

102001208

ENGINEERING GRAPHICS

Orthographic Projection

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Outline

- ◆ Introduction
- ◆ Types of Planes
- ◆ Pattern of Planes
- ◆ First Angle and Third Angle Projection
- ◆ Different Types of Lines
- ◆ Solution of Problems

Introduction

Drawing is the **Graphical way** of **representing of technical details** without the barrier of a language.

Introduction

Engineering Drawing is the **Universal Language** for Engineers

Introduction

The Fact about Drawing:

If compared with Verbal or Written Description, Drawings offer far better idea about the Shape, Size & Appearance of any object or situation or location, that too in quite a less time.

Introduction

Hence it has become the Best Medium of Communication not only in Engineering but in almost all Fields.

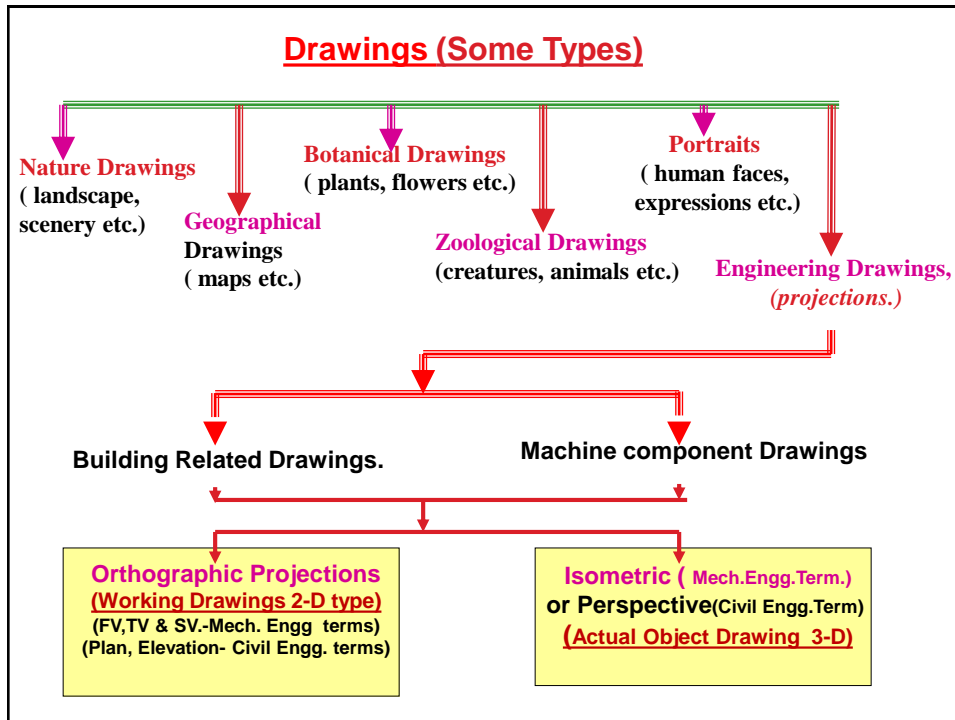
Introduction

Orthographic projection is a type of projection in which the **object is represented on paper by drawing its multiple views.**

The method is extensively used in the fields like engineering and technology.

Introduction

After drawing the views of the object, useful information such as **dimensions**, material, notes etc. is inserted to make a complete and useful drawing.



Introduction

It is a technical drawing in which

- ❖ An object is viewed from different views
- ❖ Whatever is viewed are projected on different reference planes.

Introduction

Different Reference Planes

- ❖ Horizontal Plane (HP),
- ❖ Vertical Frontal Plane (VP)
- ❖ Side Or Profile Plane (PP)

Introduction

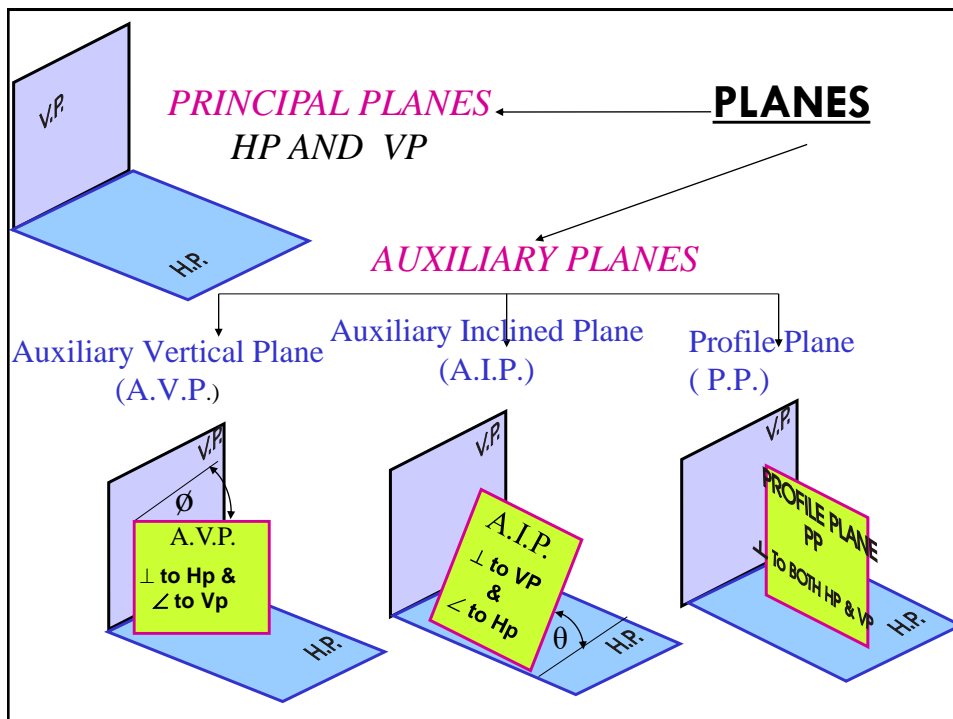
Different Views

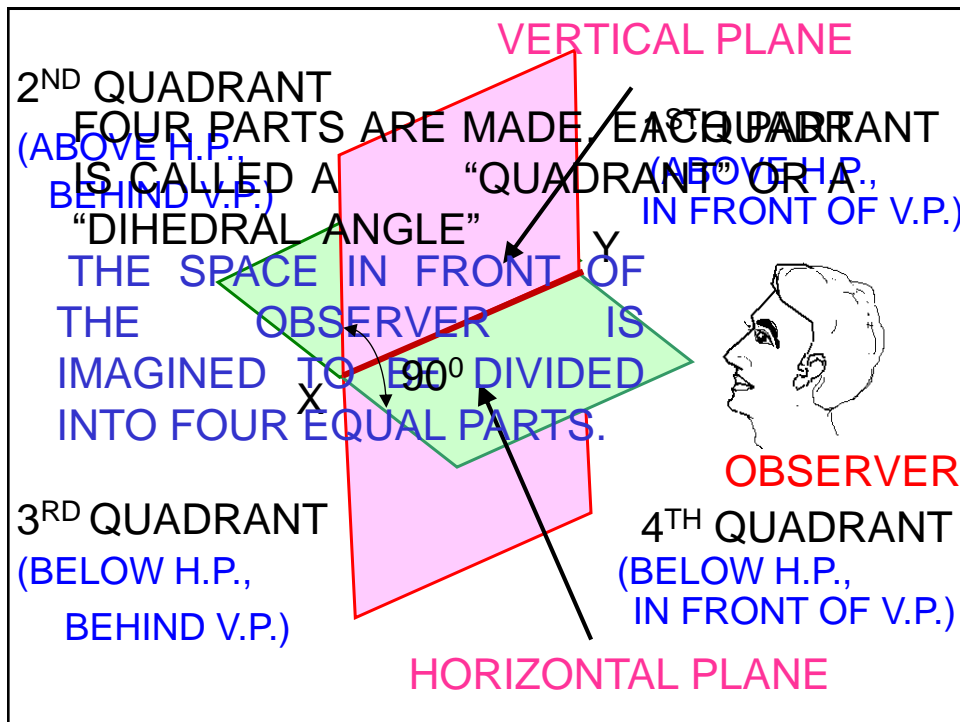
- ❖ FV is a view projected on VP.
- ❖ TV is a view projected on HP.
- ❖ SV is a view projected on PP.

Introduction

Now we will study

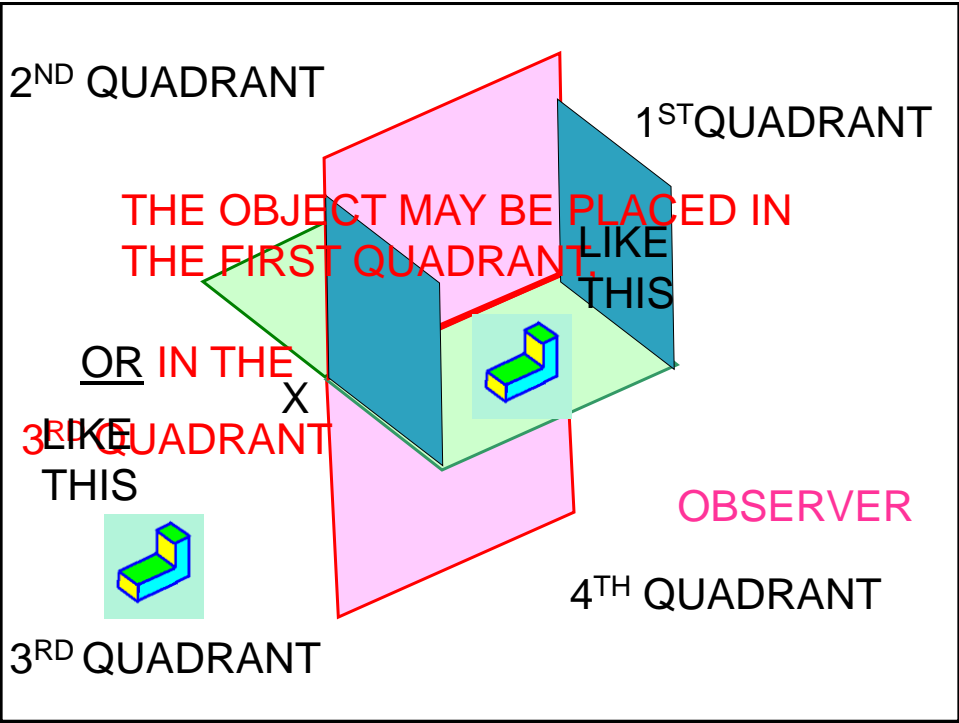
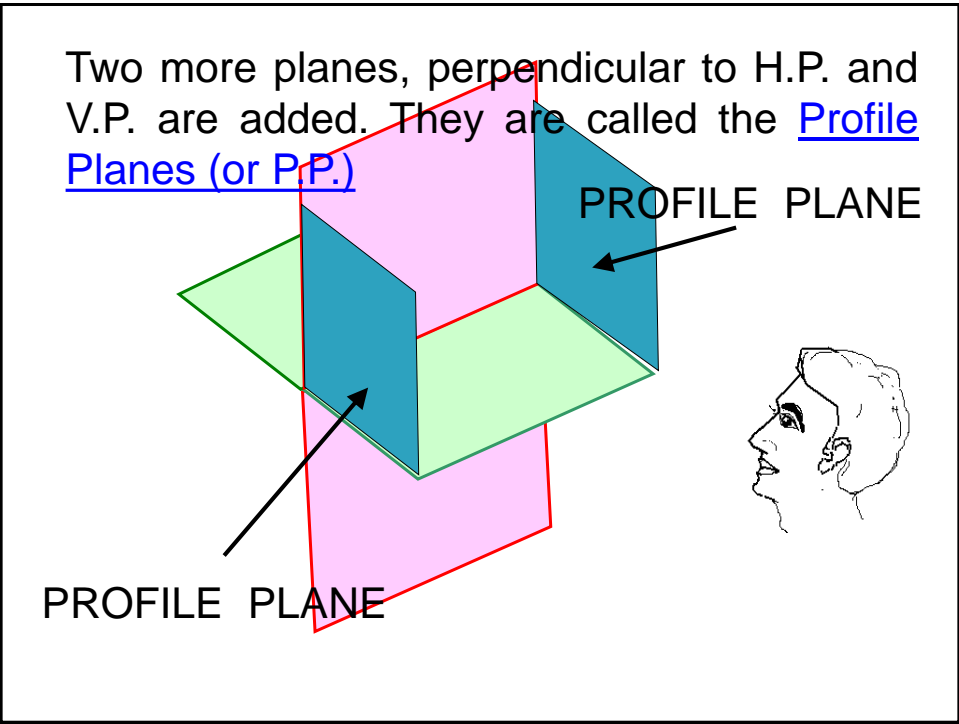
- ❖ Planes
- ❖ Pattern of Planes & Pattern of Views
- ❖ Method of Drawing Orthographic Projection





