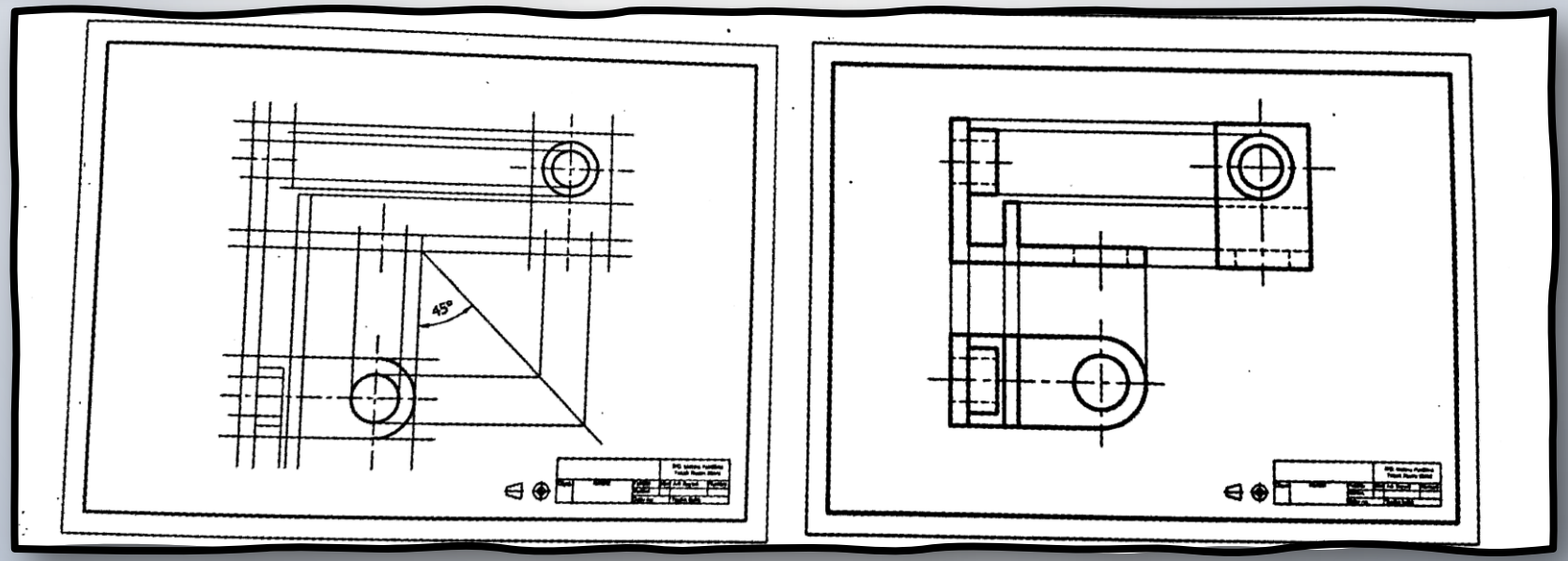
DRAWING VIEWS FROM PERSPECTIVE



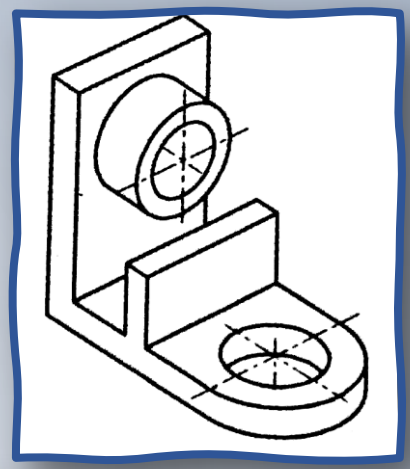
Deciding on their views and positions



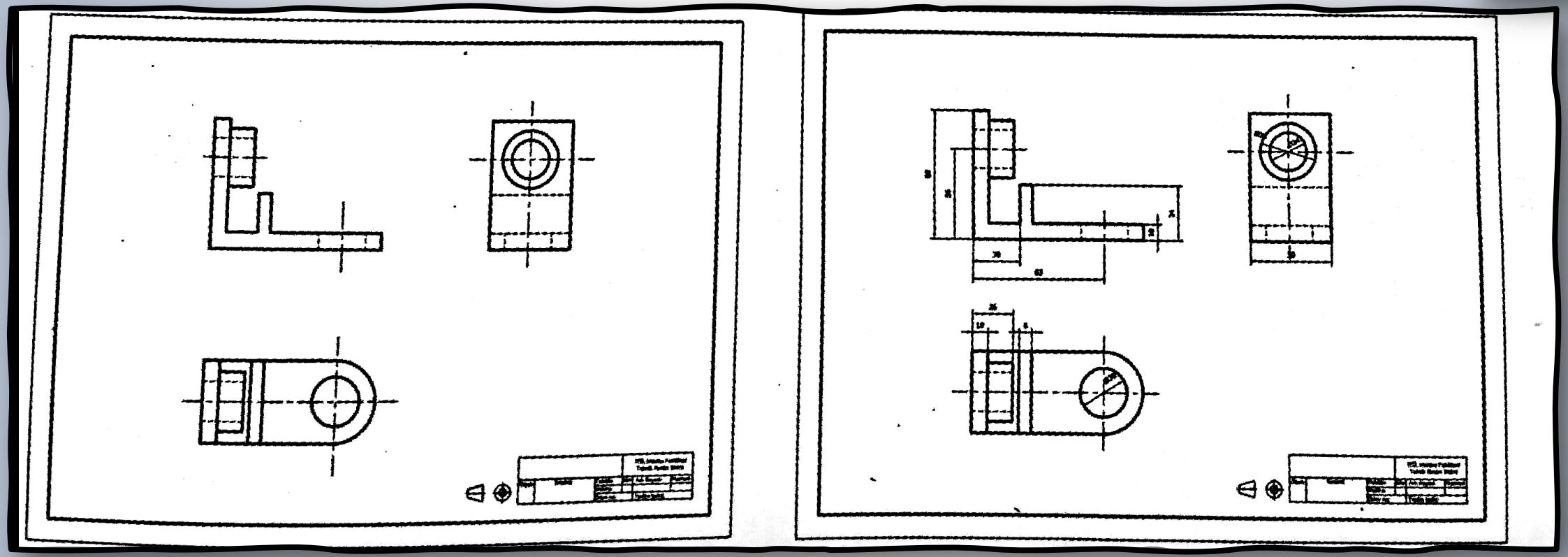
Drawing views with projection lines.



