



Continuing Education Department

AutoCAD

Level I

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Topics

Orthogonal Views

Reference Textbooks for Presentation

Engineering Drawing & Design, Cecil Jensen,  
McGraw-Hill Ryerson, ISBN 0-07-548922-8

Dr. Ashok Kaushal

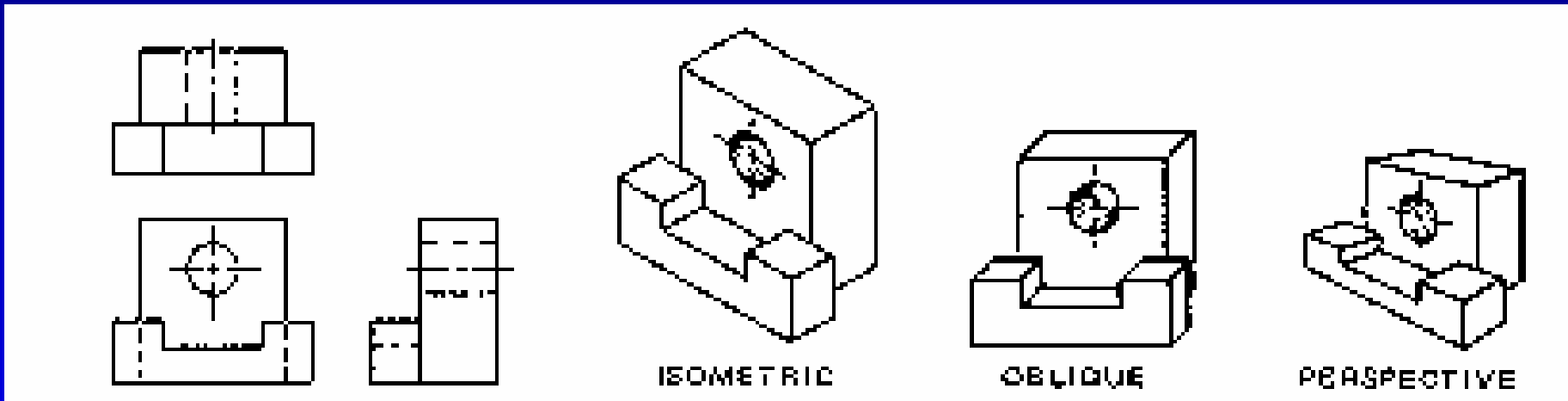


# Theory of Shape Description

1. Three dimensional “pictorial drawings” represent objects with just one view.
  - Views can be isometric, oblique and perspective.
2. Two dimensional “orthogonal projections” show what one would see looking directly at at one side face of an object.
  - Views can be front, top, left side, right side, rear and bottom.
  - Features are projected from one view to another.
  - Canada & the United States use third-angle projection