IMPORTANT

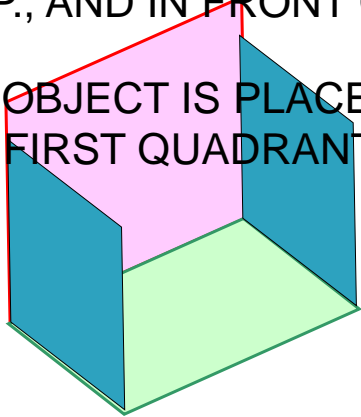
- 1- The horizontal plane is referred to as H.P. and sometimes it is called a horizontal reference plane or (H.R.P.)
- 2- The vertical plane is referred to as V.P. and sometimes it is called a frontal reference plane or (F.R.P.)
- 3- The X-Y line represents the Reference Line.
- 4- The quadrant is also referred to as the dihedral angle.



LET US CONSIDER THE FIRST
QUADRANT

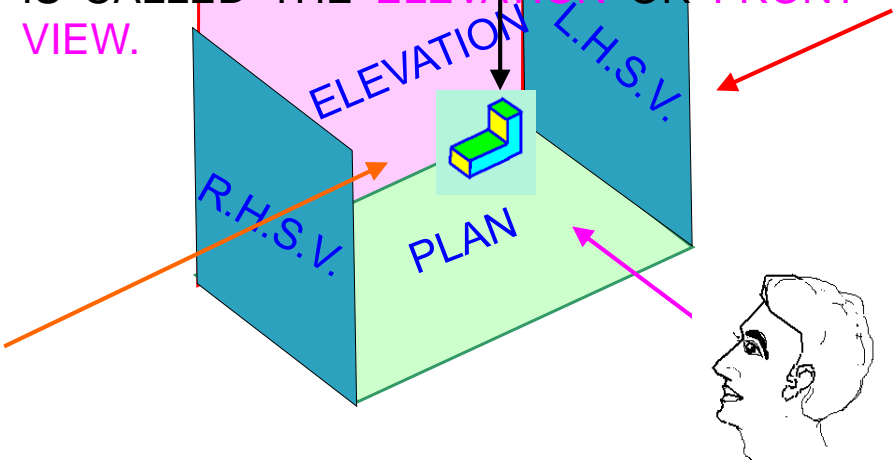
(ABOVE H.P., AND IN FRONT OF V.P.)

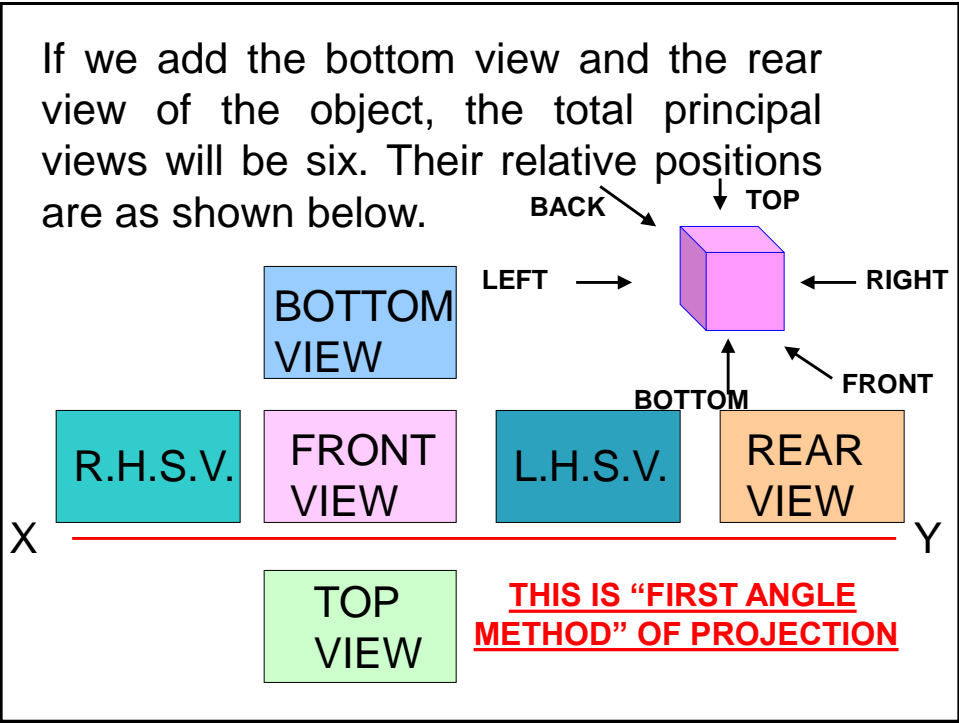
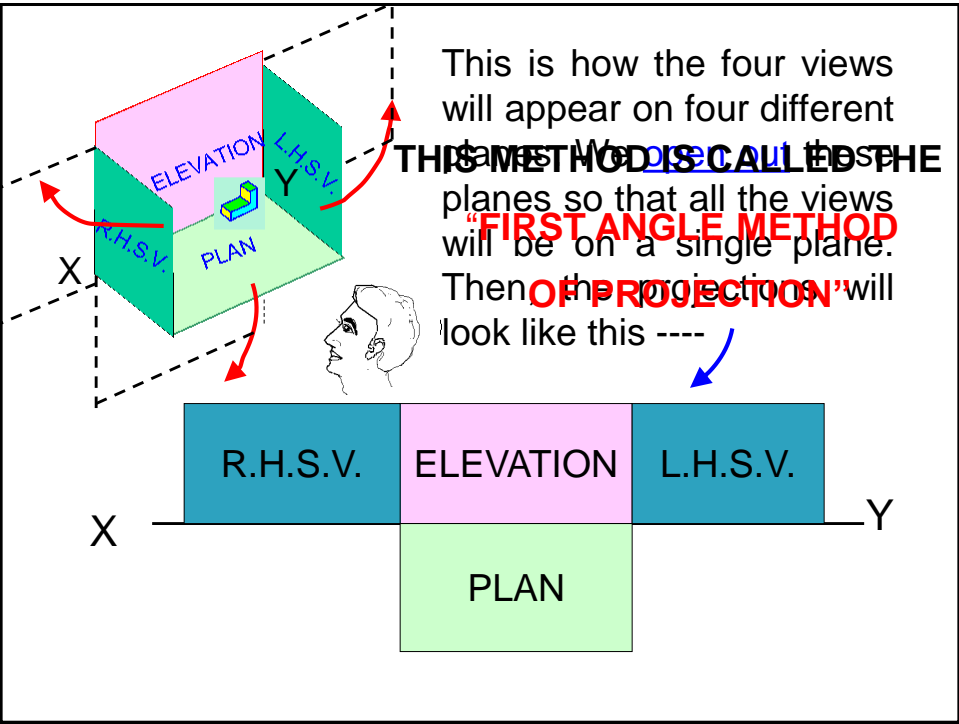
NOW, THE OBJECT IS PLACED IN
THE FIRST QUADRANT

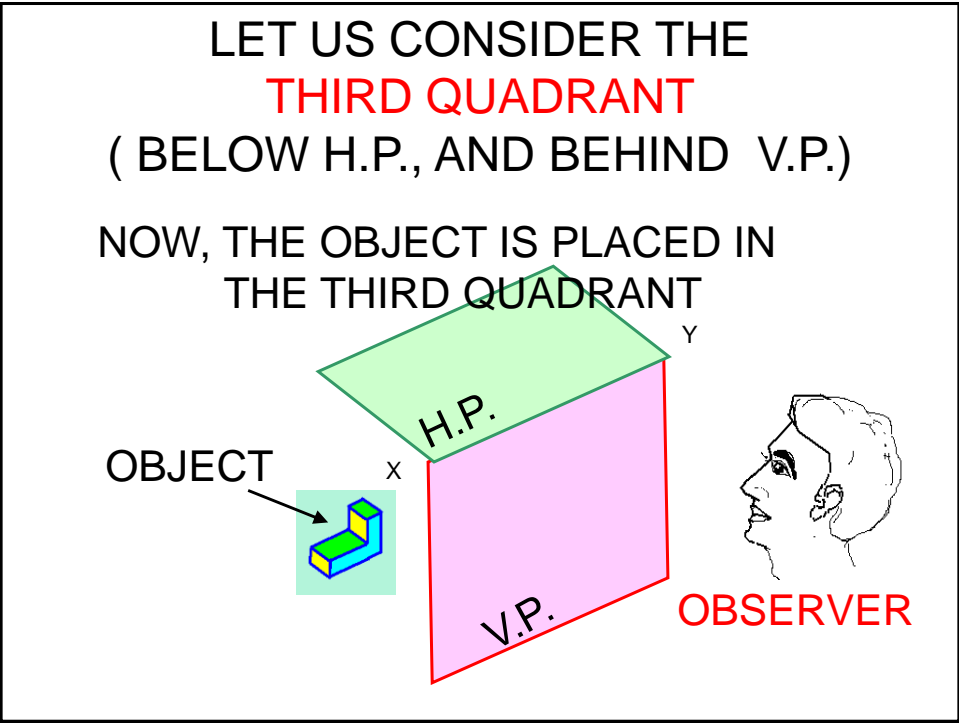
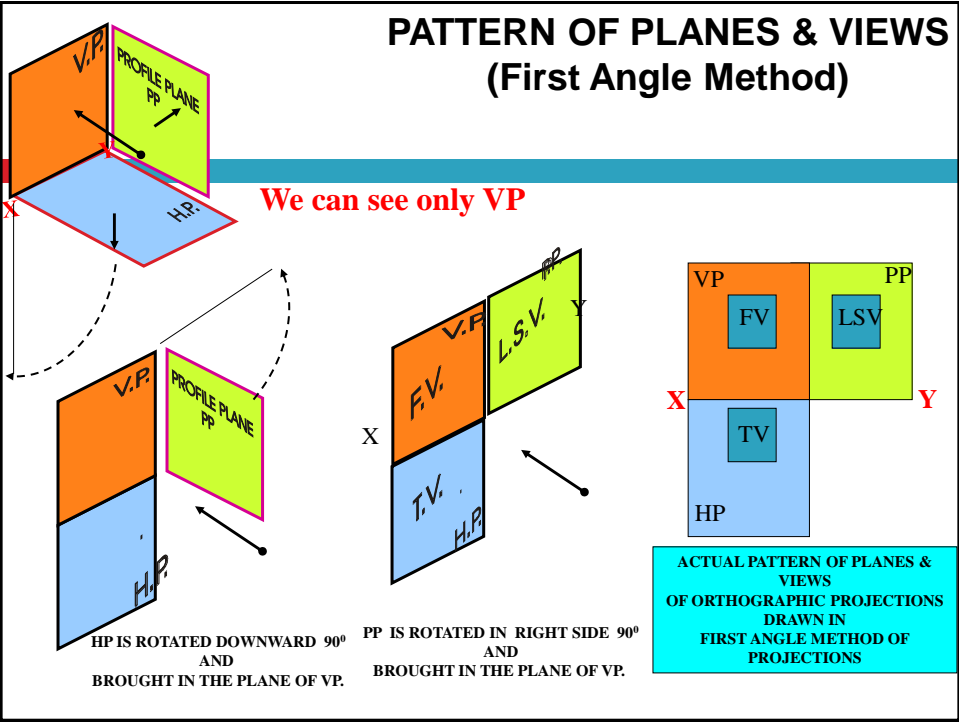