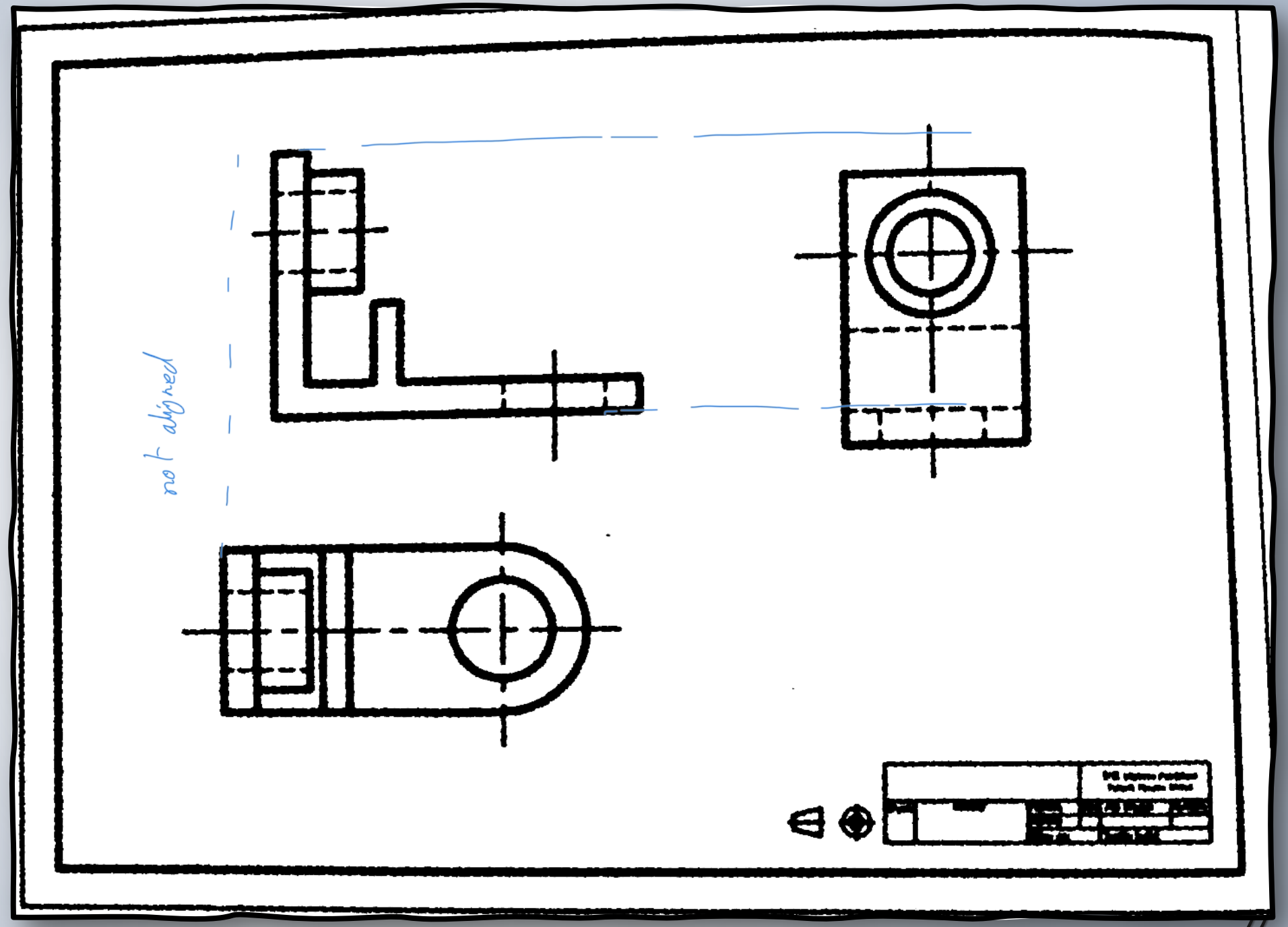
DRAWING VIEWS FROM PERSPECTIVE PAINTING



Removal of projection lines and dimensioning



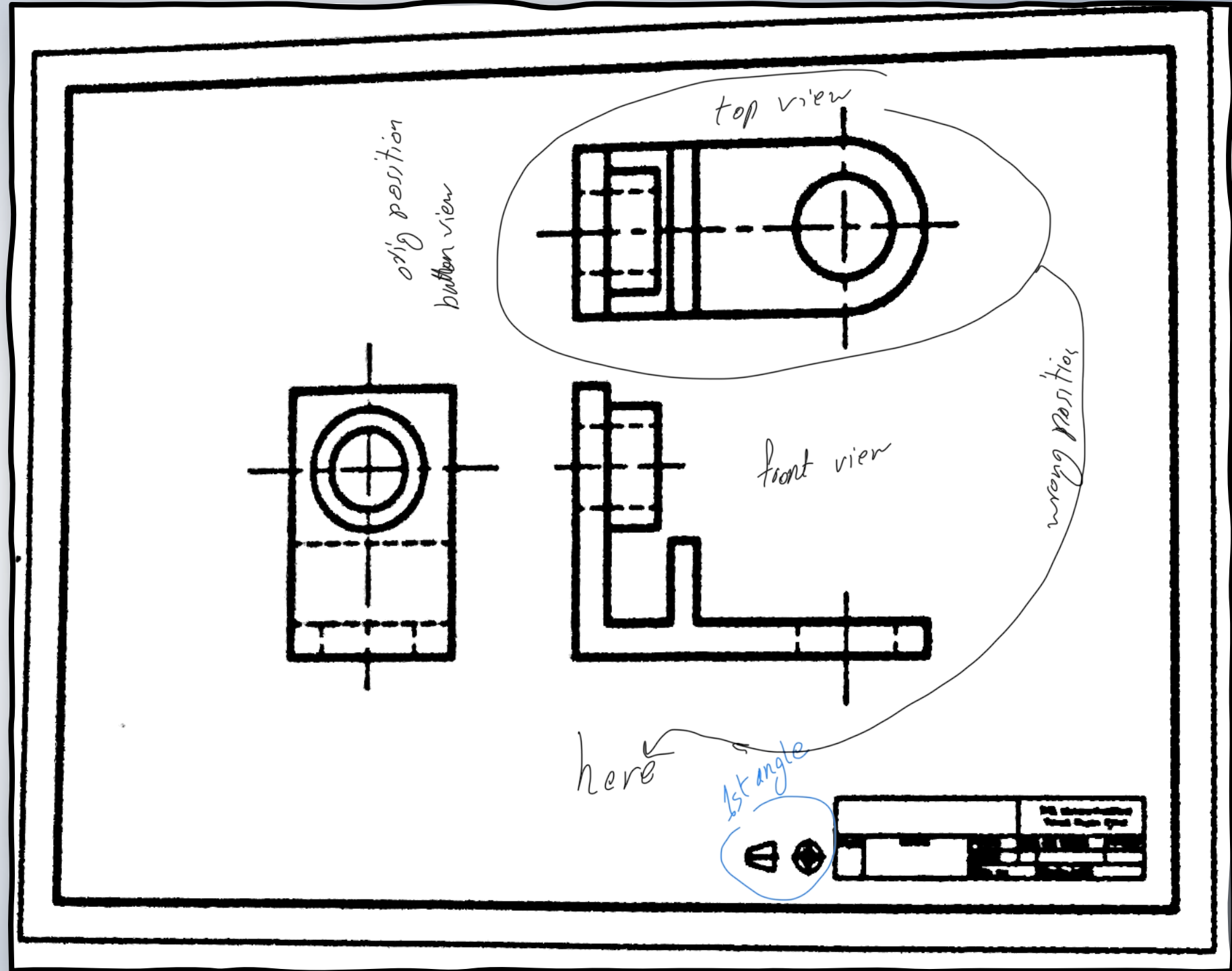
INCORRECT DRAWING



