

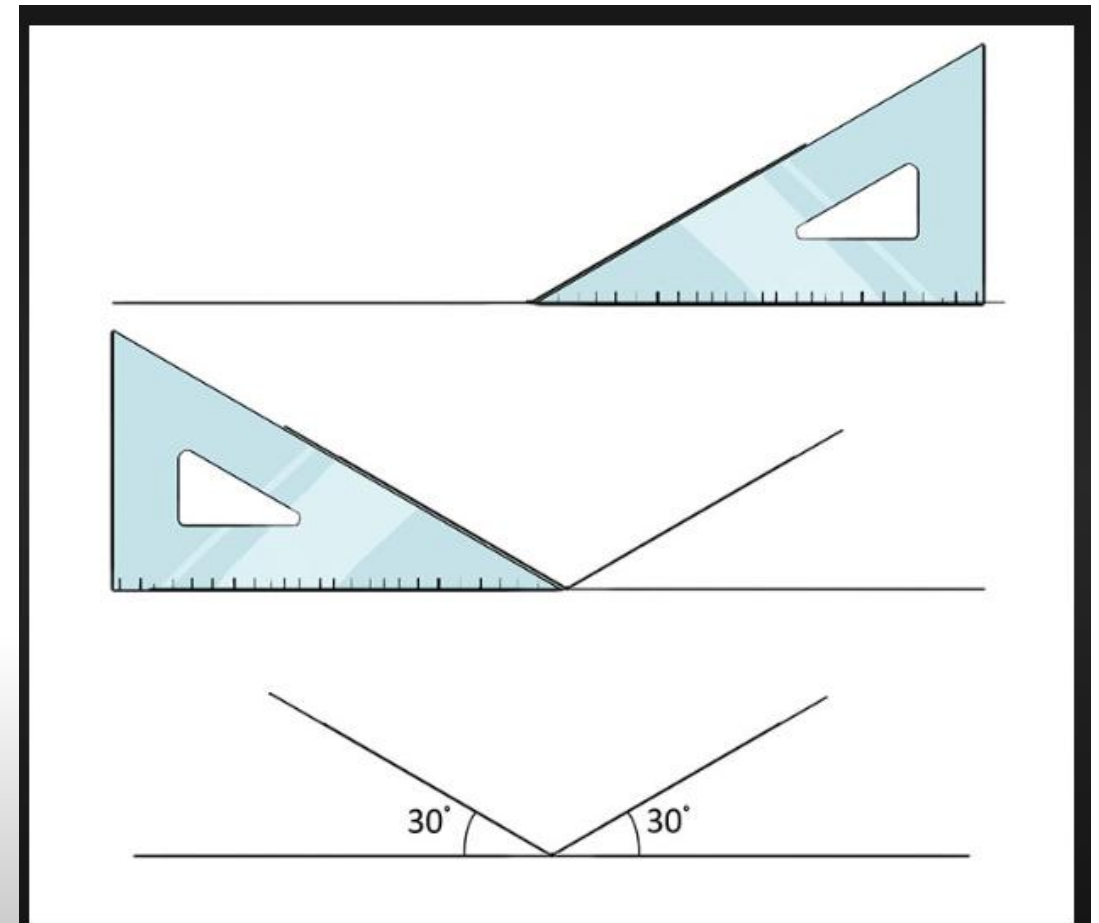
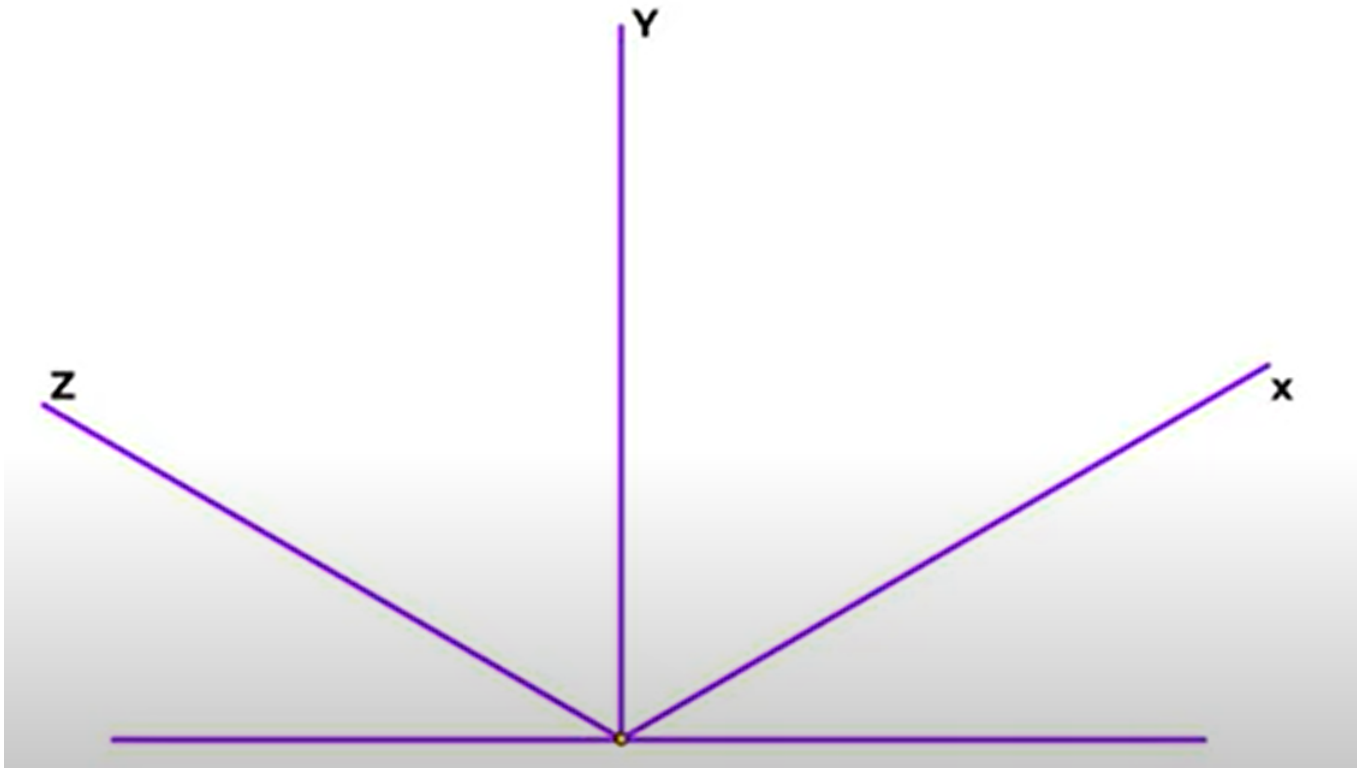
Lecture 4 Engineering Drawing

Isometric Projection and Sectioning

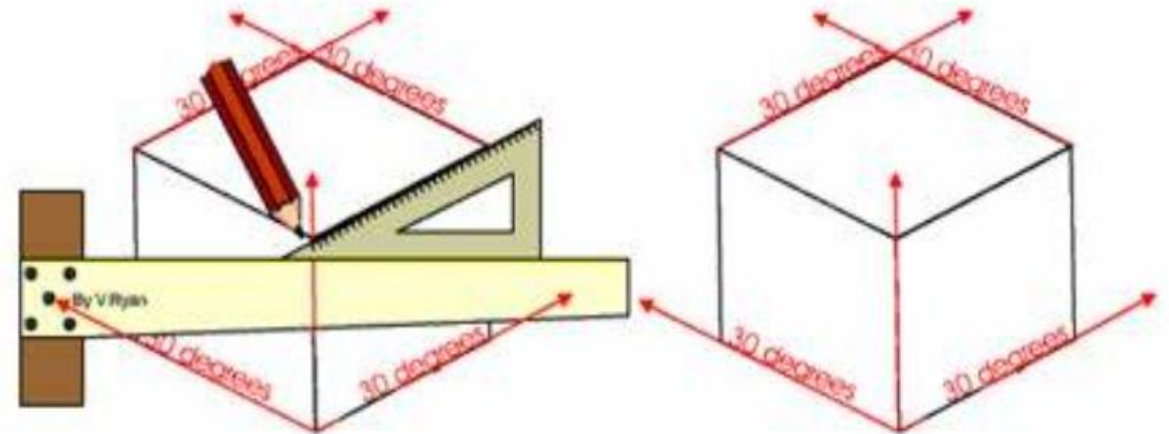
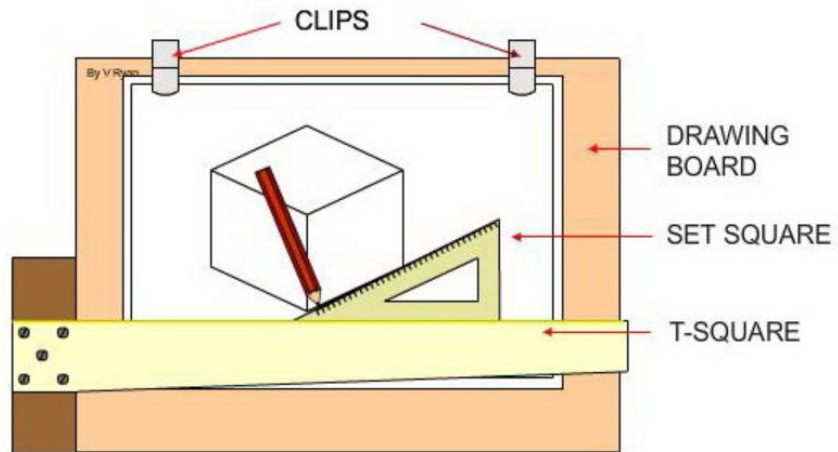
1- Isometric projection:-

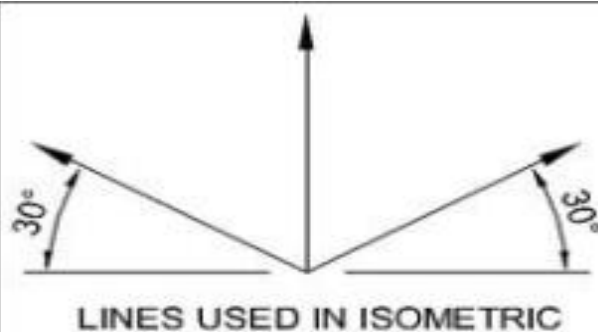
Isometric projection is a type of pictorial projection in which the three dimensions of a solid are shown in one view .

To draw the projections of a cube of 25 mm long edges resting on the ground .



The figures shows how to use T-square and (30-60 set square)
30 degrees angle to be used

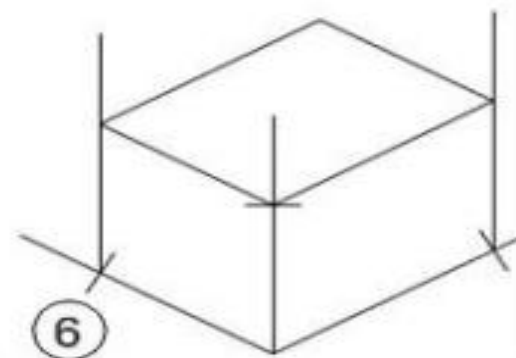
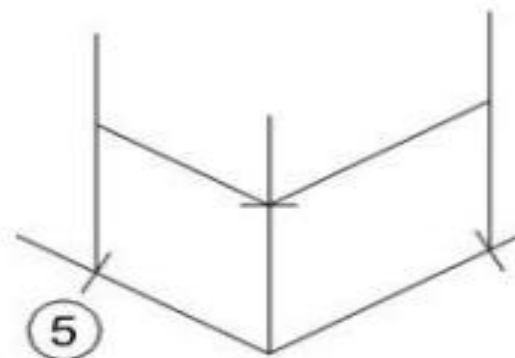
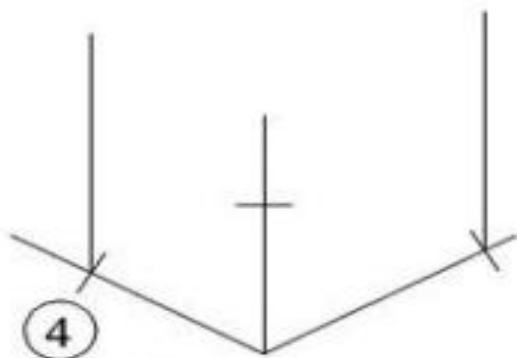
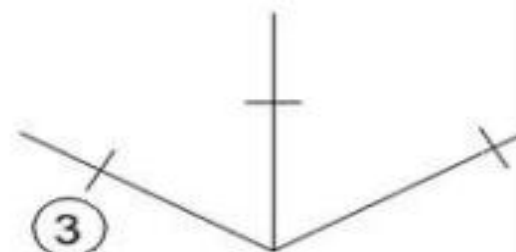
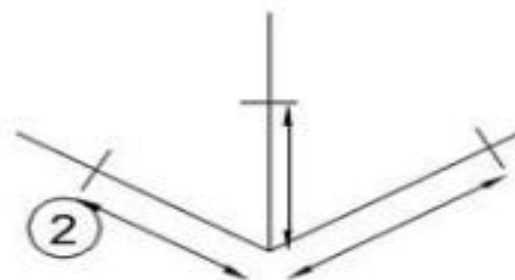
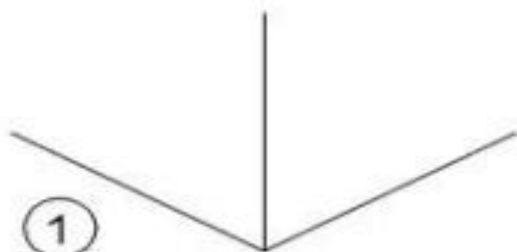
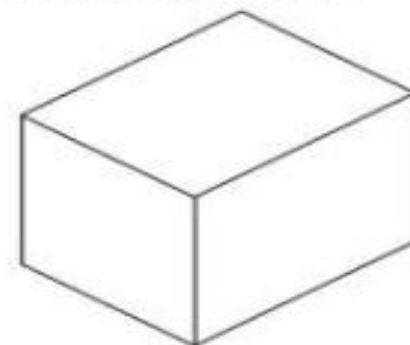