OBSERVER

LOOKING FROM THE TOP, THE OBJECT
IS PROJECTED ON THE HORIZONTAL
PLANE. THE VIEW OBTAINED IS
CALLED THE **PLAN** OR **TOP VIEW**.
LOOKING FROM THE RIGHT, THE
OBJECT IS PROJECTED ON THE
PROFILE PLANE. THE VIEW OBTAINED
IS CALLED THE **ELEVATION** OR **FRONT
VIEW**.







1. LOOKING FROM THE FRONT, THE FRONT VIEW IS OBTAINED ON THE VERTICAL PLANE.

2. LOOKING FROM THE TOP, THE TOP VIEW IS OBTAINED ON THE HORIZONTAL PLANE.

3. THE L.H.S.V. WILL BE HERE

4. THE R.H.S.V. WILL BE HERE

TOP VIEW
H.P.
FRONT VIEW
V.P.
L.H.S.V.
R.H.S.V.
OBSERVER

IF THE PLANES ARE OPENED OUT, THE VIEWS WILL BE PLACED THIS WAY

T.V.

L.H.S.V.

F.V.

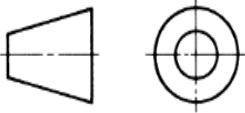
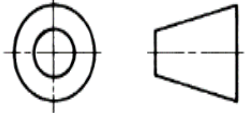
R.H.S.V.

REAR V.

BOTTOM V.

THIS METHOD IS CALLED THE THIRD ANGLE METHOD OF PROJECTION

TOP VIEW
H.P.
FRONT VIEW
V.P.
L.H.S.V.
R.H.S.V.
OBSERVER

First Angle Projection System	Third Angle Projection
<p>1. Object kept in 1st Quadrant</p> <p>2. Object lies between observer and the plane of projection</p> <p>3. Plane of projection is assumed to be non-transparent</p> <p>4. FV is drawn above xy line and TV is drawn below xy line</p> <p>5. Followed in India and Europe</p>	<p>1. Object kept in 3rd Quadrant</p> <p>2. Plane of Projection lies between the observer and the object</p> <p>3. Plane of projection is assumed to be transparent</p> <p>4. TV is drawn above xy line and FV is drawn below xy line</p> <p>5. Followed in USA</p>
	

NOTE

(1) The object whose views are required, will be shown in a pictorial, three dimensional view. The measurements are also shown on this view.

(2) The arrow “X” indicates the direction of elevation.

(3) The visible features of the object are shown by dark continuous lines.

(4) The invisible features of the object are shown by dotted lines.

THE OBJECT LINE

The lines which show the visible features of the object are called “**object lines**” or “**outlines**” or **principal lines**. They should be heavy, regularly thick, dark, and continuous lines.



An object line

THE DOTTED LINE

The lines which show the **invisible features** of the object, are called as the “dotted lines” or “dashed lines”. They are made of about 4 mm long dashes with 1 mm spacing between them.



A dotted line

A CENTRE LINE

A centre line is used to show the line of symmetry and to show the axis of an object. The centre of a circular hole is shown by two intersecting centre lines. The line consists of a long dash(@12 mm) and a short dash(1mm) alternately placed about 1 mm apart. The centre lines should extend slightly beyond the feature.



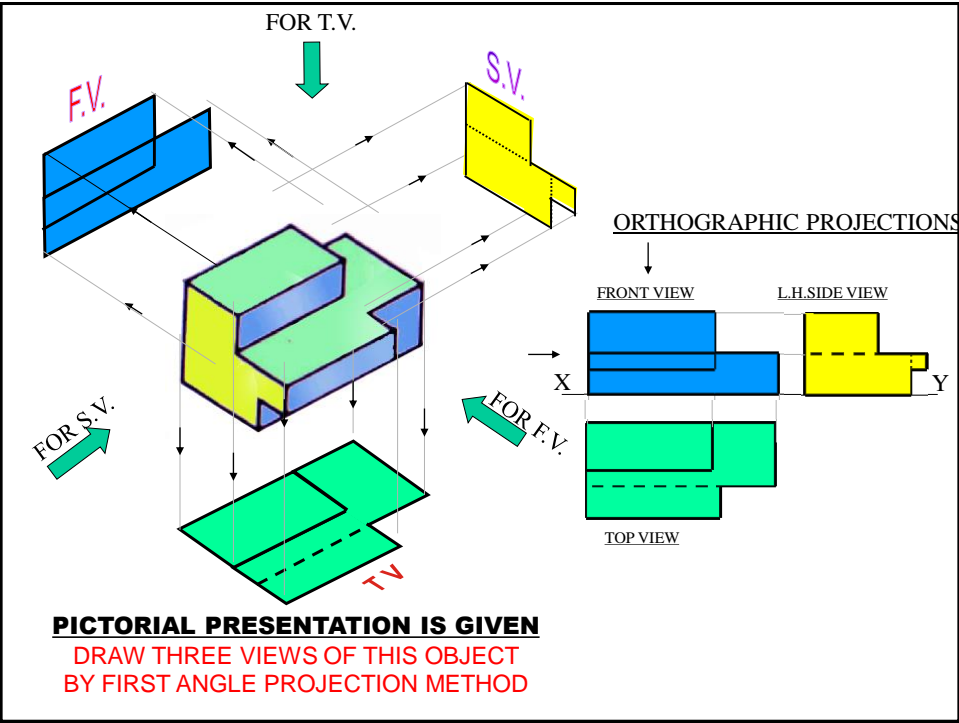
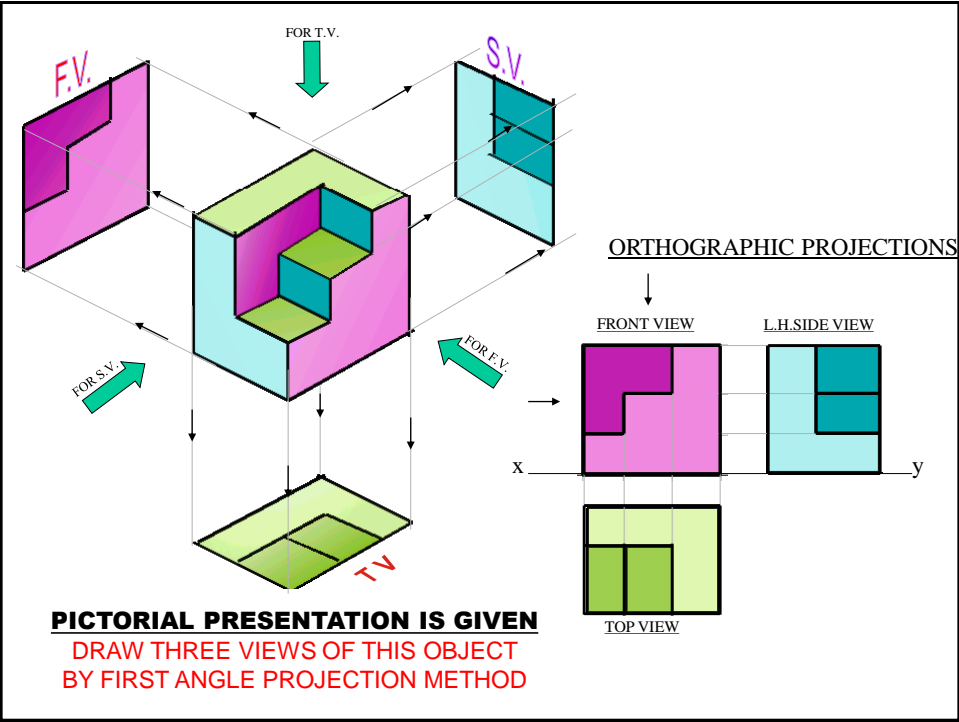
A centre line

THE CONSTRUCTION LINE

The construction lines or projectors should be used to project points from one view to another. The lines should be extremely light, thin and regular.



A construction line



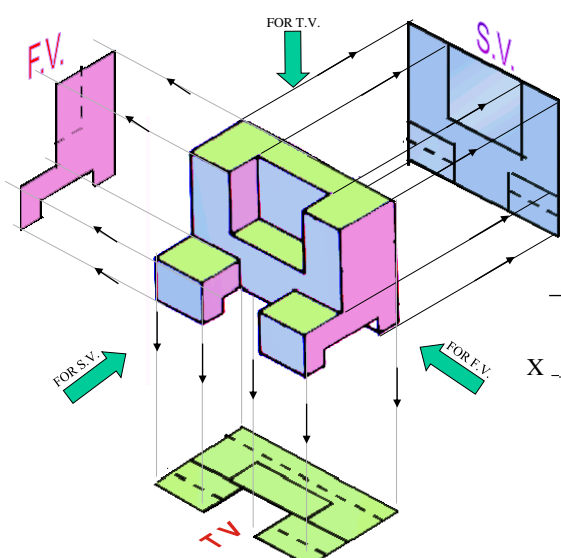


Diagram illustrating the isometric view of a 3D object (a stepped block) and its corresponding orthographic projections. The object is shown in isometric view with three views indicated: Front View (F.V.), Side View (S.V.), and Top View (T.V.). Arrows indicate the viewing directions: FOR F.V. (from the front), FOR S.V. (from the side), and FOR T.V. (from the top).

ORTHOGRAPHIC PROJECTIONS

The orthographic projections are shown as three views: FRONT VIEW, L.H. SIDE VIEW, and TOP VIEW. The views are arranged in a standard first-angle projection layout, with the FRONT VIEW at the top, the L.H. SIDE VIEW to the right, and the TOP VIEW below the FRONT VIEW. The views are labeled with X and Y axes.