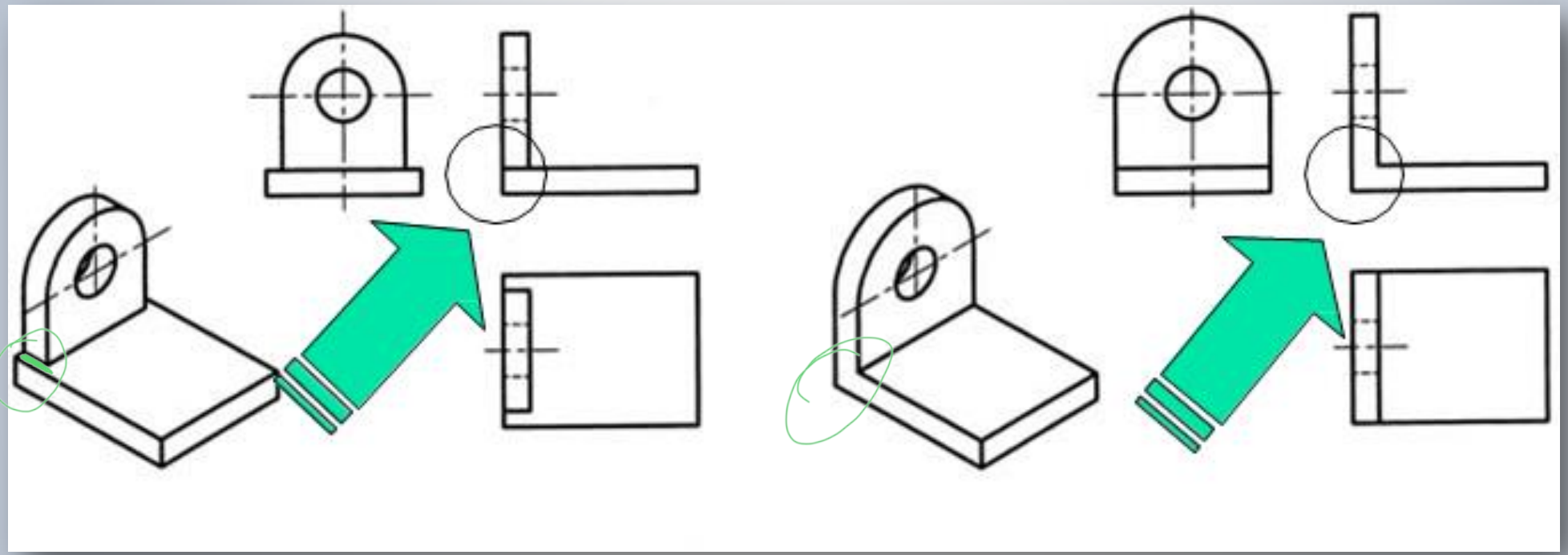
INCORRECT DRAWING

B
R F L
T

view position

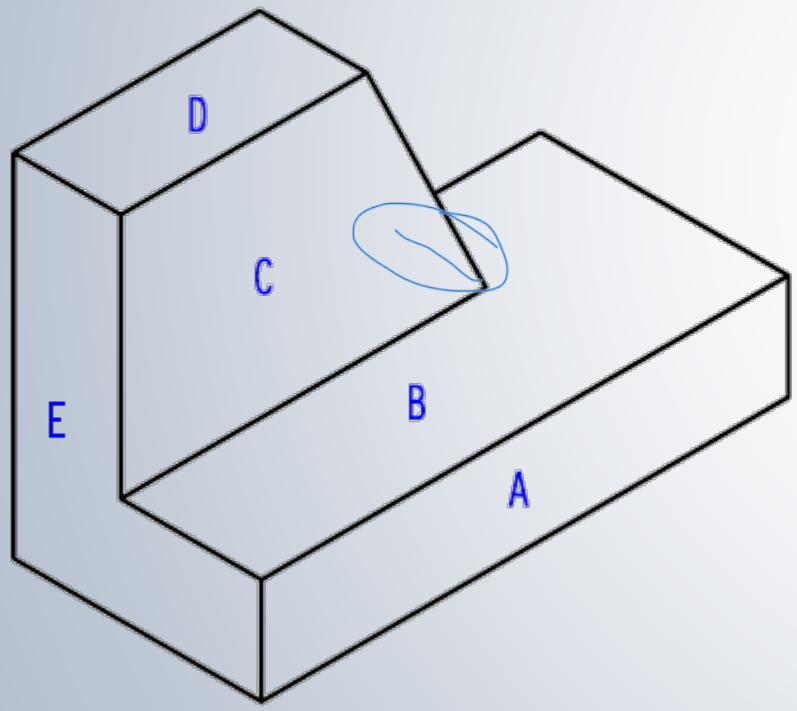


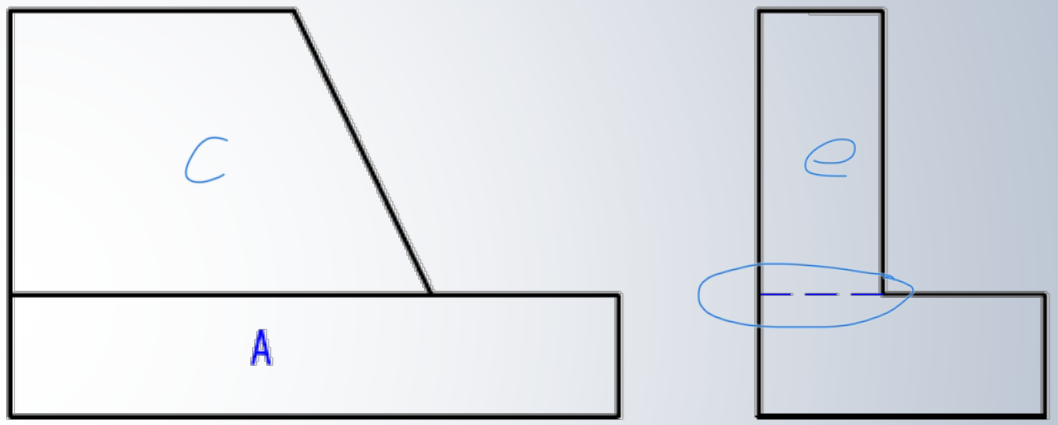
SURFACE LINES



PRACTICE

