# ISOMETRIC PROJECTION

UNIT-5

# ISOMETRIC DRAWING

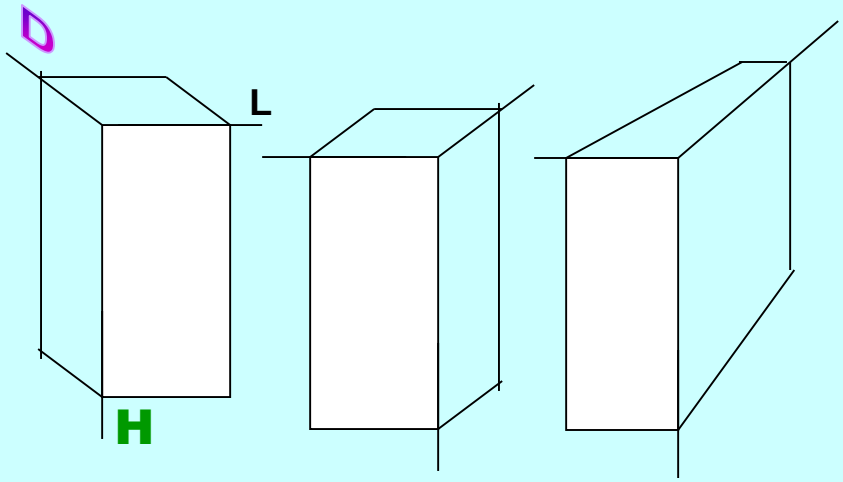
IT IS A TYPE OF PICTORIAL PROJECTION IN WHICH ALL THREE DIMENSIONS OF AN OBJECT ARE SHOWN IN ONE VIEW AND IF REQUIRED, THEIR ACTUAL SIZES CAN BE MEASURED DIRECTLY FROM IT.

## TYPICAL CONDITION.

IN THIS 3-D DRAWING, AN OBJECT IS SO PLACED THAT, ITS THREE MUTUALLY PERPENDICULAR EDGES ARE EQUALLY INCLINED WITH THE PLANE OF PROJECTION. SO ALL THREE DIMENSIONAL AXES APPEAR AT EQUAL INCLINATIONS WITH EACH OTHER.( $120^0$)

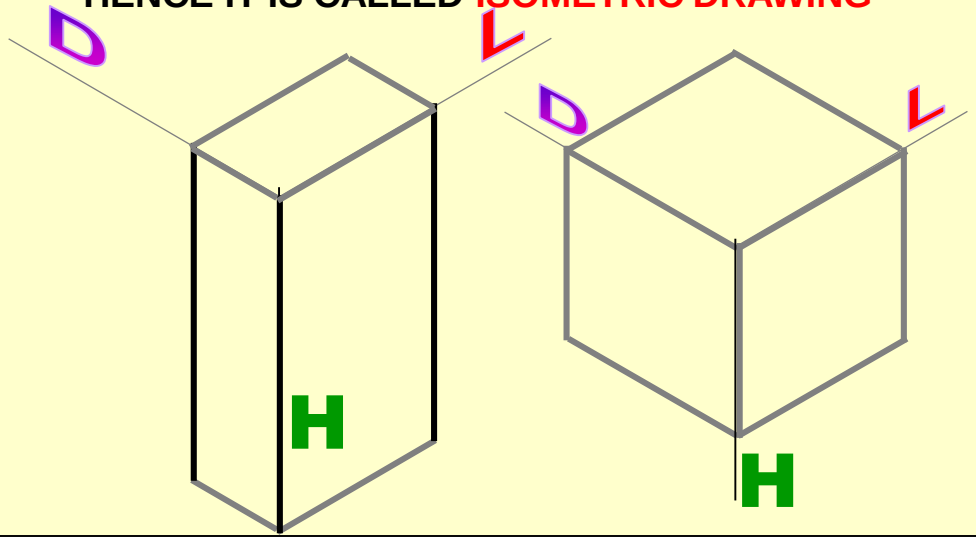
3-D DRAWINGS CAN BE DRAWN IN NUMEROUS WAYS AS SHOWN BELOW. ALL THESE DRAWINGS MAY BE CALLED 3-DIMENSIONAL DRAWINGS, OR PHOTOGRAPHIC OR PICTORIAL DRAWINGS.

HERE NO SPECIFIC RELATION AMONG H, L & D AXES IS MENTAINED.




NOW OBSERVE BELOW GIVEN DRAWINGS. ONE CAN NOTE SPECIFIC INCLINATION AMONG H, L & D AXES. ISO MEANS SAME, SIMILAR OR EQUAL.

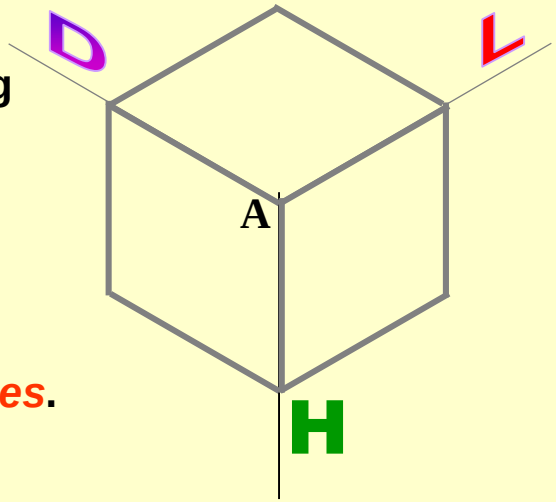
HERE ONE CAN FIND EQUAL INCLINATION AMONG H, L & D AXES. EACH IS $120^0$ INCLINED WITH OTHER TWO. HENCE IT IS CALLED ISOMETRIC DRAWING




PURPOSE OF ISOMETRIC DRAWING IS TO UNDERSTAND OVERALL SHAPE, SIZE & APPEARANCE OF AN OBJECT PRIOR TO IT'S PRODUCTION.

# SOME IMPORTANT TERMS:

## ISOMETRIC AXES, LINES AND PLANES:




**The three lines AL, AD and AH, meeting at point A and making $120^0$ angles with each other are termed *Isometric Axes.***

**The lines parallel to these axes are called *Isometric Lines*.**

**The planes representing the faces of of the cube as well as other planes parallel to these planes are called *Isometric Planes*.**

## ISOMETRIC SCALE:

**When one holds the object in such a way that all three dimensions are visible then in the process all dimensions become proportionally inclined to observer's eye sight and hence appear apparent in lengths.**

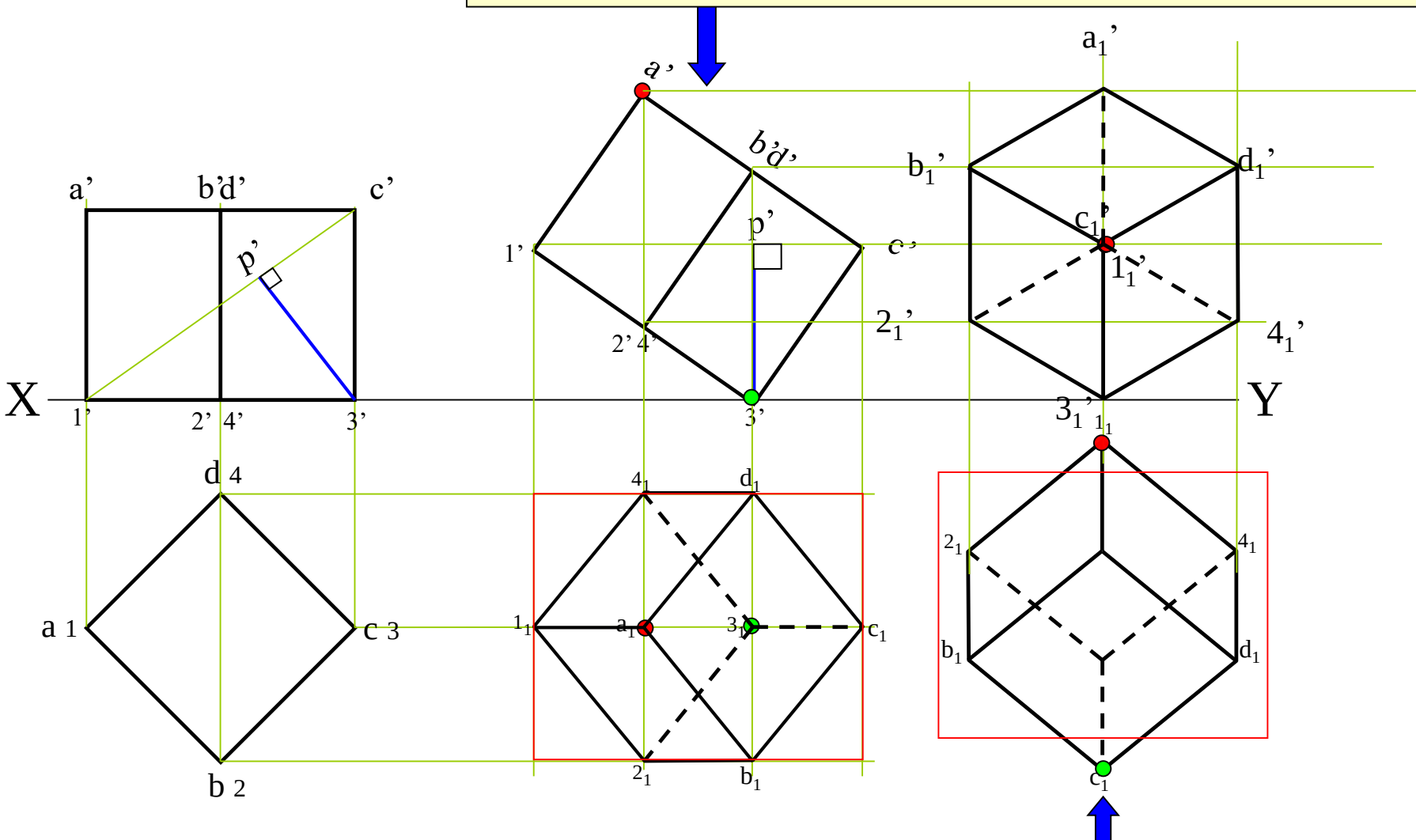
**This reduction is 0.815 or 9 / 11 ( approx.) It forms a reducing scale which Is used to draw isometric drawings and is called *Isometric scale.***

**In practice, while drawing isometric projection, it is necessary to convert true lengths into isometric lengths for measuring and marking the sizes. This is conveniently done by constructing an isometric scale as described on next page.**

**Problem 13.23:** A cube of 25 mm long edges is so placed on HP on one corner that a body diagonal is parallel to HP and perpendicular to VP Draw it's projections.

**Solution Steps:**

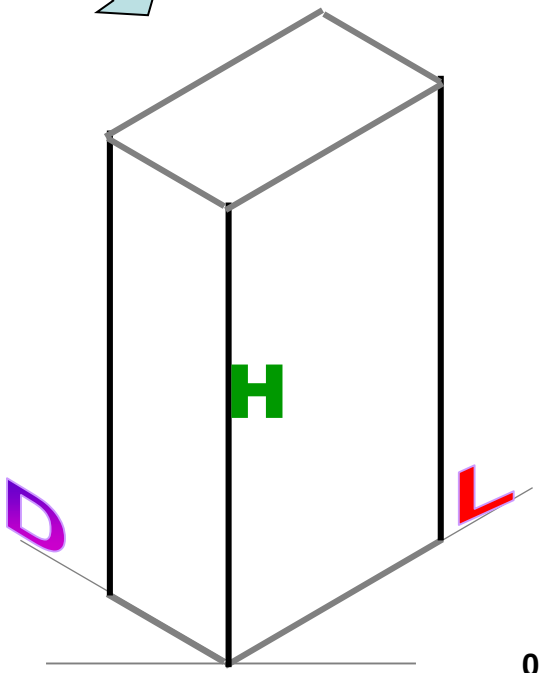
1.Assuming standing on HP, begin with TV,a square with all sides equally inclined to XY. Project FV and name all points of FV & TV.
2.Draw a body-diagonal joining c' with 1'( This can become // to xy)
3.From 3' drop a perpendicular on this and name it p'
4.Draw 2nd Fv in which 3'p' line is vertical ***means*** c'-1' diagonal must be horizontal. .Now as usual project TV..
6.In final TV draw same diagonal is perpendicular to VP as said in problem. Then as usual project final FV.

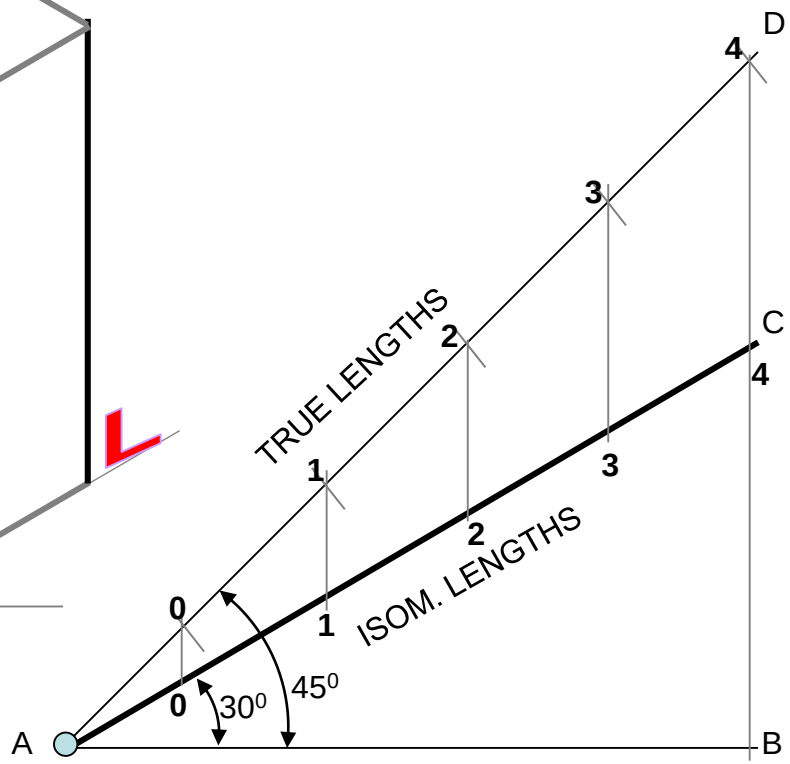


# TYPES OF ISOMETRIC DRAWINGS

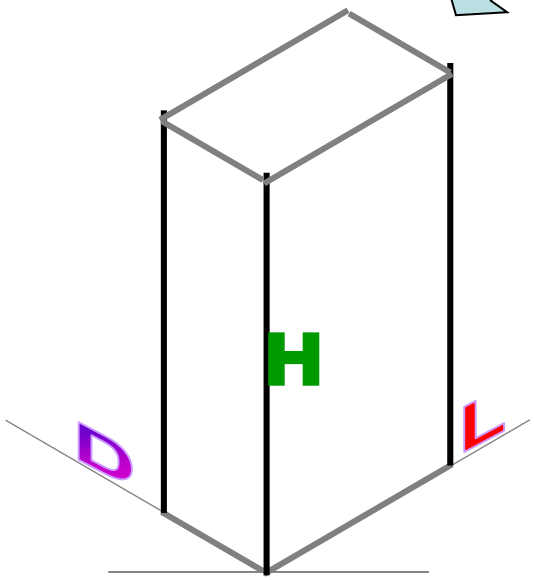
**ISOMETRIC VIEW**
Drawn by using True scale
( True dimensions )