PICTORIAL PRESENTATION IS GIVEN
DRAW THREE VIEWS OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

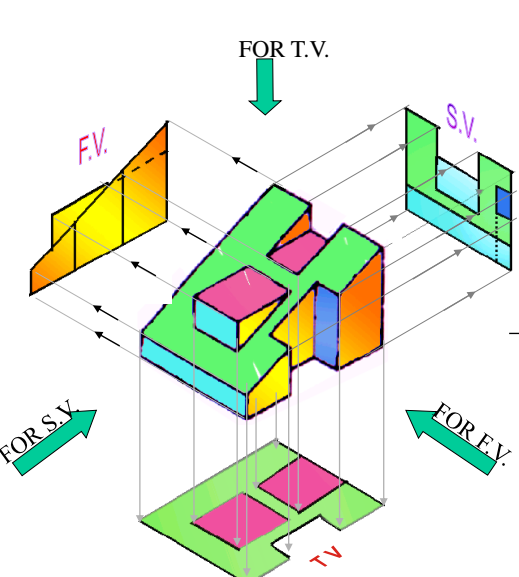
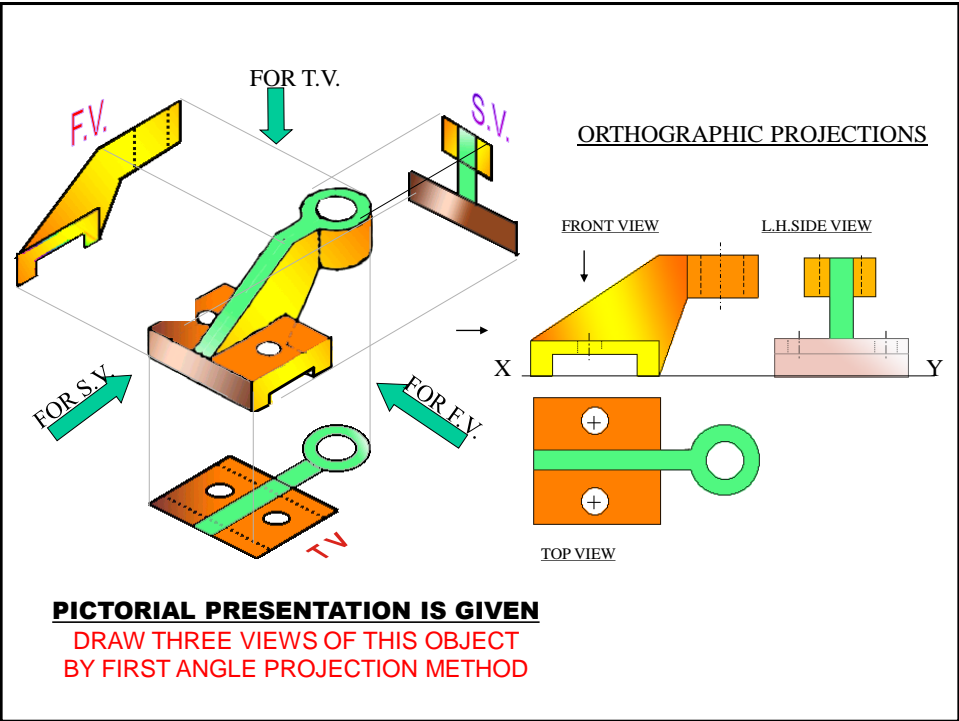
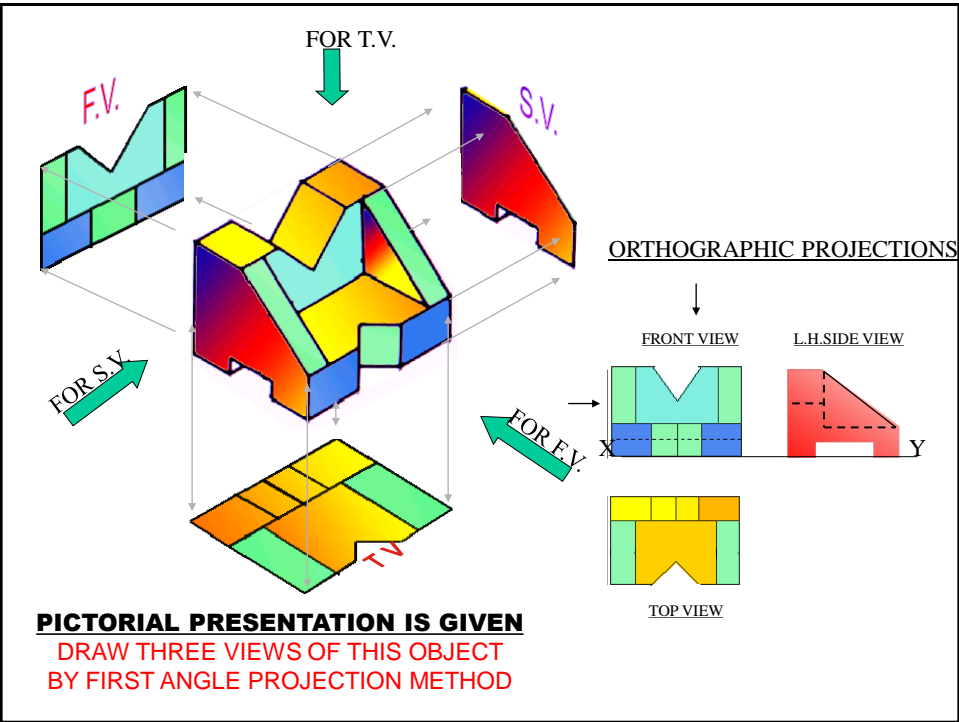


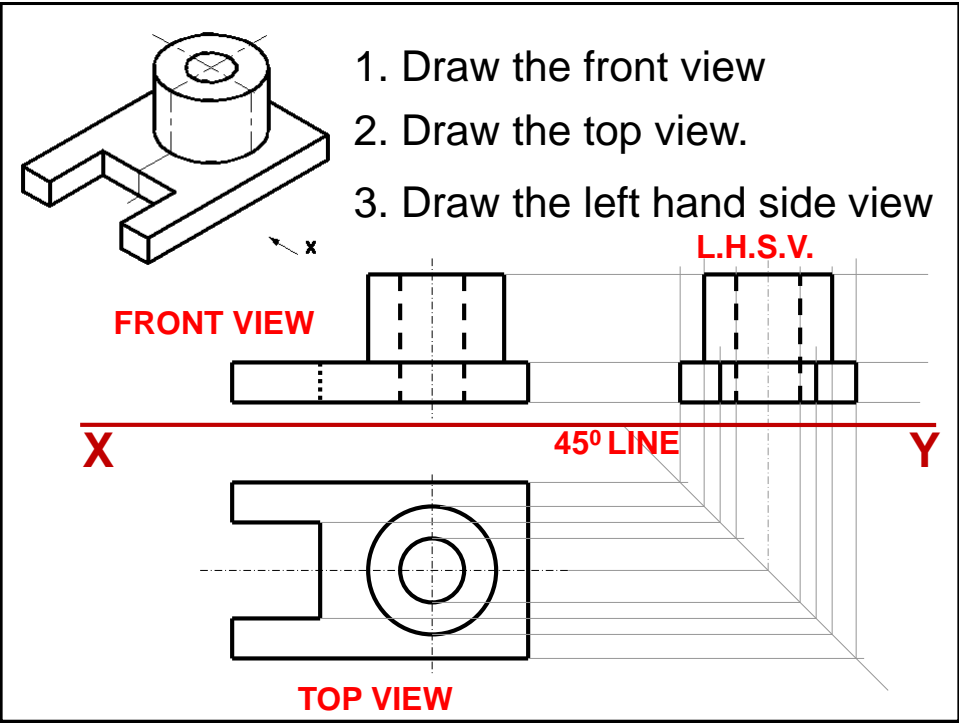
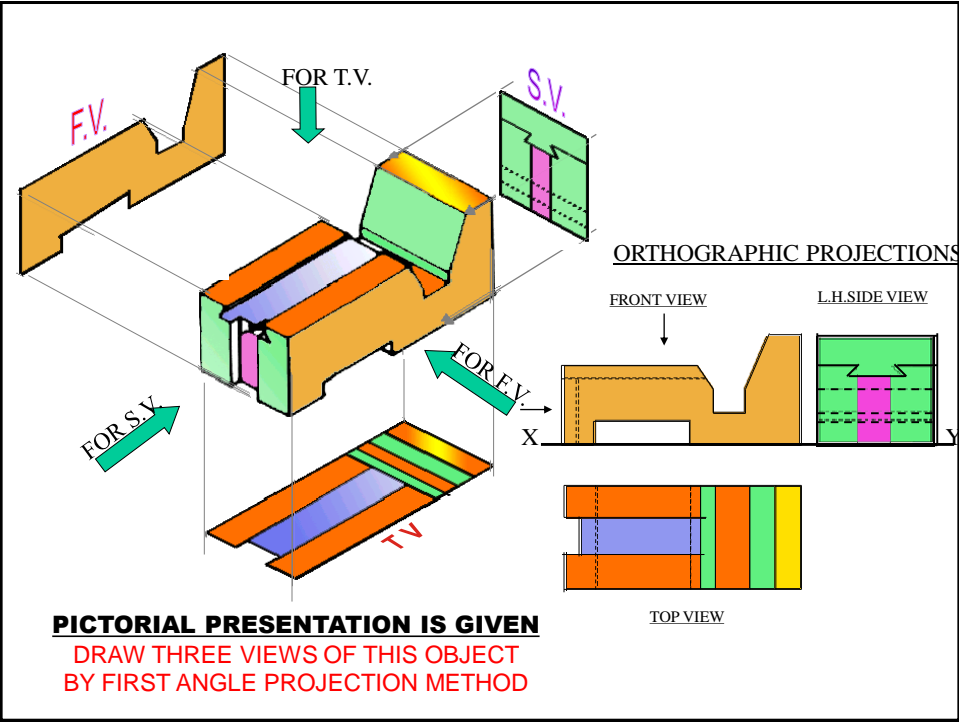
Diagram illustrating the isometric view of a 3D object (a complex shape with a sloped top) and its corresponding orthographic projections. The object is shown in isometric view with three views indicated: Front View (F.V.), Side View (S.V.), and Top View (T.V.). Arrows indicate the viewing directions: FOR F.V. (from the front), FOR S.V. (from the side), and FOR T.V. (from the top).