# Orthographic Projection & Pictorial Drawings

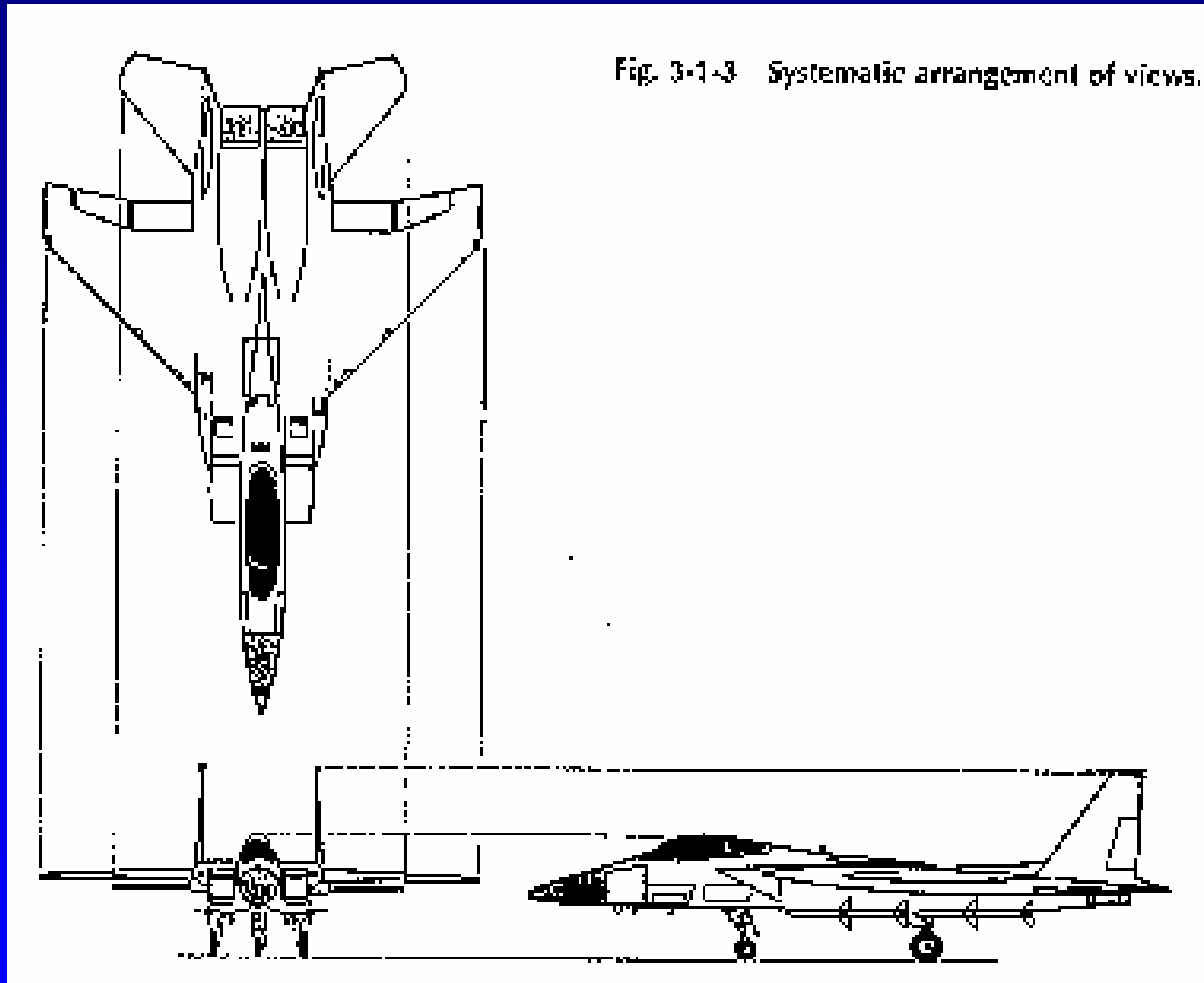


Orthographic projection

Pictorial Drawings

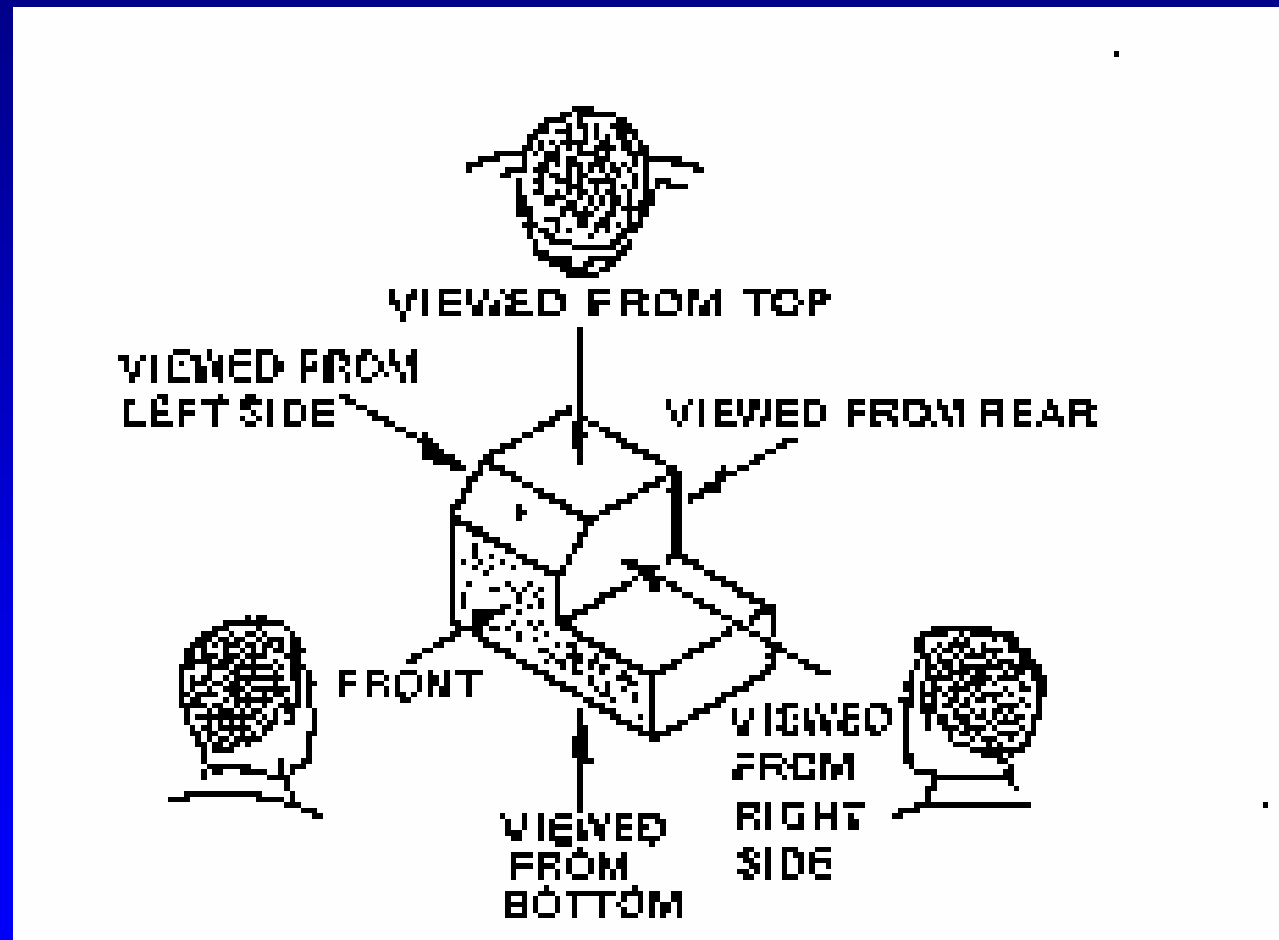


# Systematic Arrangement of Views Level I



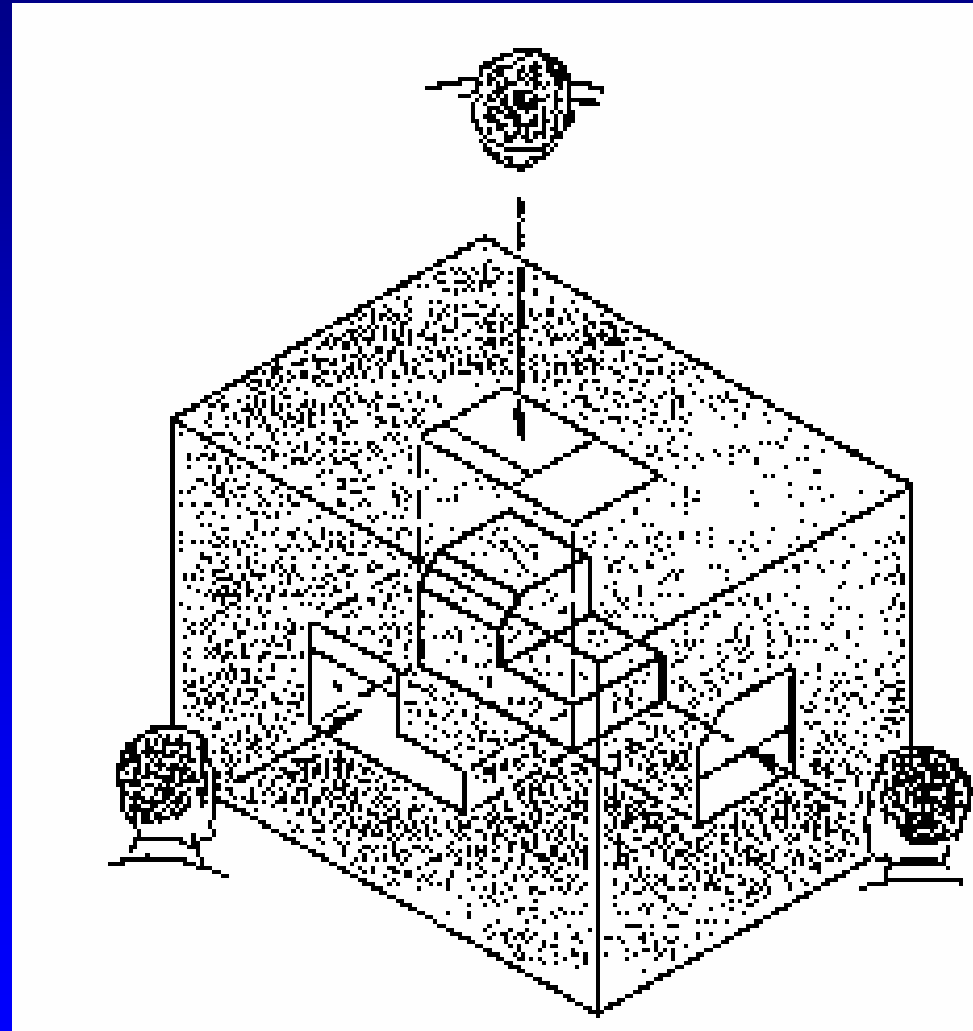


# Viewing the object from all six sides Level I





# Object enclosed in a glass box

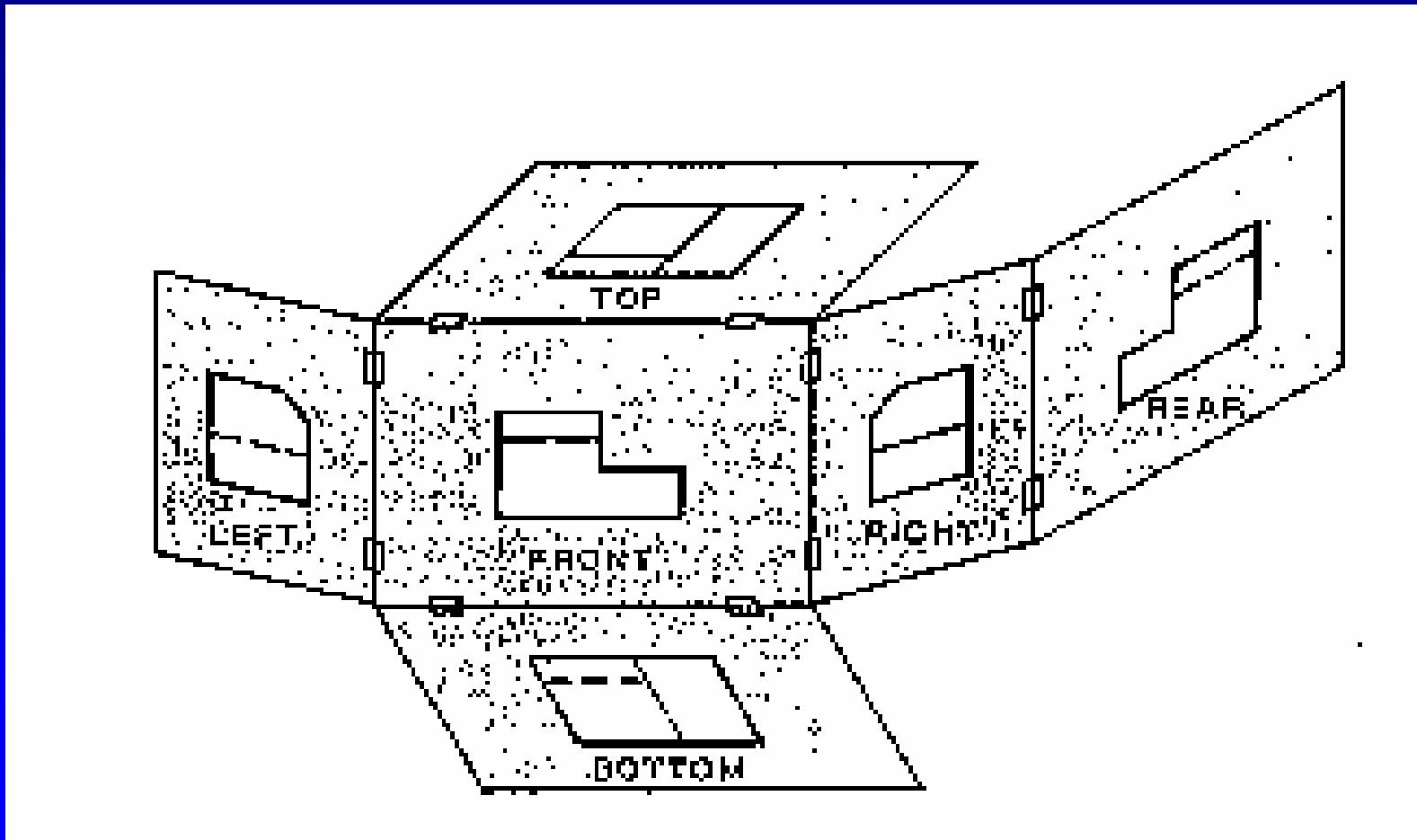


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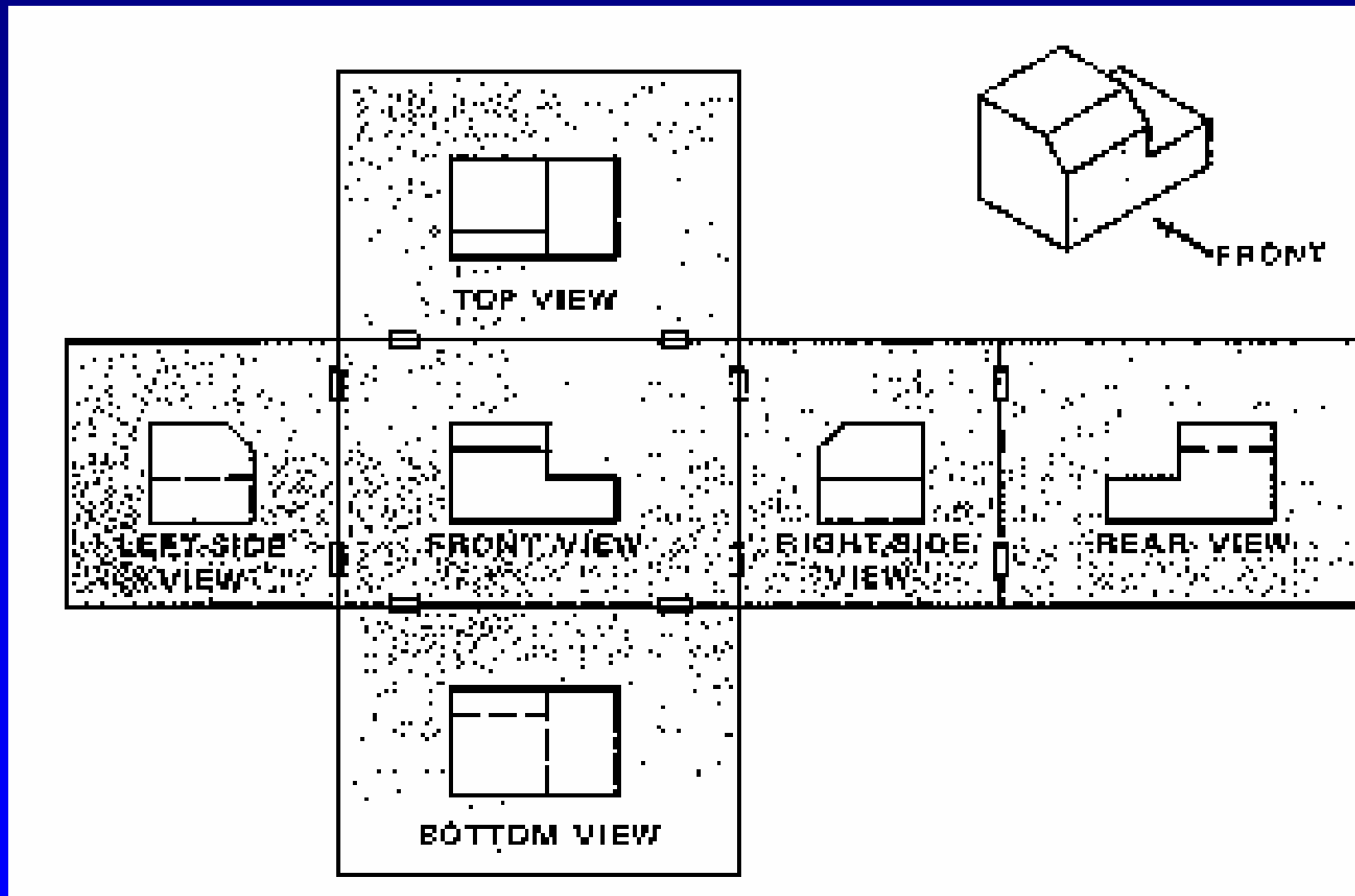
# Unfolding glass box - 3rd Angle layout of views

Level I





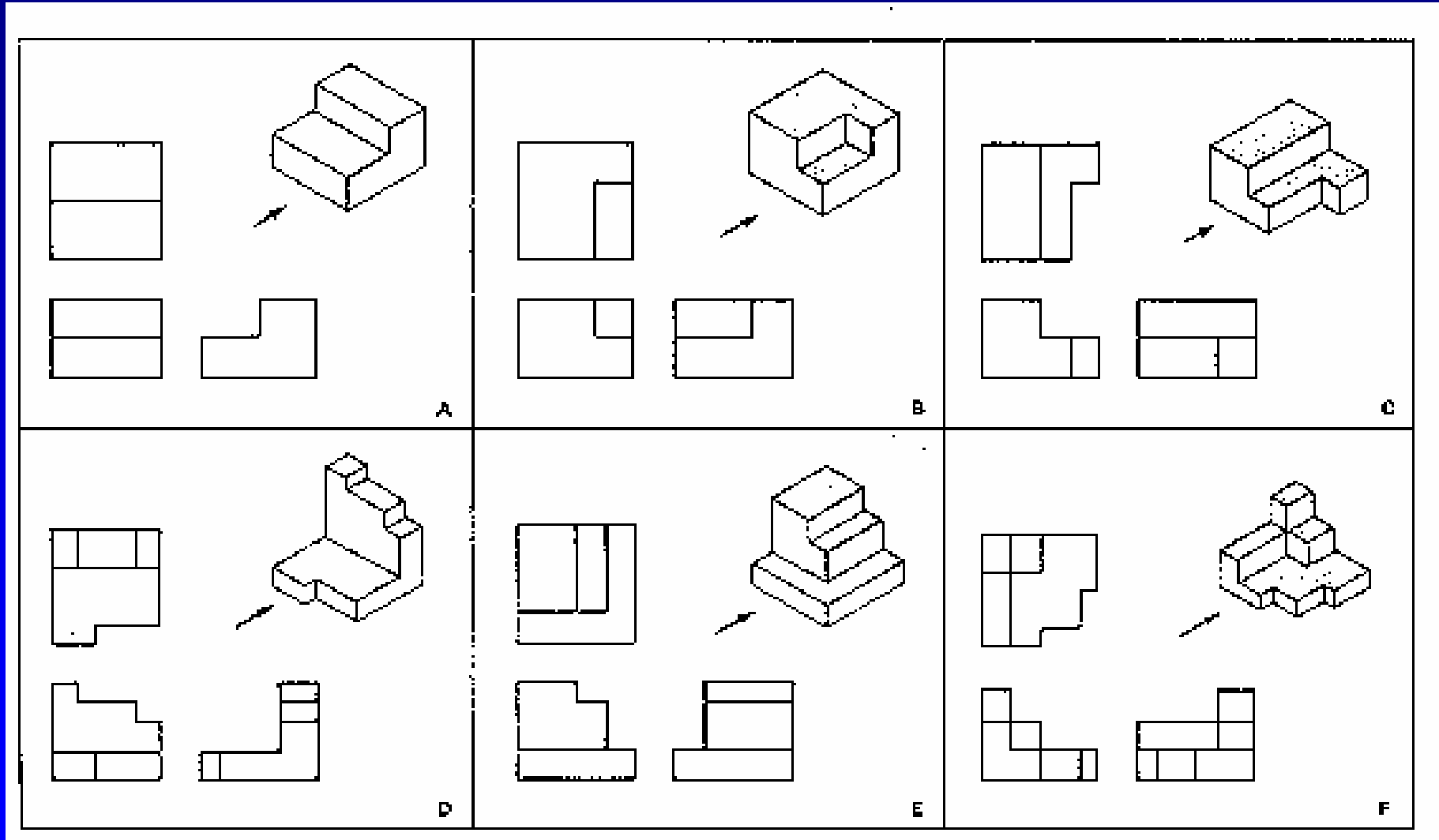
# Third angle layout of views





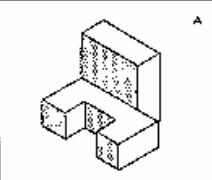
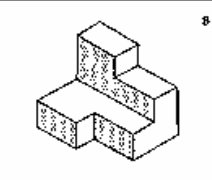
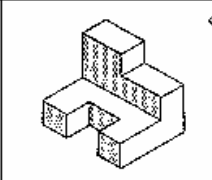
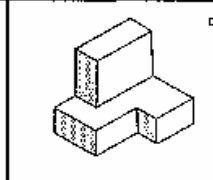
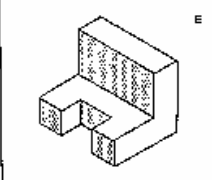
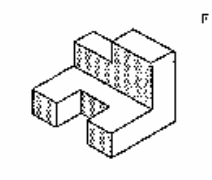
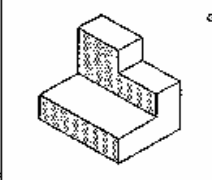
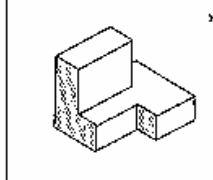
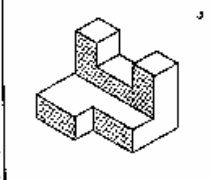
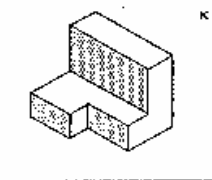
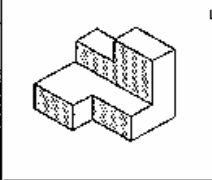
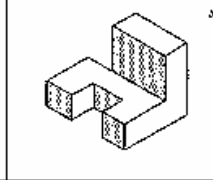
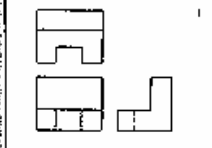
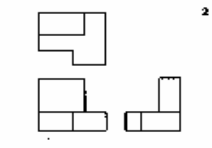
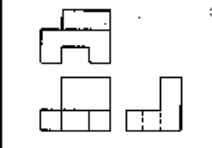
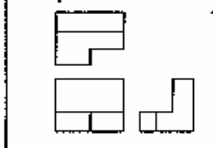
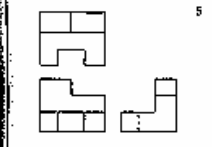
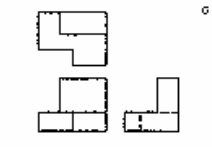
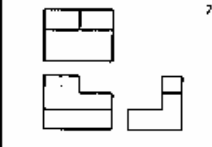
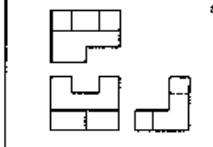
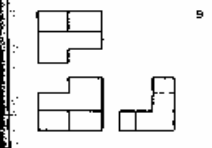