**ISOMETRIC PROJECTION**
Drawn by using Isometric scale
( Reduced dimensions )




Isometric scale [ Line AC ]
required for Isometric Projection




***CONSTRUCTION OF ISOM.SCALE.***
**From point A, with line AB draw $30^0$ and $45^0$ inclined lines AC & AD resp on AD. Mark divisions of true length and from each division-point draw vertical lines upto AC line.**
**The divisions thus obtained on AC give lengths on isometric scale.**

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# ISOMETRIC OF PLANE FIGURES

**AS THESE ALL ARE 2-D FIGURES WE REQUIRE ONLY TWO ISOMETRIC AXES.**

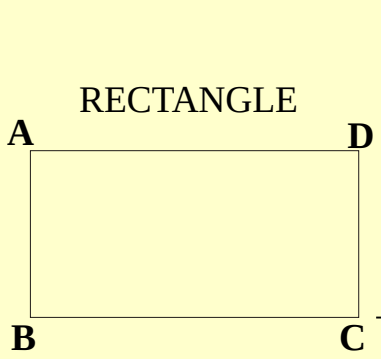
**IF THE FIGURE IS FRONT VIEW, H & L AXES ARE REQUIRED.**

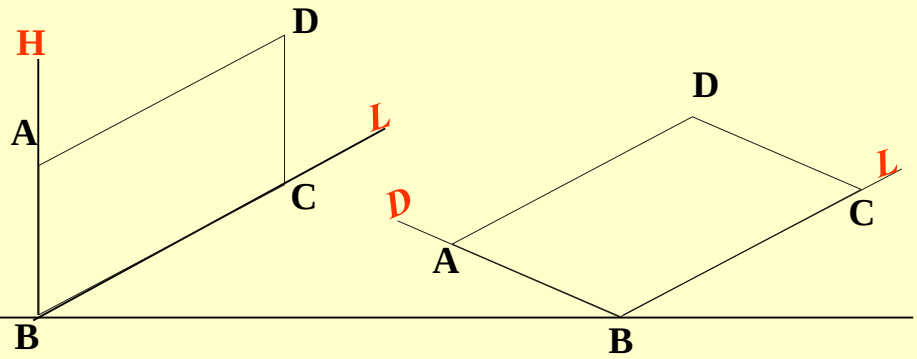
**IF THE FIGURE IS TOP VIEW, D & L AXES ARE REQUIRED.**

Shapes containing Inclined lines should be enclosed in a rectangle as shown. Then first draw isom. of that rectangle and then inscribe that shape as it is.

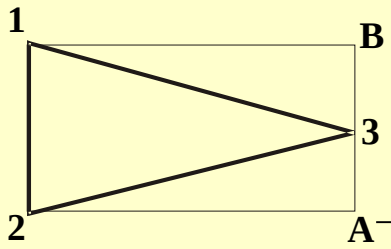
| SHAPE | Isometric view if the Shape is F.V. | or | T.V. |
|---|---|---|---|

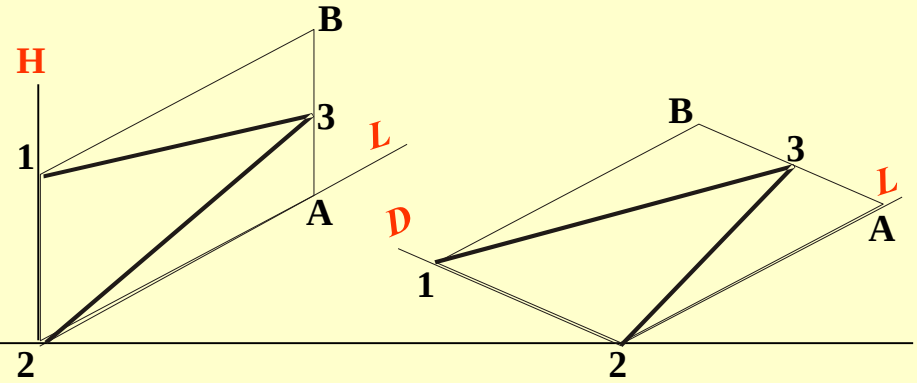
RECTANGLE



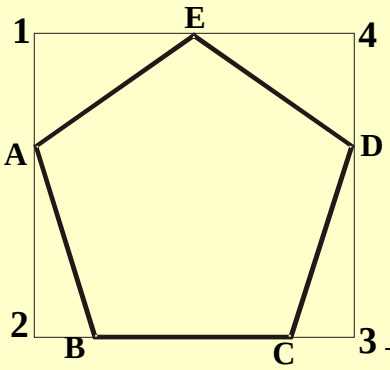



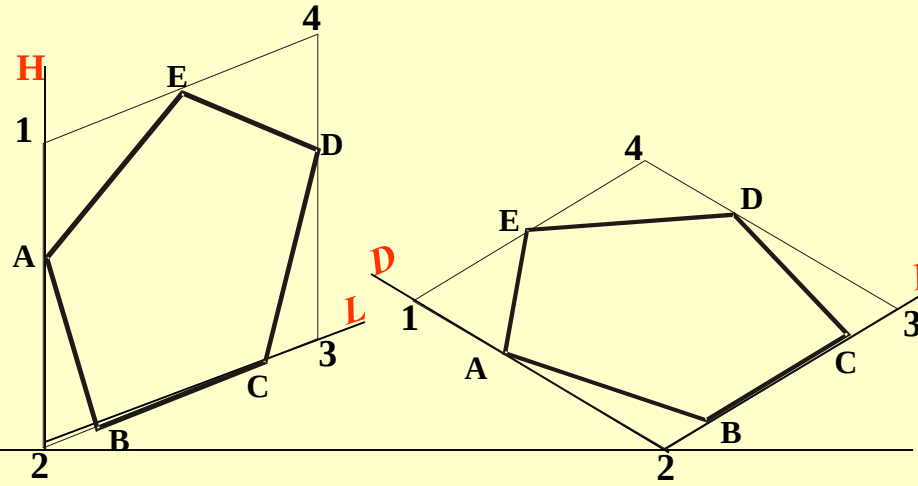

TRIANGLE



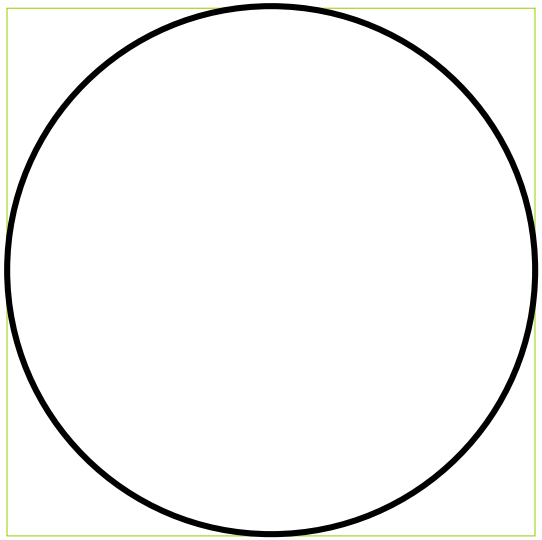

PENTAGON



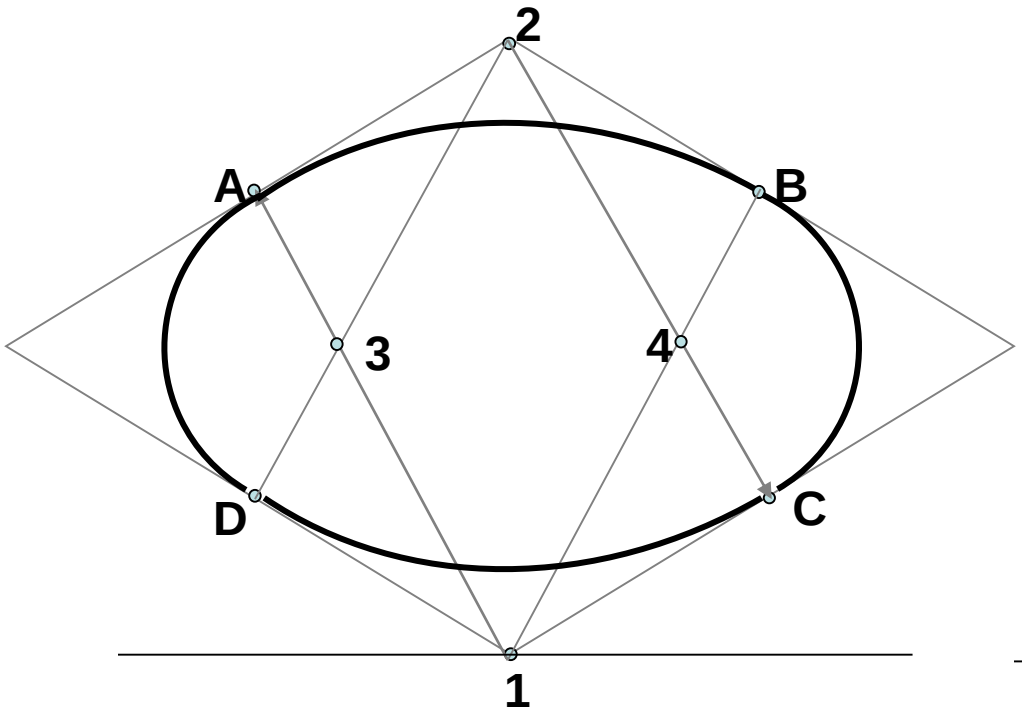



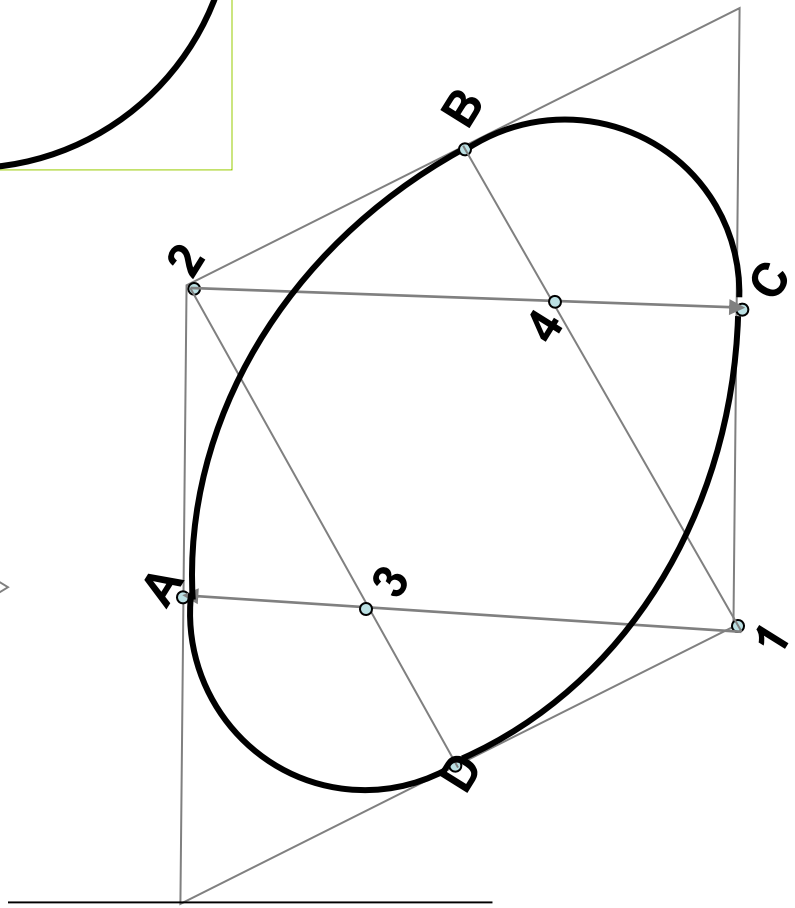
# STUDY ILLUSTRATIONS

**DRAW ISOMETRIC VIEW OF A CIRCLE IF IT IS A TV OR FV.**



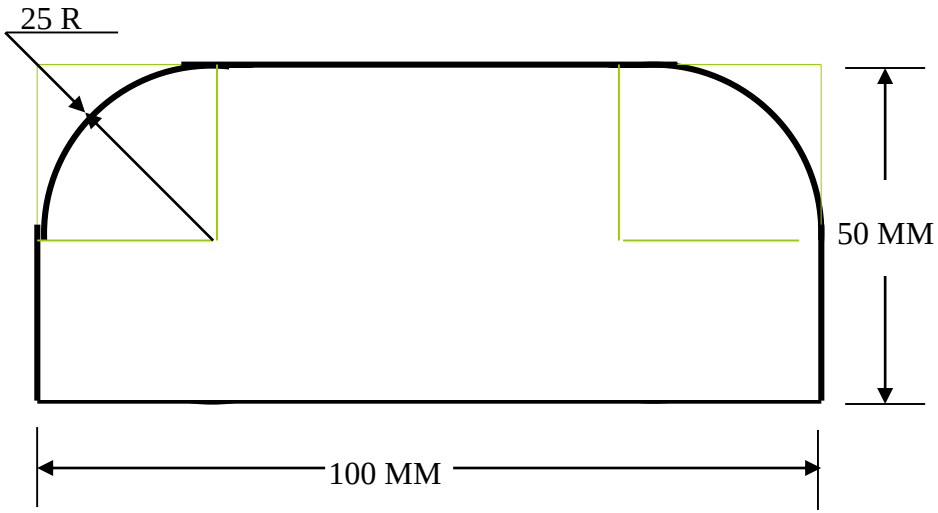
**FIRST ENCLOSE IT IN A SQUARE.**
**IT'S ISOMETRIC IS A RHOMBUS WITH D & L AXES FOR TOP VIEW.**
**THEN USE H & L AXES FOR ISOMETRIC WHEN IT IS FRONT VIEW.**
**FOR CONSTRUCTION USE RHOMBUS METHOD SHOWN HERE. STUDY IT.**