Lettering the relevant surfaces in the views according to the perspective drawing





PRACTICE

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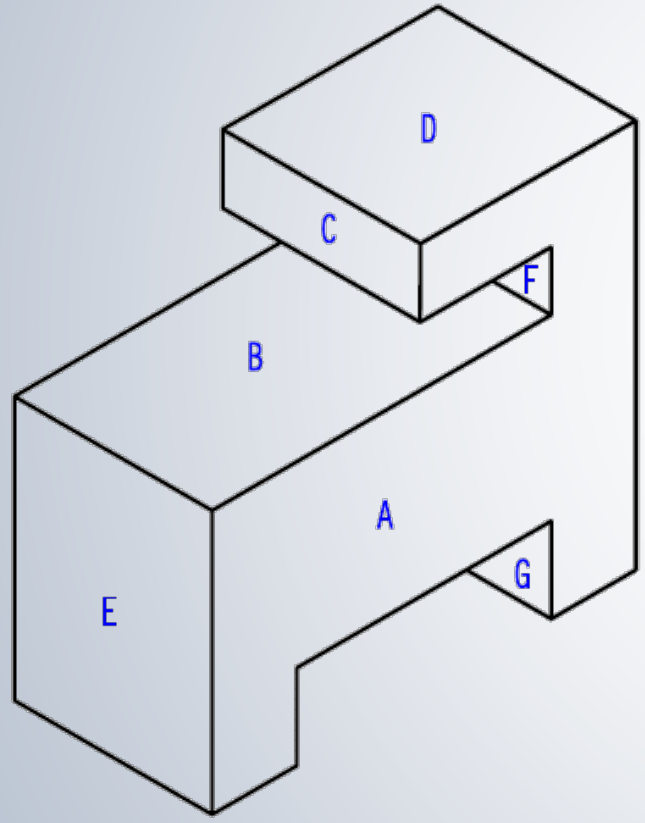