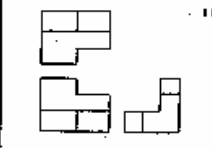



# Third Angle Orthogonal projection





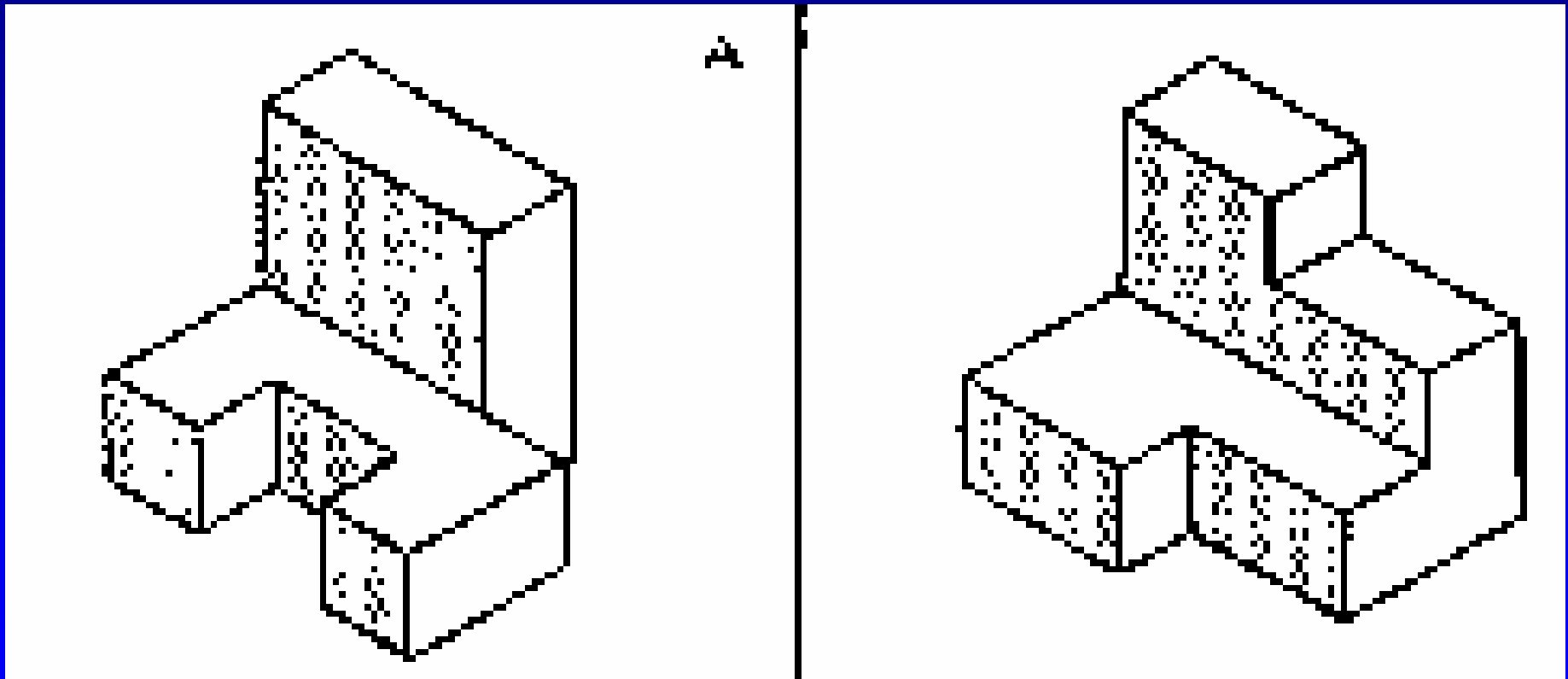
# Match isometric with orthogonal views Level I

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# Match isometric with orthogonal views Level I

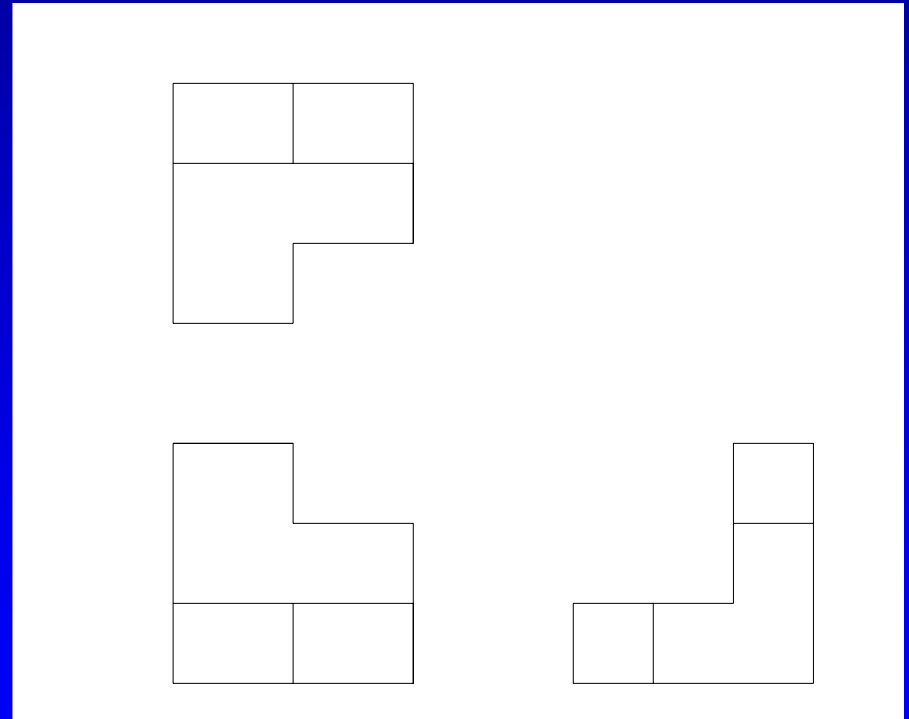
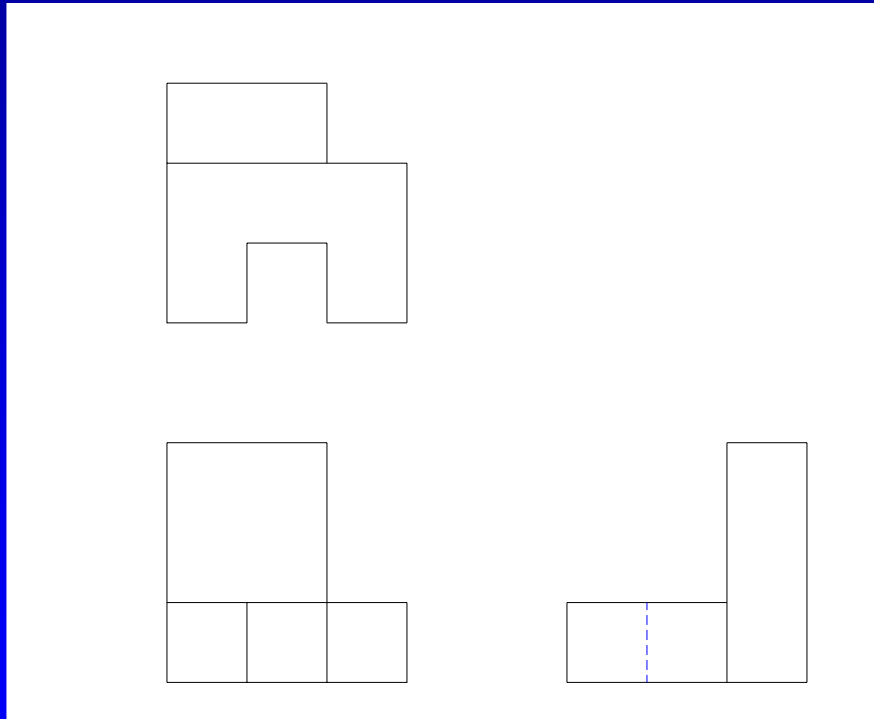




# Match isometric with orthogonal views - Results

AutoCAD

Level I



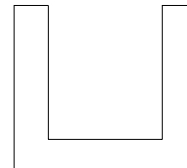
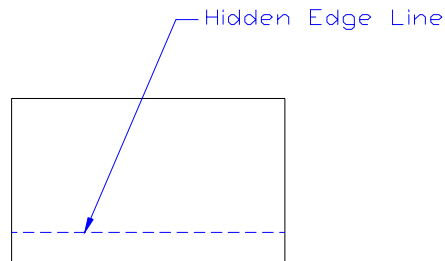
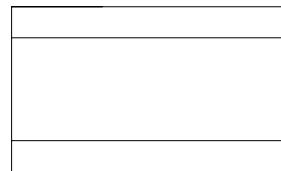
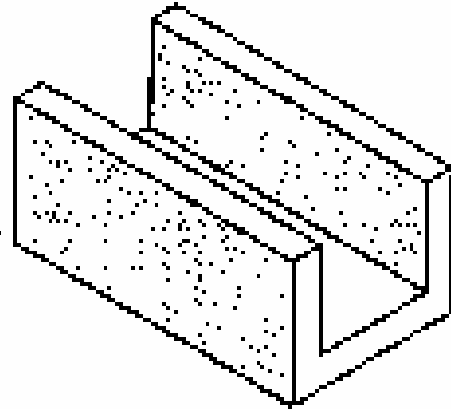


# Hidden Lines

1. Many features (lines, holes, etc) can not be seen when viewed from outside the piece depending on the view.
2. These hidden edges are called hidden lines and are required on drawings to show the true shape of the objects.