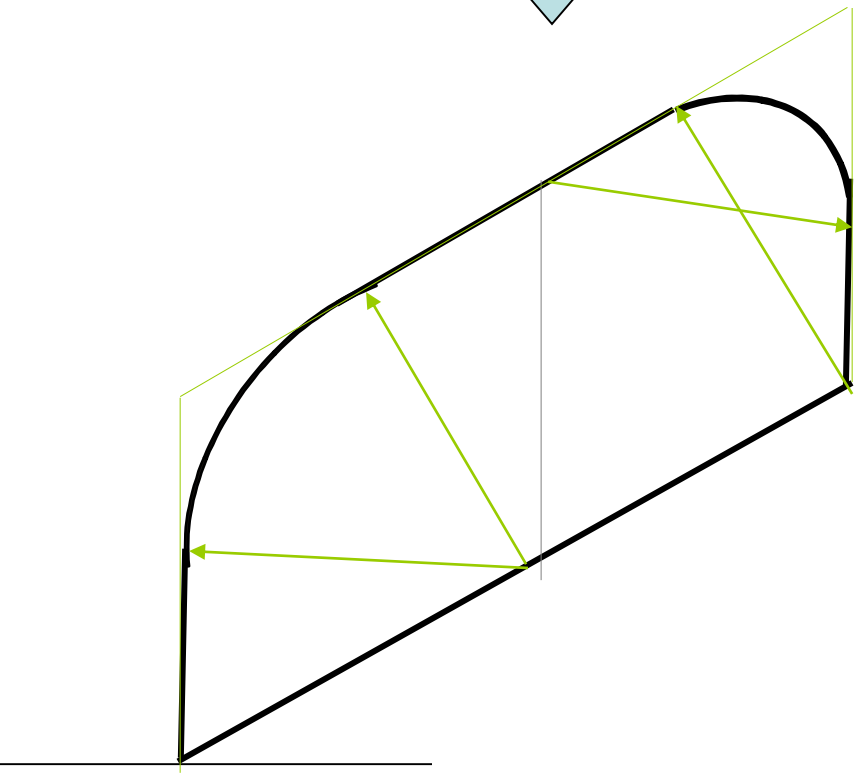



# STUDY ILLUSTRATIONS

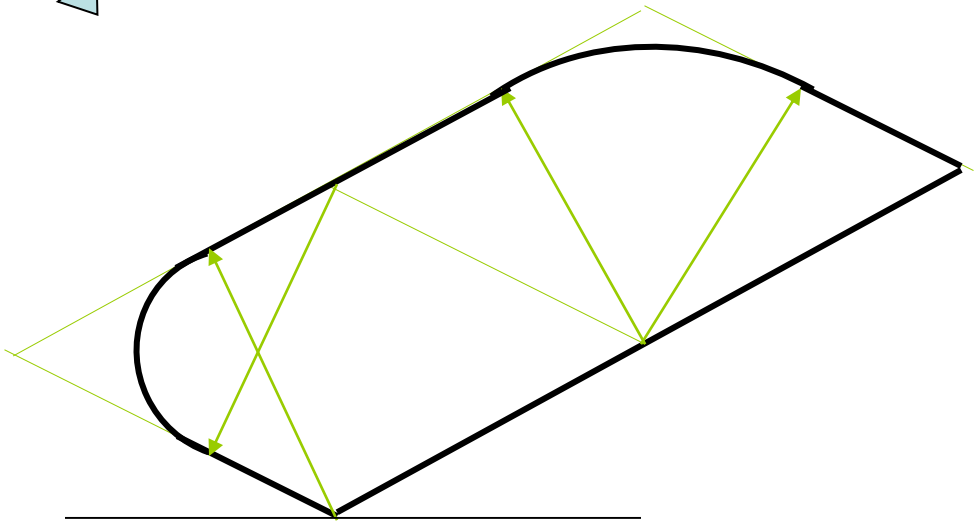
**DRAW ISOMETRIC VIEW OF THE FIGURE SHOWN WITH DIMENTIONS (ON RIGHT SIDE) CONSIDERING IT FIRST AS F.V. AND THEN T.V.**




IF FRONT VIEW



**IF TOP VIEW**



# ISOMETRIC OF PLANE FIGURES

**AS THESE ALL ARE 2-D FIGURES WE REQUIRE ONLY TWO ISOMETRIC AXES.**

**IF THE FIGURE IS FRONT VIEW, H & L AXES ARE REQUIRED.**

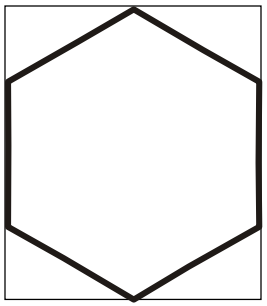
**IF THE FIGURE IS TOP VIEW, D & L AXES ARE REQUIRED.**

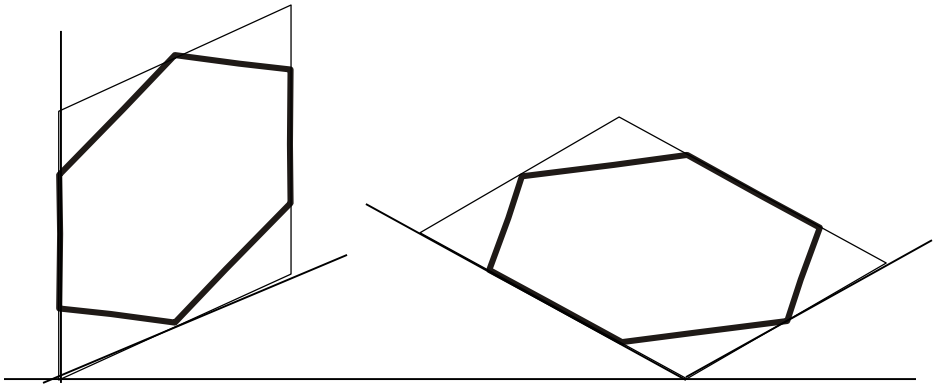
For Isometric of Circle/Semicircle use Rhombus method. Construct it of sides equal to diameter of circle always. ( Ref. Previous two pages.)



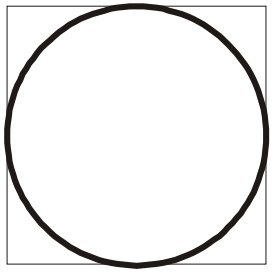
| SHAPE | IF F.V. | IF T.V. |
|---|---|---|

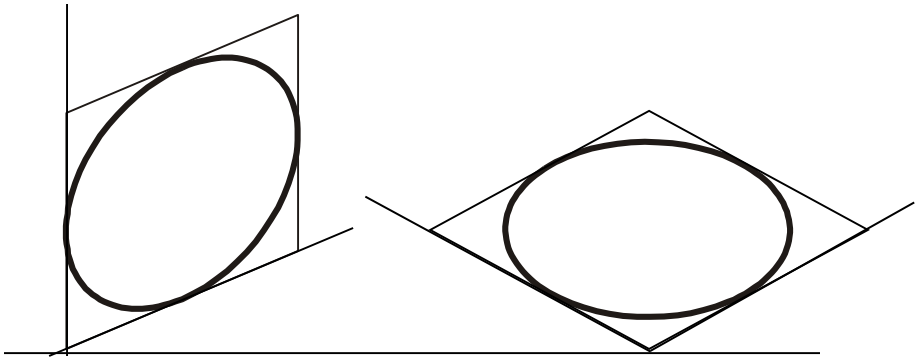
HEXAGON





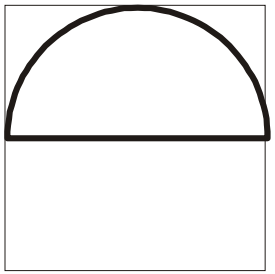
CIRCLE

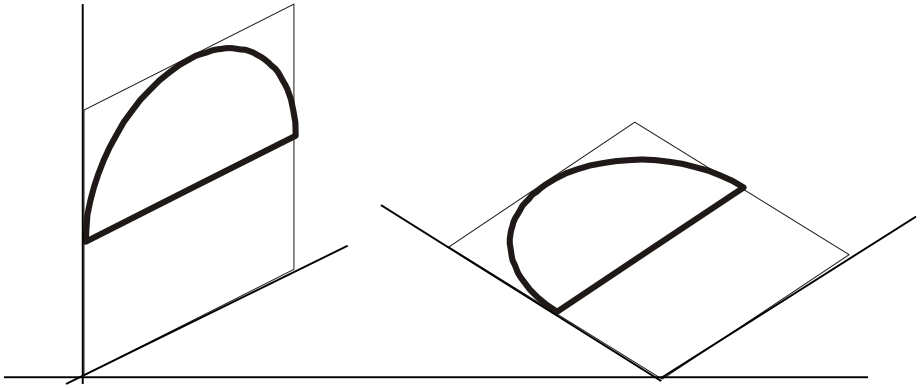




***For Isometric of Circle/Semicircle use Rhombus method. Construct Rhombus of sides equal to Diameter of circle always. ( Ref. topic ENGG. CURVES.)***

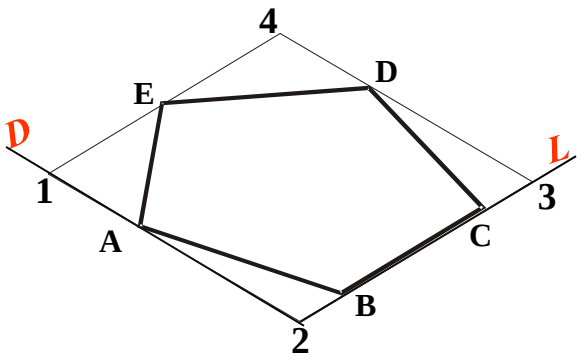
SEMI CIRCLE





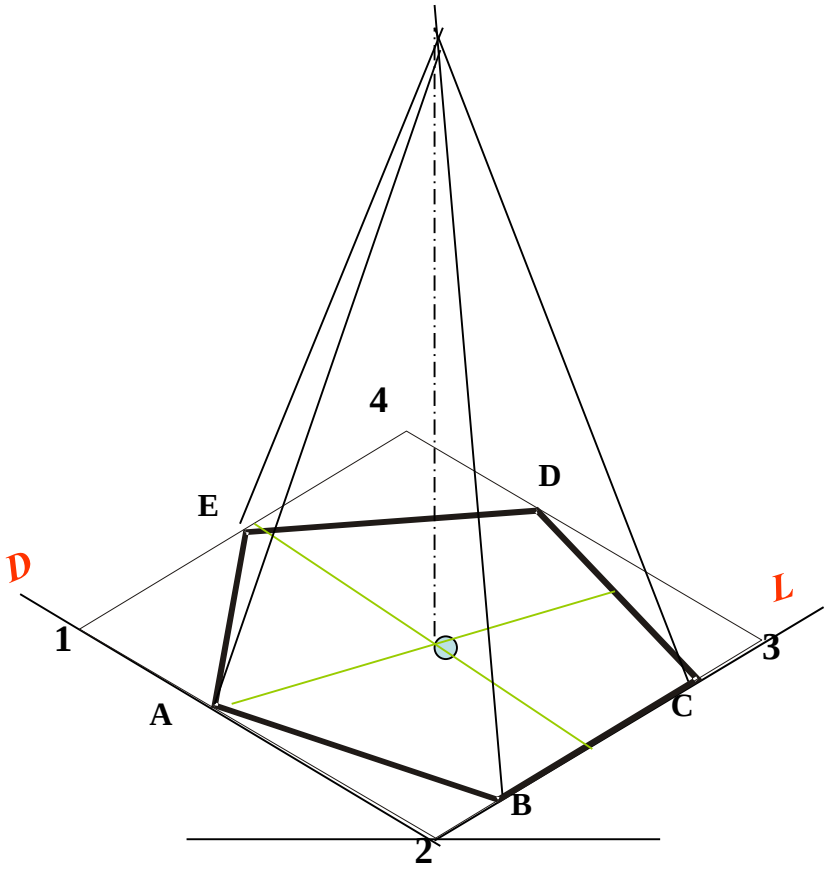
# STUDY ILLUSTRATIONS

## ISOMETRIC VIEW OF BASE OF PENTAGONAL PYRAMID STANDING ON H.P.

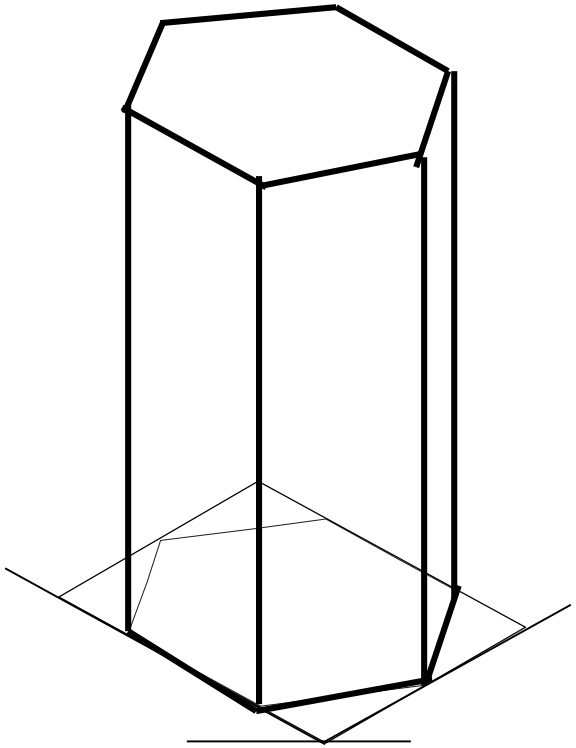



## ISOMETRIC VIEW OF PENTAGONAL PYRAMID STANDING ON H.P.

(Height is added from center of pentagon)

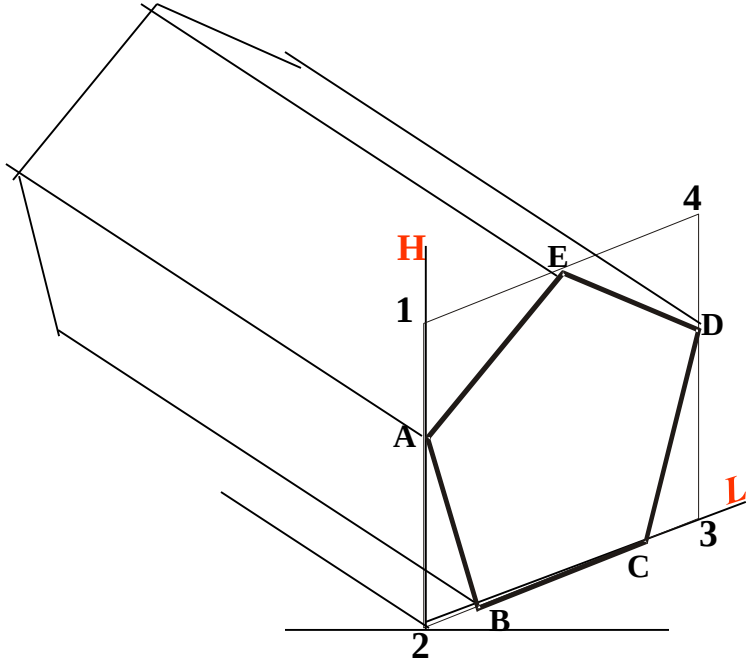


# STUDY ILLUSTRATIONS



ISOMETRIC VIEW OF
HEXAGONAL PRISM
STANDING ON H.P.