ISOMETRIC STEPS

1. 3 LINES
2. 3 DIMENSIONS
3. CRATE
4. CRATING

DRAWING A CRATE



To draw isometric from orthographic projection: Example1

- At least two views are required
- Start drawing with a thin light lines
- From the lowest point draw the main 3 lines

Using 30° set square and T- square

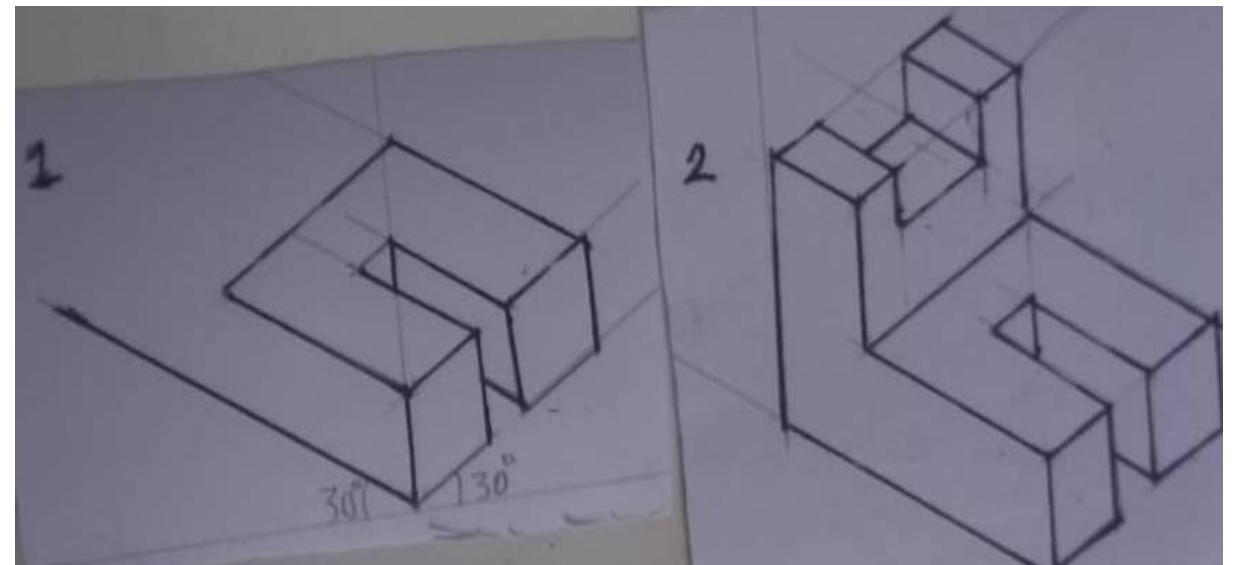
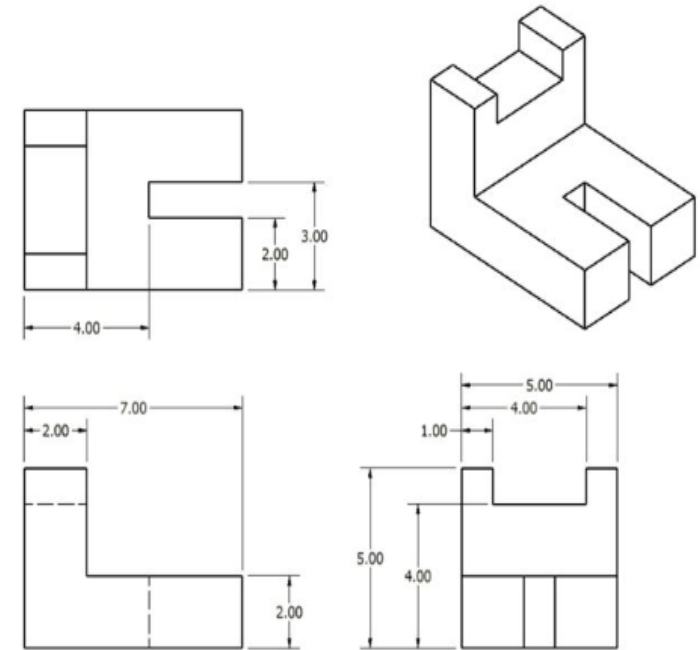
- Complete the top, right and left sides
- Then start from right or left side to draw the shape

According to the view

You have to look to both views to get the three dim.

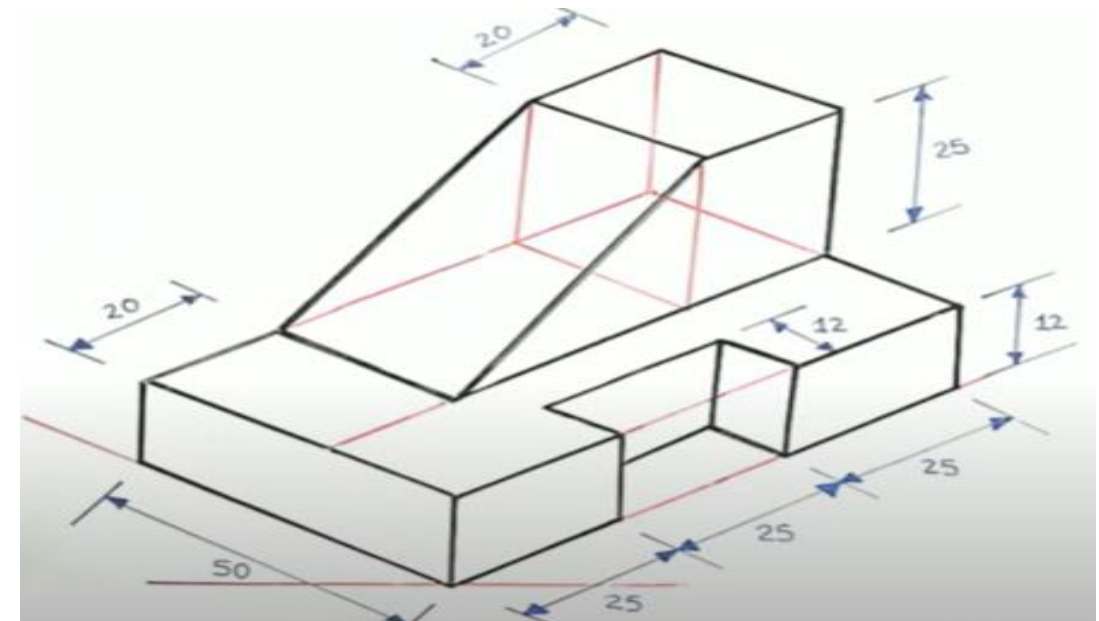
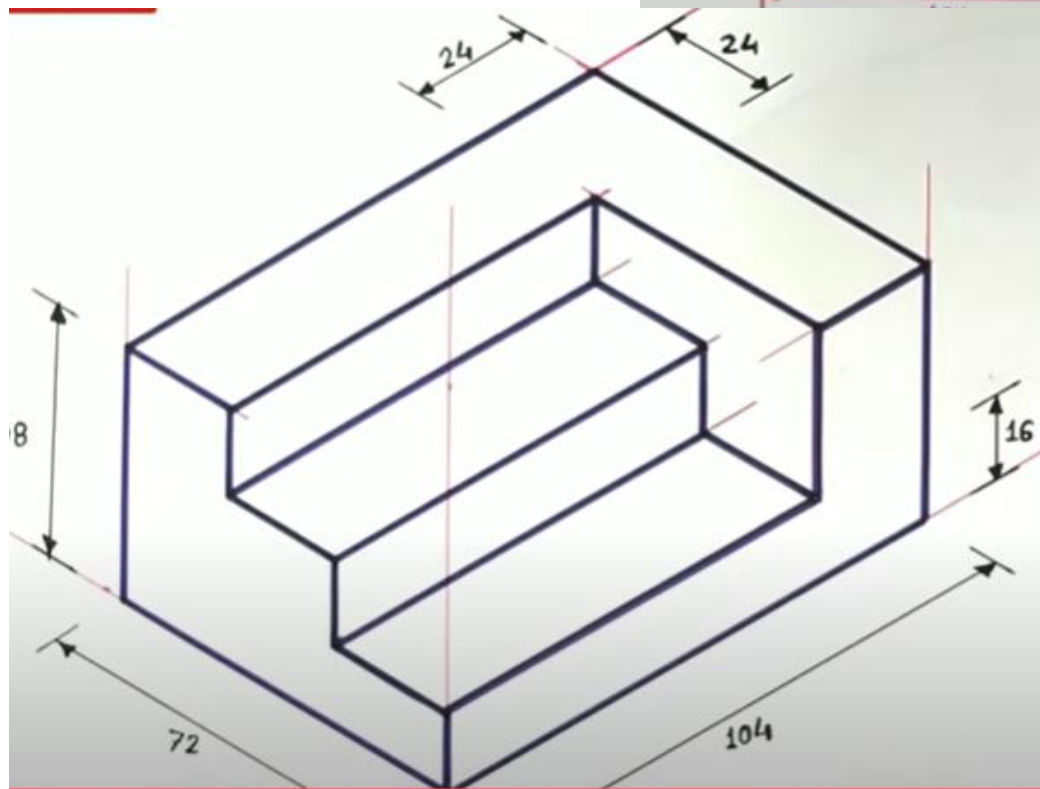
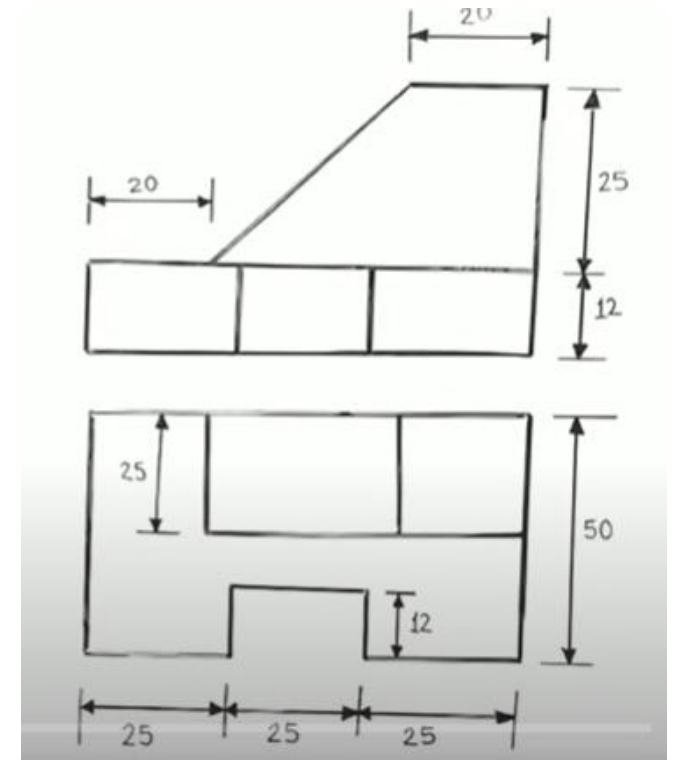
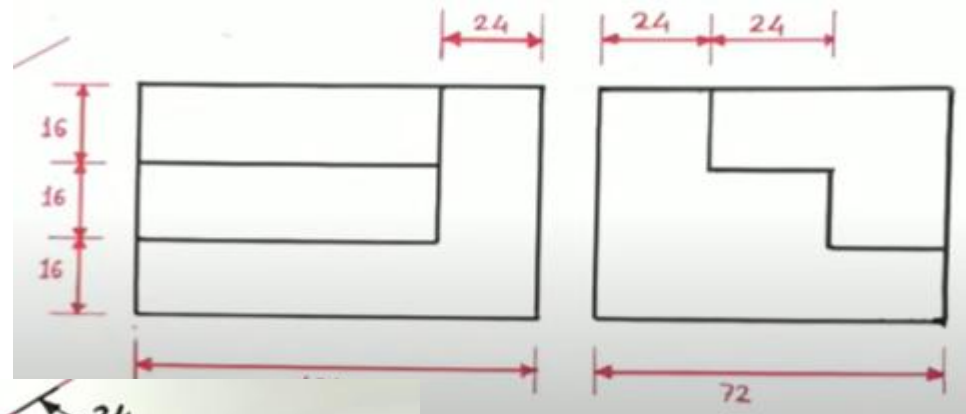
Of the part