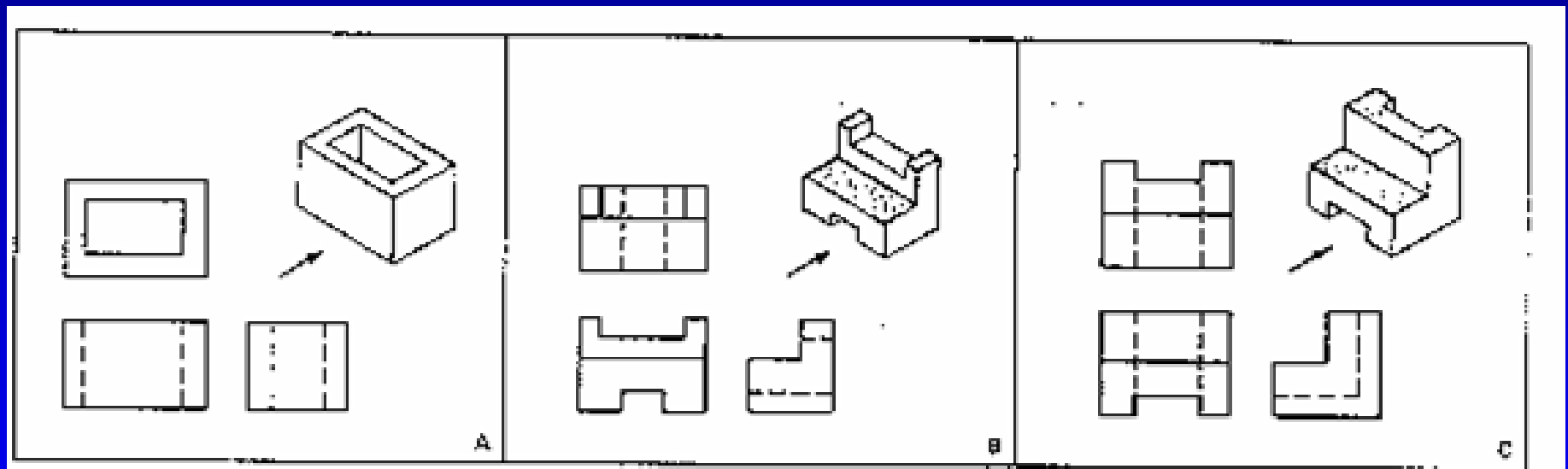
# Hidden Lines



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# Objects with hidden lines





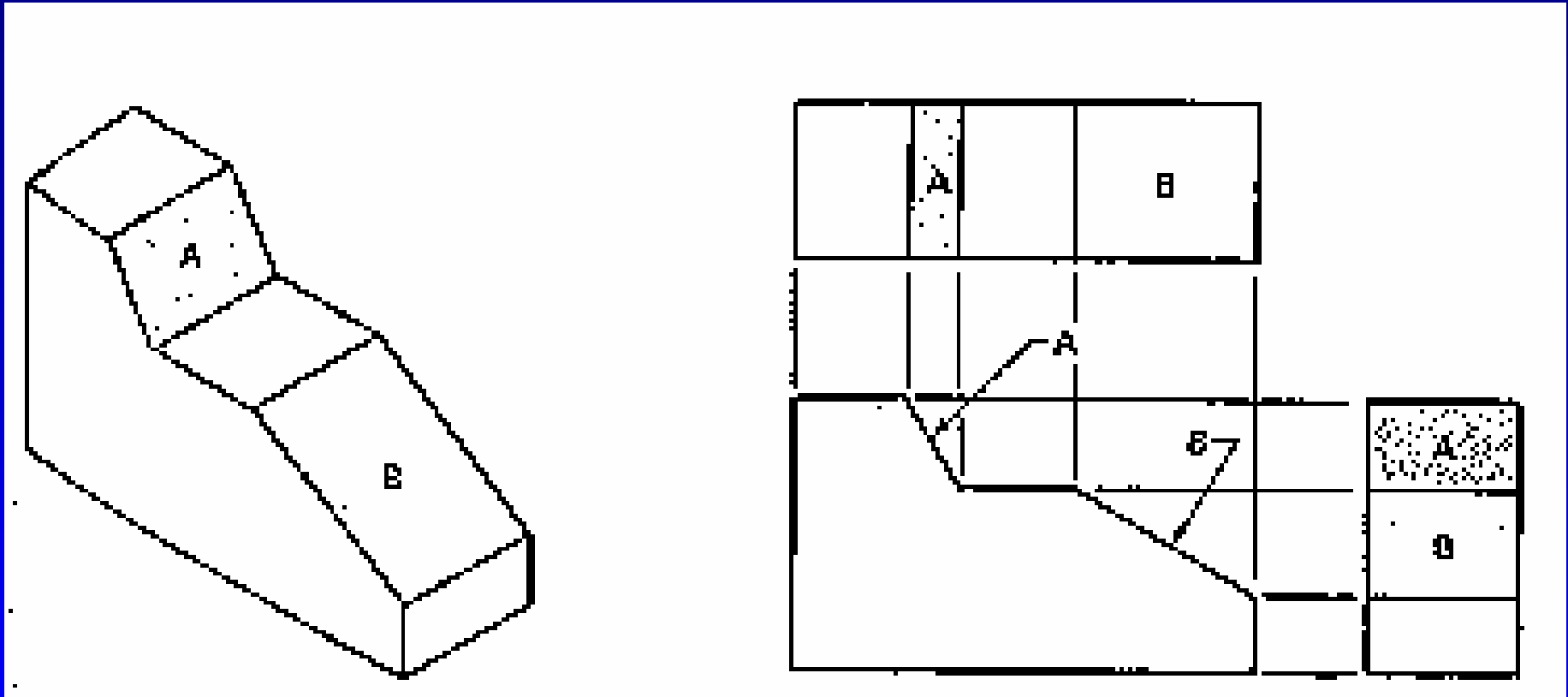
# Inclined Surfaces

1. If the surfaces of an object lie in either a horizontal or a vertical position, then
  - the surfaces appear in their true shapes in one of the three views
  - these surfaces appear as a line in the other two views.
2. When a surface is inclined or sloped in only one direction, then
  - that surface is not seen in its true shape in the top, front or side view.
  - it is ,however seen in two views as a distorted surface.
  - on the third view it appears as a line.
  - Sometimes an auxiliary view is required.





# Sloping Surfaces

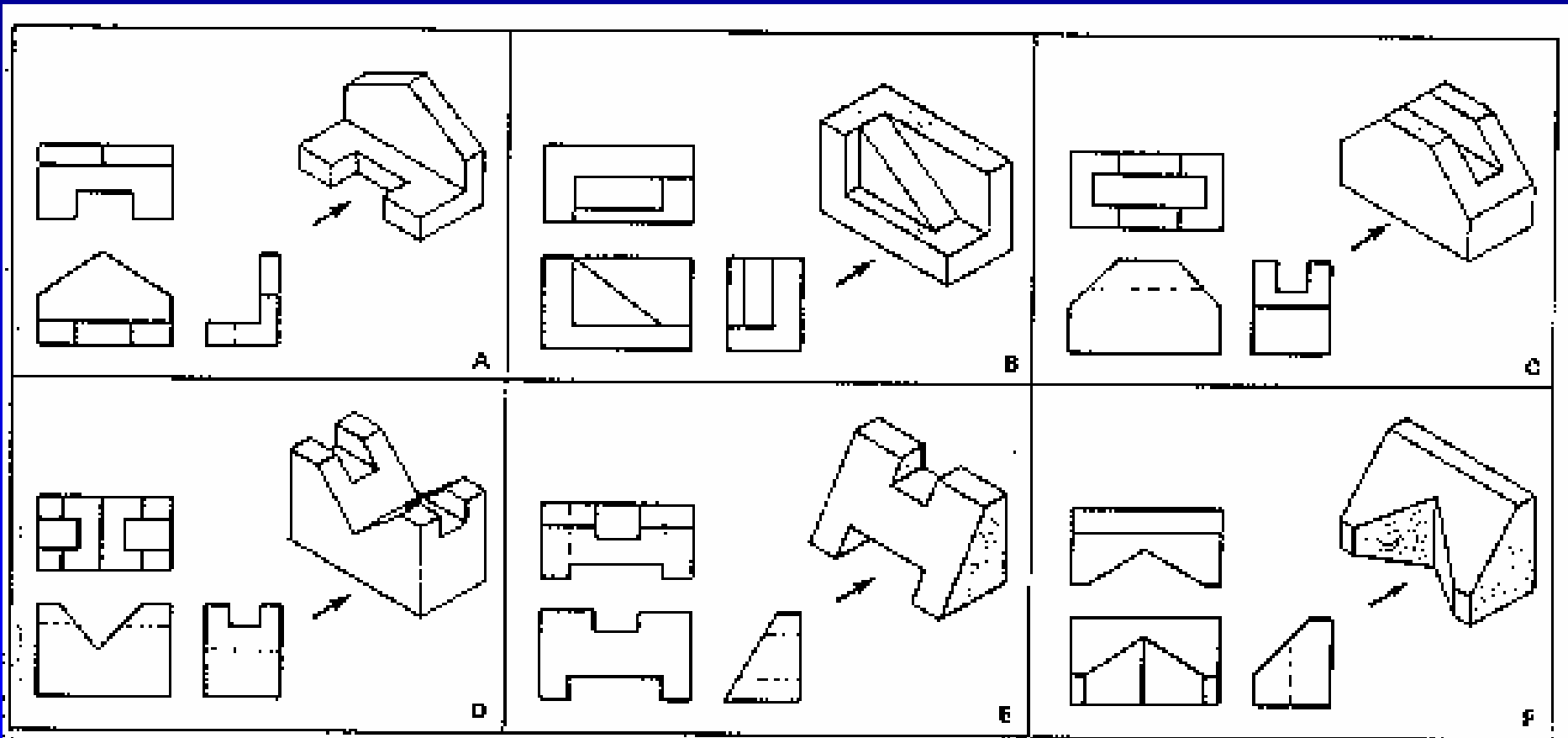


**NOTE:** The true shape of surfaces A and B do not appear on the top and side views.

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# Objects with sloping surfaces



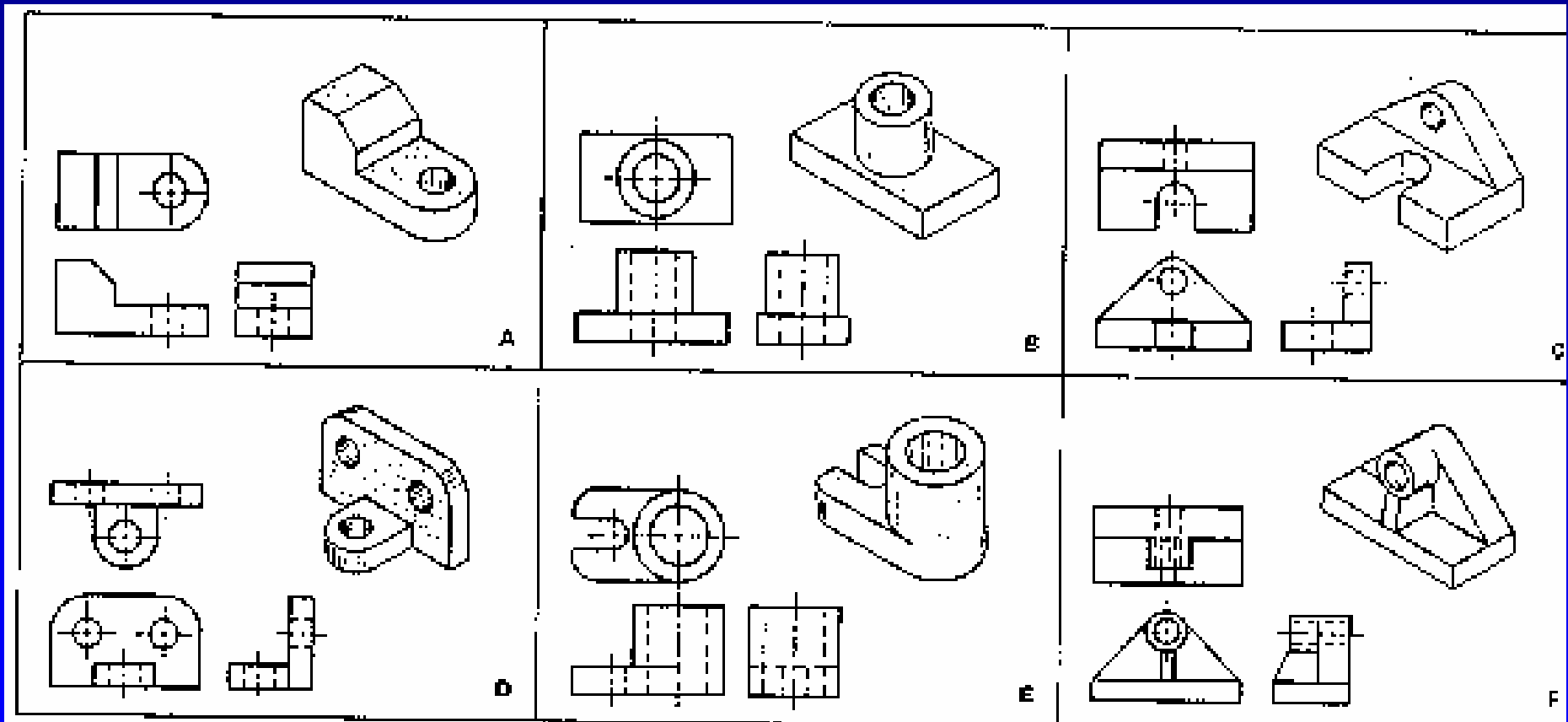


# Circular features

1. Circular features appear circular in one view only.
2. No line is used to indicate where a curved surface joins a flat surface.
3. Hidden circles ,like hidden flat surfaces , are represented on drawings by a hidden line.
4. A centre line
  - is drawn as a thin, broken line of long and short dashes, spaced alternately.
  - should project for a short distance beyond the outline of the part or feature to which they refer.
  - they may be extended to be used as extension lines for dimensioning purposes

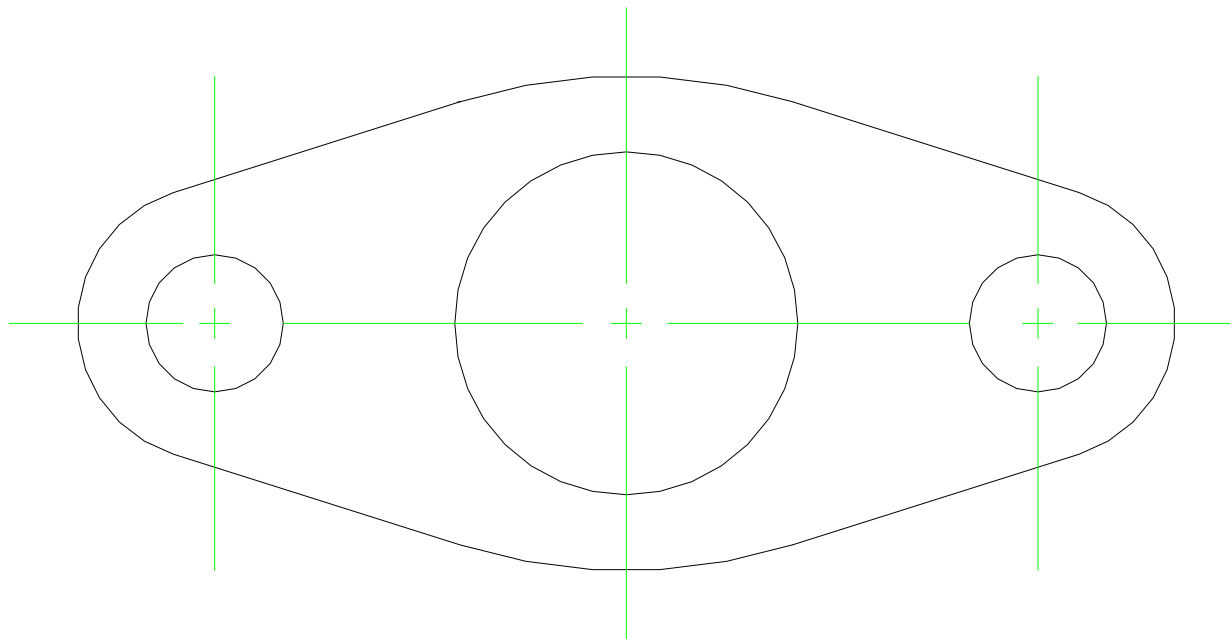


# Objects with circular features





# Centre lines



Two short dashes should be at the point of intersection at the center of the circles.