ISOMETRIC VIEW OF
PENTAGONALL PRISM
LYING ON H.P.



# STUDY ILLUSTRATIONS

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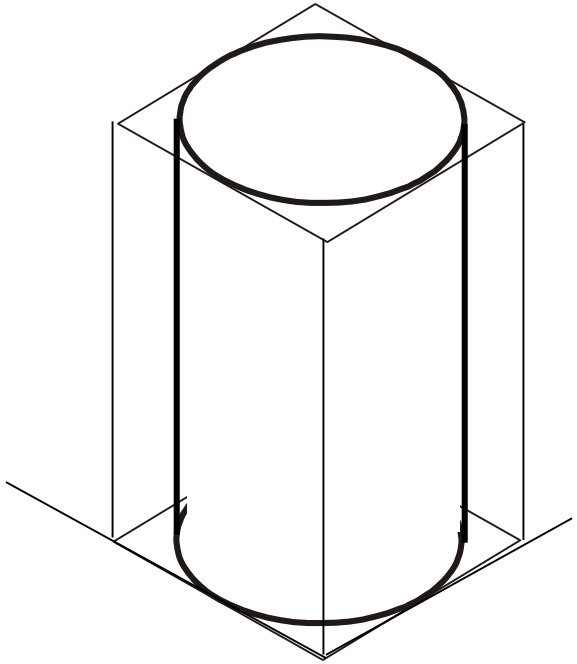
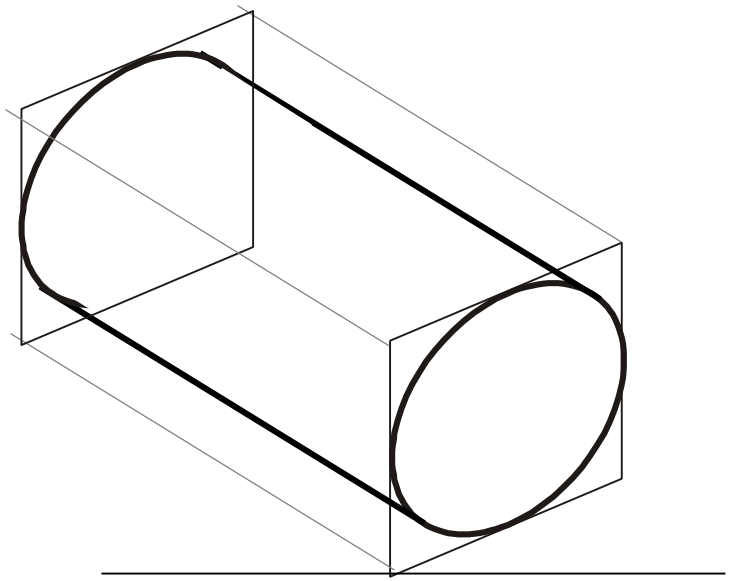
## CYLINDER STANDING ON H.P.



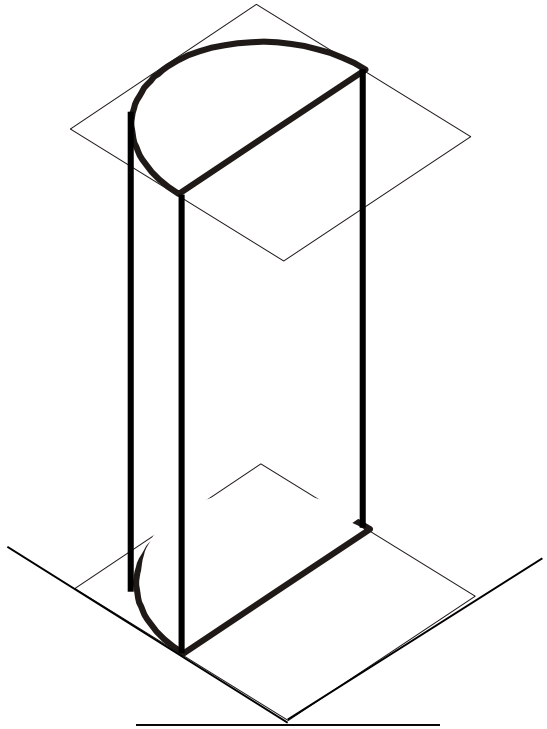


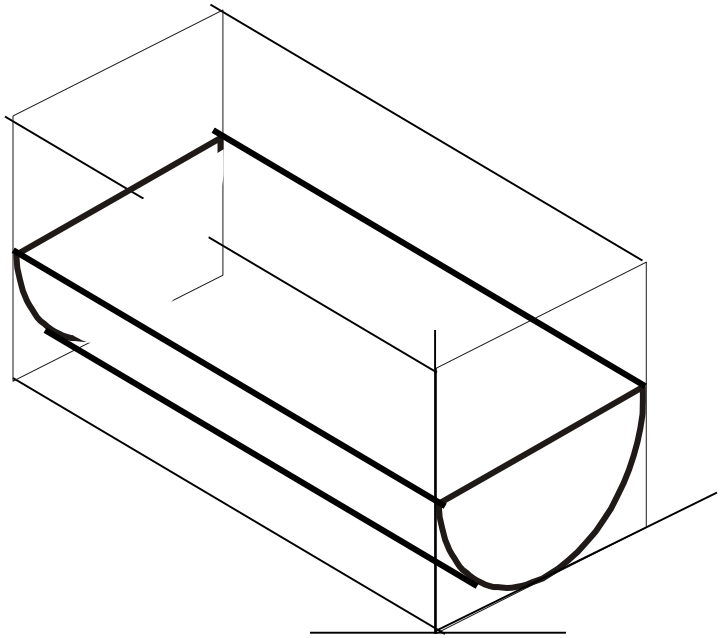
## CYLINDER LYING ON H.P.

# STUDY ILLUSTRATIONS

7

## HALF CYLINDER STANDING ON H.P.
### ( ON IT'S SEMICIRCULAR BASE)



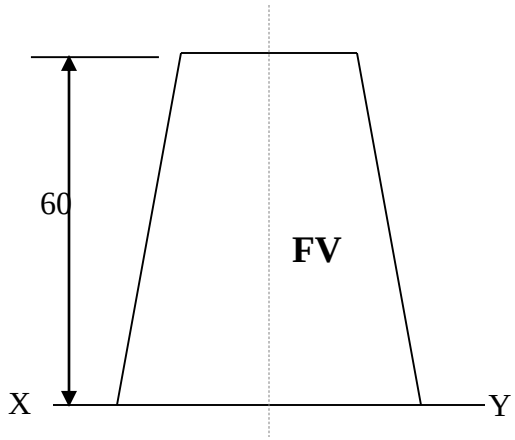


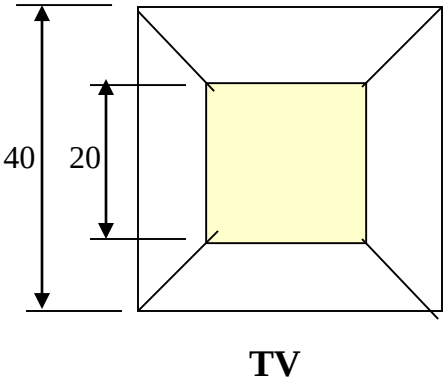
## HALF CYLINDER LYING ON H.P.
### ( with flat face // to H.P.)

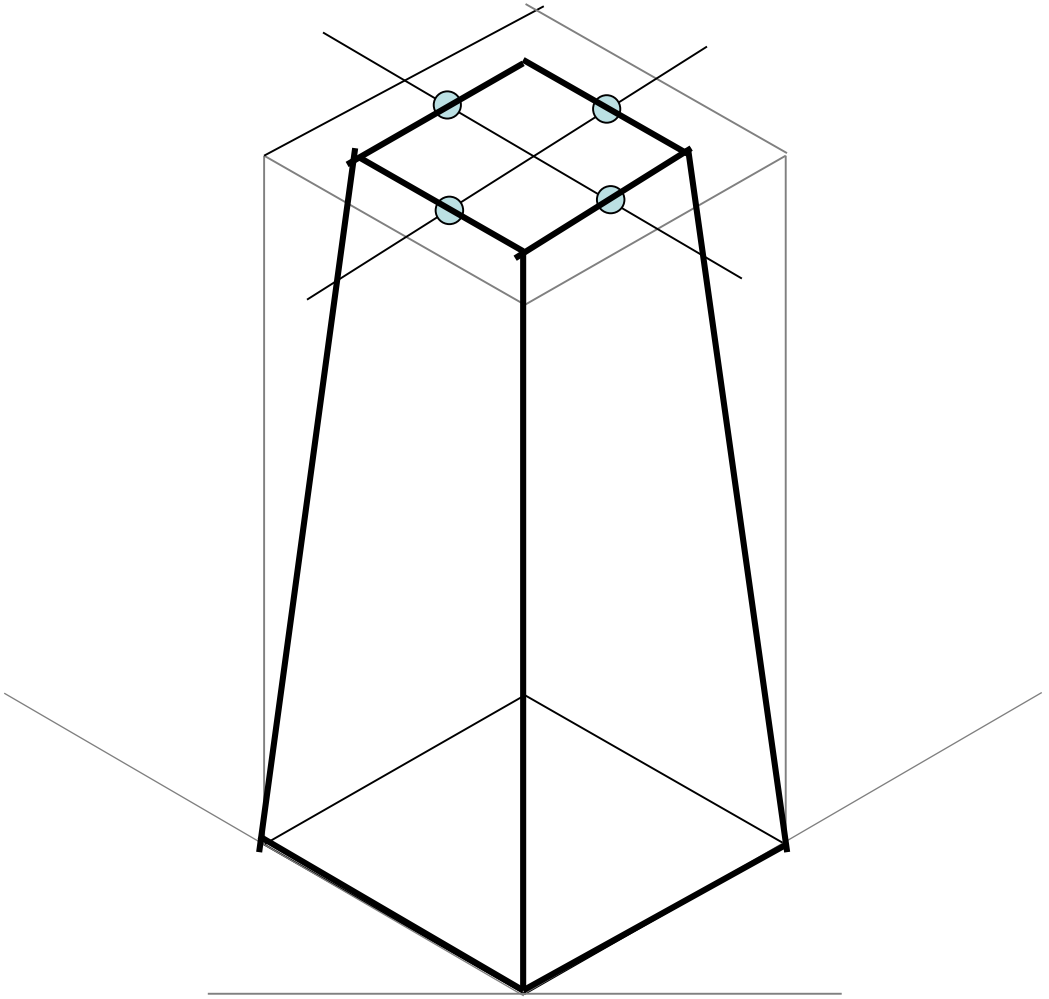
STUDY ILLUSTRATIONS

7

## ISOMETRIC VIEW OF
## A FRUSTOM OF SQUARE PYRAMID
## STANDING ON H.P. ON IT'S LARGER BASE.



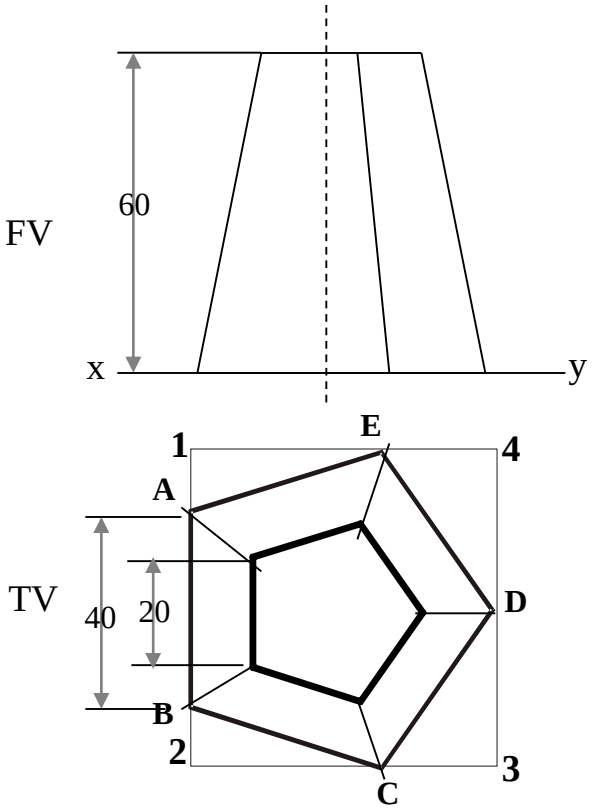



# STUDY ILLUSTRATION



**PROJECTIONS OF FRUSTOM OF PENTAGONAL PYRAMID ARE GIVEN. DRAW IT'S ISOMETRIC VIEW.**



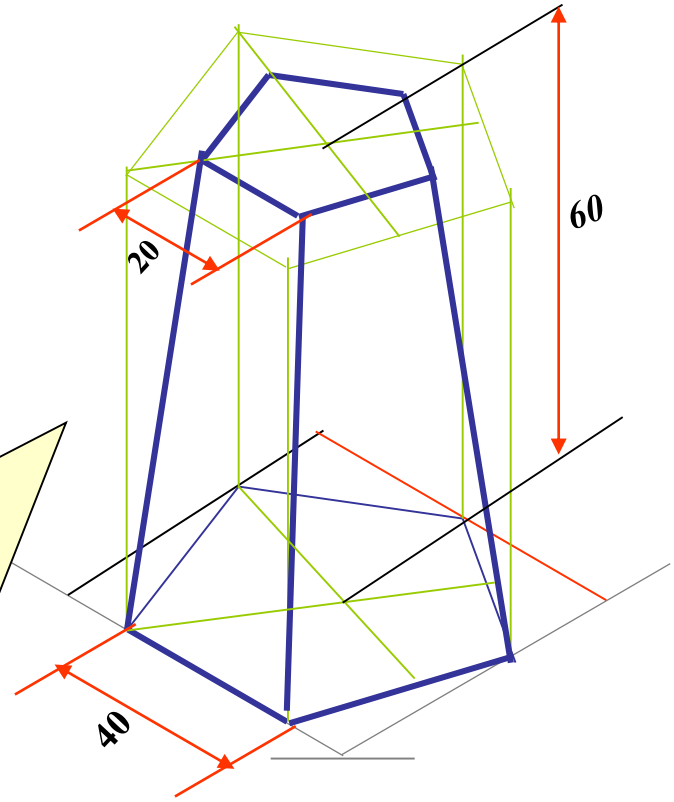

**SOLUTION STEPS:**

**FIRST DRAW ISOMETRIC OF IT'S BASE.**

**THEN DRAWSAME SHAPE AS TOP, 60 MM ABOVE THE BASE PENTAGON CENTER.**

**THEN REDUCE THE TOP TO 20 MM SIDES AND JOIN WITH THE PROPER BASE CORNERS.**

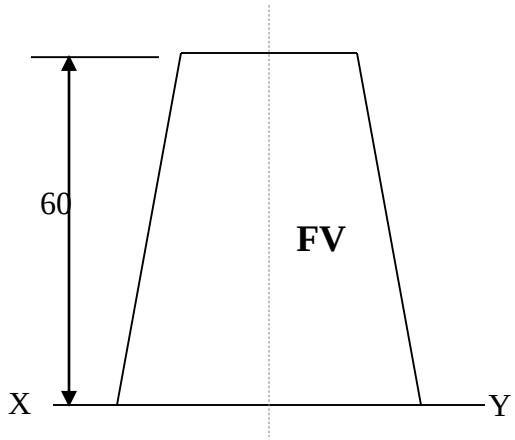
**ISOMETRIC VIEW OF FRUSTOM OF PENTAGONAL PYRAMID**