- Hidden lines are not required

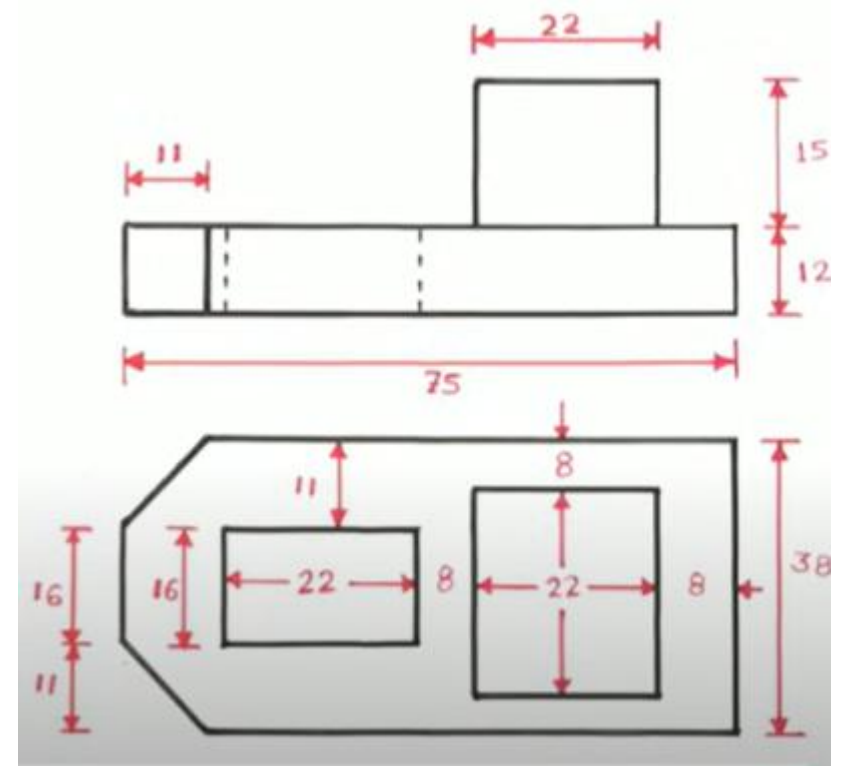
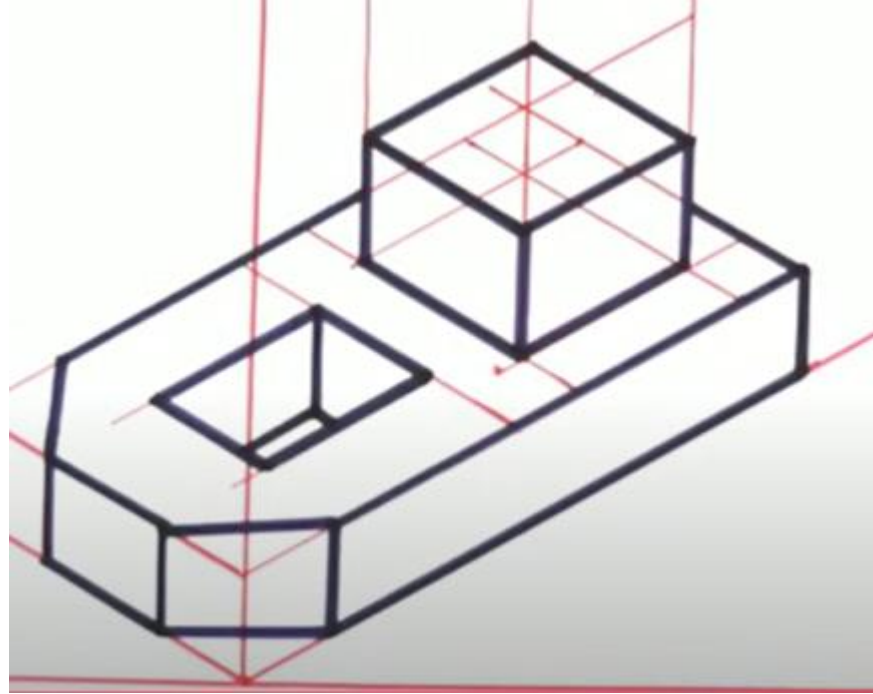


Isometric drawing or Isometric Views

Example 2



Example 3



Note: The circle in isometric view appears as ellipse.

How to draw circles on Isometric Projection

Four centers method:

II. four-centre method:

Draw the isometric view of the square [fig. i)]. Draw perpendicular bisectors of the sides of the rhombus, intersecting each other on the longer diagonal at points p and q, and which meet at the 120° -angles b and d. Fig.ii

(Or, draw lines joining the 120° -angles b and d with the mid-points of the opposite

sides and intersecting each other on the longer diagonal at points p and q. Two of these

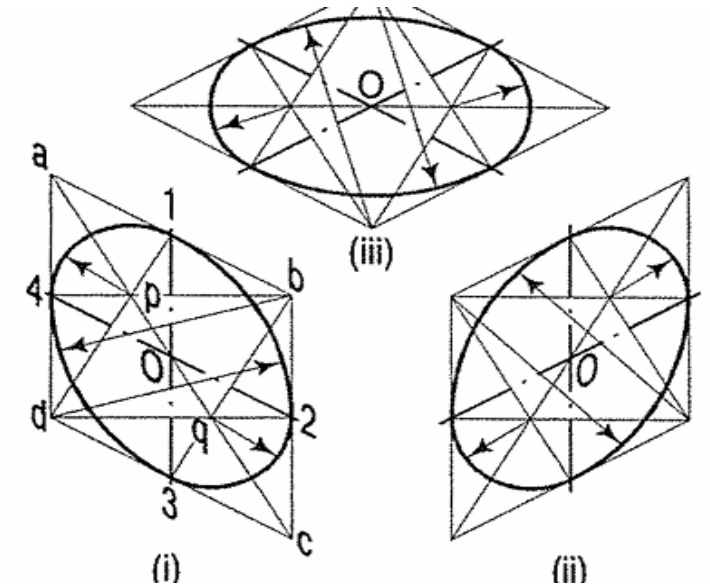
lines will be drawn horizontal, while the other two will make 60° -angles with the

horizontal. With centres b and d, draw arcs 3-4 and 1-2 respectively. With centres p

and q, draw arcs 1-4 and 2-3 respectively and complete the required ellipse. Fig. ii)

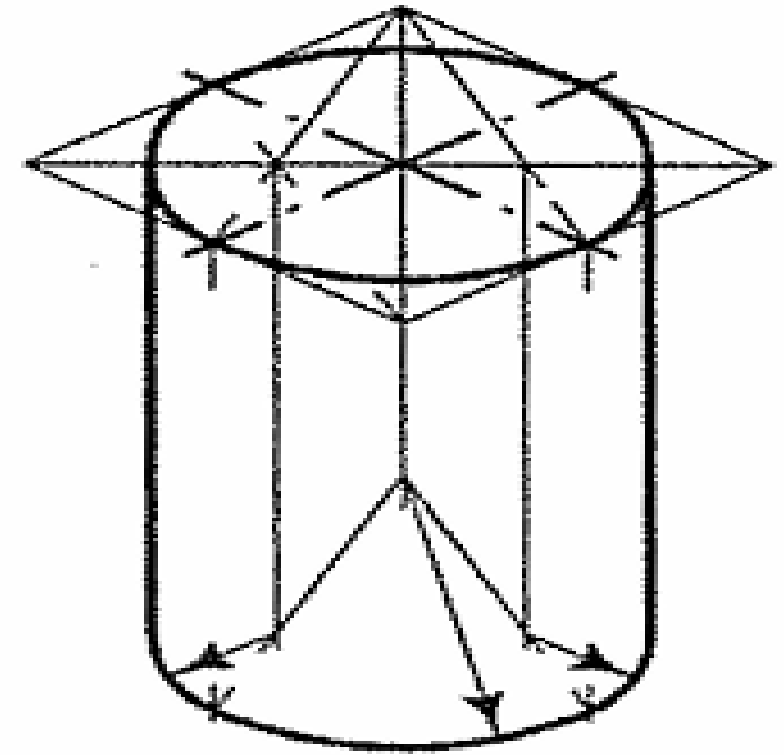
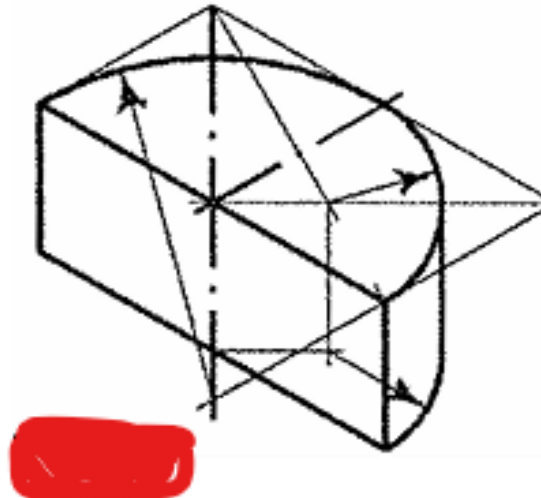
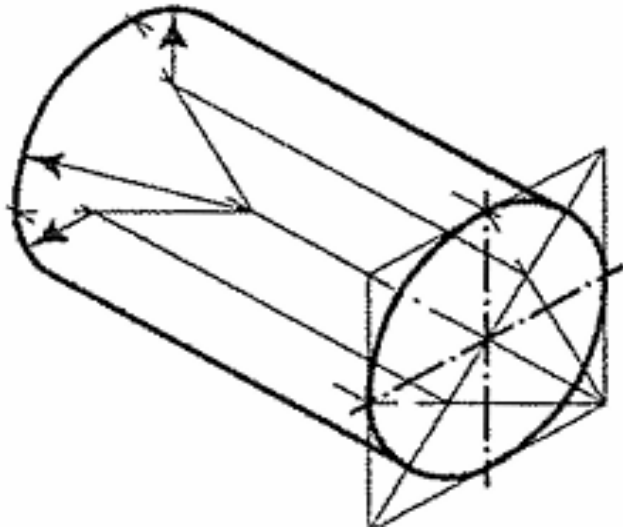
shows the ellipse obtained in the rhombus drawn in the direction of the other sloping

axis. (iii) shows the isometric view of the circle when its surface is horizontal.