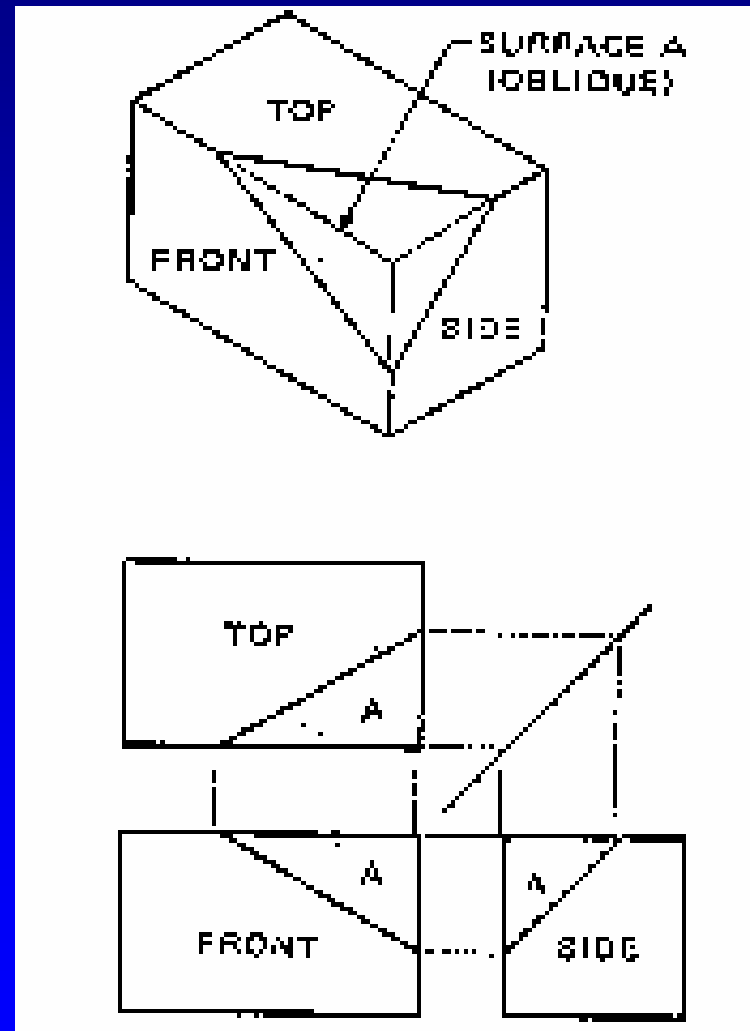


# Oblique Surfaces

1. When a surface is sloped so that it is not perpendicular to any of the three viewing planes
  - it will appear as a surface in all three views
  - but never in its true shape.
2. Since the oblique object surface is not perpendicular to the viewing planes
  - it can not be parallel to them
  - and consequently appears foreshortened.
3. If a true view is required for this surface, two auxiliary views are required.

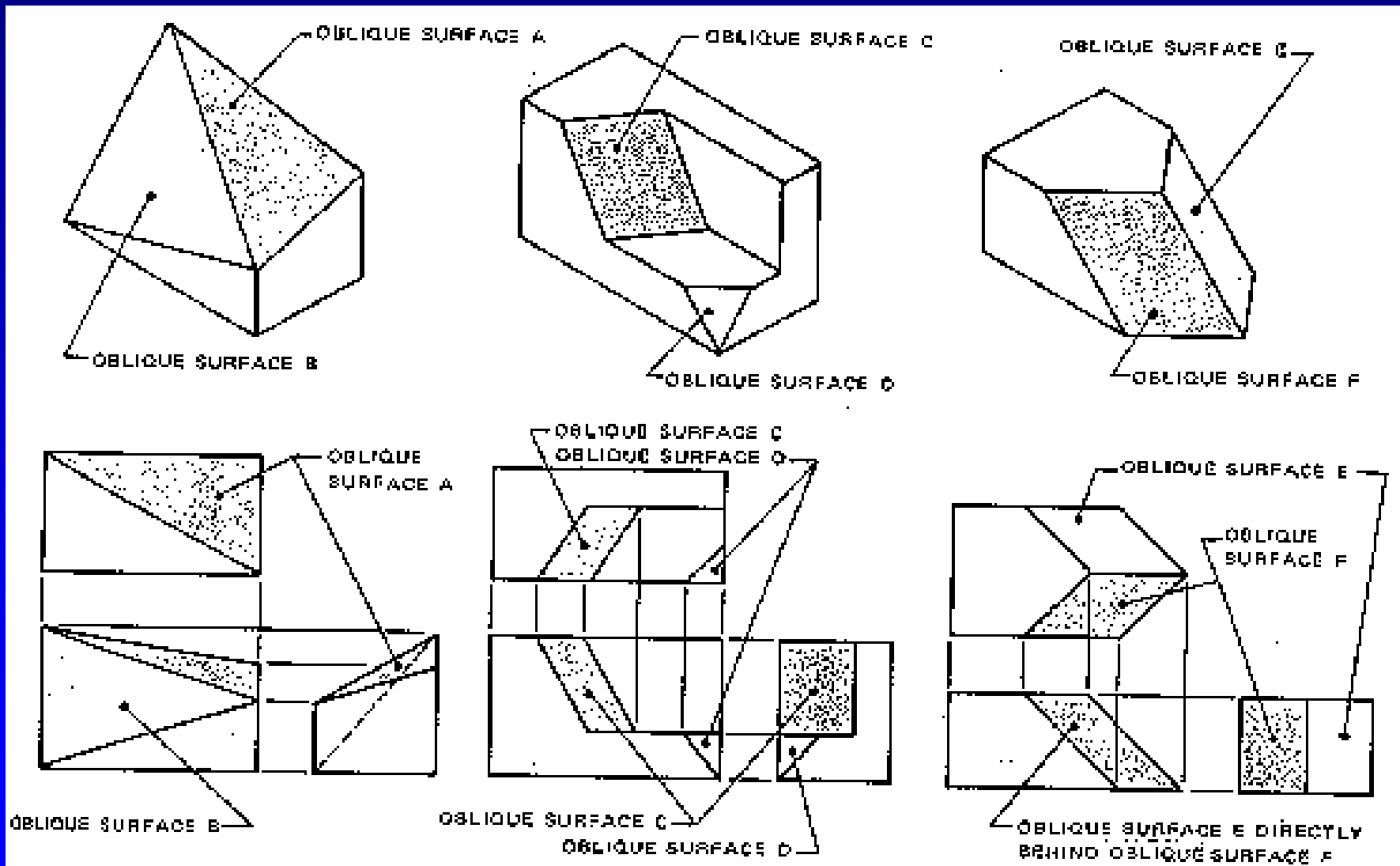


# Oblique surface A not true shape in any of the 3 views





# Objects with oblique surfaces

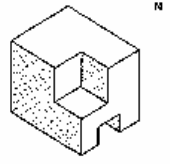
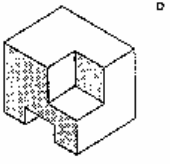
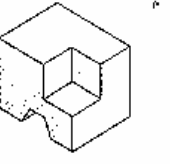
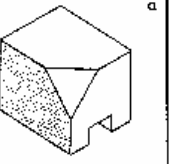
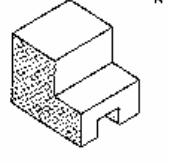
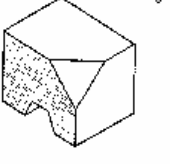
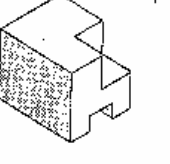
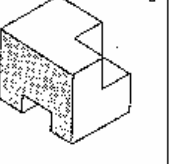
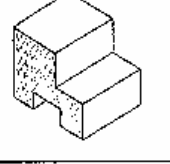
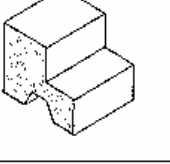
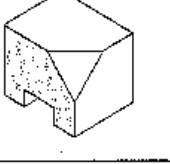
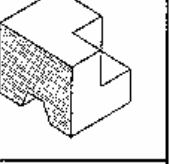
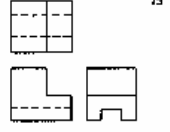

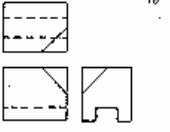
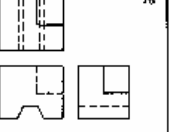
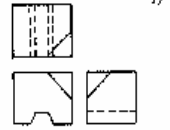
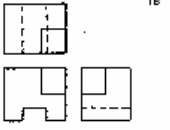


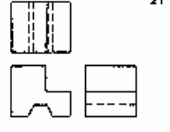


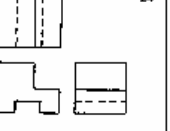


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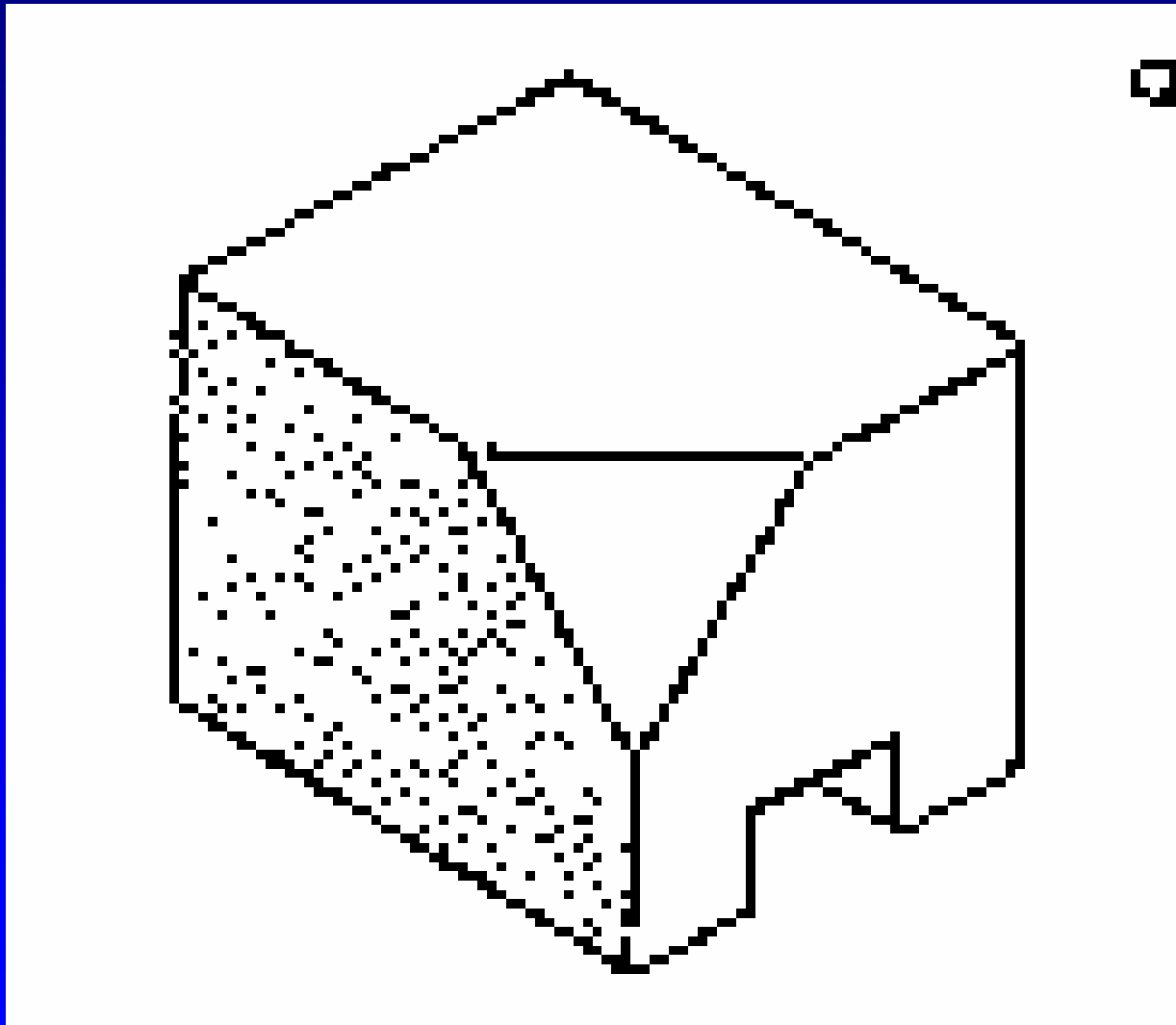


# Match isometric with orthogonal views Level I

 N	 D	 P	 Q
 R	 S	 T	 U
 V	 W	 X	 Y
 13	 14	 15	 16
 17	 18	 19	 20
 21	 22	 23	 24

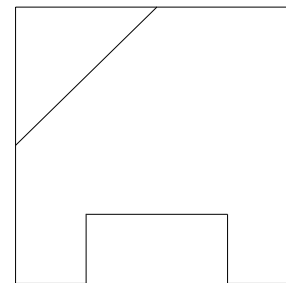
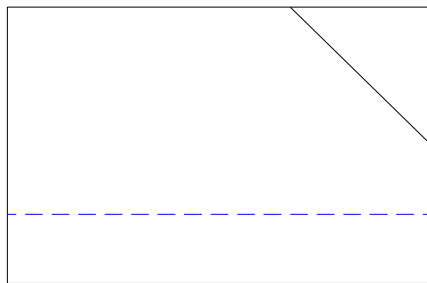
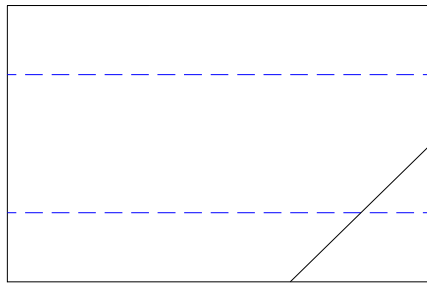