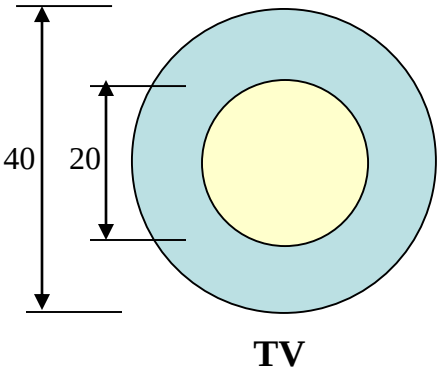


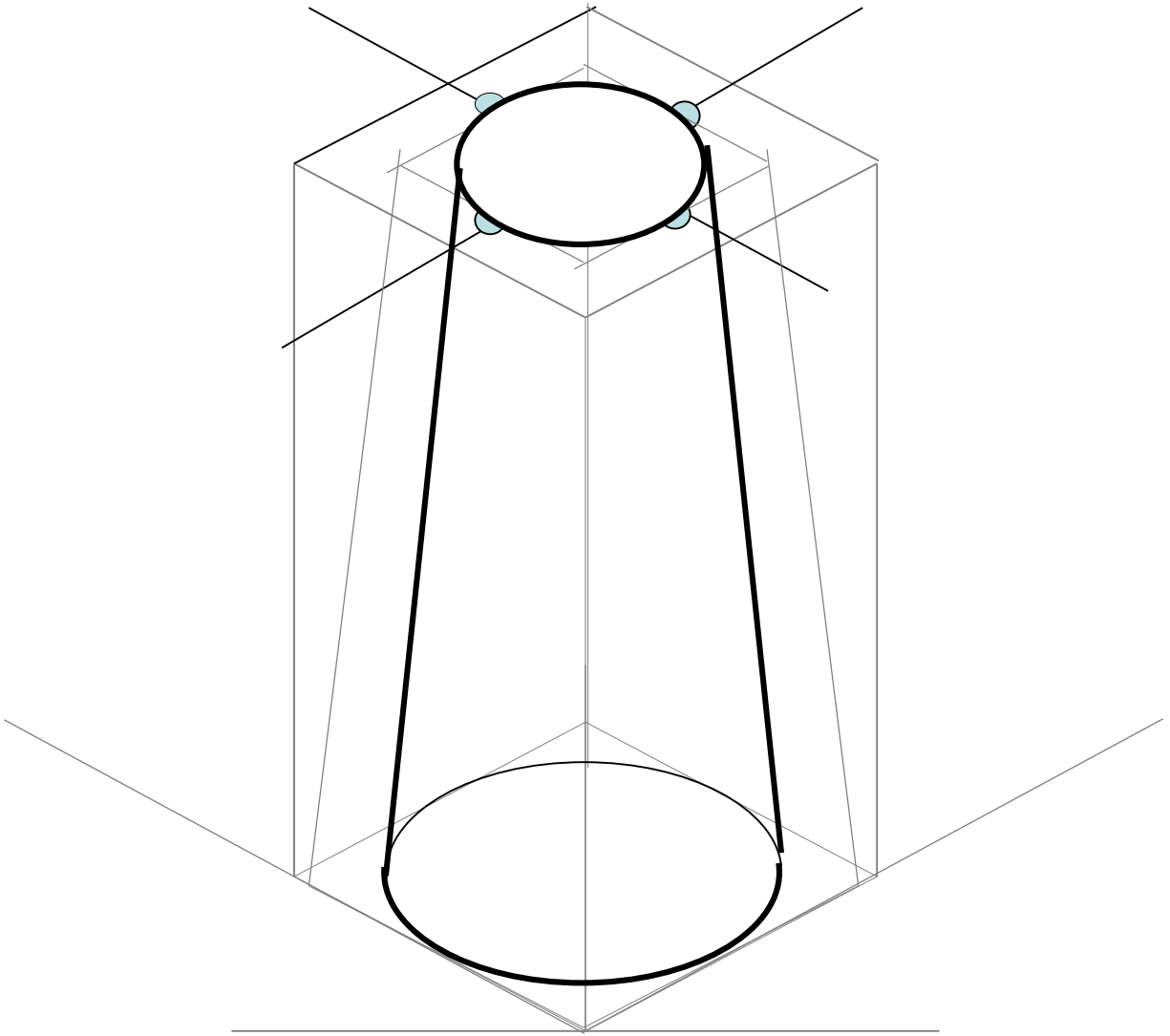
STUDY ILLUSTRATIONS

7

# ISOMETRIC VIEW OF A FRUSTOM OF CONE STANDING ON H.P. ON IT'S LARGER BASE.

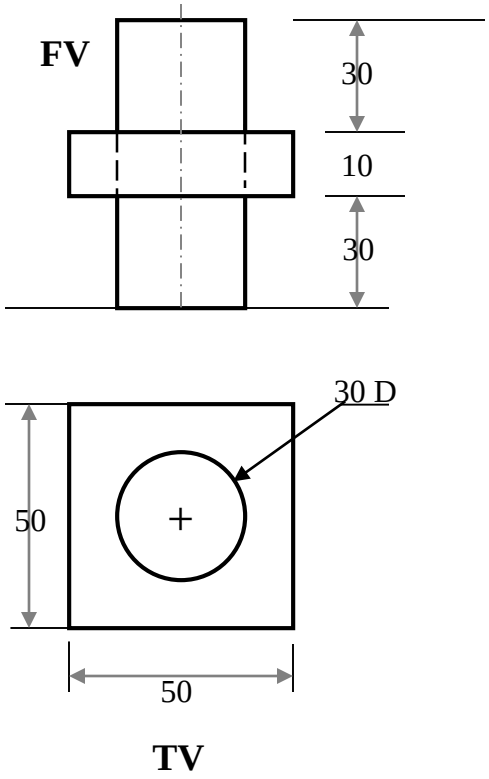


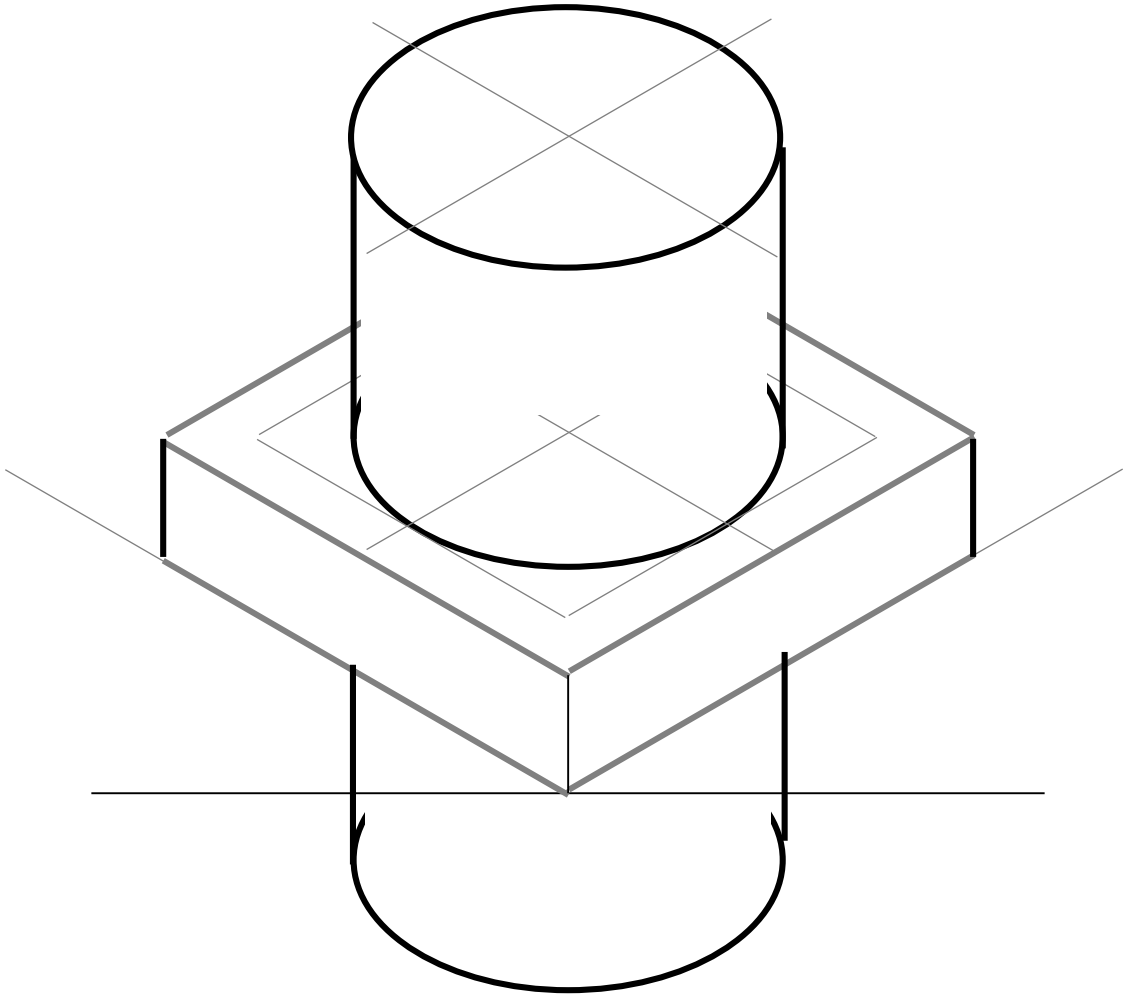



# STUDY ILLUSTRATIONS 7

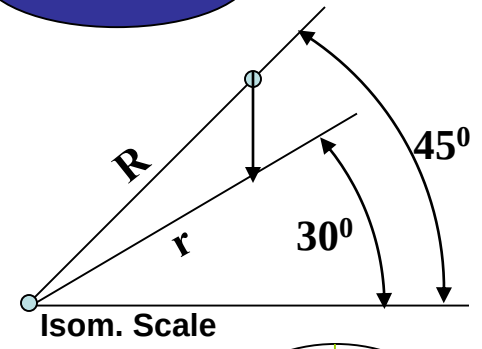
**PROBLEM:**
**A SQUARE PLATE IS PIERCED THROUGH CENTRALLY BY A CYLINDER WHICH COMES OUT EQUALLY FROM BOTH FACES OF PLATE. IT'S FV & TV ARE SHOWN. DRAW ISOMETRIC VIEW.**

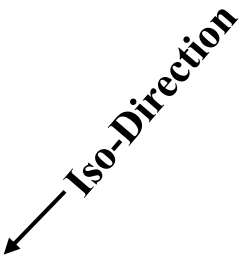


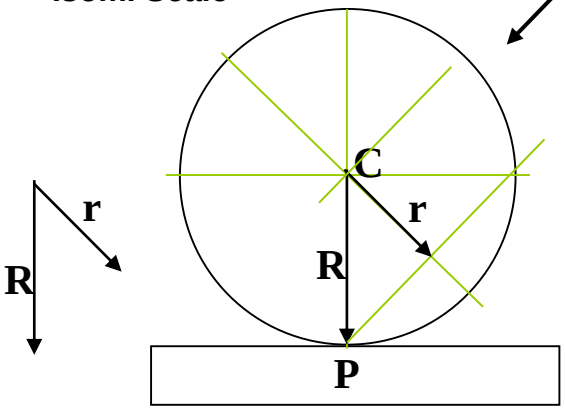



# ISOMETRIC PROJECTIONS OF SPHERE & HEMISPHERE

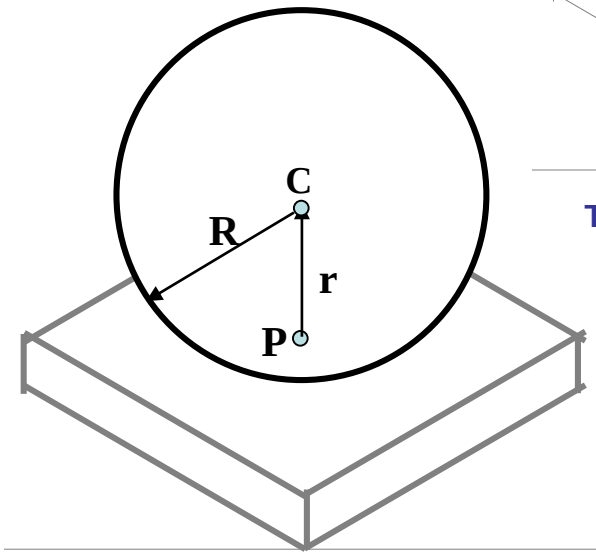


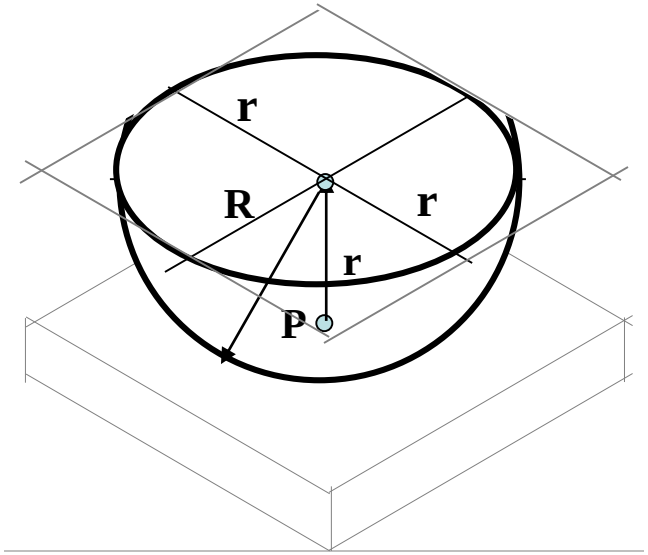



C = Center of Sphere.
P = Point of contact
R = True Radius of Sphere
r = Isometric Radius.