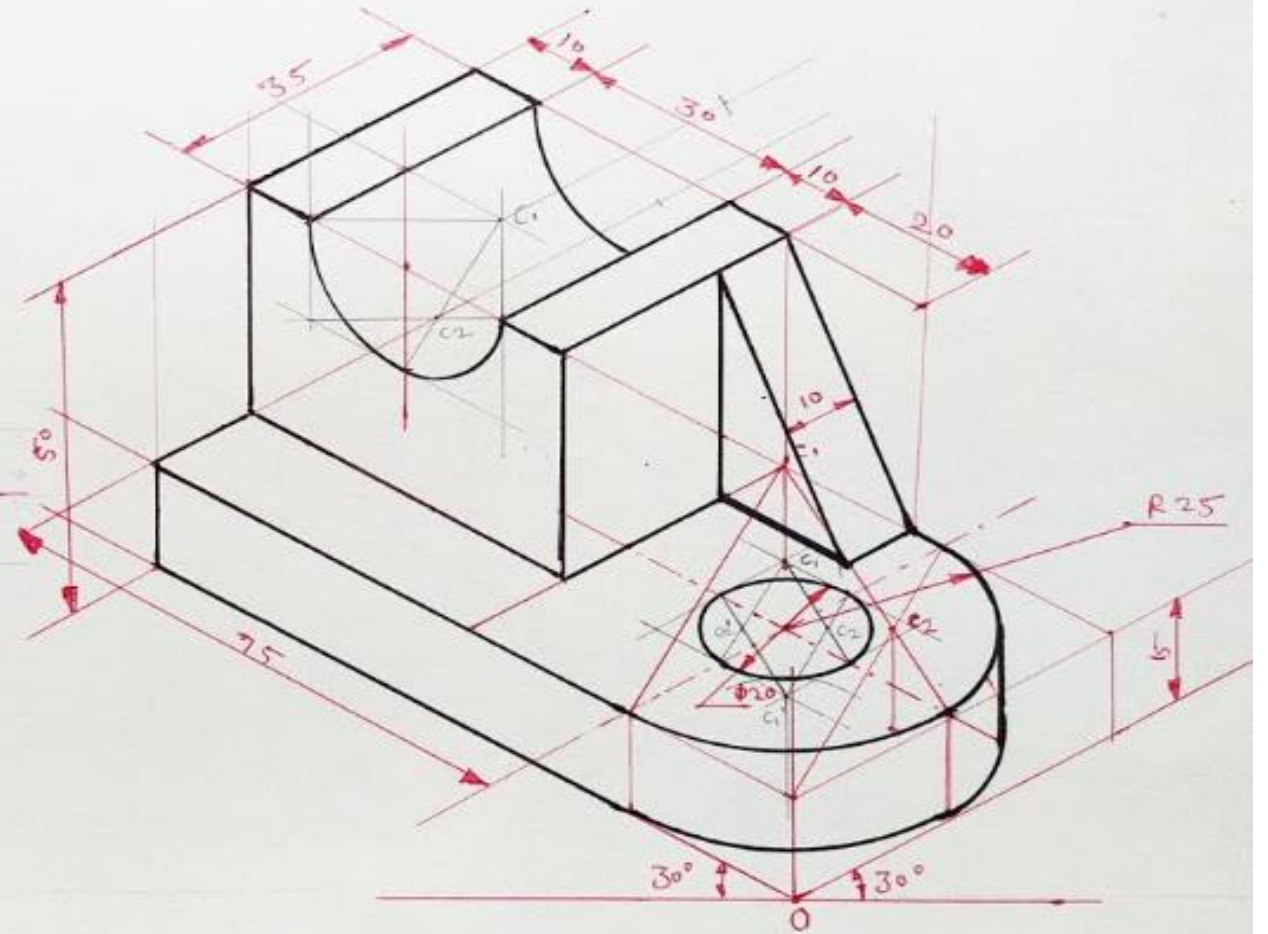
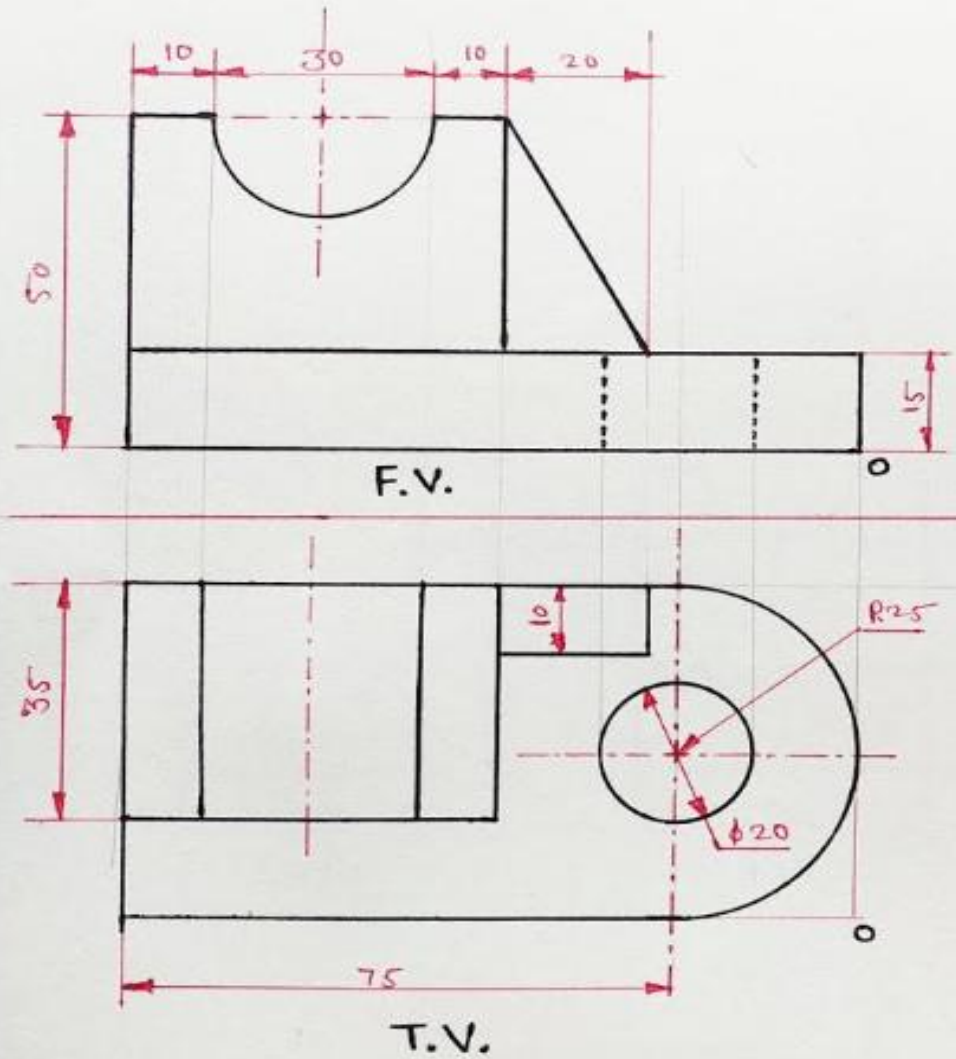
To draw the isometric Cylinder

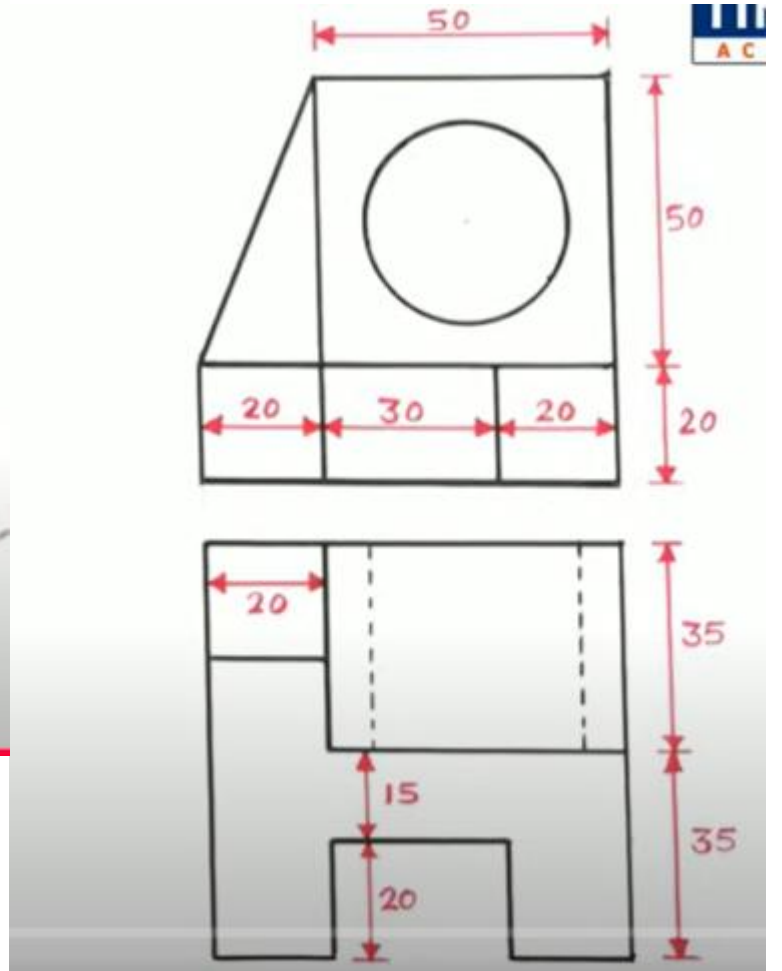
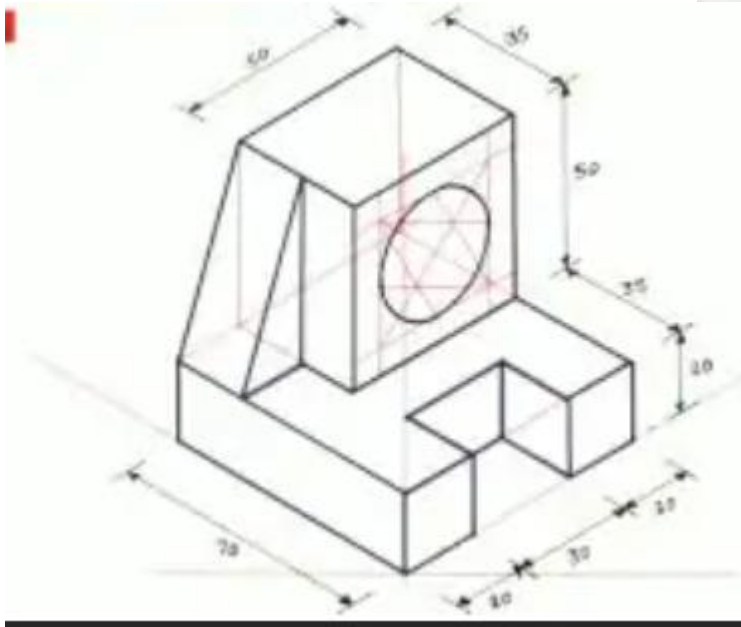
Draw the rhombus for the upper end of the prism [fig. (iii)] and in it, draw the ellipse by the four-centre method. From the centres for the arcs, draw vertical lines of length equal to the length of the axis, thus determining the centres for the lower ellipse. Draw the arcs for the half ellipse. Draw common tangents, thus completing the required view.



(iii)

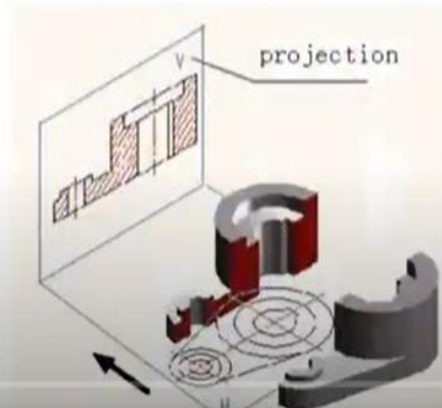
Example 4





2- Sectioning

Sectional Views



What is Sectioning?

It is a process of cutting and removing a part of an object from a particular given point using an imaginary cutting plane.

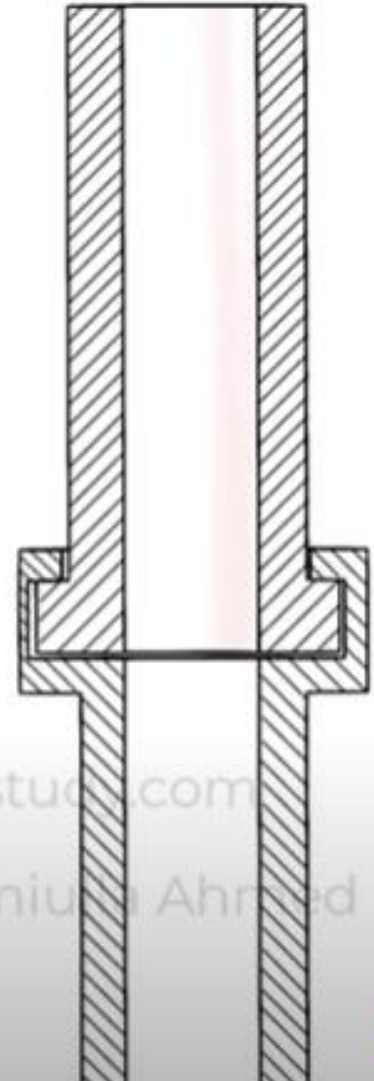
What is Sectional Orthographic Projections?

When we draw the different views i.e FV, TV & SV of an sectioned object in designing then this is known as sectional orthographic projections.

Sectional View

Why are sectional views important?

- Reveals hidden details.
 - Internal holes
 - Slots
 - Complex shapes
- Improved Understanding
- Avoids Clutter.