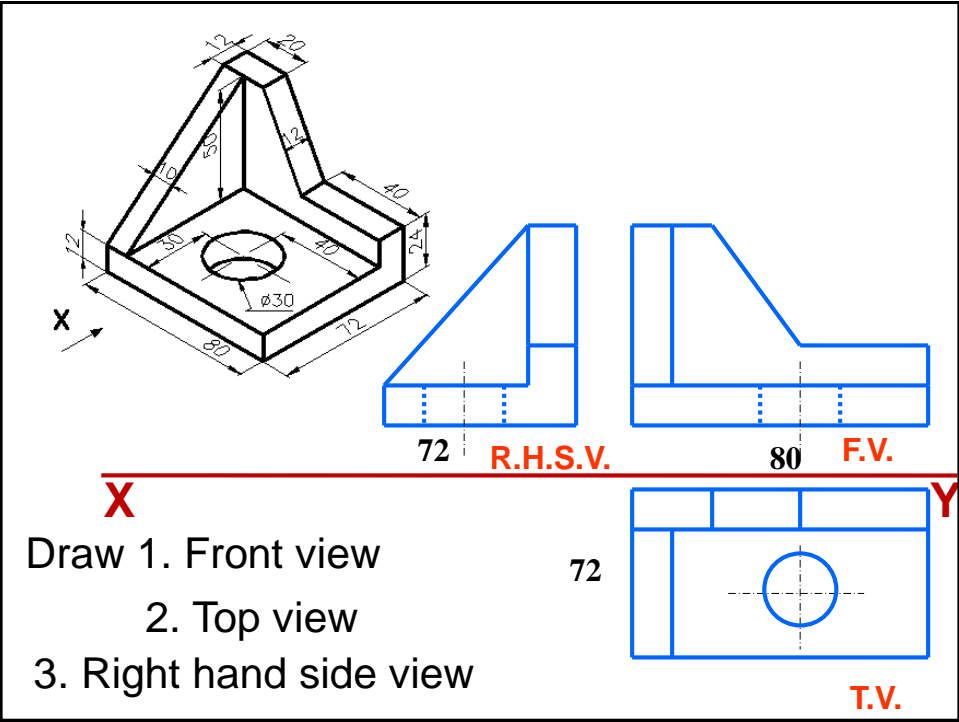
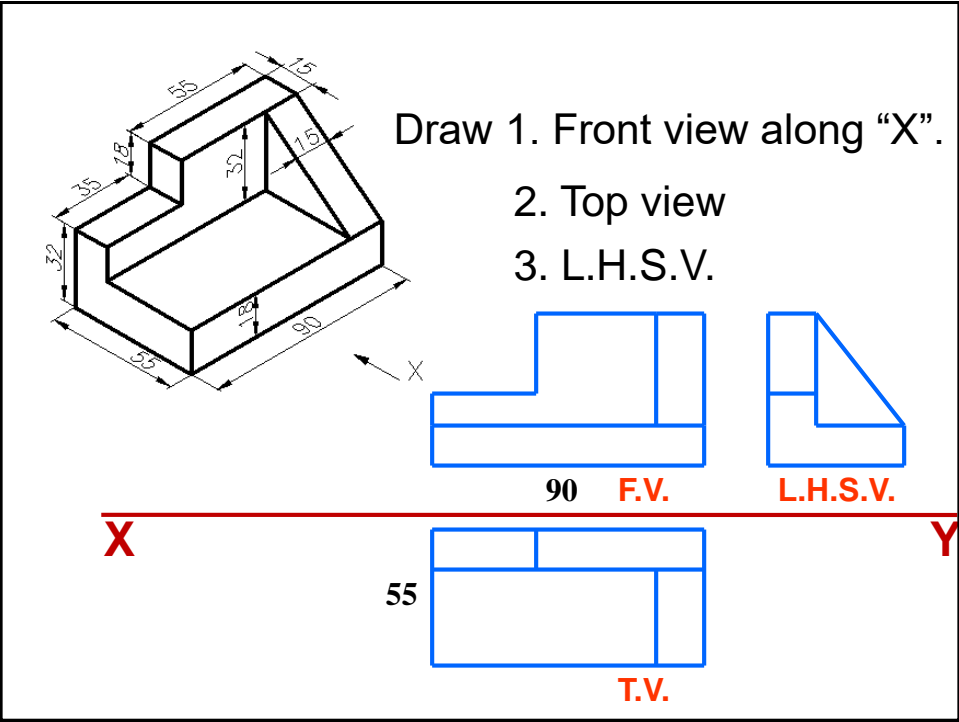
ORTHOGRAPHIC PROJECTIONS

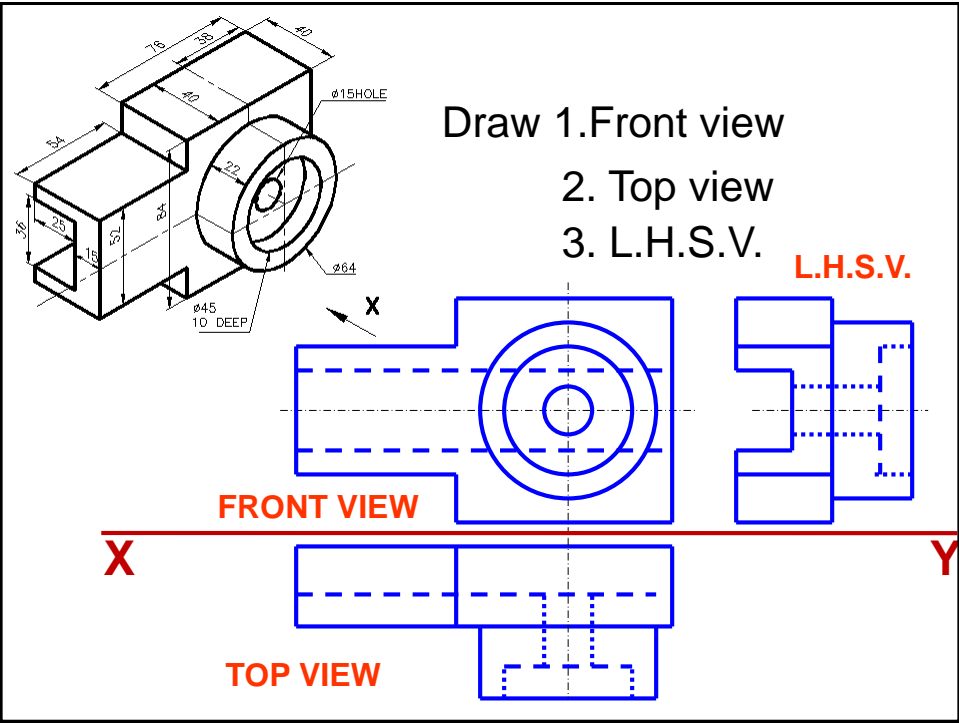
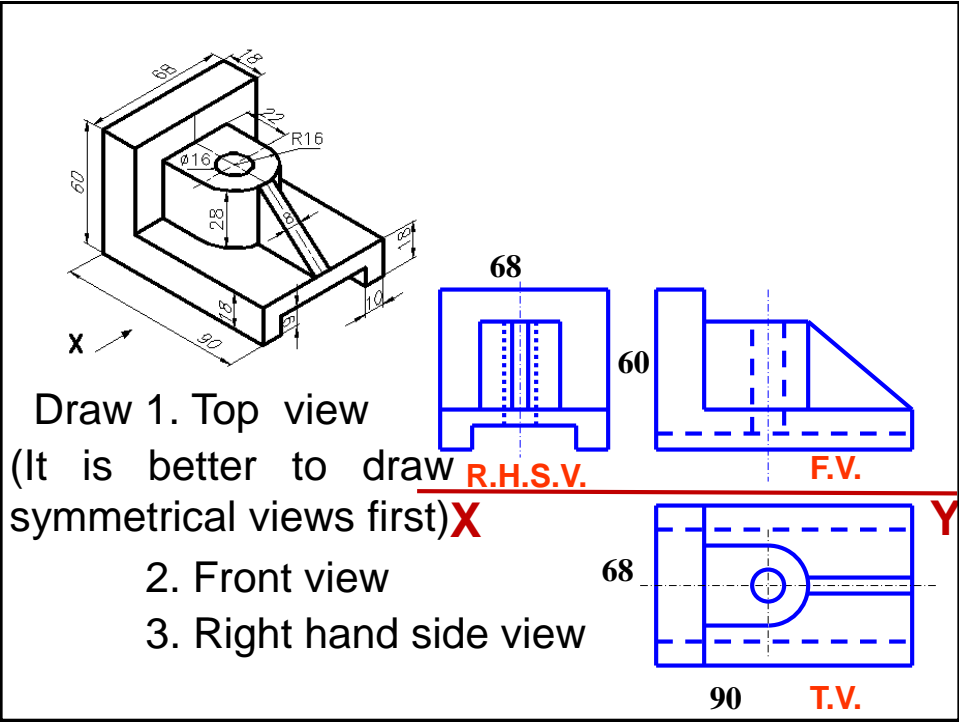
The orthographic projections are shown as three views: FRONT VIEW, L.H. SIDE VIEW, and TOP VIEW. The views are arranged in a standard first-angle projection layout, with the FRONT VIEW at the top, the L.H. SIDE VIEW to the right, and the TOP VIEW below the FRONT VIEW. The views are labeled with X and Y axes.

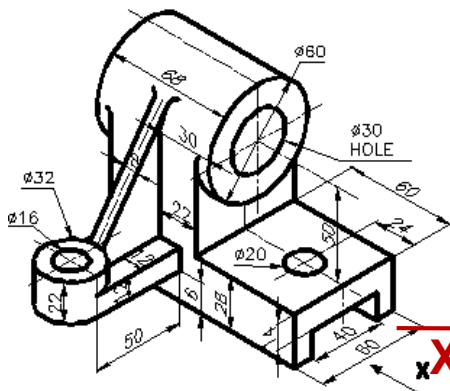
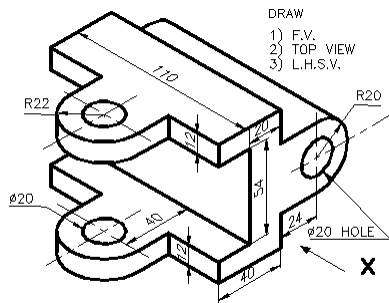
PICTORIAL PRESENTATION IS GIVEN
DRAW THREE VIEWS OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