TO DRAW ISOMETRIC PROJECTION OF A HEMISPHERE

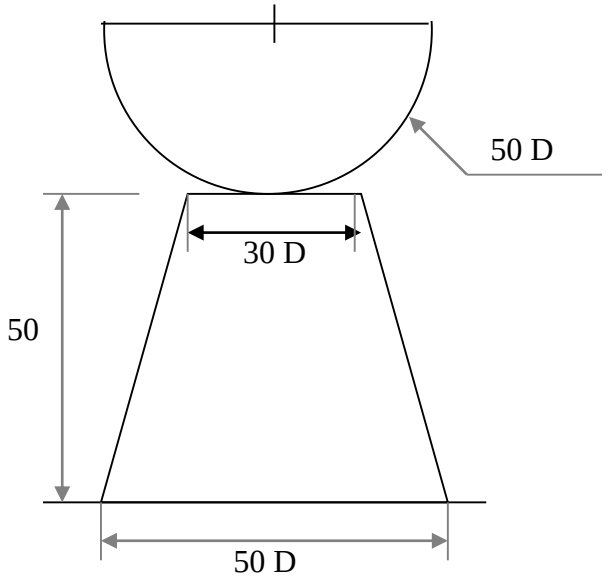
Adopt same procedure.
Draw lower semicircle only.
Then around 'C' construct Rhombus of Sides equal to Isometric Diameter.
For this use iso-scale.
Then construct ellipse in this Rhombus as usual
And Complete Isometric-Projection of Hemi-sphere.

TO DRAW ISOMETRIC PROJECTION OF A SPHERE

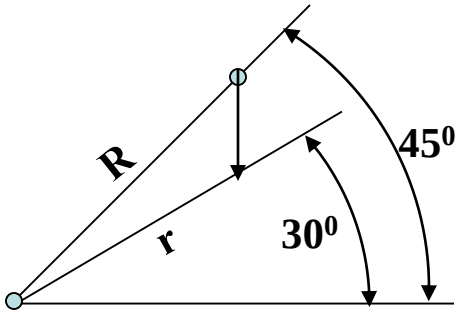
1. FIRST DRAW ISOMETRIC OF SQUARE PLATE.
2. LOCATE IT'S CENTER. NAME IT P.
3. FROM PDRAW VERTICAL LINE UPWARD, LENGTH ' r mm' AND LOCATE CENTER OF SPHERE "C"
4. 'C' AS CENTER, WITH RADIUS 'R' DRAW CIRCLE.
   *THIS IS ISOMETRIC PROJECTION OF A SPHERE.*

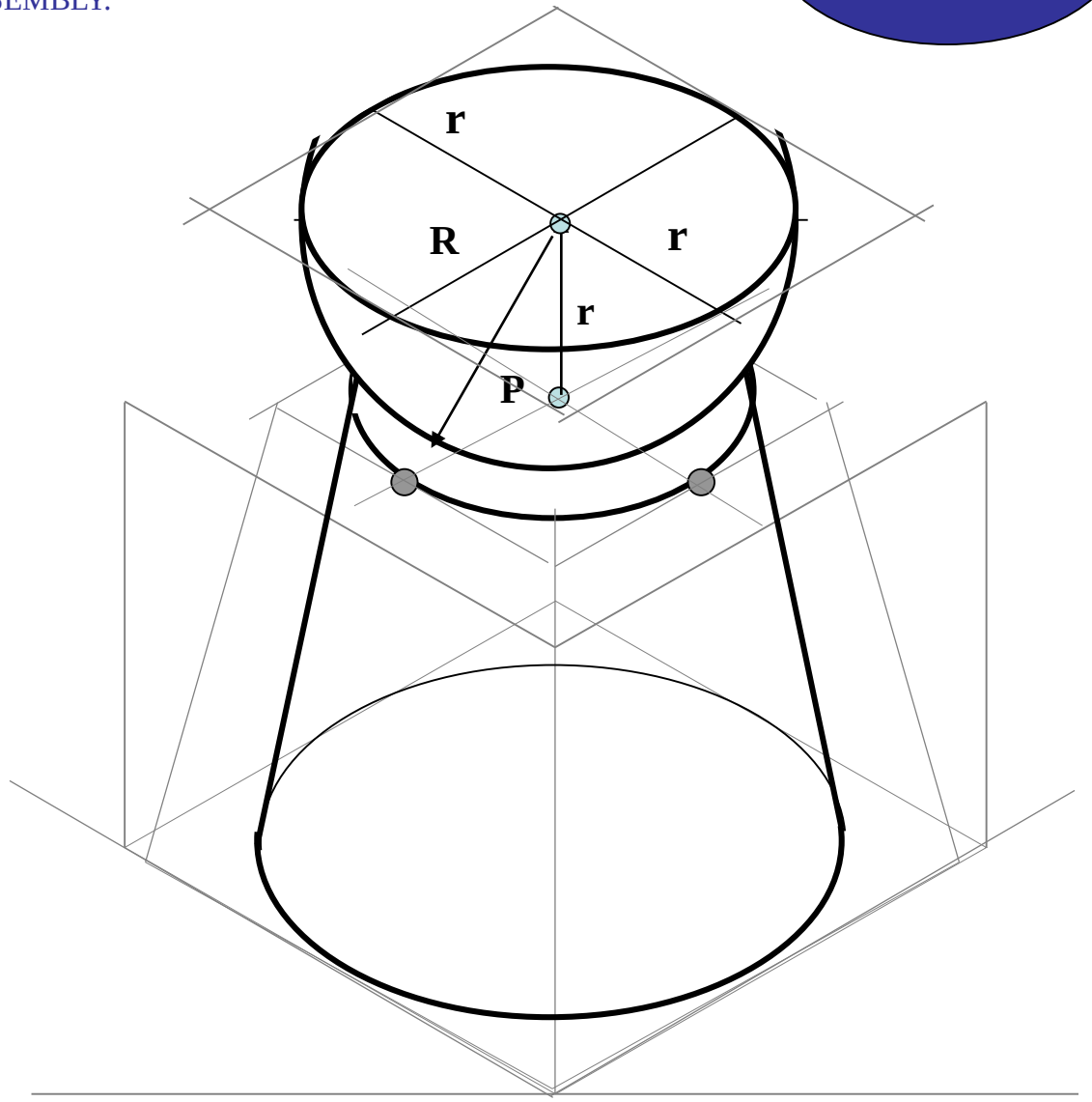
**PROBLEM:**

A HEMI-SPHERE IS CENTRALLY PLACED ON THE TOP OF A FRUSTOM OF CONE. DRAW ISOMETRIC PROJECTIONS OF THE ASSEMBLY.