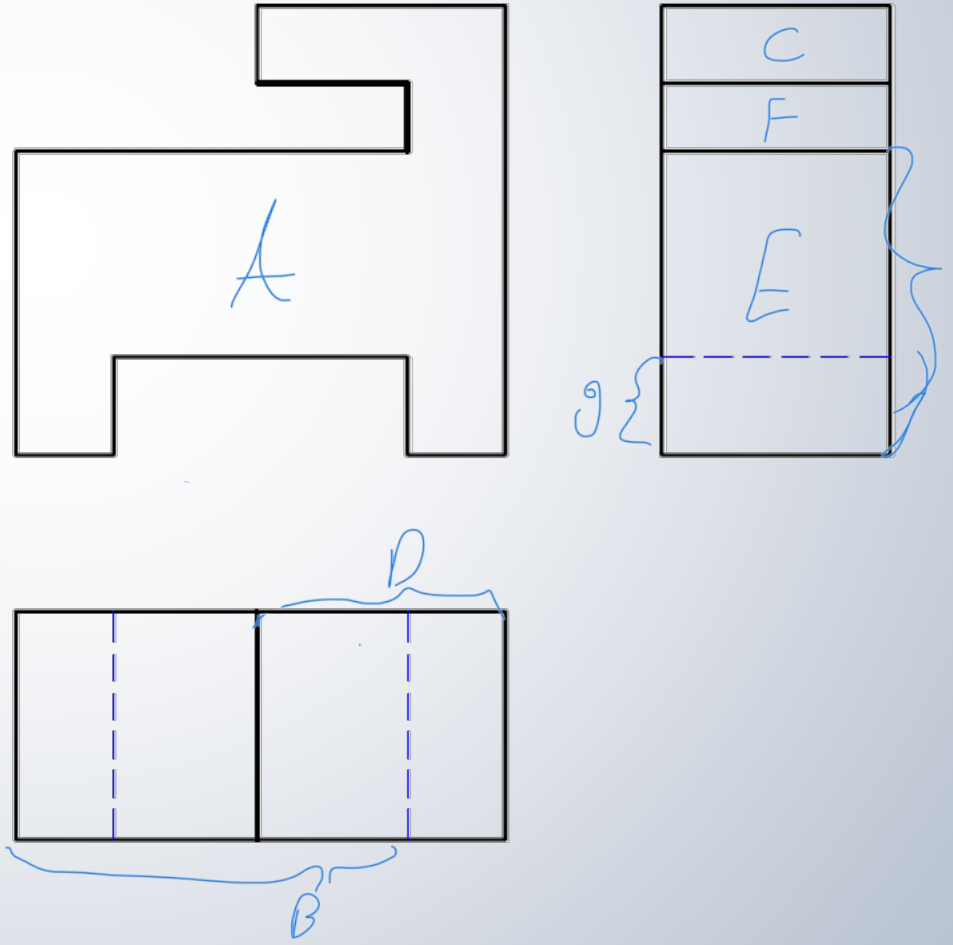

PRACTICE

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