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Types of Sectioning :

1- Full Section

2- Half Section

3- Offset Section

Types of Sectional Views

Full Sectional
View



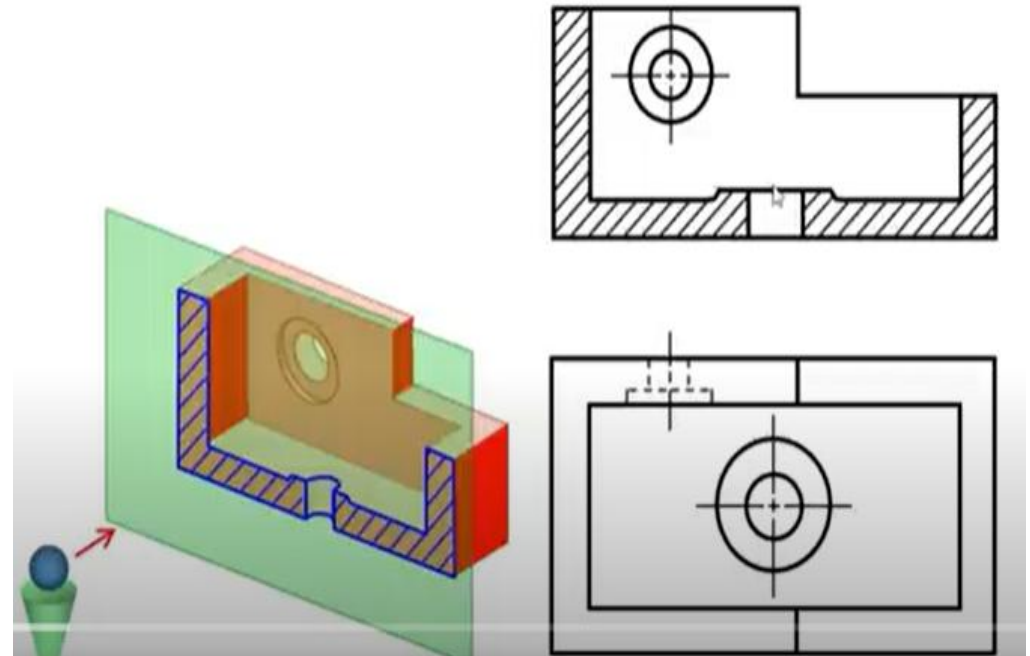
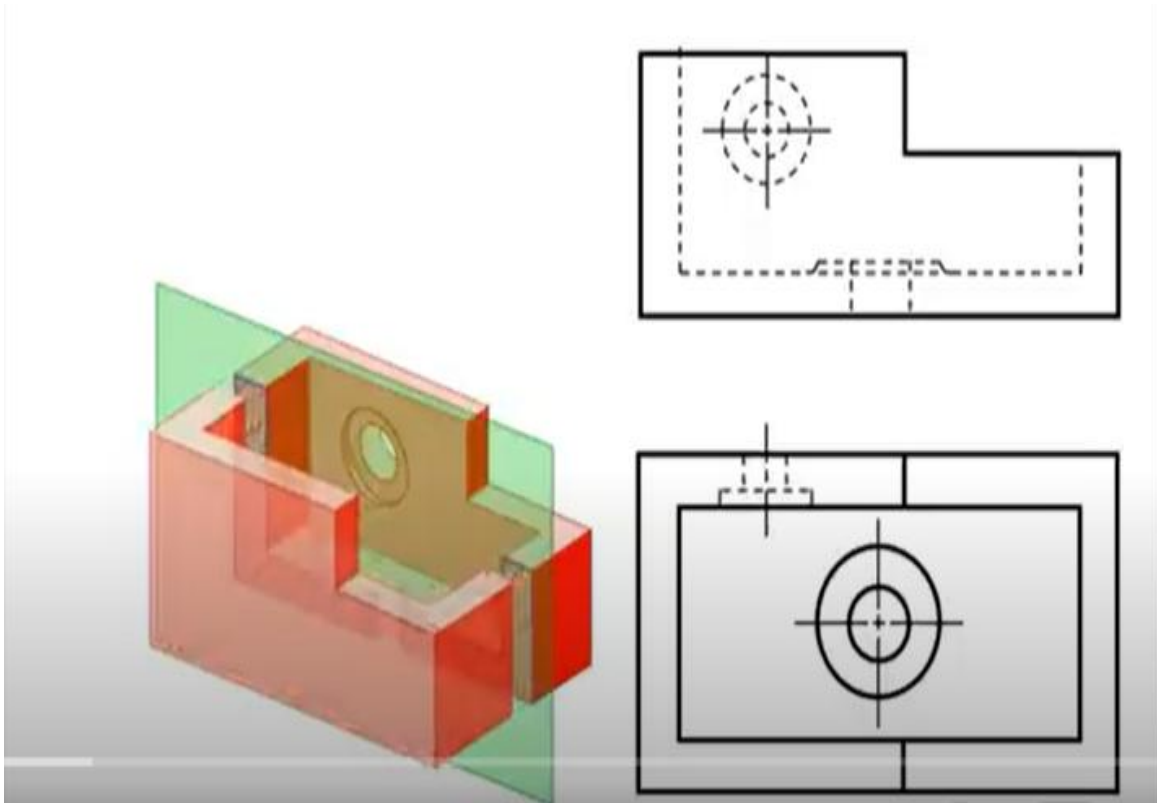
Half Sectional
View



Offset Sectional
View



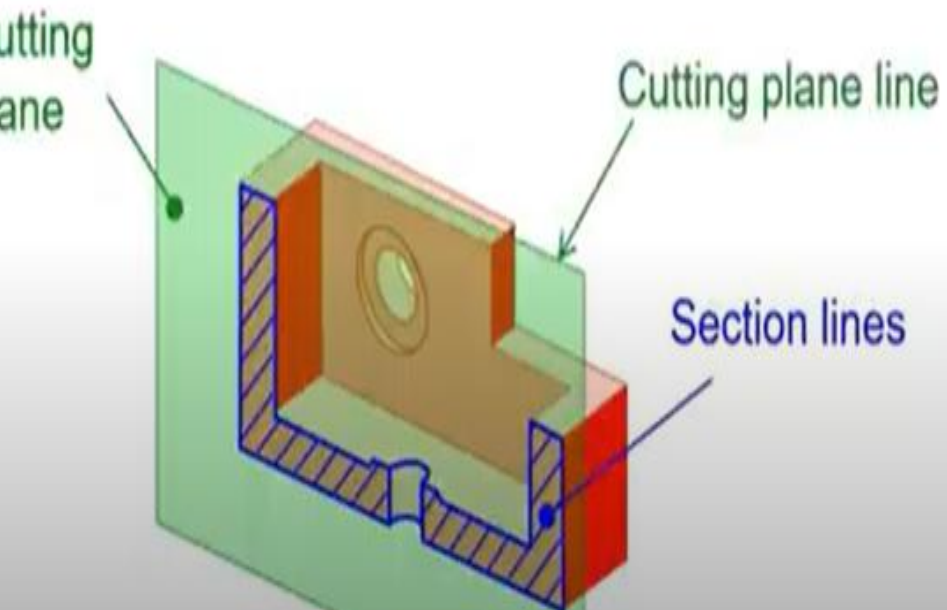
**Images shows the cutting plane and
How the view appears after removing part of the view**



CUTTING PLANE

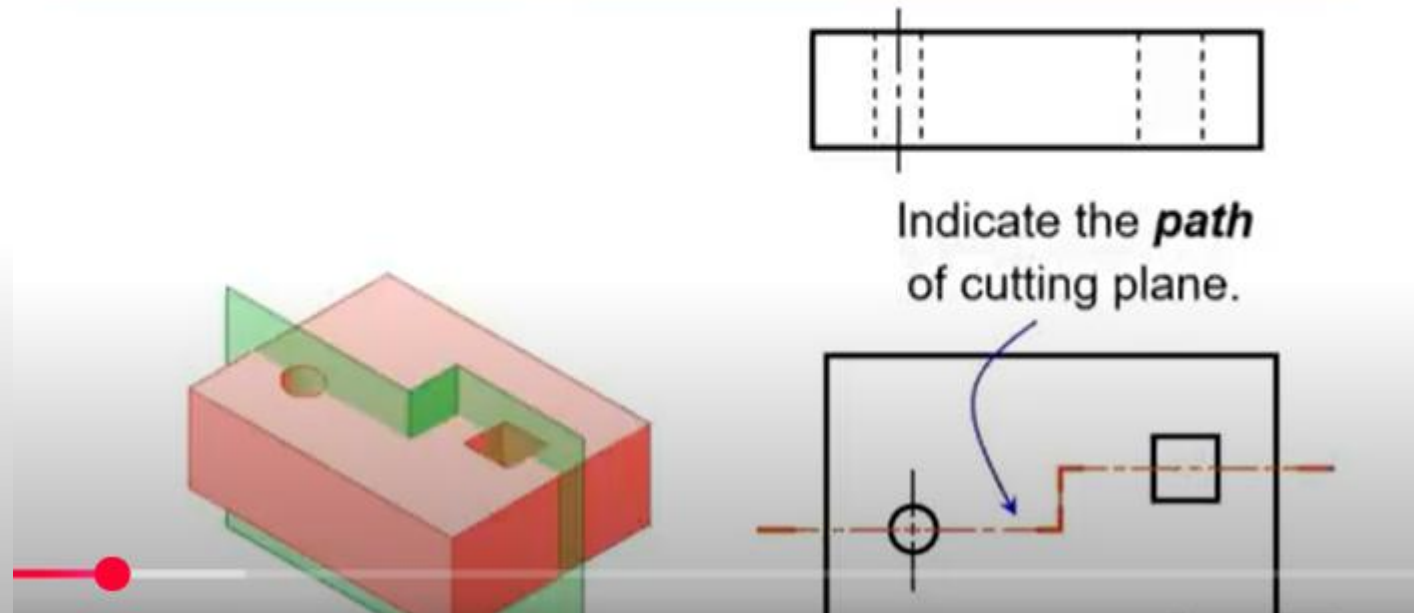
Cutting plane is a plane that *imaginarily cuts* the object to reveal the internal features.

a. Vertical Plane b. Horizontal Plane c. Inclined Plane

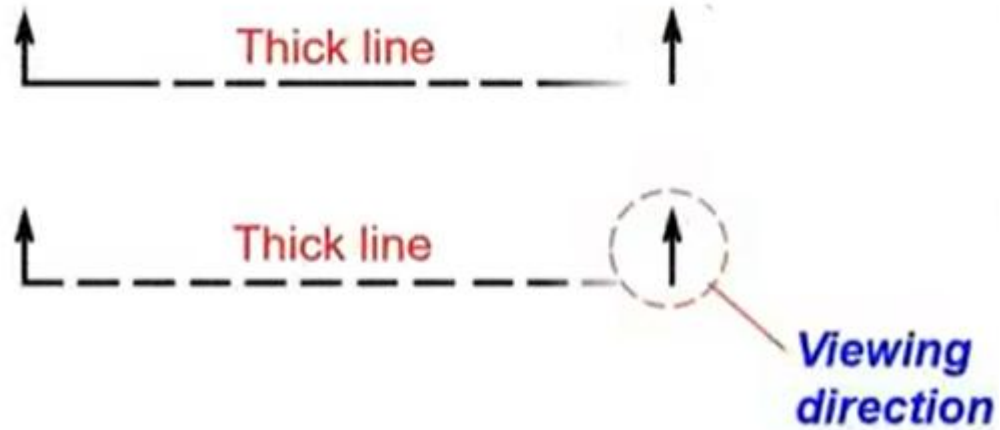


Cutting Plane Line or Section Line

Cutting plane line is an *edge view* of the cutting plane.