**FIRST CONSTRUCT ISOMETRIC SCALE. USE THIS SCALE FOR ALL DIMENSIONS IN THIS PROBLEM.**

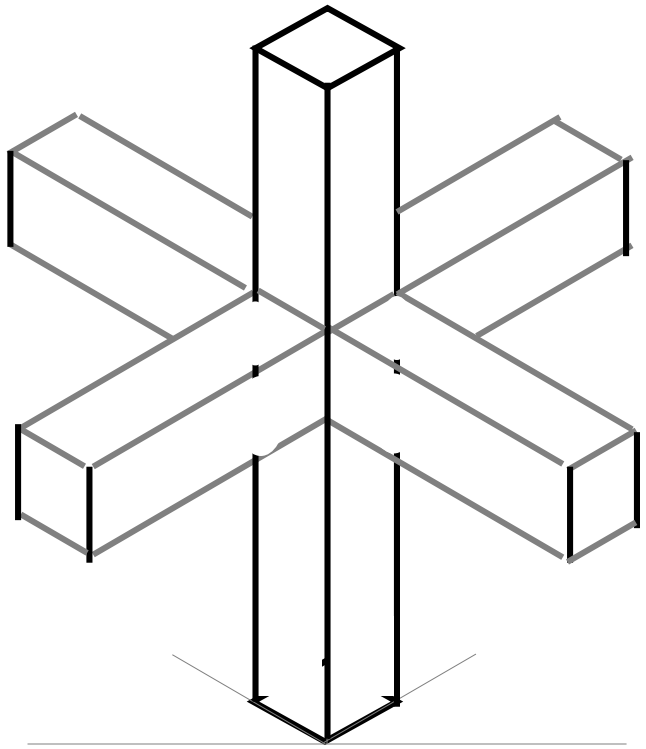


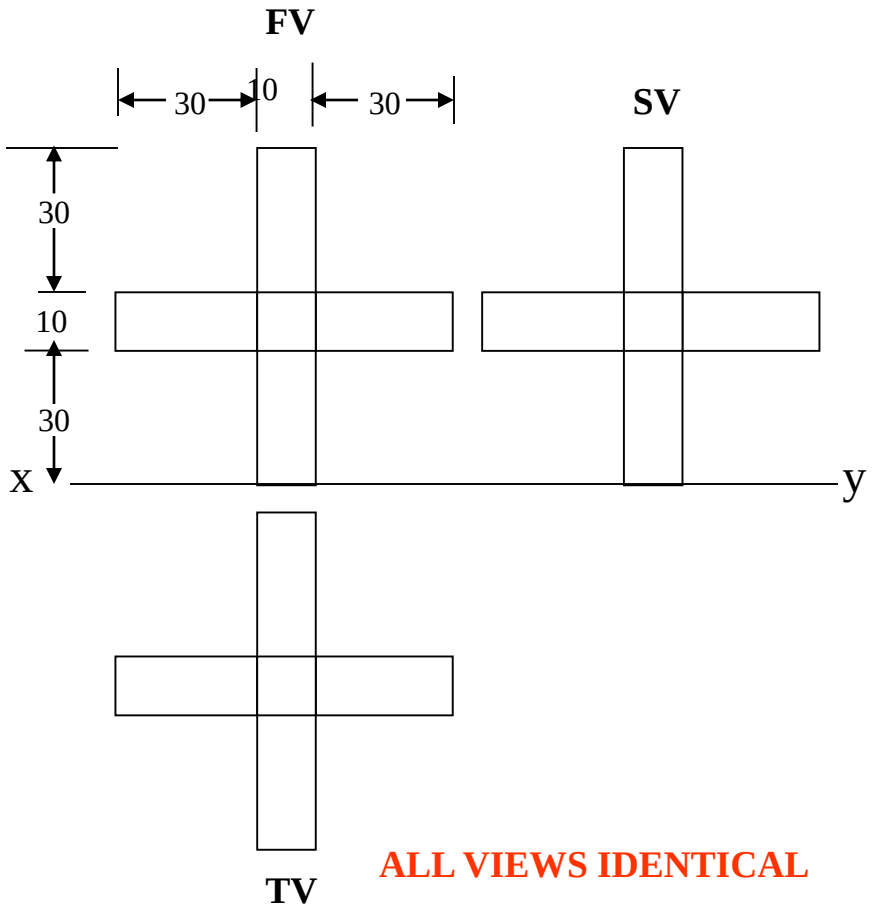



# STUDY ILLUSTRATIONS

7

**F.V. & T.V. and S.V.of an object are given. Draw it's isometric view.**

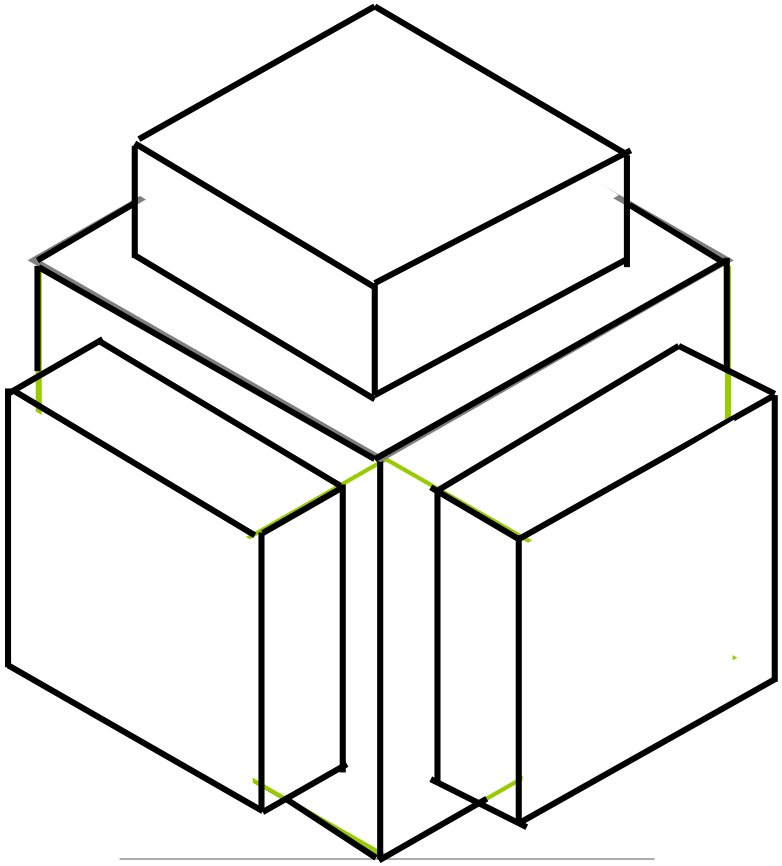




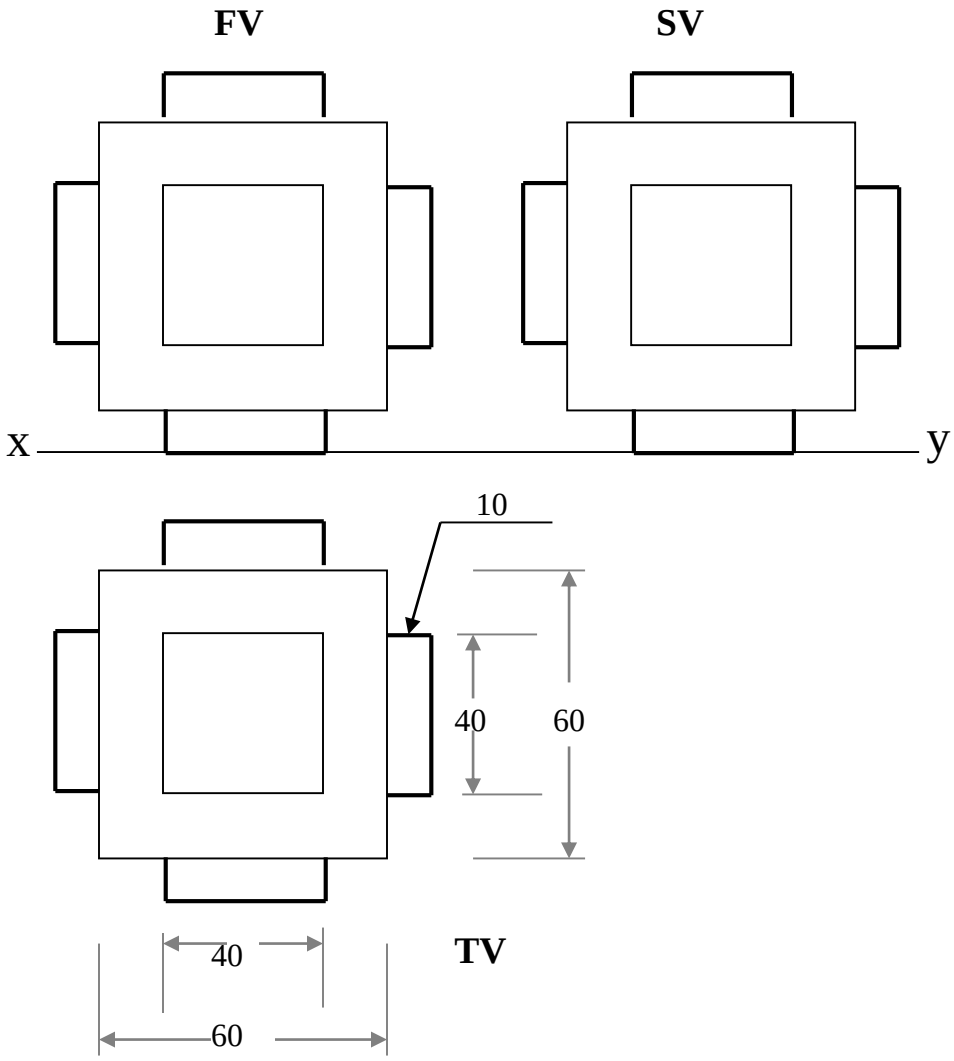

**ALL VIEWS IDENTICAL**

# F.V. & T.V. and S.V.of an object are given. Draw it's isometric view.



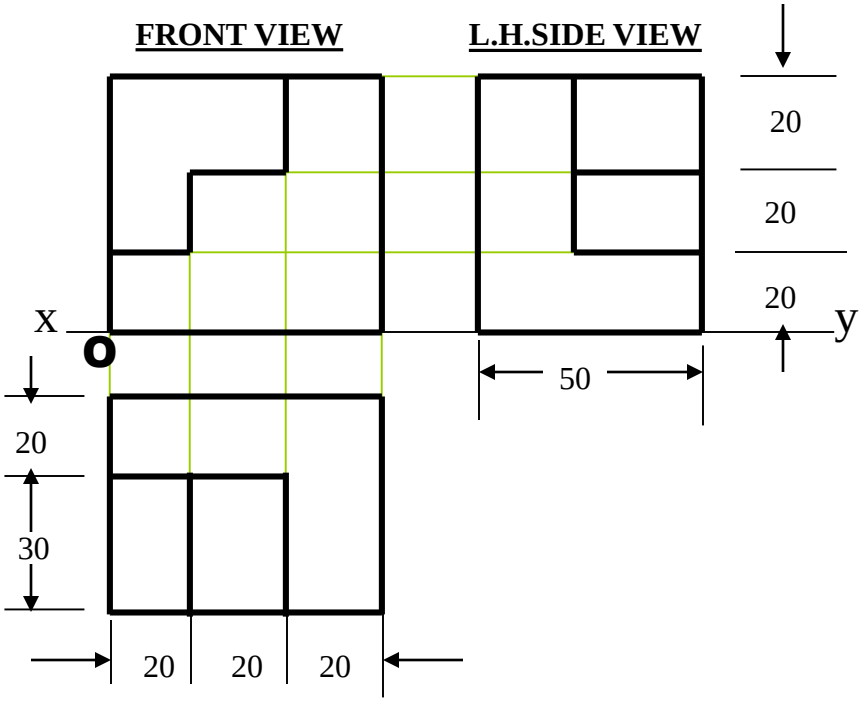


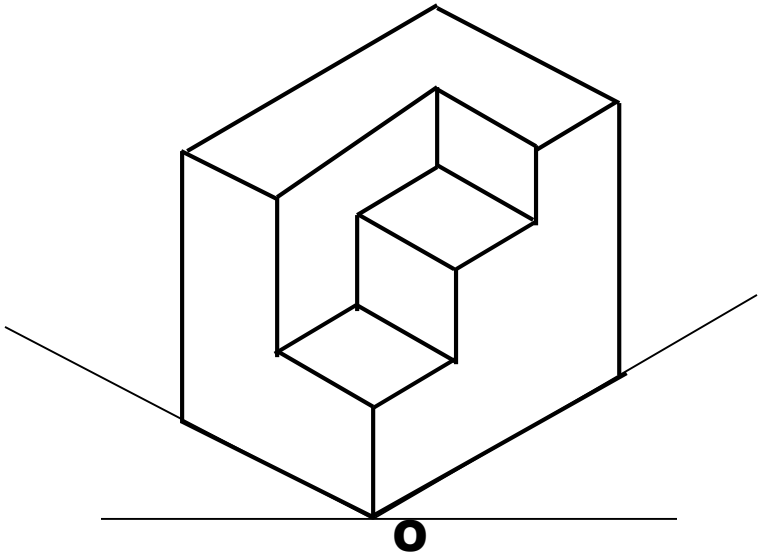
ALL VIEWS IDENTICAL



**F.V. & T.V. and S.V.of an object are given. Draw it's isometric view.**

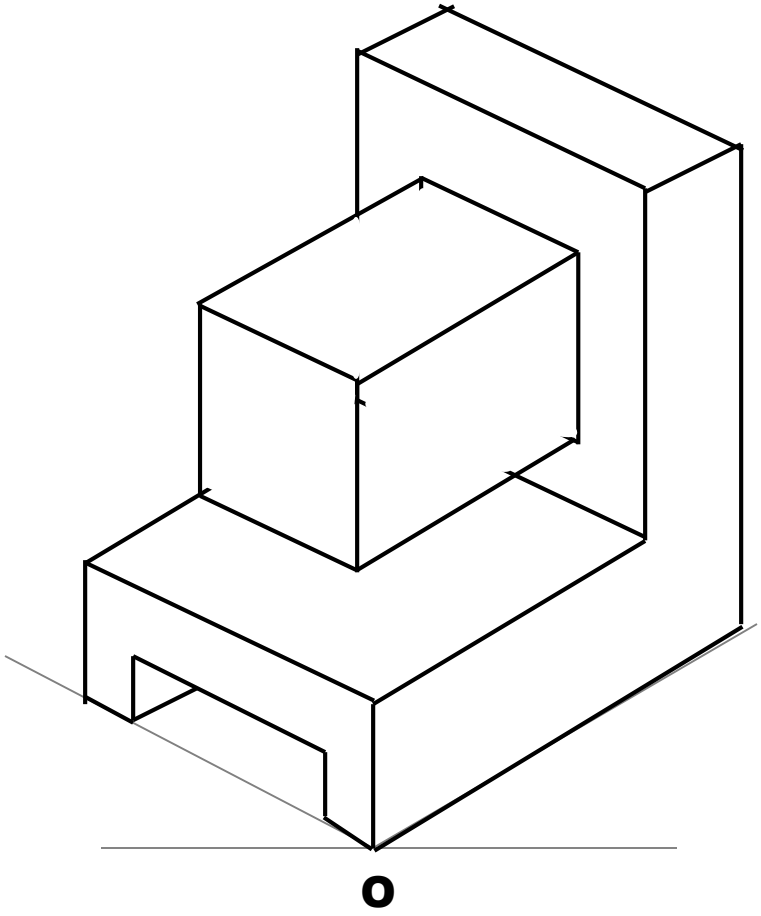
## ORTHOGRAPHIC PROJECTIONS

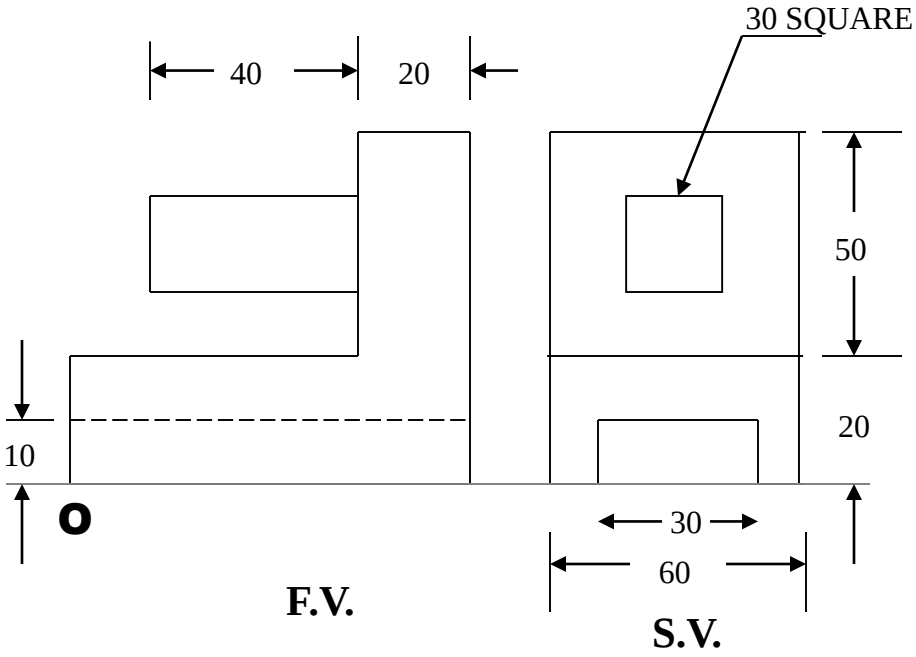


STUDY ILLUSTRATIONS

**F.V. and S.V.of an object are given. Draw it's isometric view.**



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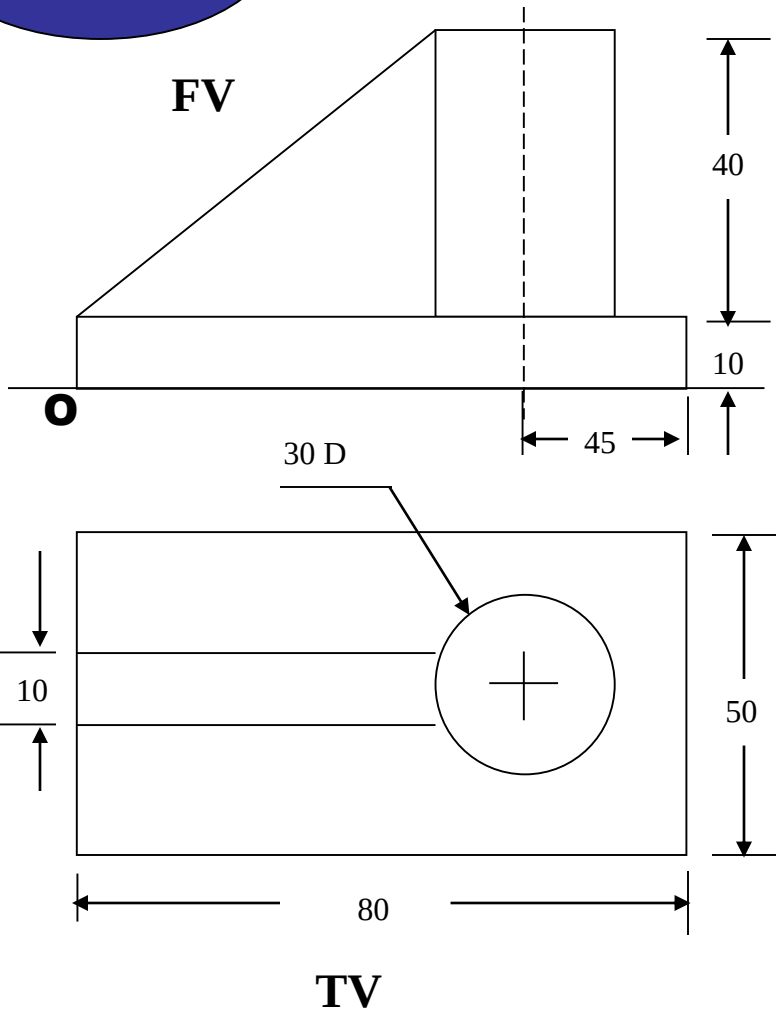