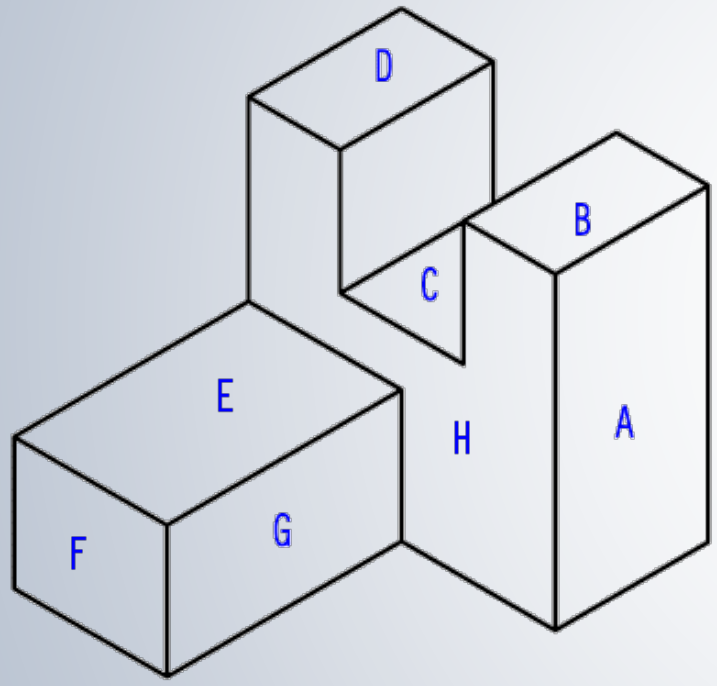
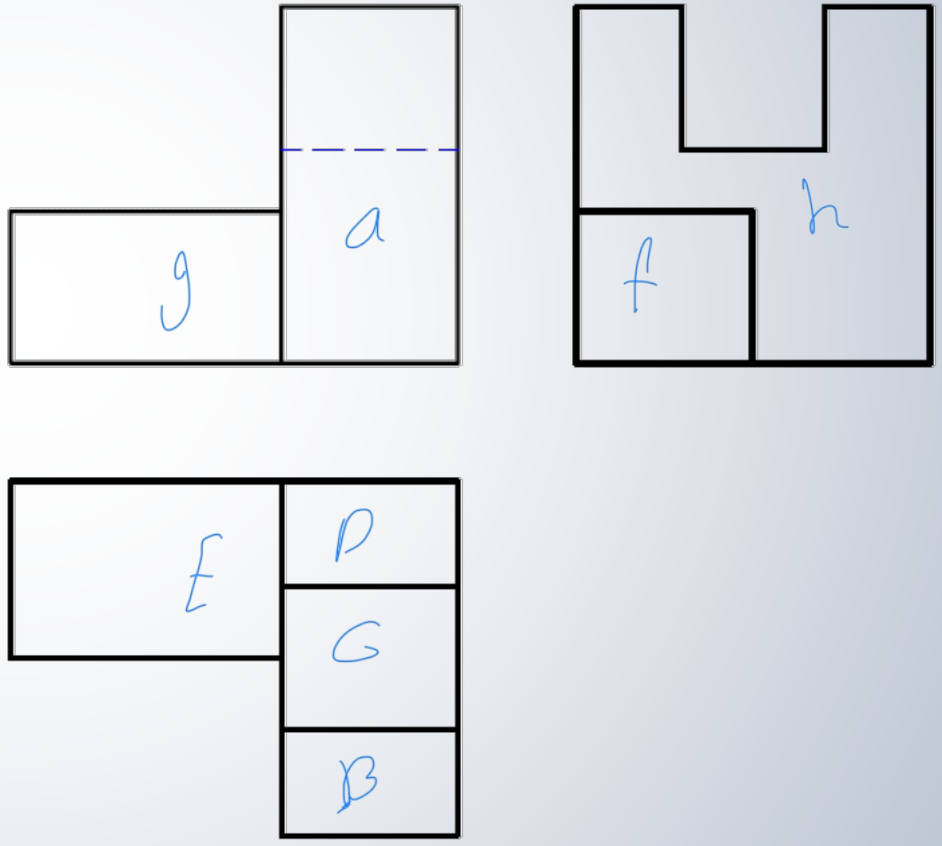
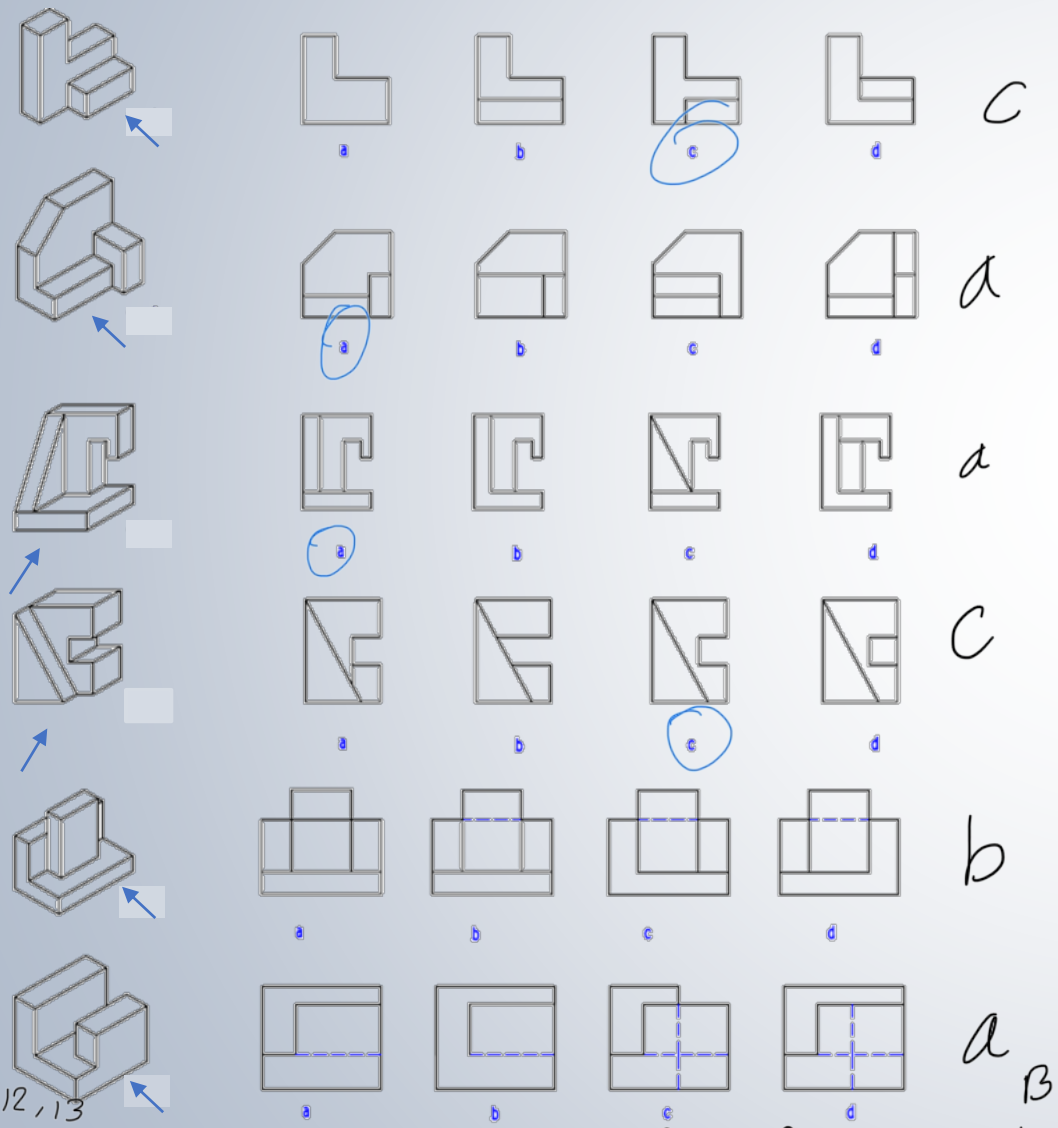