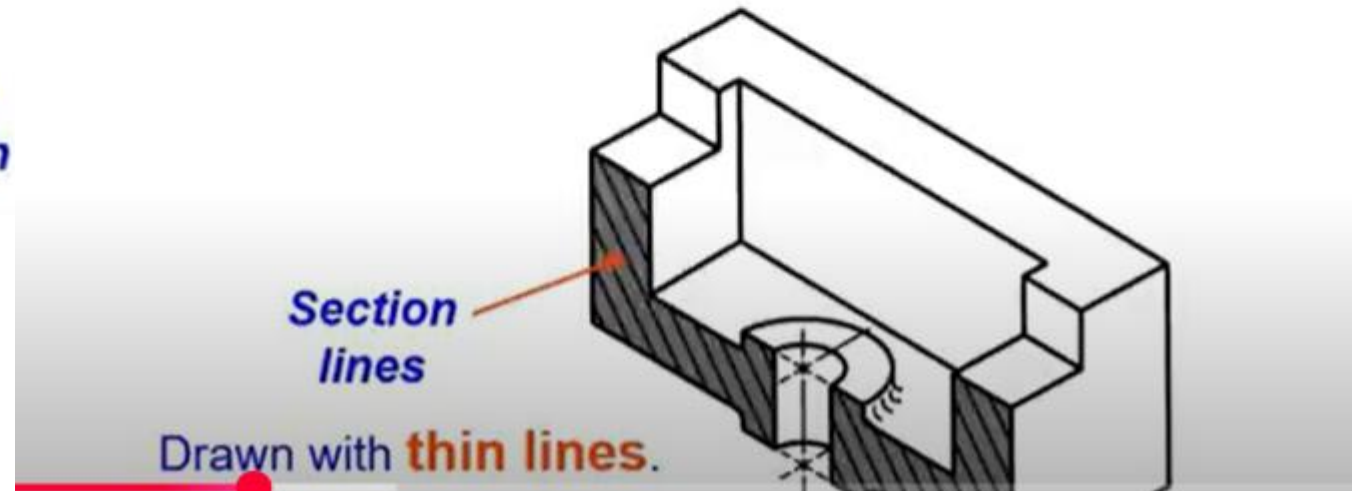
How to draw a Section Line



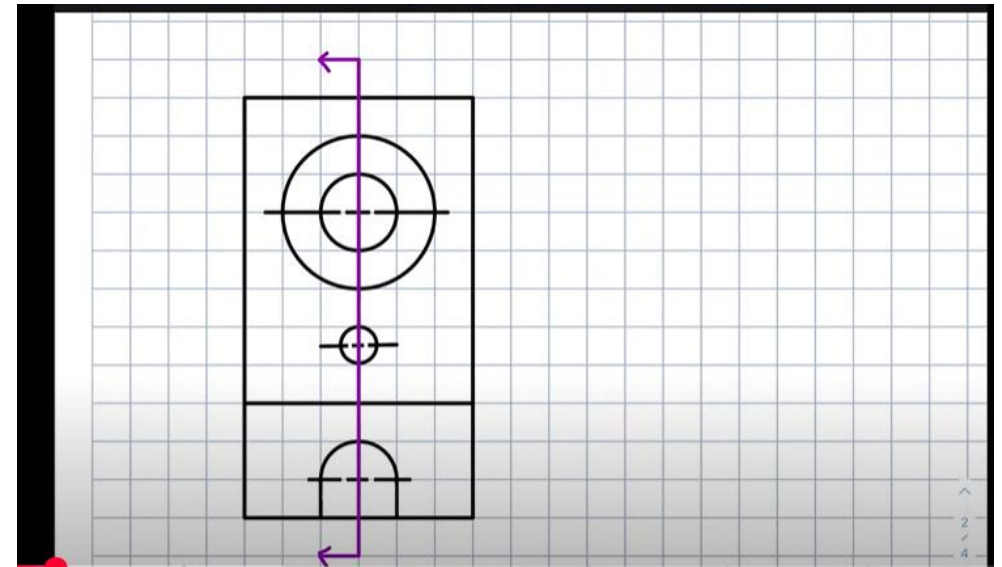
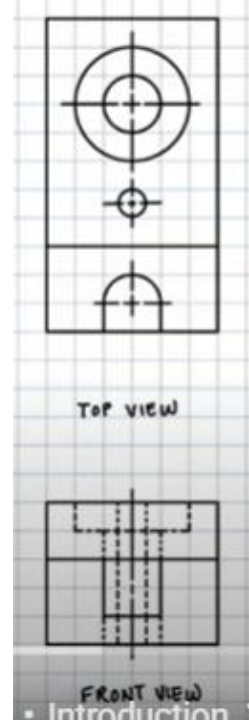
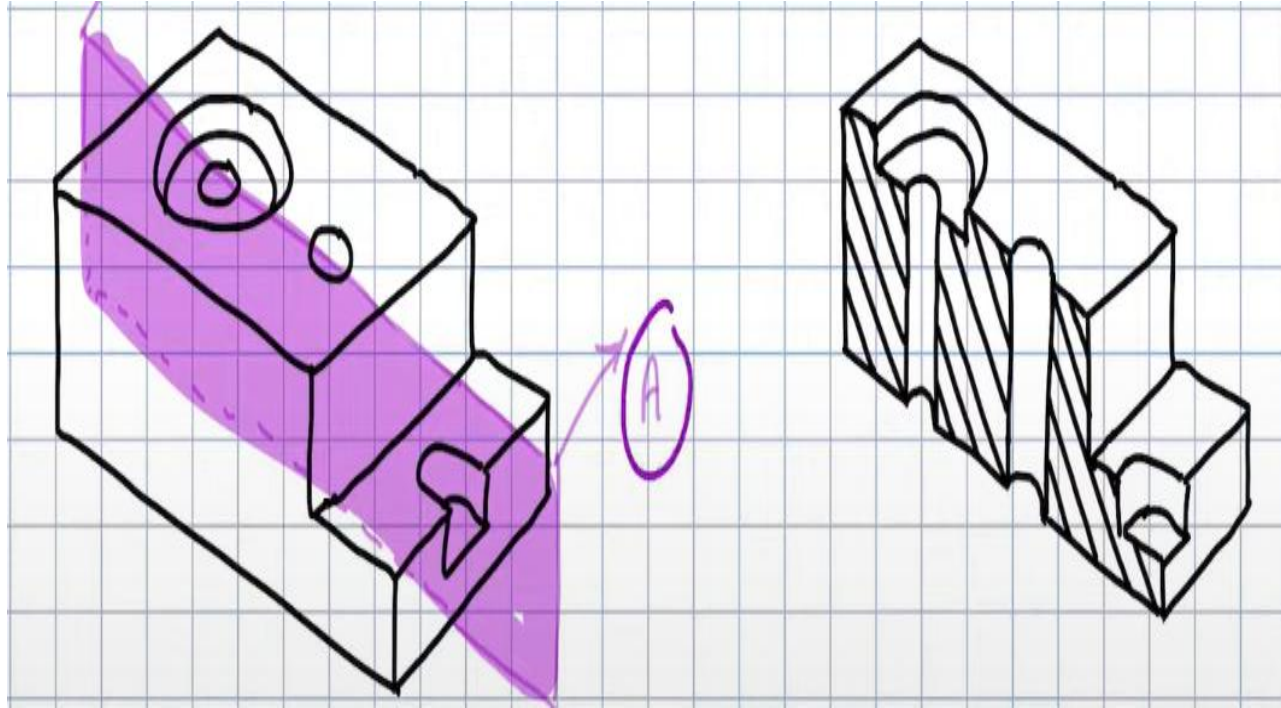
What is Hatching?

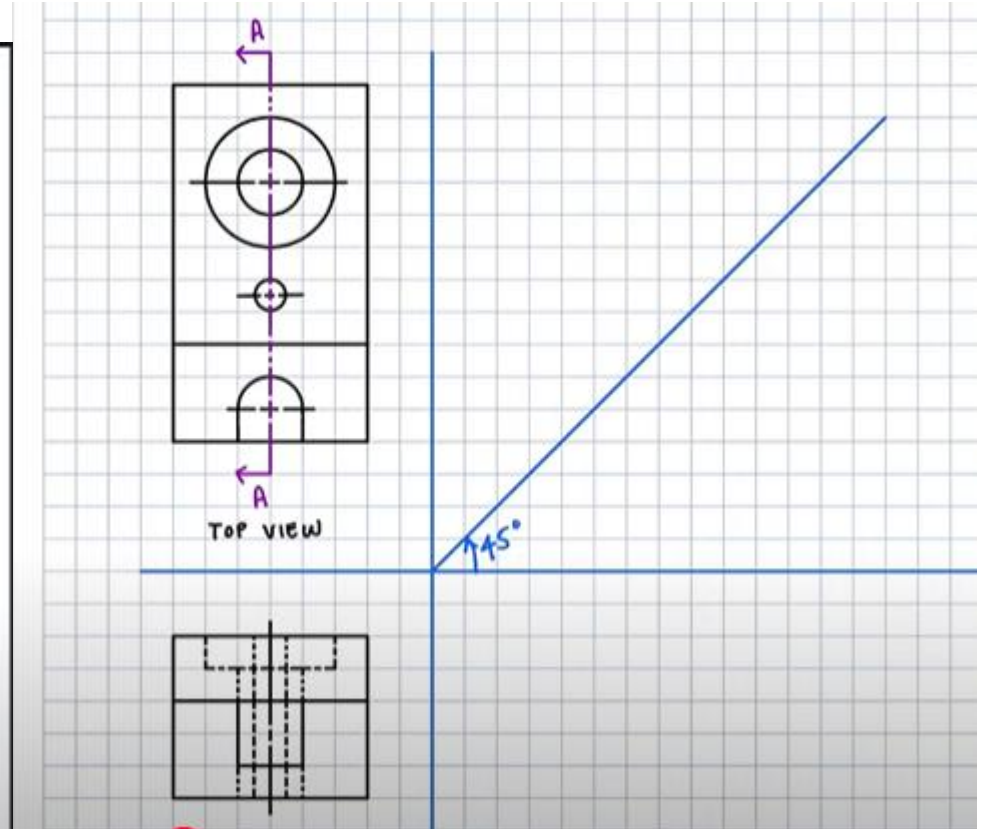
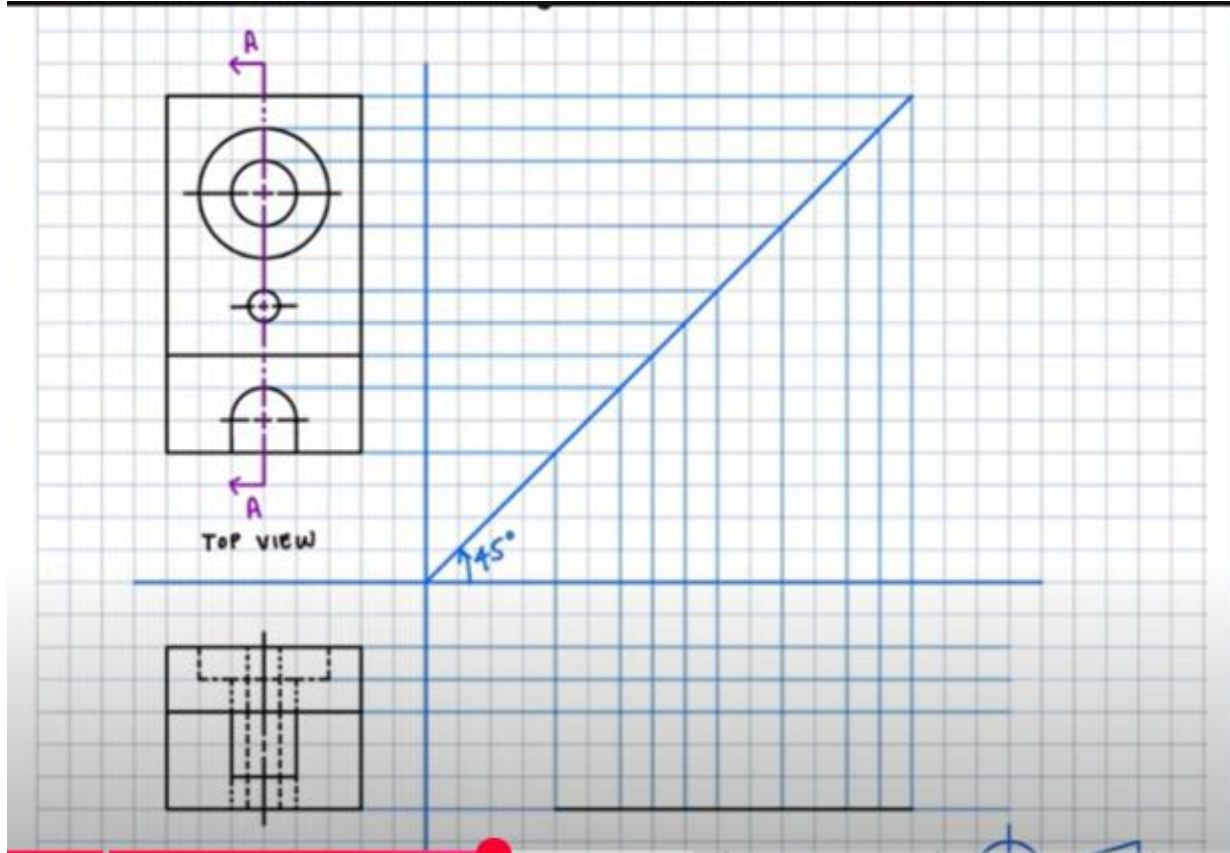
Process of highlighting the area where the imaginary cutting plane or section plane has made contact with the object while sectioning.

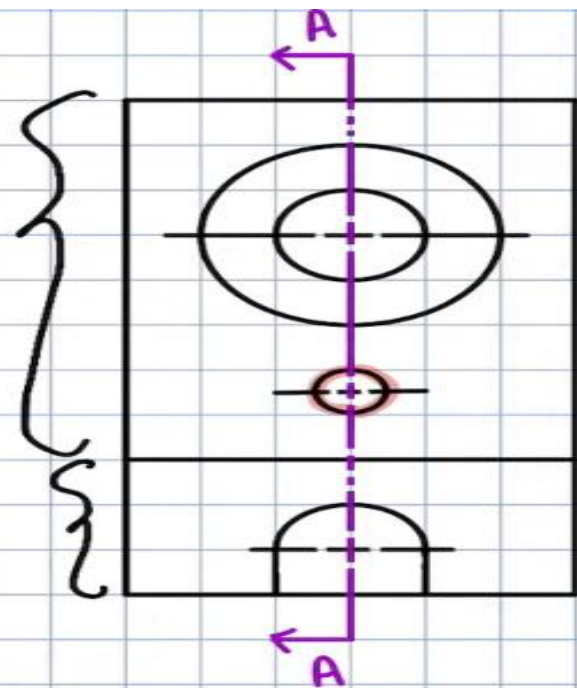
What is hatch line and hatch pattern?