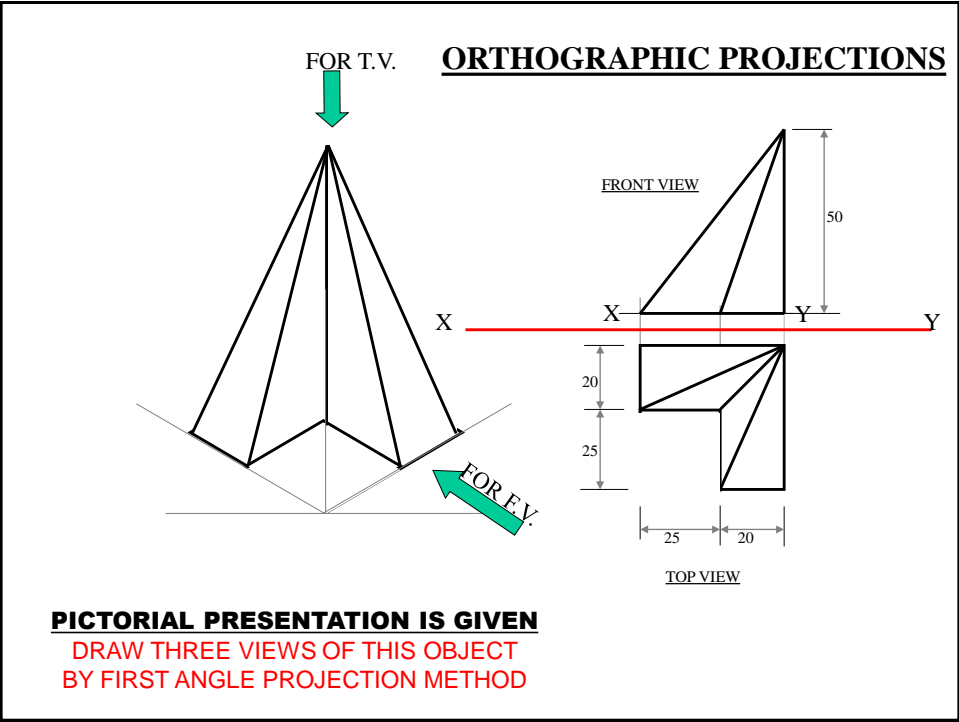
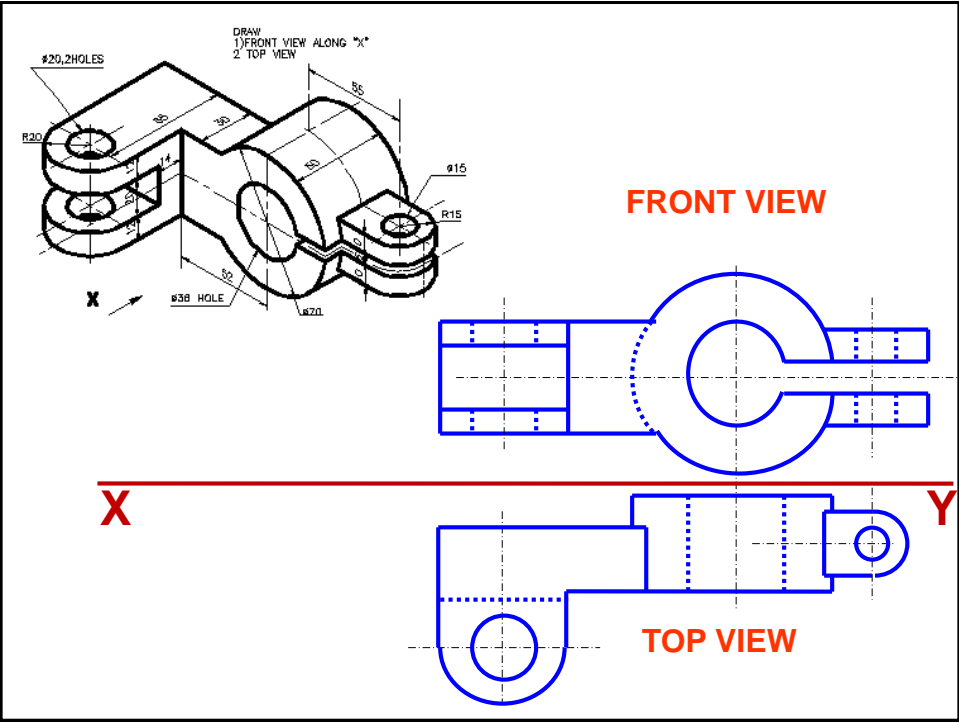












ORTHOGRAPHIC PROJECTIONS

FOR T.V.

FOR S.V.

FOR F.V.

FRONT VIEW

L.H. SIDE VIEW

X

Y

TOP VIEW

PICTORIAL PRESENTATION IS GIVEN

DRAW THREE VIEWS OF THIS OBJECT

BY FIRST ANGLE PROJECTION METHOD

ORTHOGRAPHIC PROJECTIONS

FOR T.V.

FOR S.V.

FOR F.V.

FRONT VIEW

L.H. SIDE VIEW

X

Y

TOP VIEW

PICTORIAL PRESENTATION IS GIVEN

DRAW THREE VIEWS OF THIS OBJECT

BY FIRST ANGLE PROJECTION METHOD

FOR T.V.

ORTHOGRAPHIC PROJECTIONS

FOR S.V.

FOR F.V.

FRONT VIEW

L.H. SIDE VIEW

X

Y

TOP VIEW

PICTORIAL PRESENTATION IS GIVEN

DRAW THREE VIEWS OF THIS OBJECT BY FIRST ANGLE PROJECTION METHOD

FOR T.V.

ORTHOGRAPHIC PROJECTIONS

FOR S.V.

FOR F.V.

FRONT VIEW

L.H. SIDE VIEW

X

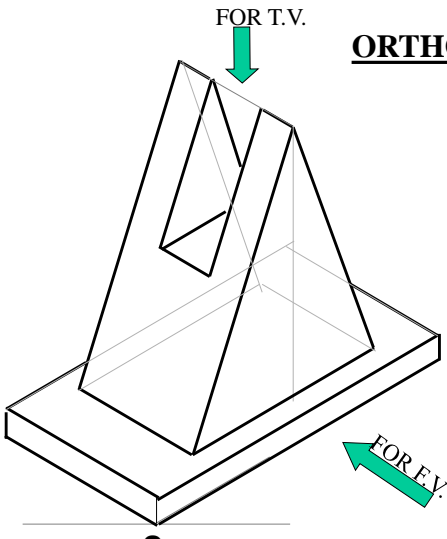
Y

TOP VIEW

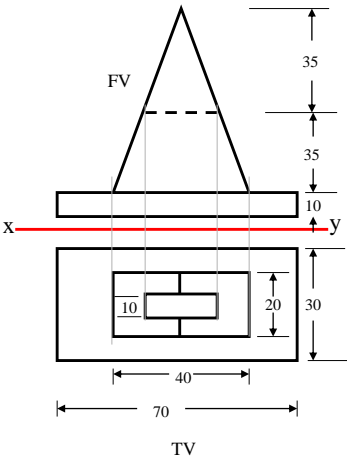
PICTORIAL PRESENTATION IS GIVEN

DRAW THREE VIEWS OF THIS OBJECT BY FIRST ANGLE PROJECTION METHOD

FOR T.V.

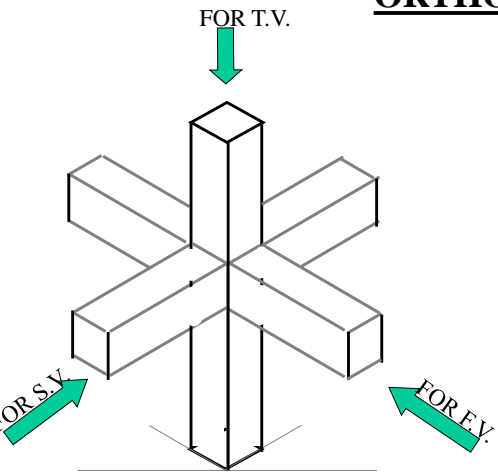


ORTHOGRAPHIC PROJECTIONS

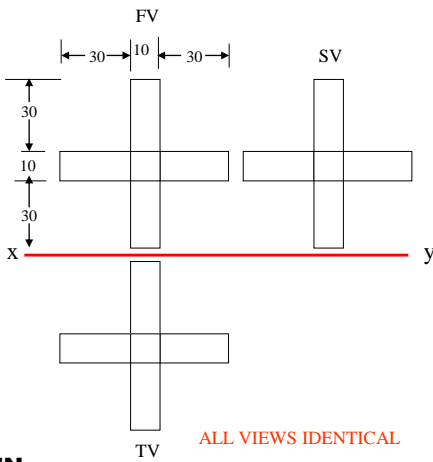


PICTORIAL PRESENTATION IS GIVEN
DRAW FV AND TV OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

FOR T.V.



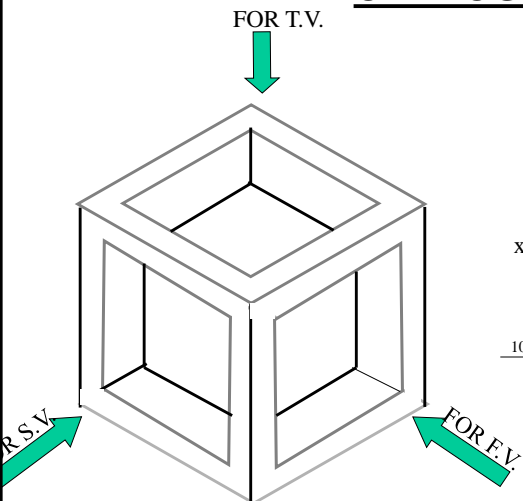
ORTHOGRAPHIC PROJECTIONS



PICTORIAL PRESENTATION IS GIVEN
DRAW THREE VIEWS OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

ALL VIEWS IDENTICAL

FOR T.V.



FOR F.V.

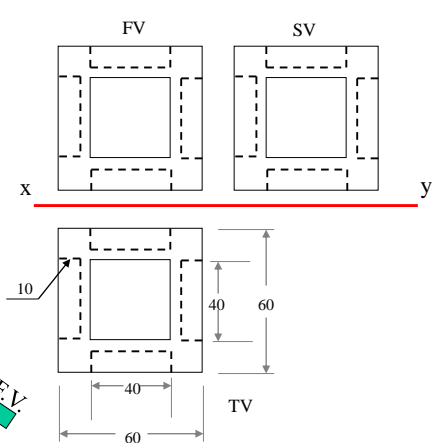
FOR S.V.

ORTHOGRAPHIC PROJECTIONS

ALL VIEWS IDENTICAL

FV

SV



x

y

10

40

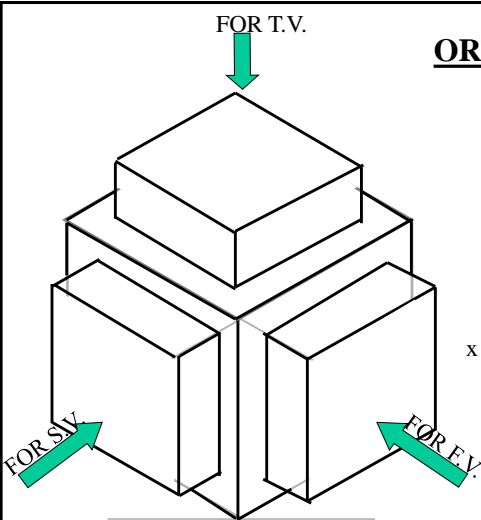
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TV

PICTORIAL PRESENTATION IS GIVEN

DRAW THREE VIEWS OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

FOR T.V.



FOR F.V.

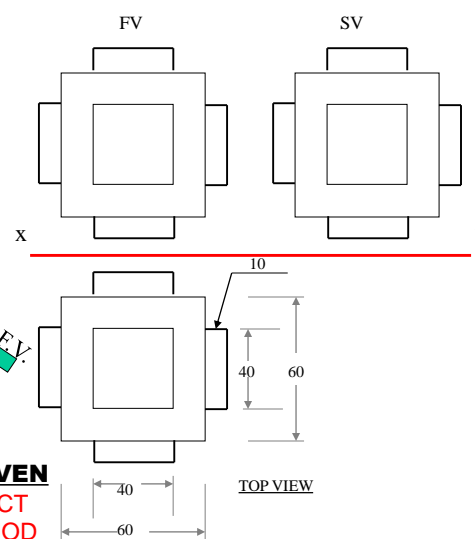
FOR S.V.