# Match isometric with orthogonal views Level I





# Match isometric with orthogonal views - Result



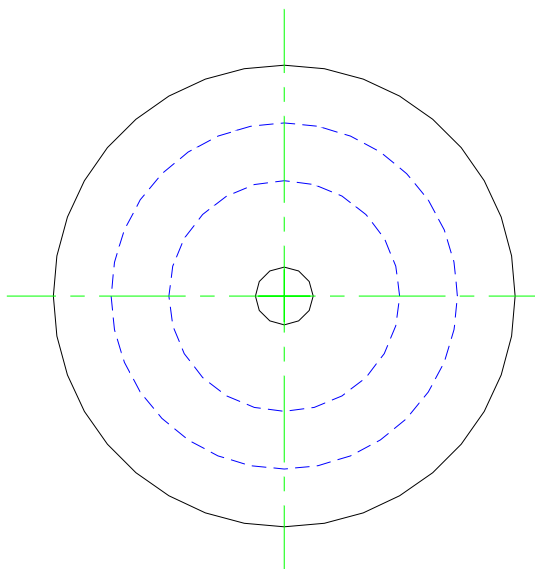


# One view and two view drawings

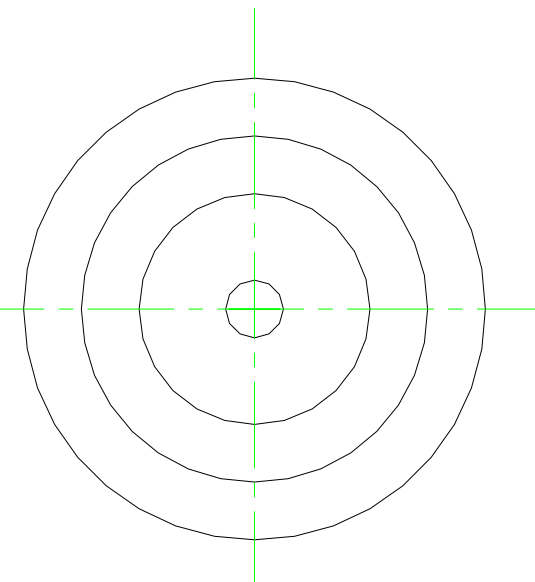
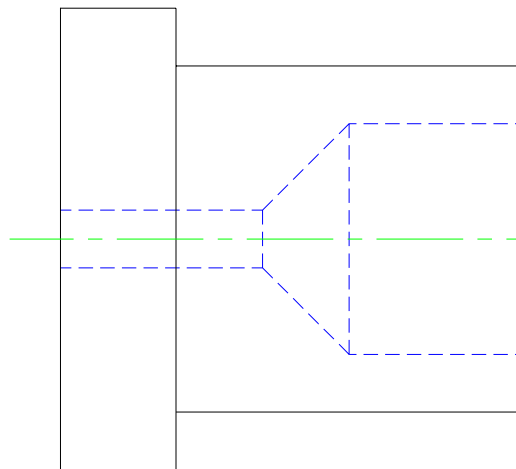
1. Views should be chosen that will best describe the object to be shown.
2. Only the minimum number of views that will completely portray the the size and shape of the part should be used.
3. The views should be chosen to avoid hidden feature lines when possible.



# Avoidance of hidden-line features



This end view should be avoided



This end view is preferred.

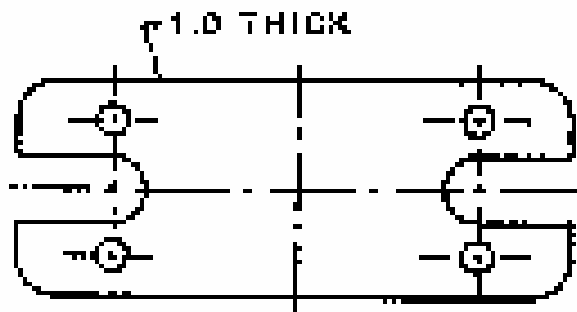


# One view drawings

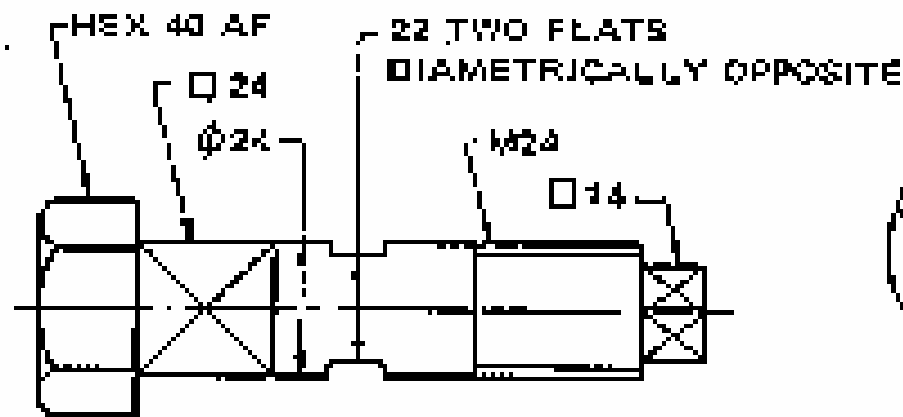
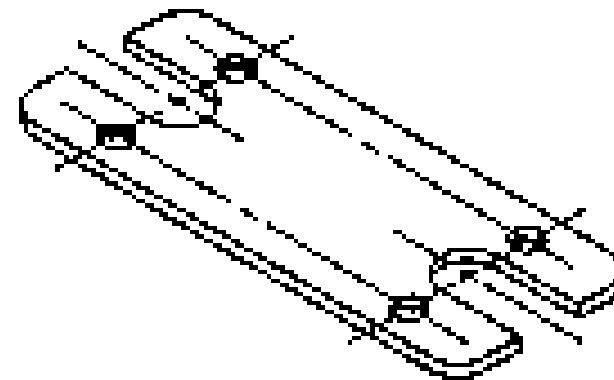
1. In one view drawings, the third dimension, such as thickness, may be expressed
  - by a note i.e. thickness is
  - by descriptive words or abbreviations such as DIA, Radius, or Hexagon across flats



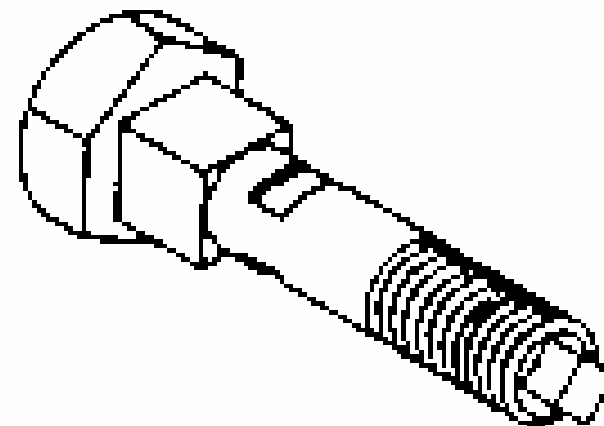
# One view drawings



(A) FLAT PART



(B) TURNED PART





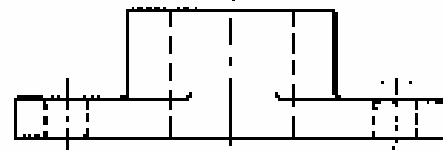
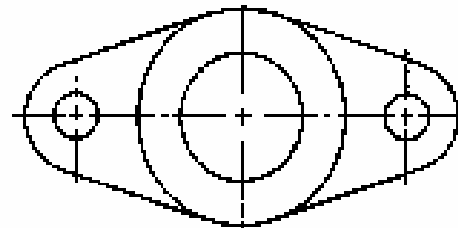
# Two-view drawings

1. Frequently a drafter will decide that only two views are necessary to explain fully a shape of an object.
2. Therefore, some drawings consist of two adjacent views
  - top and front views only
  - front and right views only
3. Two views are usually sufficient for cylindrical objects.

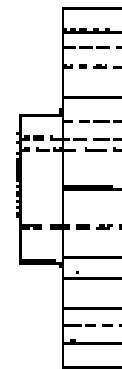
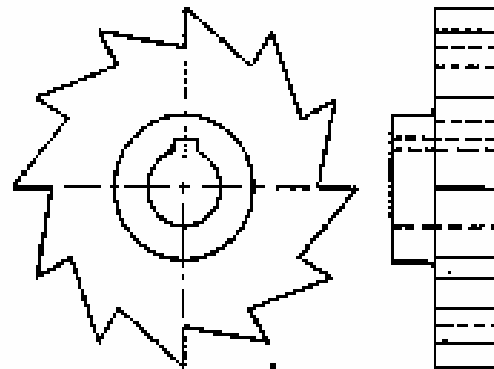




# Two view drawings



(A) SIDE VIEW NOT REQUIRED



(B) TOP VIEW NOT REQUIRED

Fig. 3-8-3 Two-view drawings.

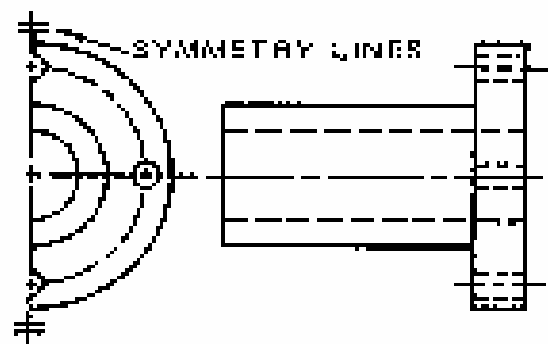


# Partial views

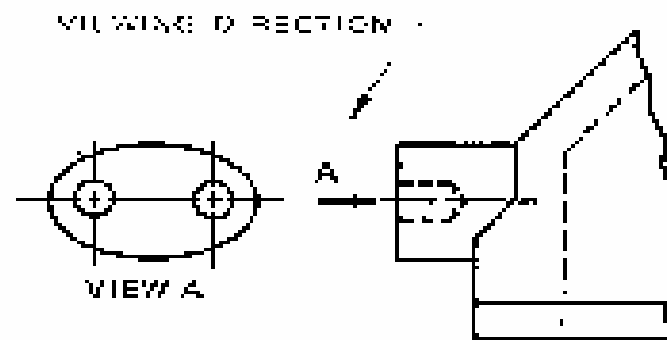
1. Symmetrical objects are often adequately portrayed by half views.
  - a center line is used to show the axis of symmetry.
  - two short lines ,above and below the the view of the object, are drawn at right angles to and on the centre line to indicate the line of symmetry.
2. Partial views, which show only a limited portion of the object with remote details omitted, should be used to clarify the meaning of the drawing.
3. Occasionally two side views can be used to better depict the shape.



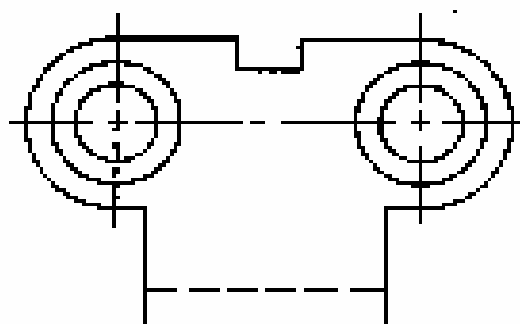
# Partial views



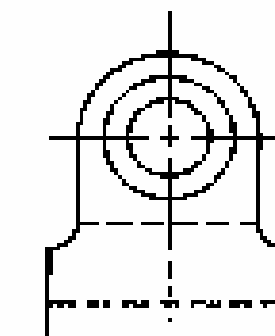
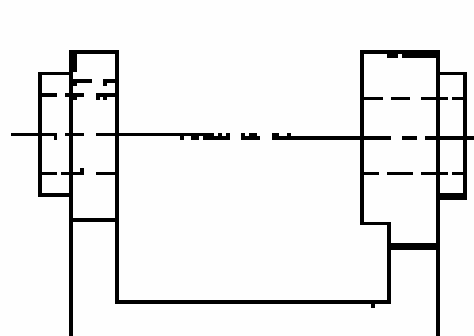
(A) WITH HALF VIEW