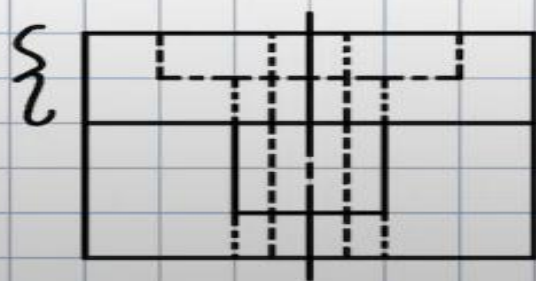
Steps how to section the view



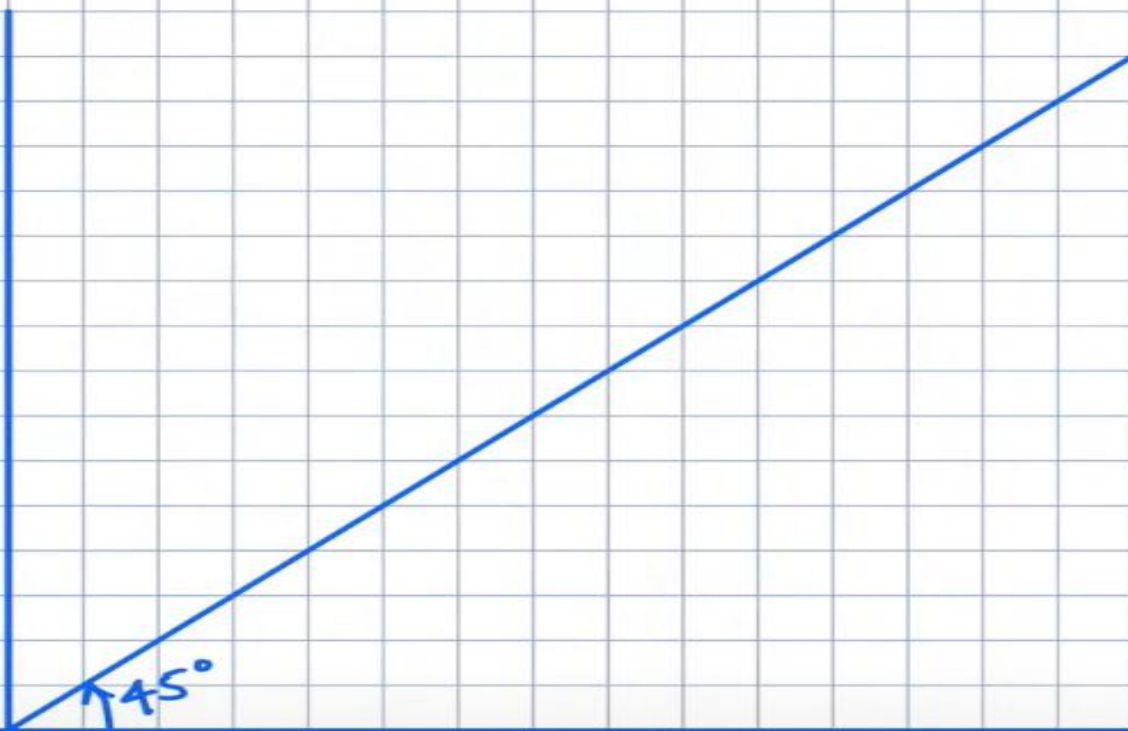


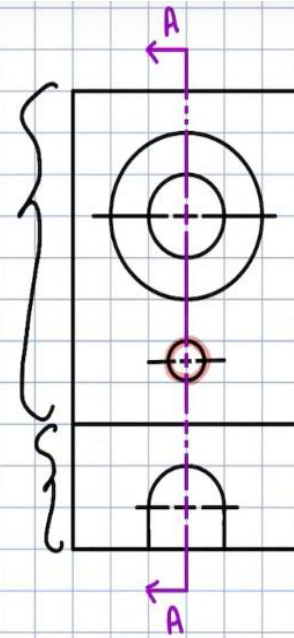


TOP VIEW

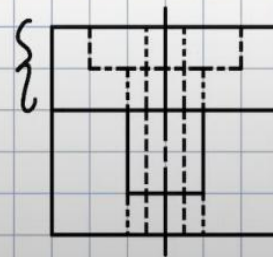


FRONT VIEW

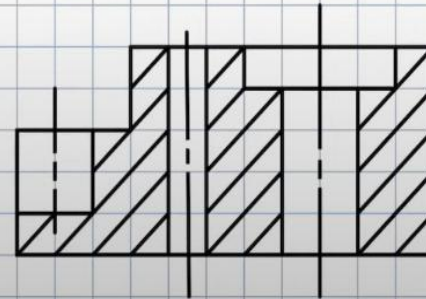
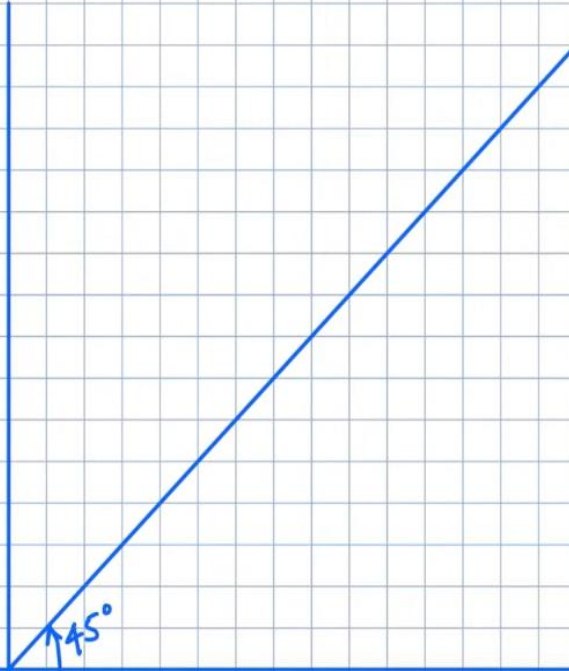




TOP VIEW



FRONT VIEW



SECTION A-



What is the use of a Hatch Pattern?

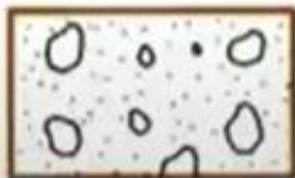
- The hatch lines are different for each of material's type.
- For practical purpose, the cast iron symbol is used most often for any materials.



Cast iron,
Malleable iron



Steel



Concrete



Sand



Wood

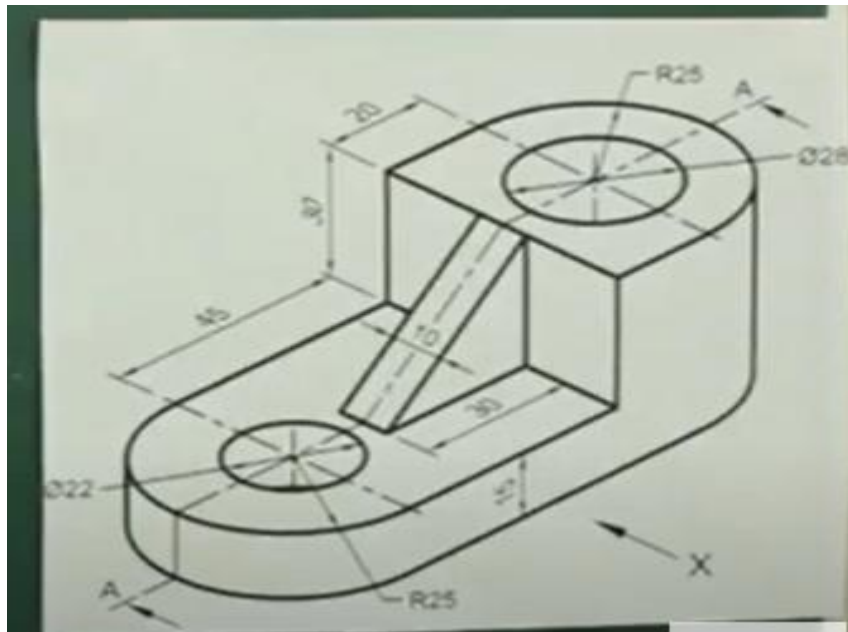
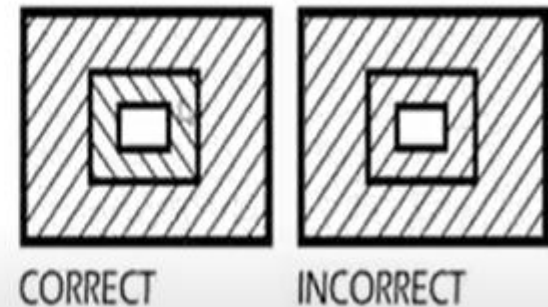
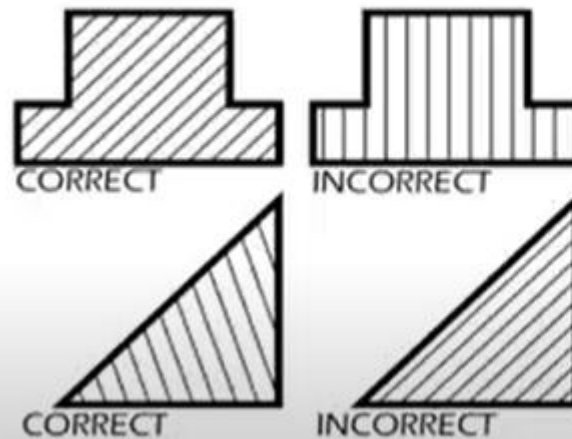
Rules of hatch pattern or hatch lines?

- *Always drawn at 45° to the base.*
- *Must have a uniform gap of 2 to 5mm between lines.*
- *Parallel to each other.*
- *Have same darkness as that of object lines*
- Lines should never be parallel or perpendicular to the object lines.
- If the outline of the object has 45 degree lines, 30 or 60 degree lines should be used.

Rules of Sectioning?

- Never do sectioning of a Web/Wedge or Rib.
- Never draw *any line* inside the hatch pattern.
- Assemblies with several parts should be lined with varying angle section lines.
- In half sectioning, erase all the hidden lines coming in second half

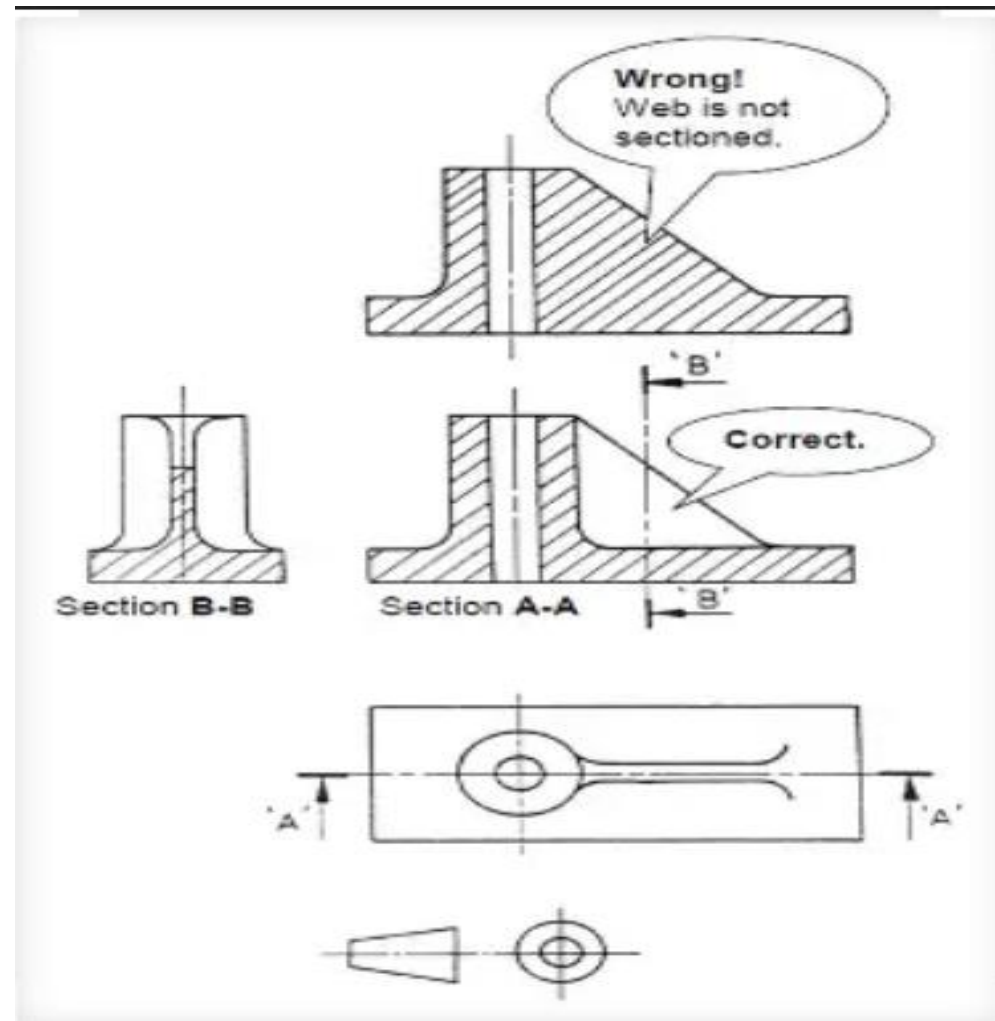
Section Lining – Line Placement



Rib sectioning

When the rib cuts parallel to its surface will not be hatched

Rib can be hatched when is is cut perpendicular to its surface



SECTION LINING PRACTICE

- The spaces between lines may vary from 2 mm for small sections to 5 mm for large sections.