ORTHOGRAPHIC PROJECTIONS

ALL VIEWS IDENTICAL

FV

SV



x

y

10

40

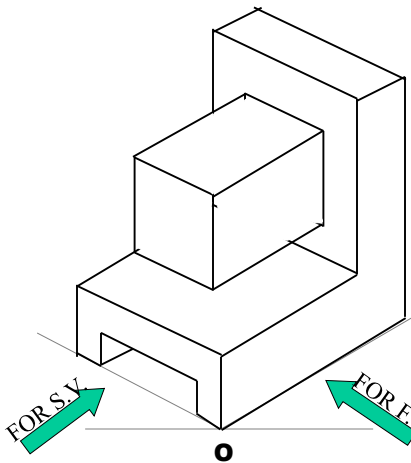
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TOP VIEW

PICTORIAL PRESENTATION IS GIVEN

DRAW THREE VIEWS OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

ORTHOGRAPHIC PROJECTIONS



FRONT VIEW

40 20

10

F.V.

L.H. SIDE VIEW

30 SQUARE

50

20

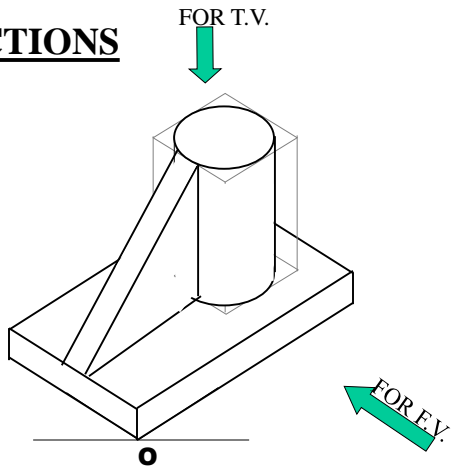
30 60

S.V.

Y

PICTORIAL PRESENTATION IS GIVEN
DRAW FV AND SV OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

ORTHOGRAPHIC PROJECTIONS



FV

40

10

45

30 D

X

Y

TV

80

50

10

PICTORIAL PRESENTATION IS GIVEN
DRAW FV AND TV OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

ORTHOGRAPHIC PROJECTIONS

FV

TV

30 R

20 D

100

40

10

25

25

10

30

10

X

Y

O

FOR T.V.

FOR F.V.

PICTORIAL PRESENTATION IS GIVEN

DRAW FV AND TV OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

PICTORIAL PRESENTATION IS GIVEN

DRAW FV AND TV OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

FOR T.V.

FOR F.V.

FV

TV

RECT. SLOT

30

50

35

10

10

20 D

30 D

60 D

TOP VIEW

X

Y

O

ORTHOGRAPHIC PROJECTIONS

The isometric view shows a mechanical part with a rectangular base. The front face has a V-shaped cutout. A rectangular block is attached to the top right. Dimensions: total width 80, total height 25, V-cut depth 10, V-cut width 25, block width 15, block height 25. Projection arrows: 'FOR S.V.' points to the left, 'FOR F.V.' points to the right.

The orthographic projections are the Front View (F.V.) and Side View (S.V.). The F.V. shows the front face with the V-cut and the block. The S.V. shows the side profile with the block and the V-cut. Dimensions are consistent with the isometric view.

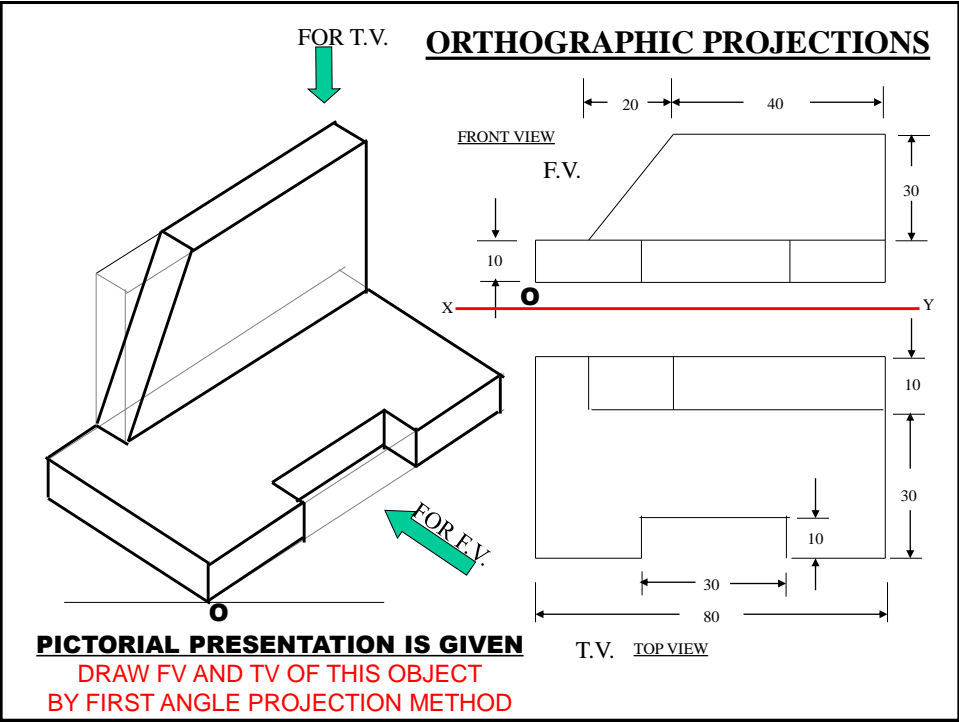
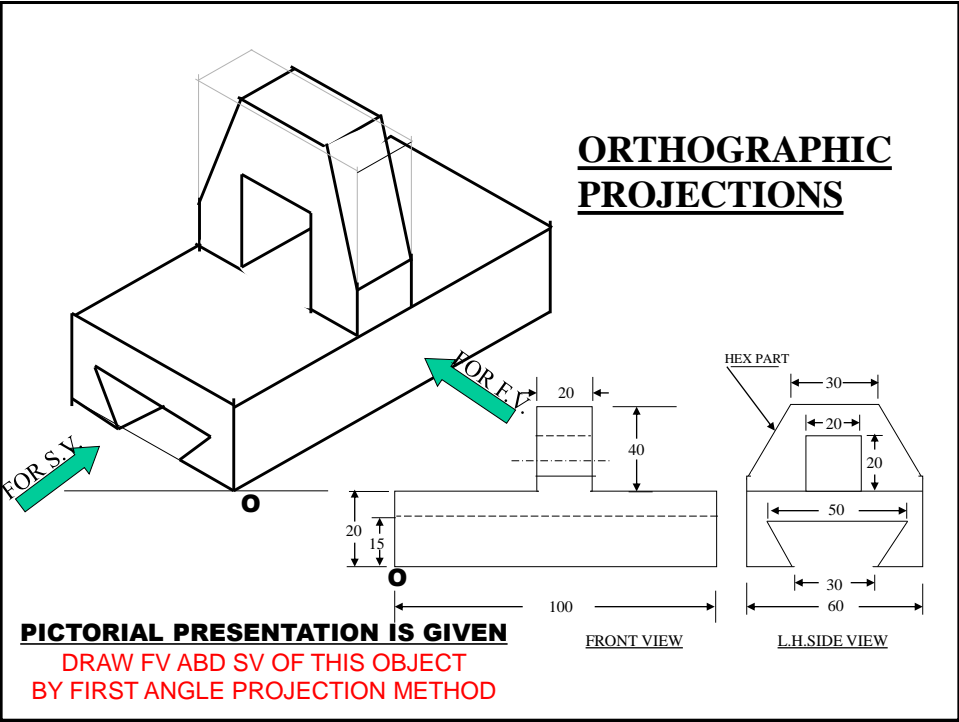
PICTORIAL PRESENTATION IS GIVEN
DRAW FV AND SV OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

ORTHOGRAPHIC PROJECTIONS

The isometric view shows a mechanical part with a rectangular base. The front face has a V-shaped cutout. A rectangular block is attached to the top right. Dimensions: total width 80, total height 25, V-cut depth 10, V-cut width 25, block width 15, block height 25. Projection arrows: 'FOR T.V.' points to the top, 'FOR F.V.' points to the right.

The orthographic projections are the Front View (FV) and Top View (TV). The FV shows the front face with the V-cut and the block. The TV shows the top surface with the block and the V-cut. Dimensions are consistent with the isometric view.

PICTORIAL PRESENTATION IS GIVEN
DRAW FV AND TV OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD



ORTHOGRAPHIC PROJECTIONS

FV

LSV

FOR S.V.

FOR F.V.

PICTORIAL PRESENTATION IS GIVEN
DRAW FV AND LSV OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

PICTORIAL PRESENTATION IS GIVEN
DRAW FV AND SV OF THIS OBJECT
BY FIRST ANGLE PROJECTION METHOD

ORTHOGRAPHIC PROJECTIONS

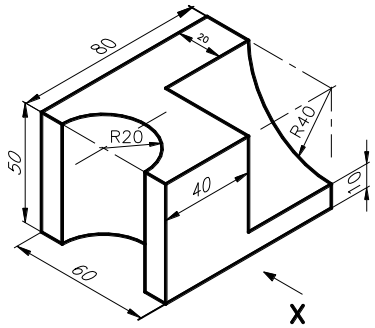
FOR S.V.

FOR F.V.

F.V.

LEFT S.V.

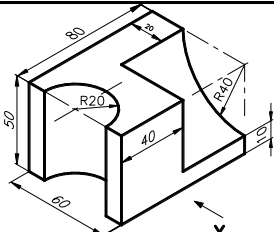
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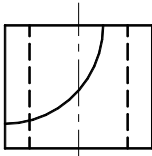
ORTHOGRAPHIC PROJECTIONS

DRAW

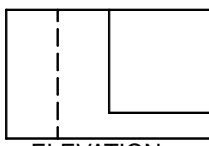
- 1) ELEVATION ALONG THE ARROW "X"
- 2) PLAN
- 3) LEFT HAND SIDE VIEW
- 4) RIGHT HAND SIDE VIEW



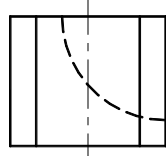
ORTHOGRAPHIC PROJECTIONS



RIGHT HAND SIDE VIEW

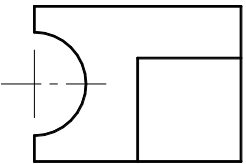


ELEVATION



LEFT HAND SIDE VIEW

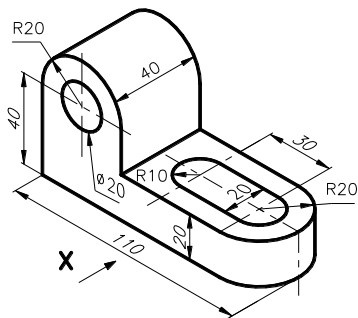
X



PLAN

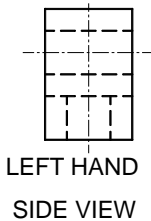
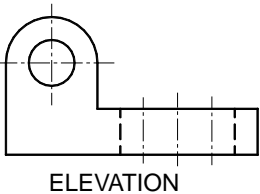
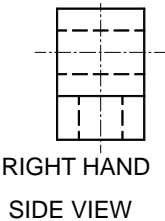
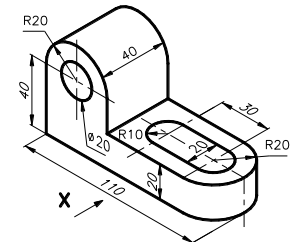
Y