(B) PARTIAL VIEW WITH A VIEWING-PLANE LINE USED TO INDICATE DIRECTION



LEFT SIDE ONLY



RIGHT SIDE ONLY

(C) PARTIAL SIDE VIEWS

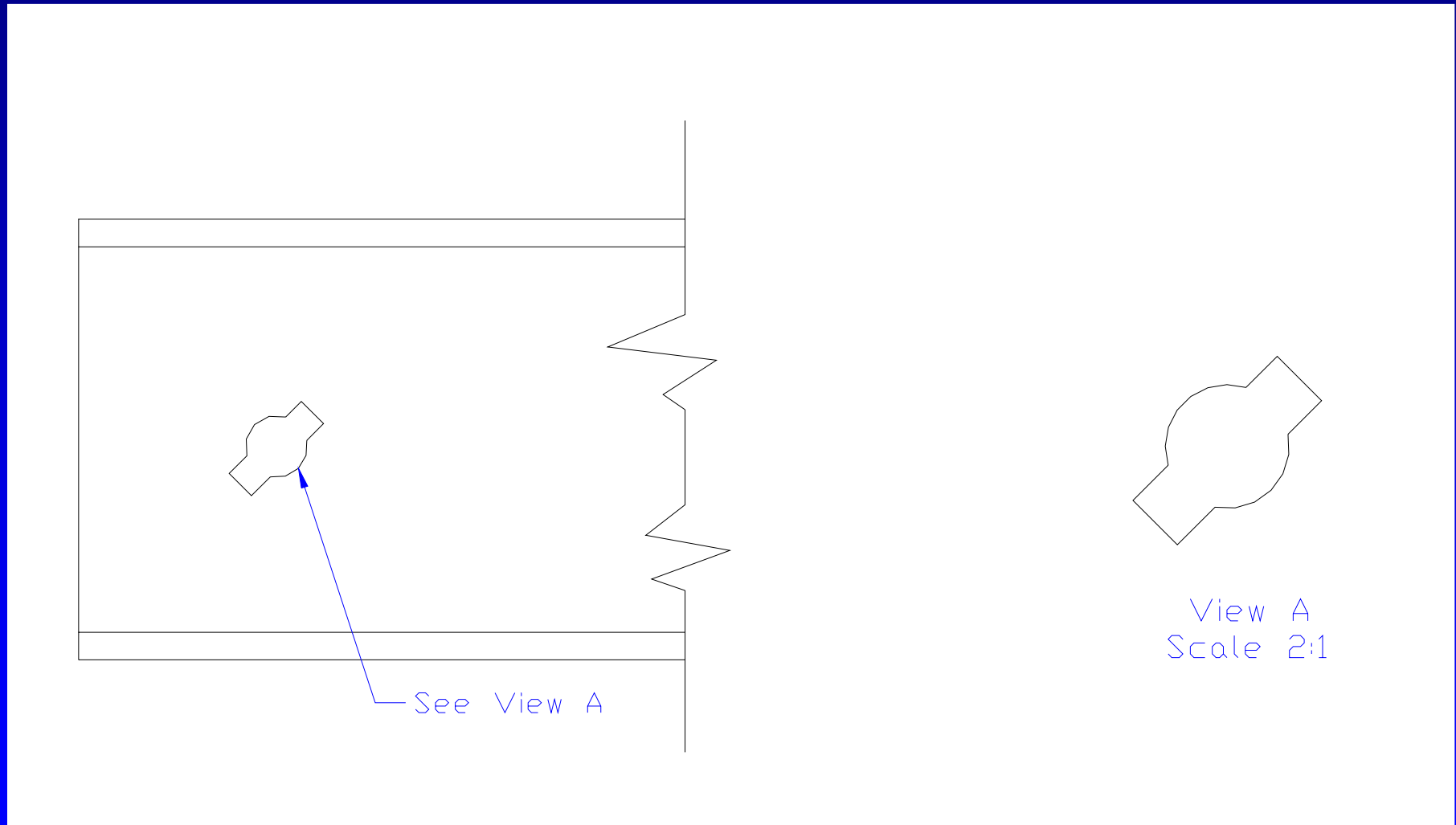


# Enlarged views

1. Enlarged views are used
  - when it is desirable to show a feature in greater detail
  - to eliminate the crowding of details or dimensioning
2. If the enlarged view is rotated
  - state the direction of rotation
  - the amount of rotation of the detail
3. The scale of enlargement must be shown.

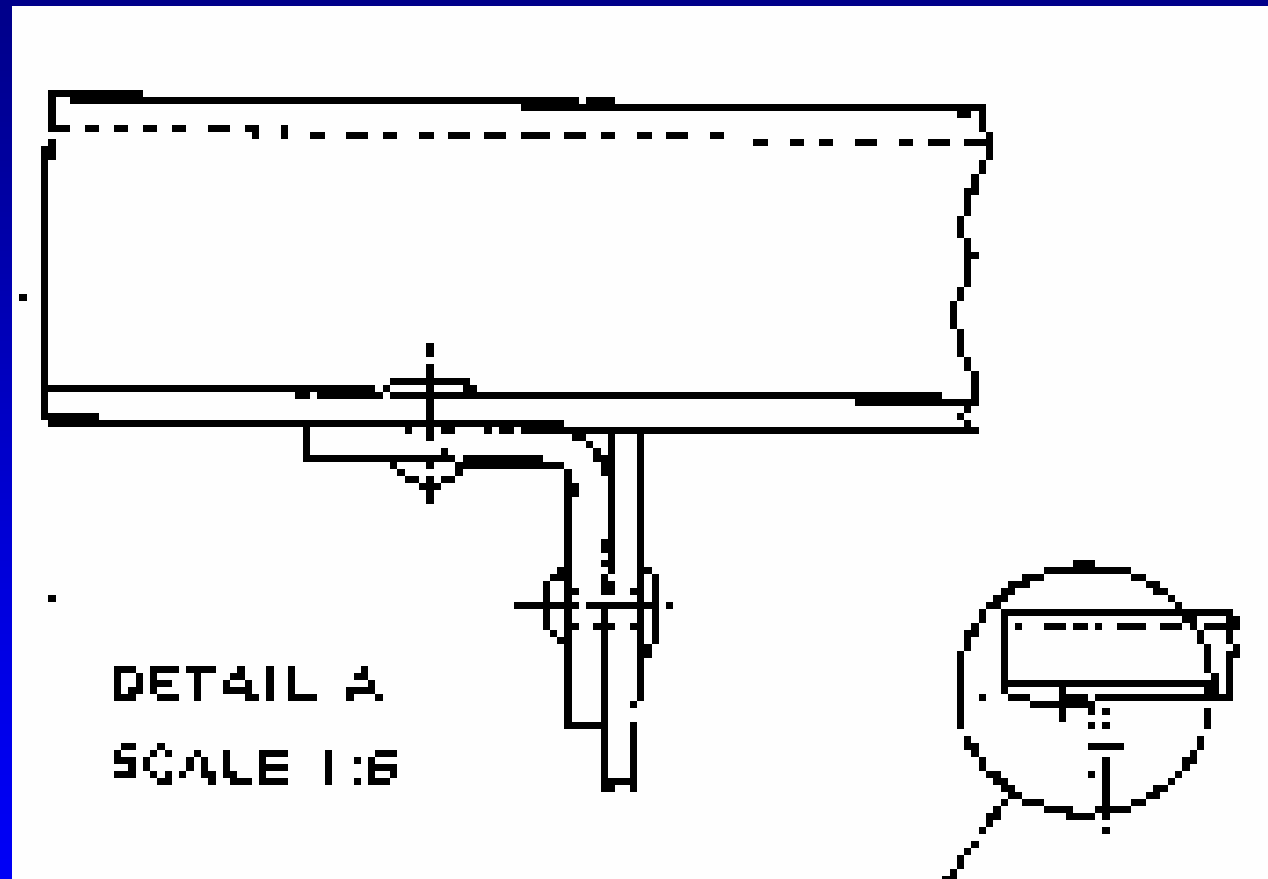


# Enlarged view of feature





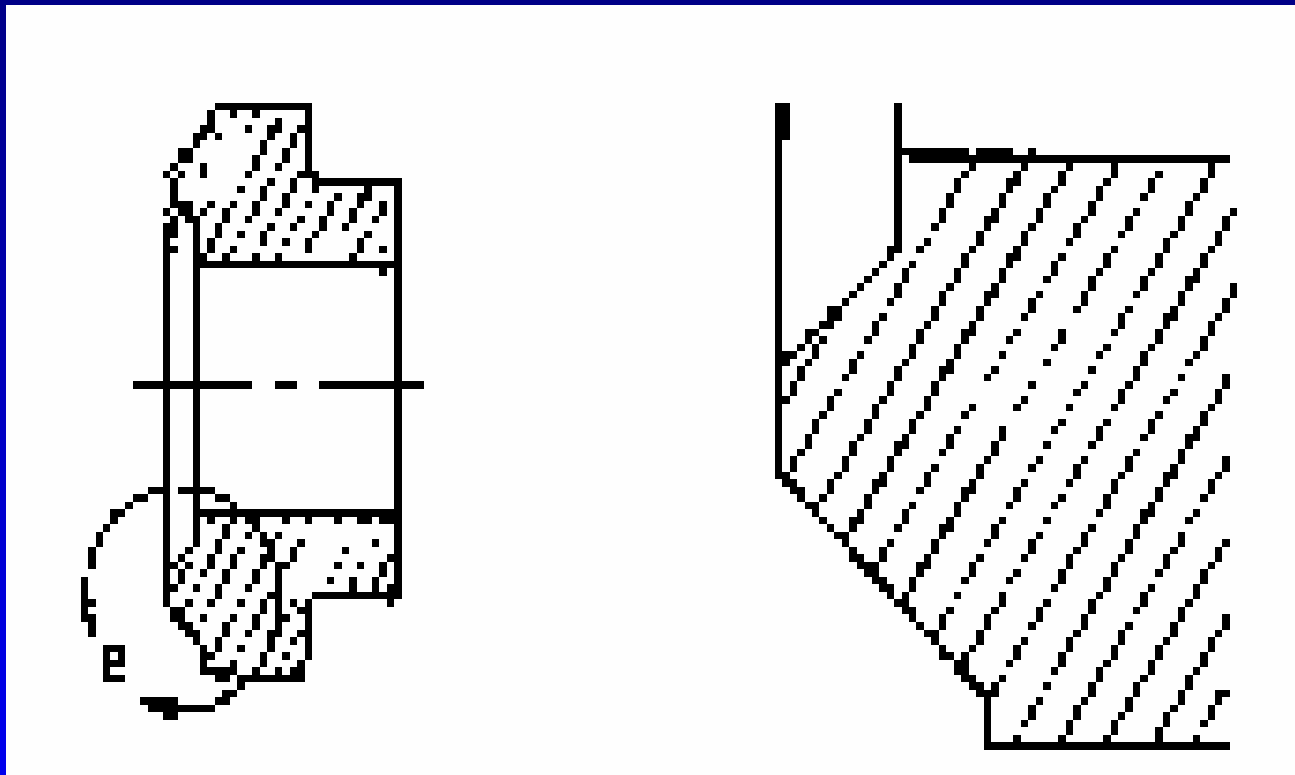
# Enlarged view of assembly



See Detail A  
Scale shown on  
drawing.



# Enlarged view removed



View B  
Scale 5:1



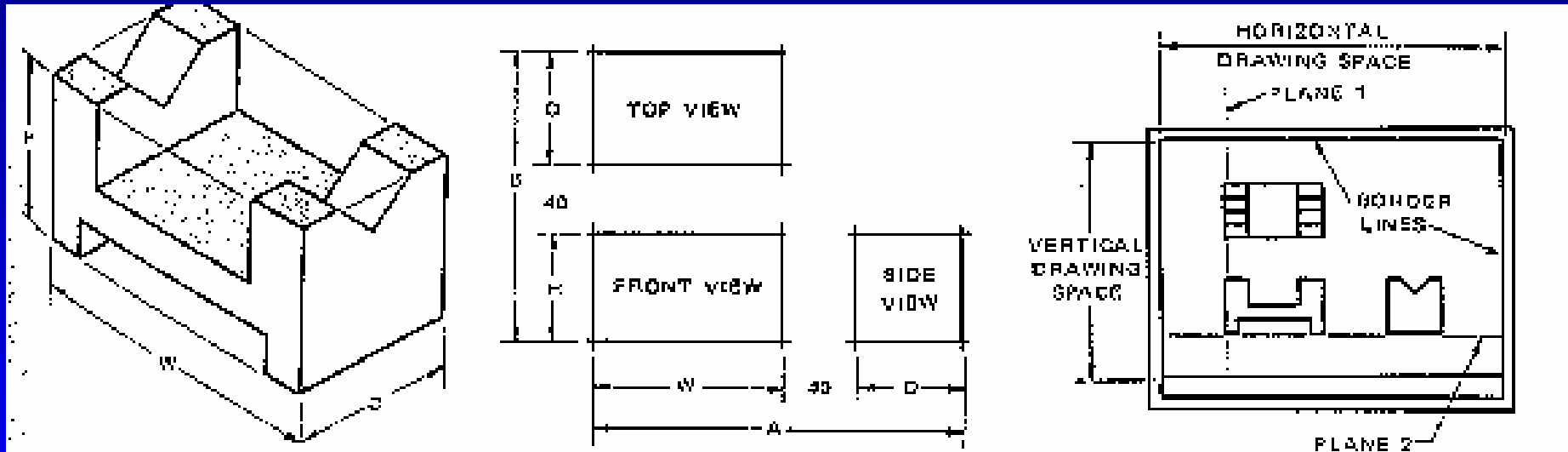
# Spacing the views

1. Views should be well balanced on the drawing paper for clarity and provide a professional presentation of the work.
2. The designer must anticipate the approximate space limits required for all the views to be properly shown.
  - This is determined from
    - the size of the object to be drawn
    - the number of views
    - the scale used
    - the space between the views
      - (providing the same space between the front and top views as between the front and side views)





# Balancing the Drawing on the Drawing Paper. Level I



Deciding the views to be drawn and the scale to be used.

Calculating distances A and B.

Establishing location of planes 1 and 2.