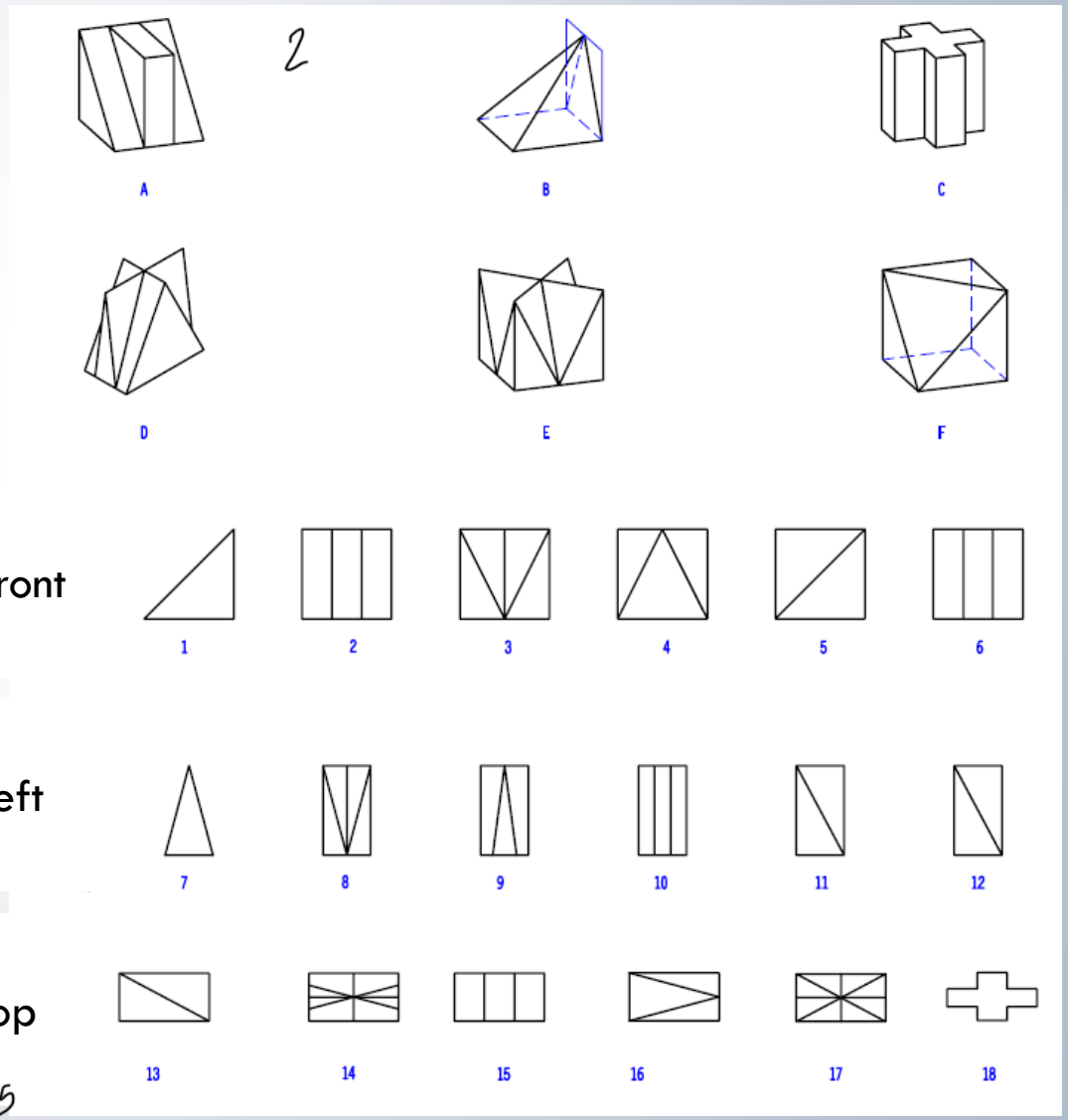
PRACTICE

Match the front views with corresponding perspective views

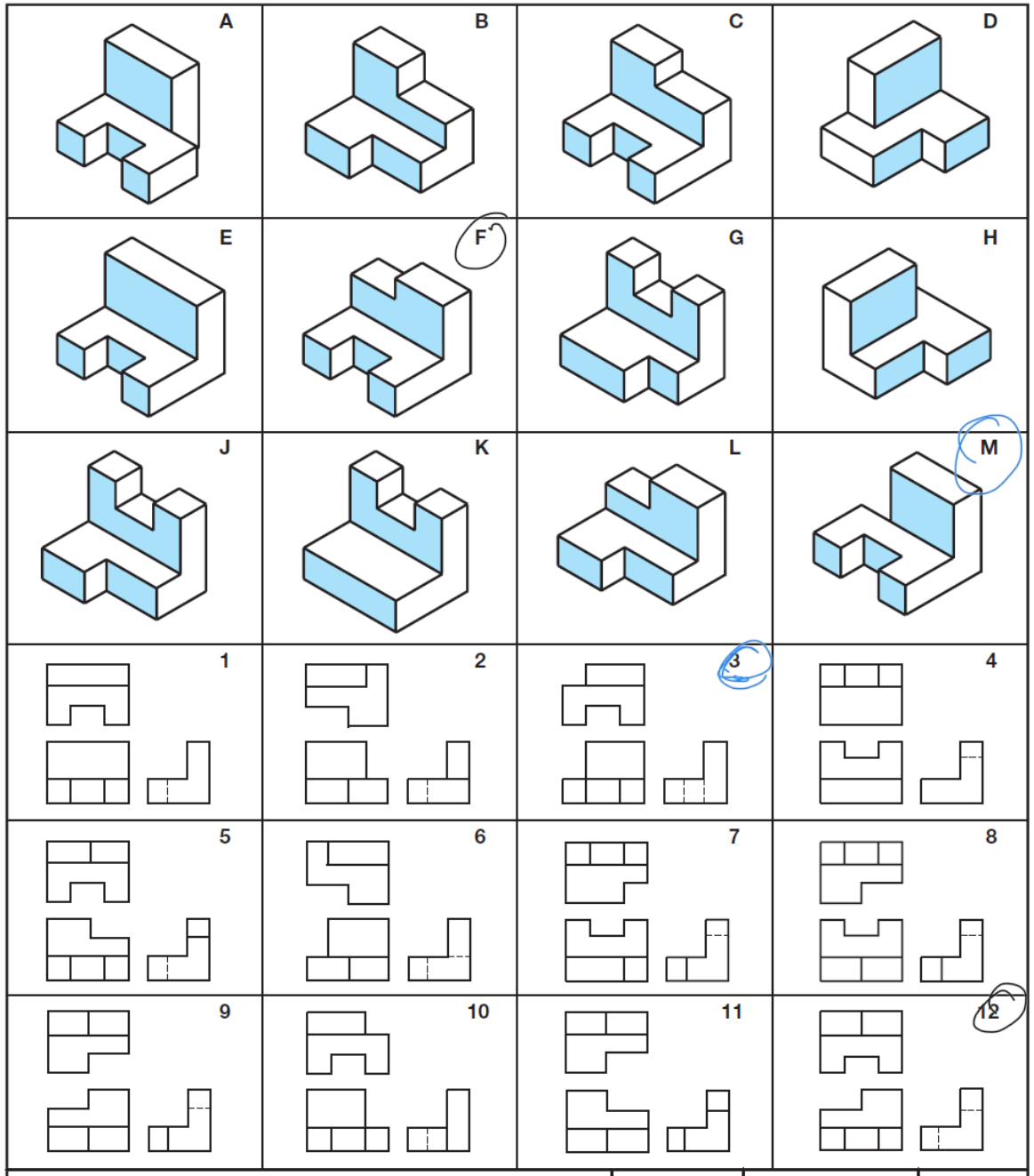


F = 5, 12, 13
E = 3, 8, 12
D = 4, 9, 14
C = 6, 10, 18
B = 1, 9, 16
A = 2, 11, 15

Match the ortoghtaphic views with the perspective views



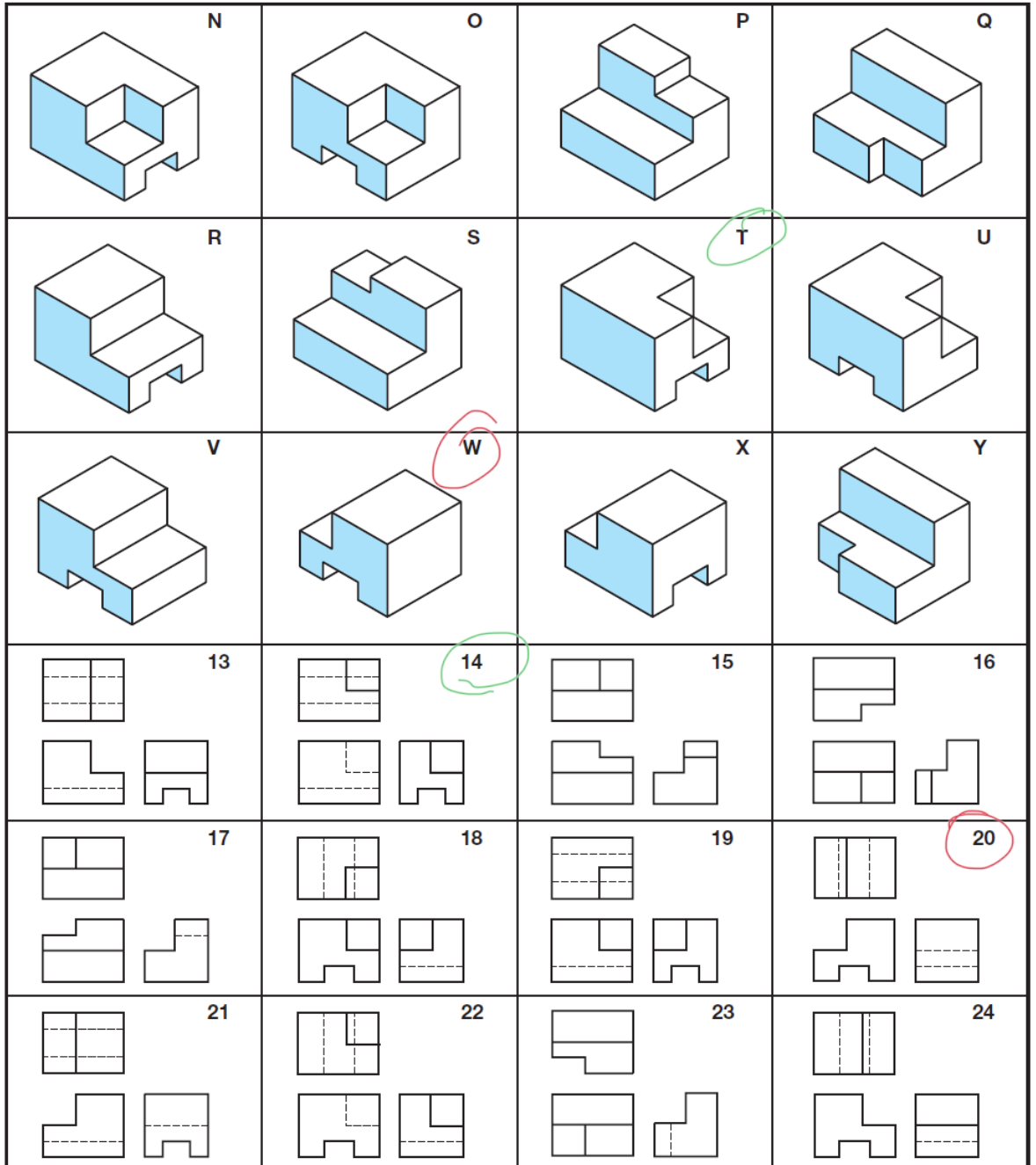
PRACTICE



ASSIGNMENT: MATCH PICTORIAL DRAWINGS A TO M WITH ORTHOGRAPHIC DRAWINGS 1 TO 12.