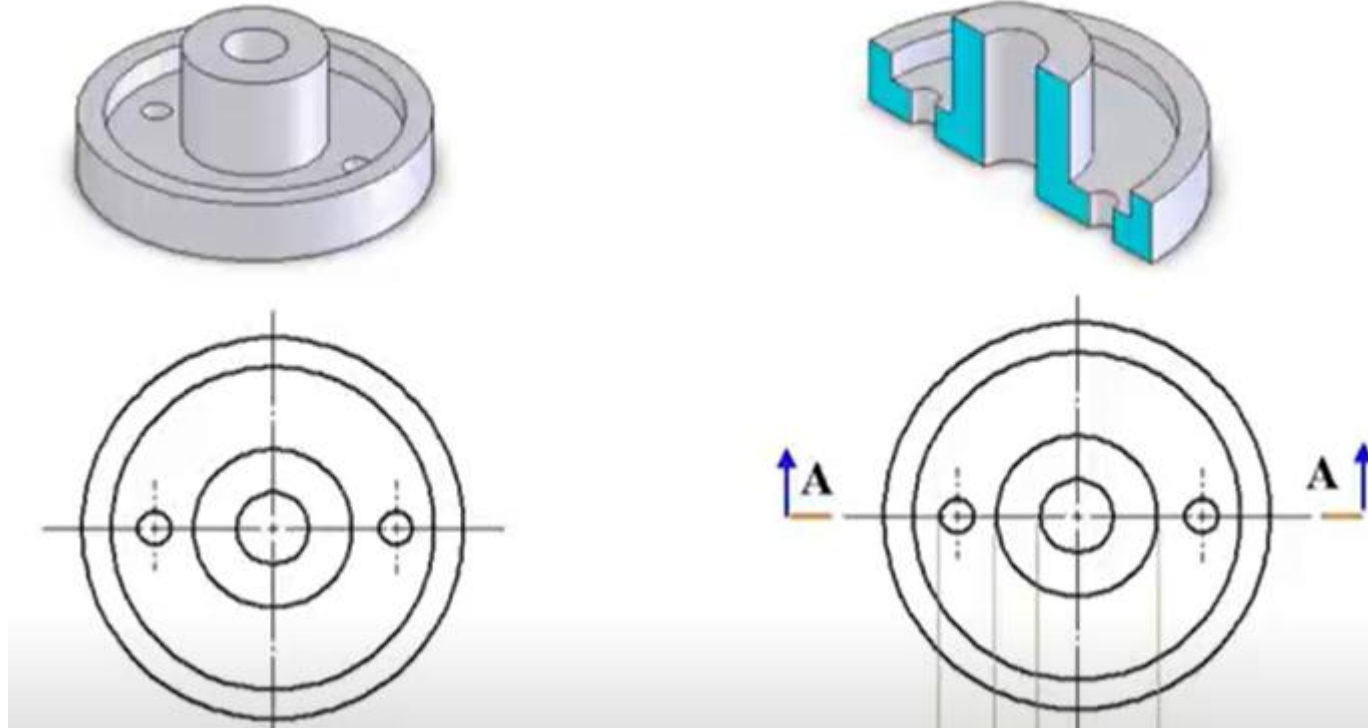


TREATMENT OF HIDDEN LINES

- Hidden lines are *normally omitted* from section views.

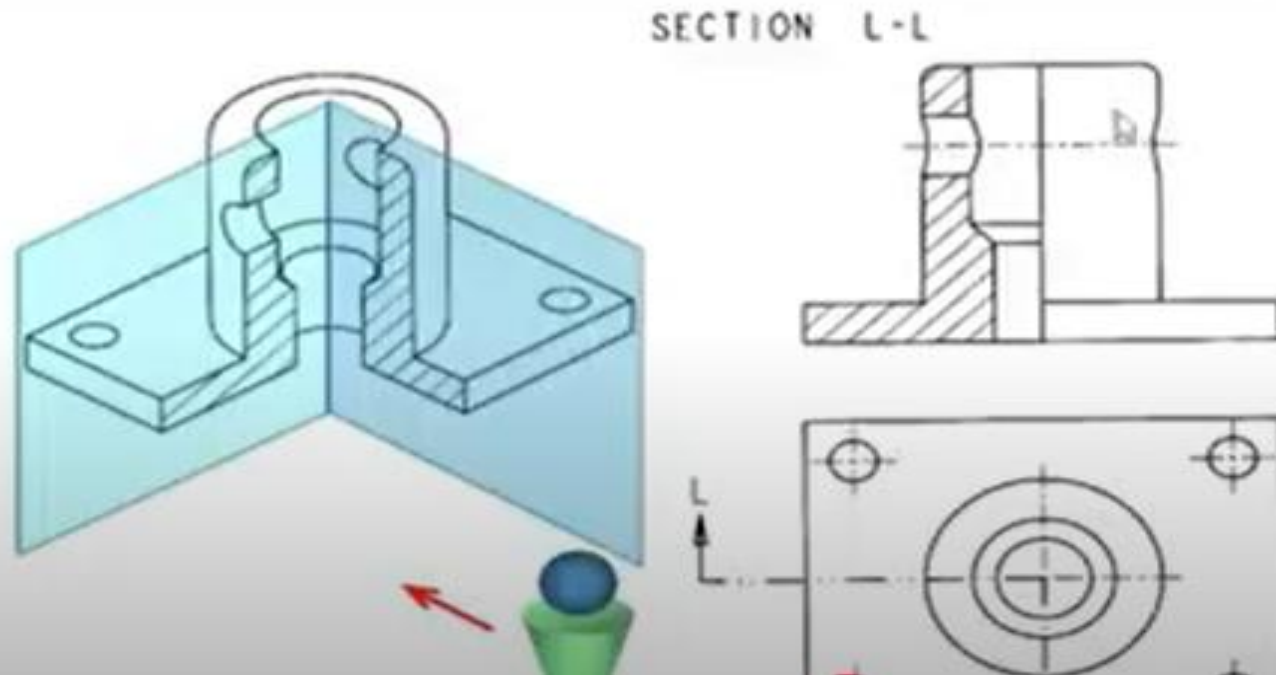
1- Full Section

The view is made by passing the **straight** cutting plane **completely through** the part, removes 50% of object.



HALF SECTION VIEW

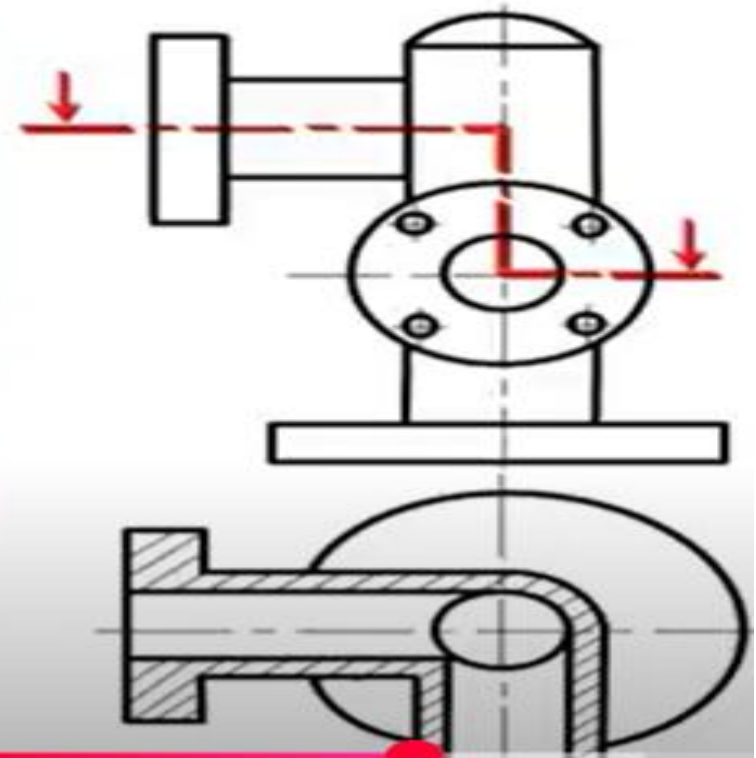
Half sections are commonly used to show both the **internal** and **outside** view of symmetrical objects.



3. OFFSET SECTION VIEW

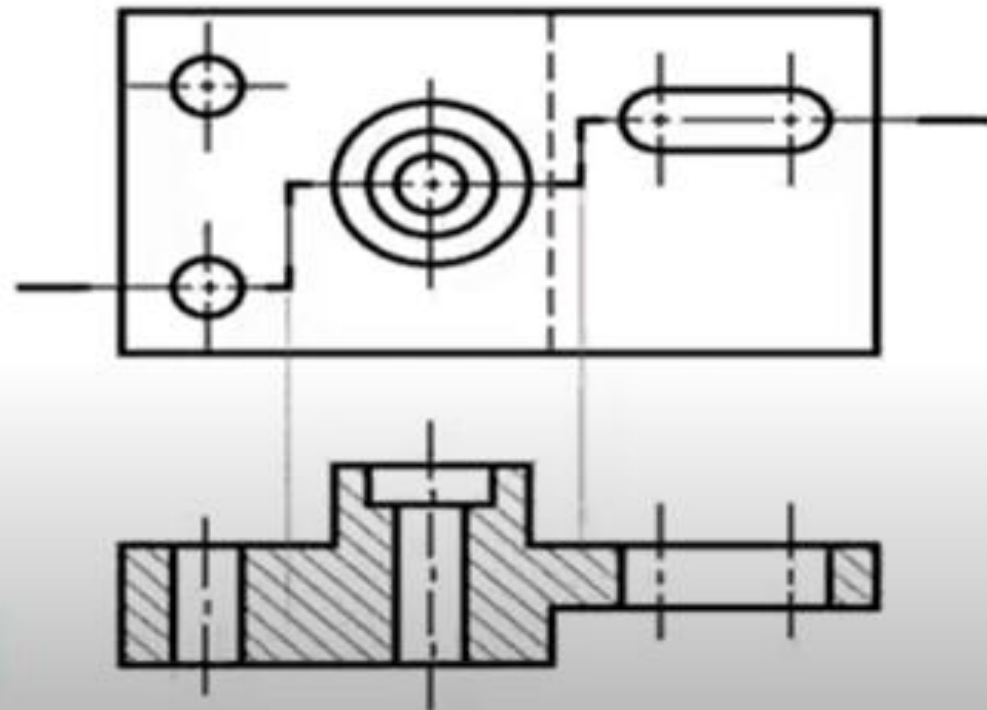
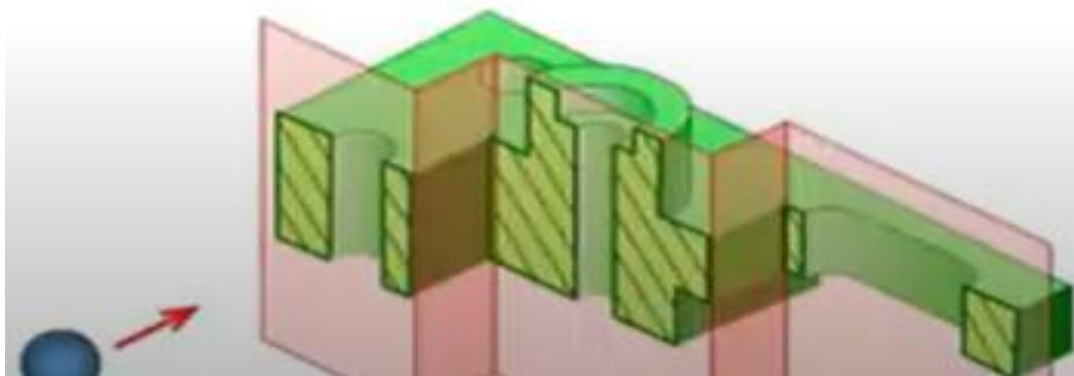
The cutting plane is **off-set** to include features that are not in a straight line. A zig-zag shape of section plane

It is possible for the cutting plane to **change directions**, to **minimise on the number** of sectional views required to capture the necessary details.

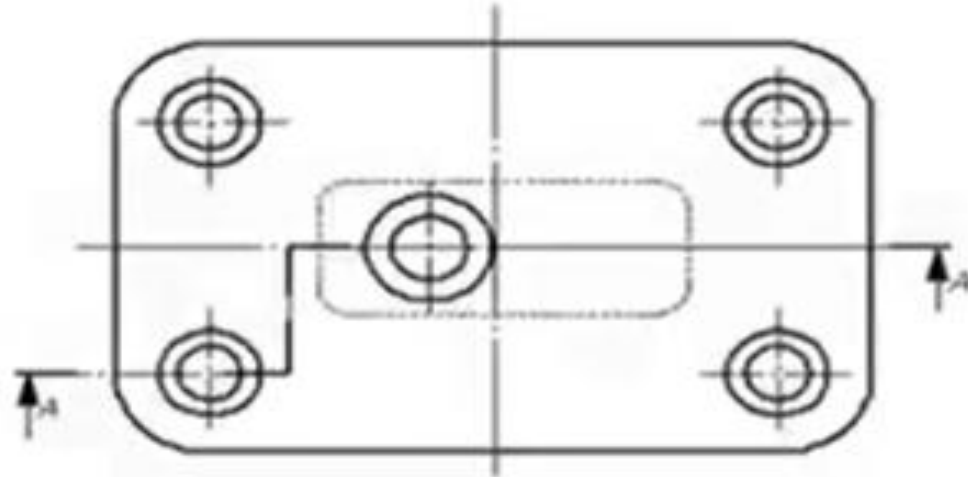


OFFSET SECTION VIEW

The view is made by passing the **bended** cutting plane **completely through** the part.



OFFSET SECTION



SECTION A-A