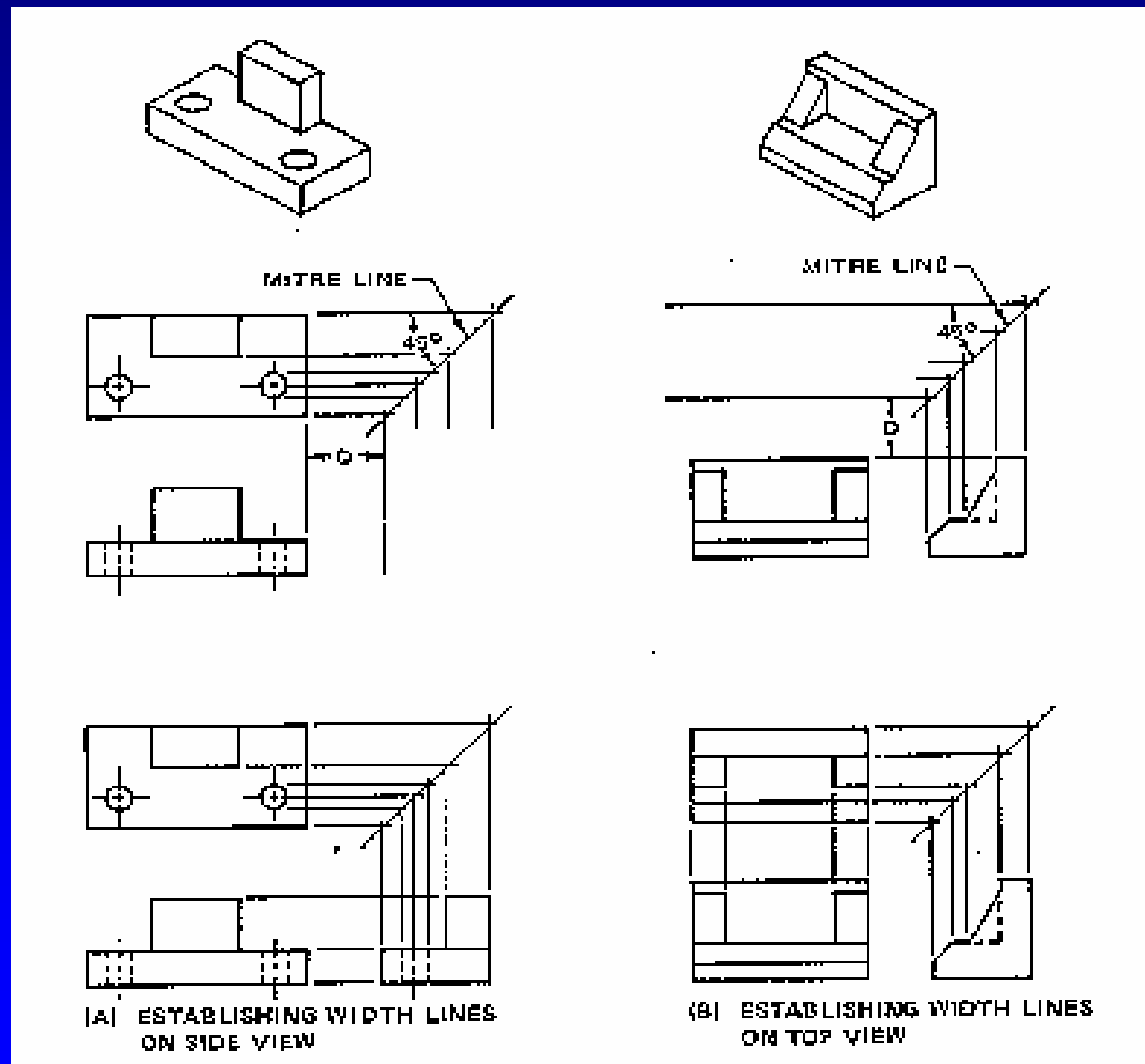


# Use of a Mitre Line

1. The use of a Mitre line at 45 degrees provides a fast and accurate method of constructing the third view once two views are known.
2. It is a technique that comes from manual drafting but is still effective for 2D CAD drawings when only 2 views are provided.



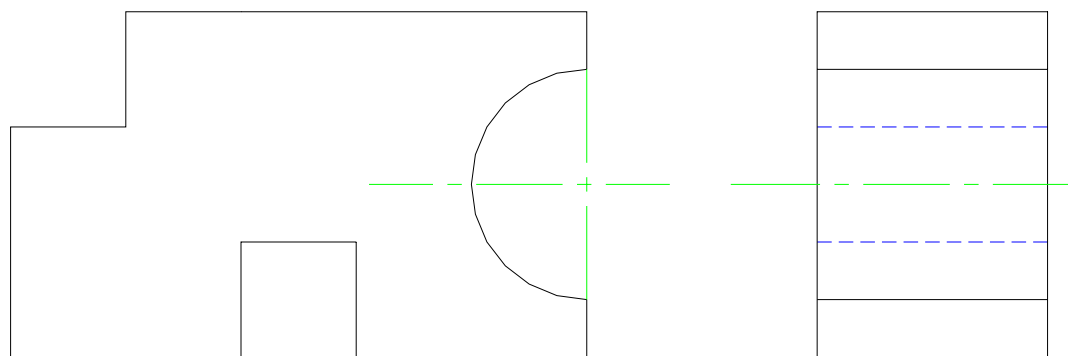
# Use of a mitre line



Dr. Ashok Kaushal

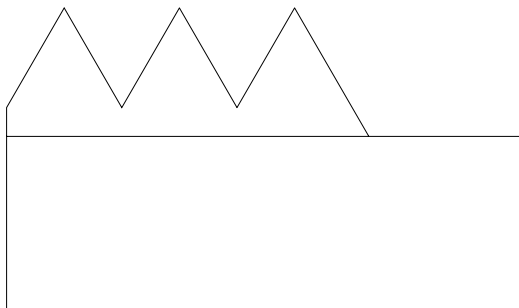
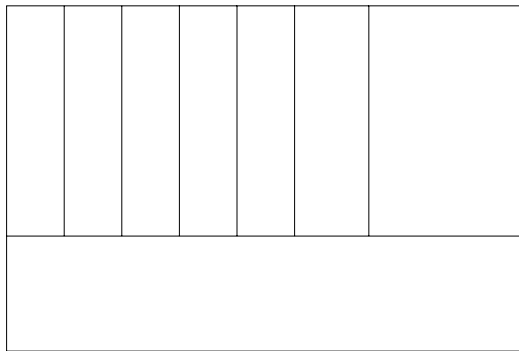


# Completion test - Missing top view



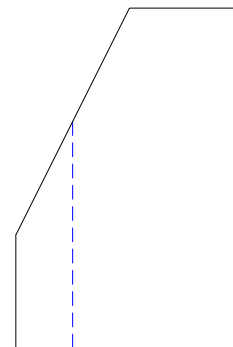
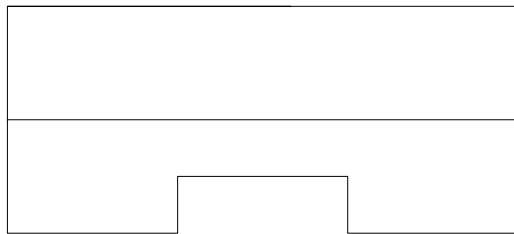


# Completion test - Missing side view





# Completion test - Missing front view





# Object with circular surfaces

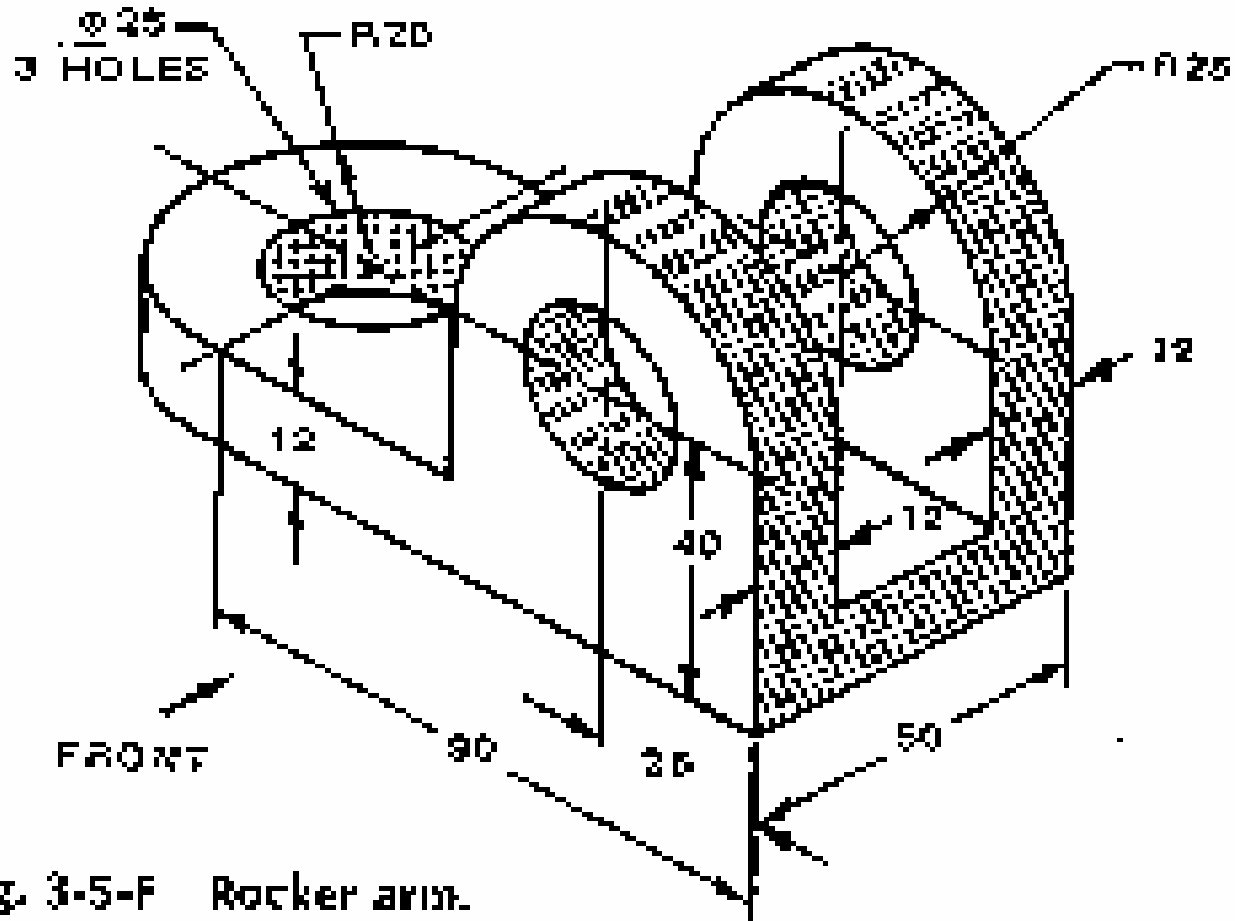
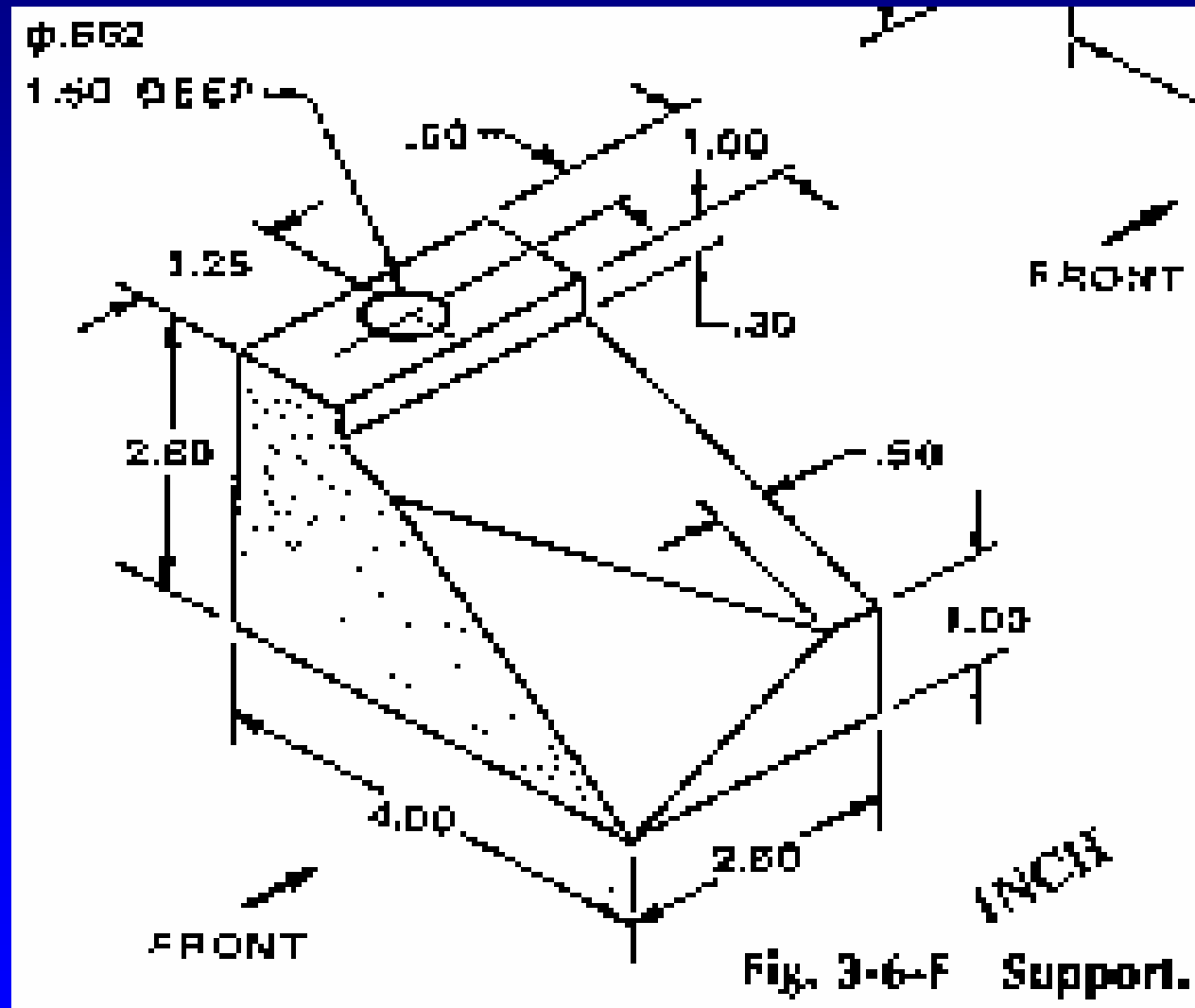


Fig. 3-5-F Rocker arm.



# Object with oblique surfaces







# Portfolio

1. Use Concordia University 3 ring binder. Your choice of color.
2. A title page is required.
  - Concordia University
  - Computer Institute
  - Course CI811 : AutoCAD Level I
  - Student name
  - Date submitted
3. A table of contents is required.
4. Include your term projects.
5. All term drawings and your project must be submitted on a CDR or Zip disk.
6. Marks are given for professional presentations.

Dr. Ashok Kaushal