ORTHOGRAPHIC
PROJECTIONS

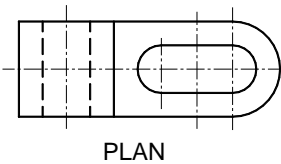


- DRAW
- 1) ELEVATION ALONG THE ARROW “X”
 - 2) PLAN
 - 3) RIGHT HAND SIDE VIEW
 - 4) LEFT HAND SIDE VIEW

ORTHOGRAPHIC
PROJECTIONS



X



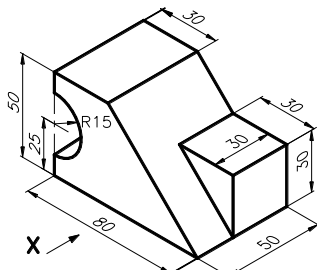
Y



3) LEFT HAND SIDE VIEW



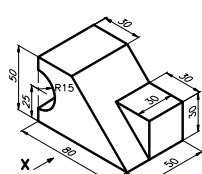
PLAN



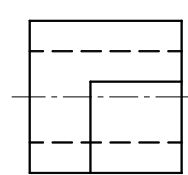
ORTHOGRAPHIC PROJECTIONS

DRAW

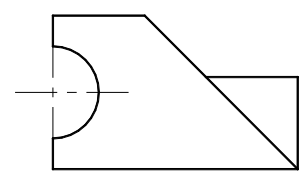
- 1) ELEVATION ALONG ARROW “X”
- 2) PLAN
- 3) RIGHT HAND SIDE VIEW
- 4) LEFT HAND SIDE VIEW



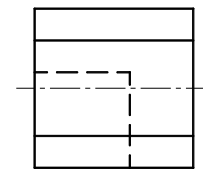
ORTHOGRAPHIC PROJECTIONS



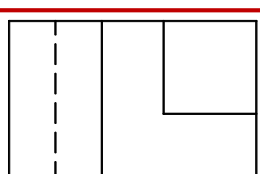
RIGHT HAND SIDE VIEW



ELEVATION



LEFT HAND SIDE VIEW



PLAN

X

Y



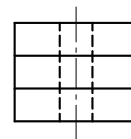
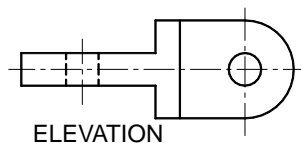
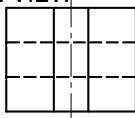
1) ELEVATION ALONG ARROW "X"

3) LEFT HAND SIDE VIEW

4) RIGHT HAND SIDE VIEW



LEFT HAND
SIDE VIEW



ELEVATION

PLAN

Isometric view of a mechanical part. Dimensions include: R45 (fillet radius), 30 (width of top flange), 20 (height of top flange), 45 (height of main body), 65 (length of main body), 90 (outer diameter of main body), 50 (inner diameter of main body), and HOLE Ø50 (hole in the top flange). An arrow labeled 'X' indicates the direction of view.

1) ELEVATION ALONG ARROW "X"

3) BOTH SIDE VIEWS

Isometric view of a mechanical part. Dimensions include: R45 (fillet radius), 30 (width of top flange), 20 (thickness of top flange), 45 (height of main body), 65 (length of main body), 90 (outer diameter of main body), 50 (inner diameter of main body), and HOLE Ø50 (hole in top flange). An arrow labeled 'X' indicates the direction of view.

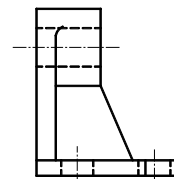
LEFT HAND SIDE VIEW

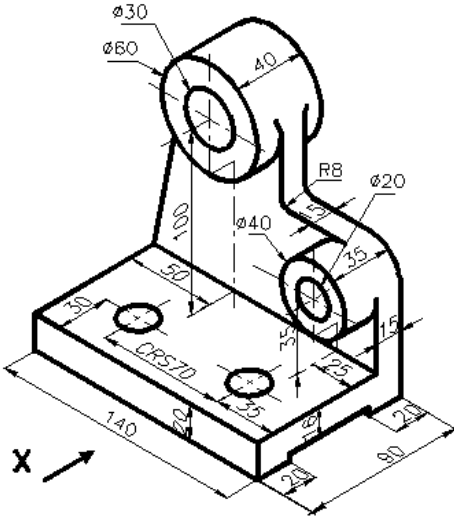
Y

An isometric drawing of a mechanical component. The base is a rectangular plate with overall dimensions of 85 mm by 110 mm and a thickness of 10 mm. On the front face of the base, there are three circular holes, each with a diameter of 25 mm ($\phi 25$). The distance between the centers of these holes is 75 mm. Two vertical support pillars, each with a diameter of 60 mm ($\phi 60$) at the top, rise from the base. The height of the pillars is 100 mm. At the top of the pillars, they connect to a horizontal cylindrical member with an outer diameter of 60 mm ($\phi 60$) and a length of 50 mm. This member contains a central hole with a diameter of 30 mm ($\phi 30$ HOLE). The distance from the center of the base's holes to the center of the top cylinder is 25 mm. A coordinate system is shown at the bottom right corner of the base, with the X-axis pointing towards the upper right.

3) LEFT HAND SIDE VIEW

An isometric drawing of a mechanical component. The base is a rectangular plate with overall dimensions of 80 mm by 60 mm and a thickness of 10 mm. It features three circular holes, each with a diameter of 25 mm, arranged in a triangular pattern. A vertical support rises from the center of the base, consisting of a cylindrical upper section with a diameter of 60 mm and a conical lower section. The total height of the part is 100 mm. Various other dimensions are provided for specific features and offsets.

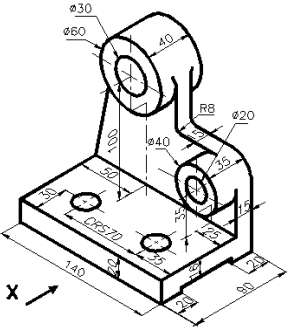




ORTHOGRAPHIC PROJECTIONS

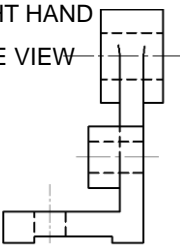
DRAW

- 1) ELEVATION ALONG "X"
- 2) PLAN
- 3) RIGHT HAND SIDE VIEW

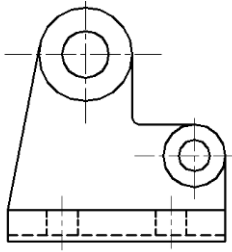


ORTHOGRAPHIC PROJECTIONS

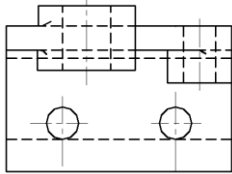
RIGHT HAND SIDE VIEW



ELEVATION

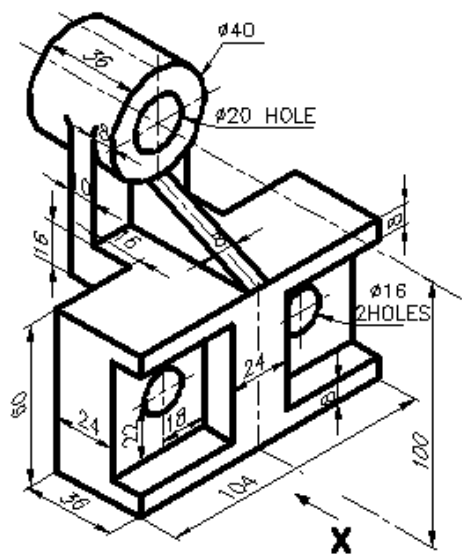


PLAN



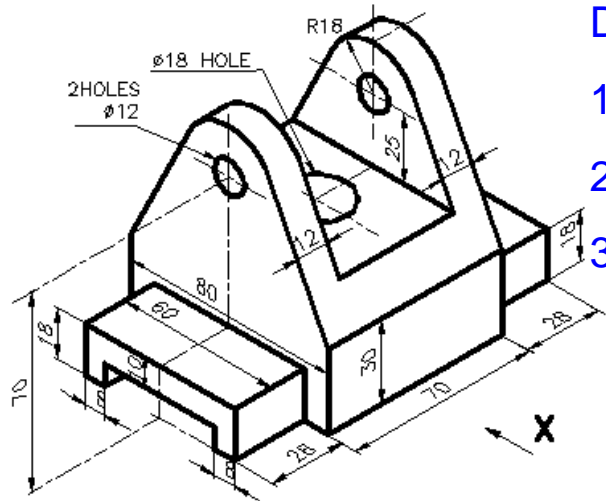
A red line with 'X' at the left end and 'Y' at the right end is positioned below the elevation and plan views.

Home Assignment No. 1



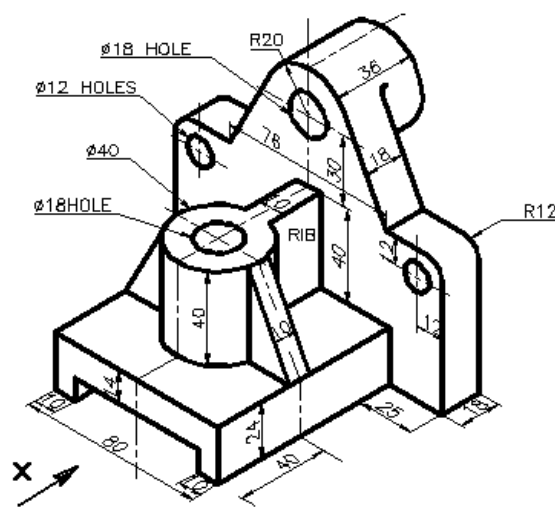
- Draw
- 1.F.V.
 - 2.T.V.
 - 3. L.H.S.V.

Home Assignment No. 2



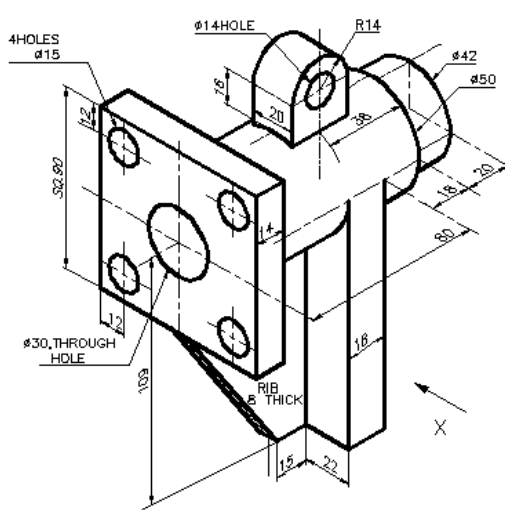
- Draw
- 1. F.V.
 - 2. T.V.
 - 3. L.H.S.V.

Home Assignment No. 3



- Draw
- 1.F.V.
 - 2.T.V.
 - 3.R.H.S.V.

Home Assignment No. 3



- Draw
- 1.F.V.
 - 2.T.V.
 - 3.Both side views

QUESTIONS ?


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THANK YOU.

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If you are headed in
the right direction,
each step, no matter
how small,
is getting you closer to
your goal.