NOTE: SHADED SURFACE REPRESENTS FRONT VIEW.

MATCHING DRAWINGS-1

A-7



ASSIGNMENT: MATCH PICTORIAL DRAWINGS N TO Y WITH ORTHOGRAPHIC DRAWINGS 13 TO 24.
NOTE: SHADED SURFACE REPRESENTS FRONT VIEW.

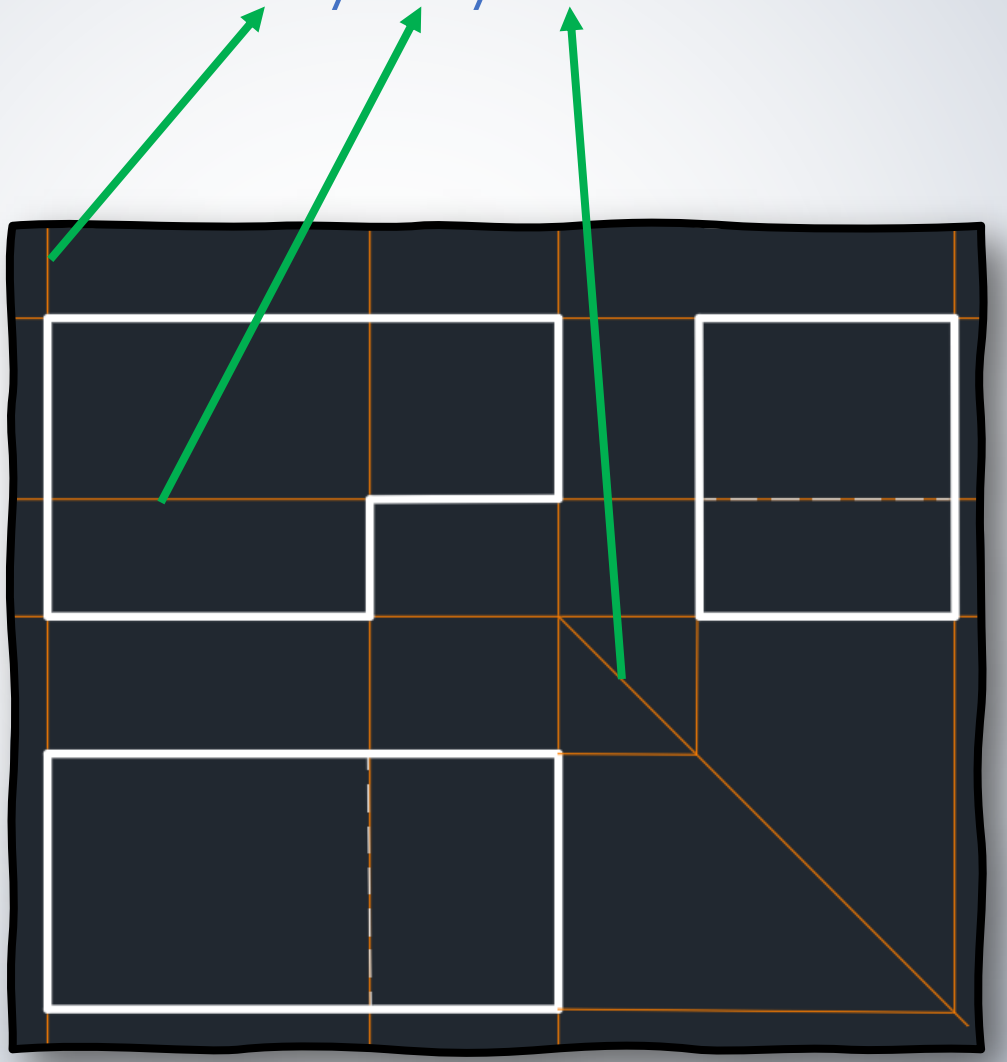
MATCHING DRAWINGS-2

A-8

AUTOCAD

Command for projection lines:

XLINE + V / H / A



REFERENCES

The content of this presentation has been compiled from the following sources

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