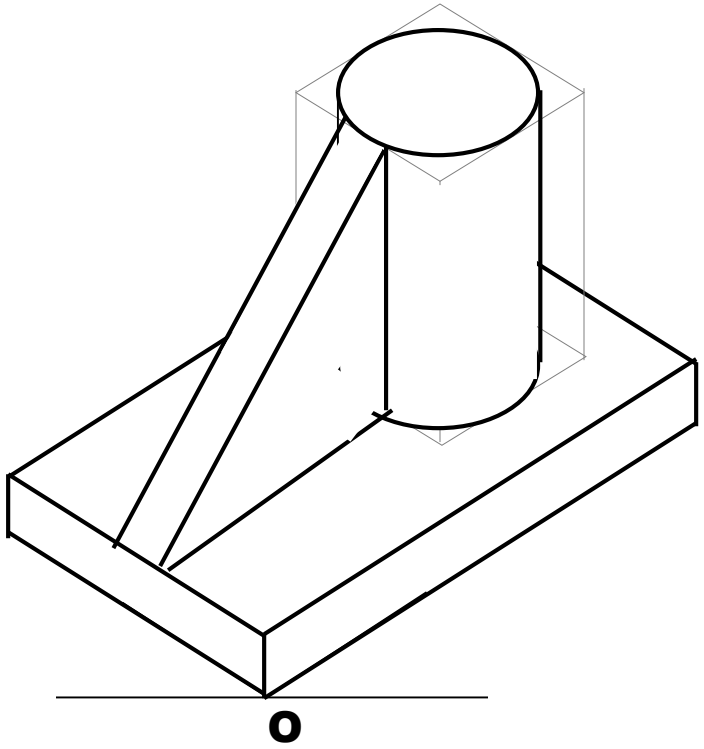

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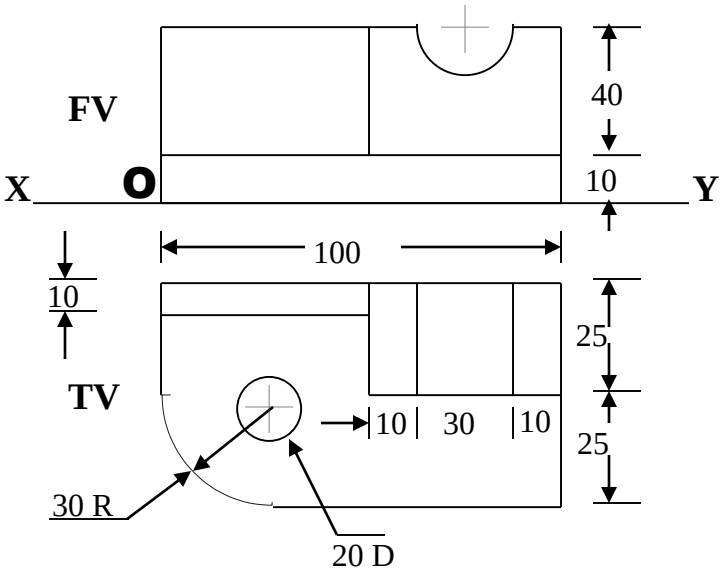


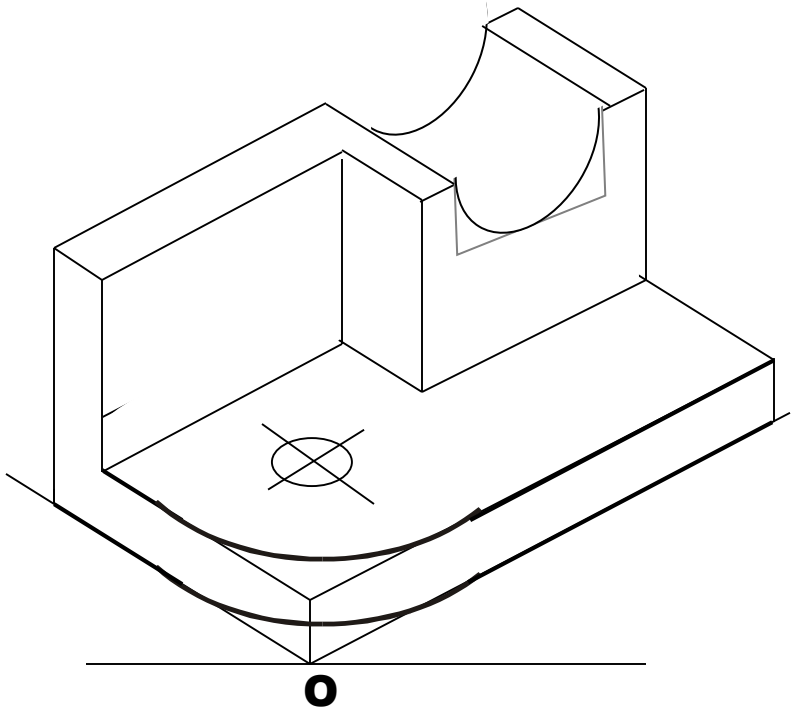

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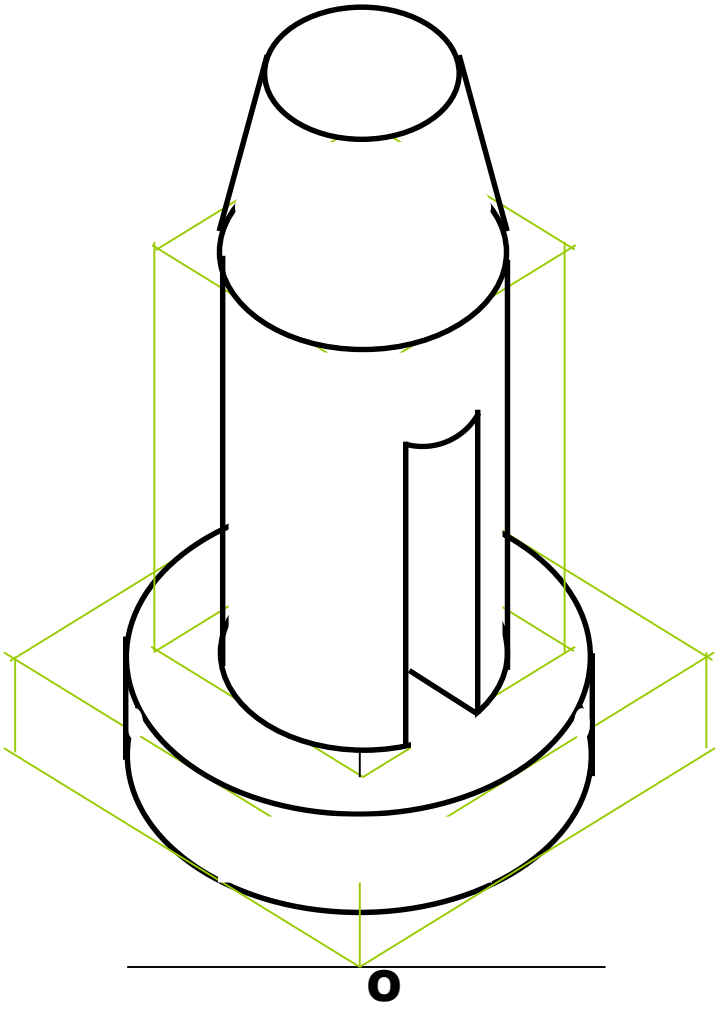


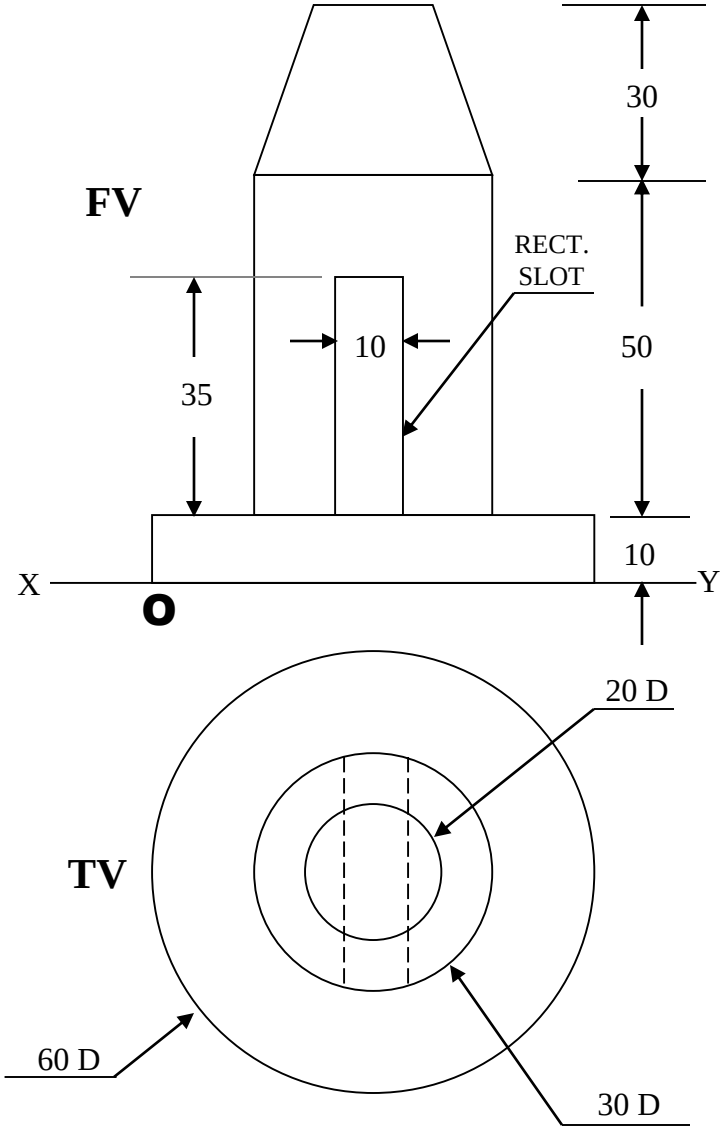

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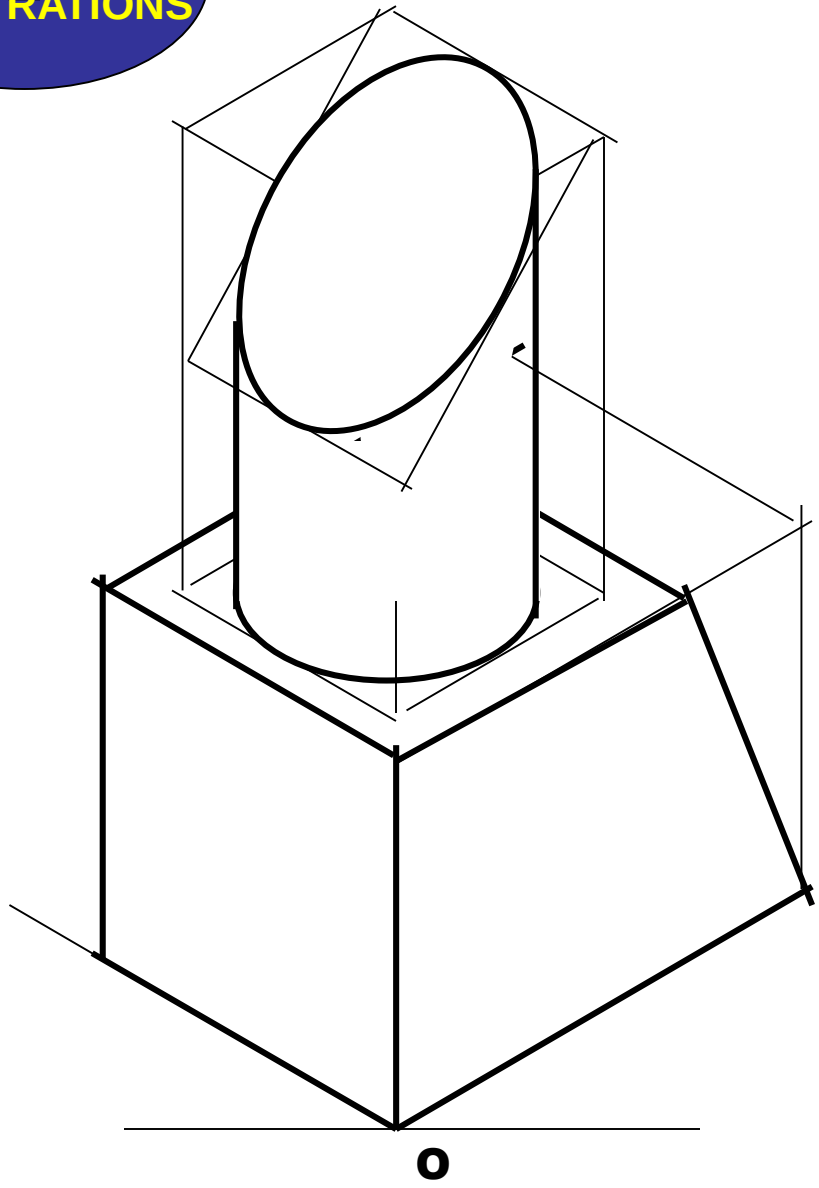


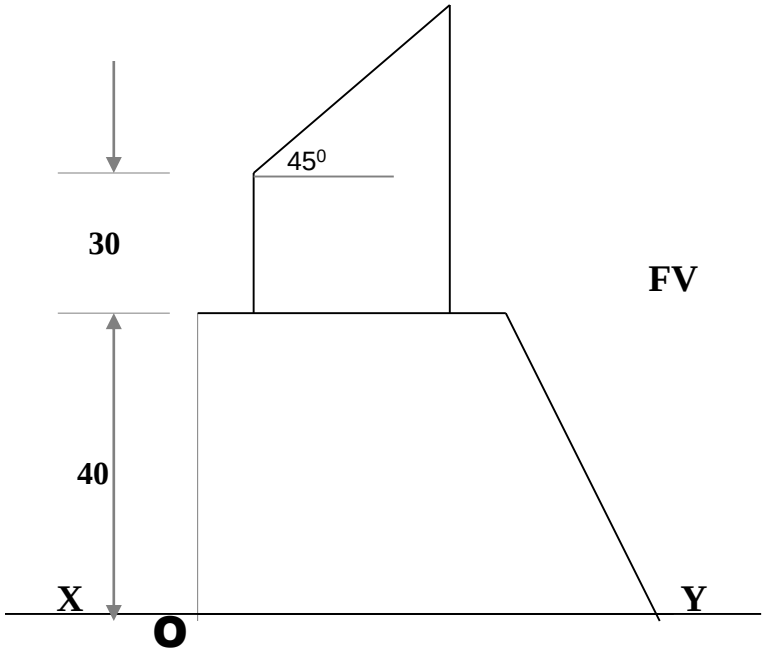


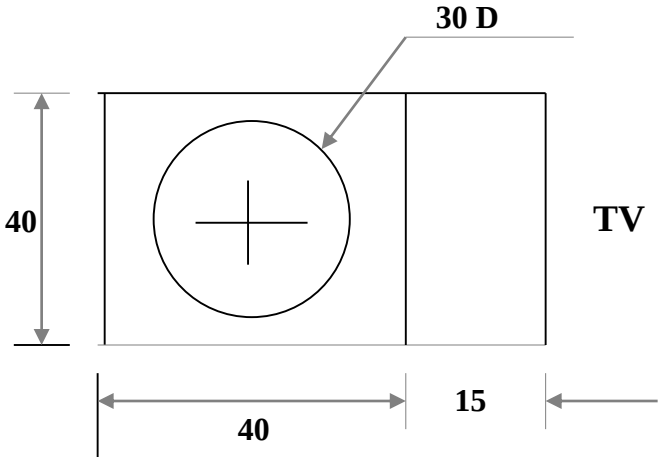

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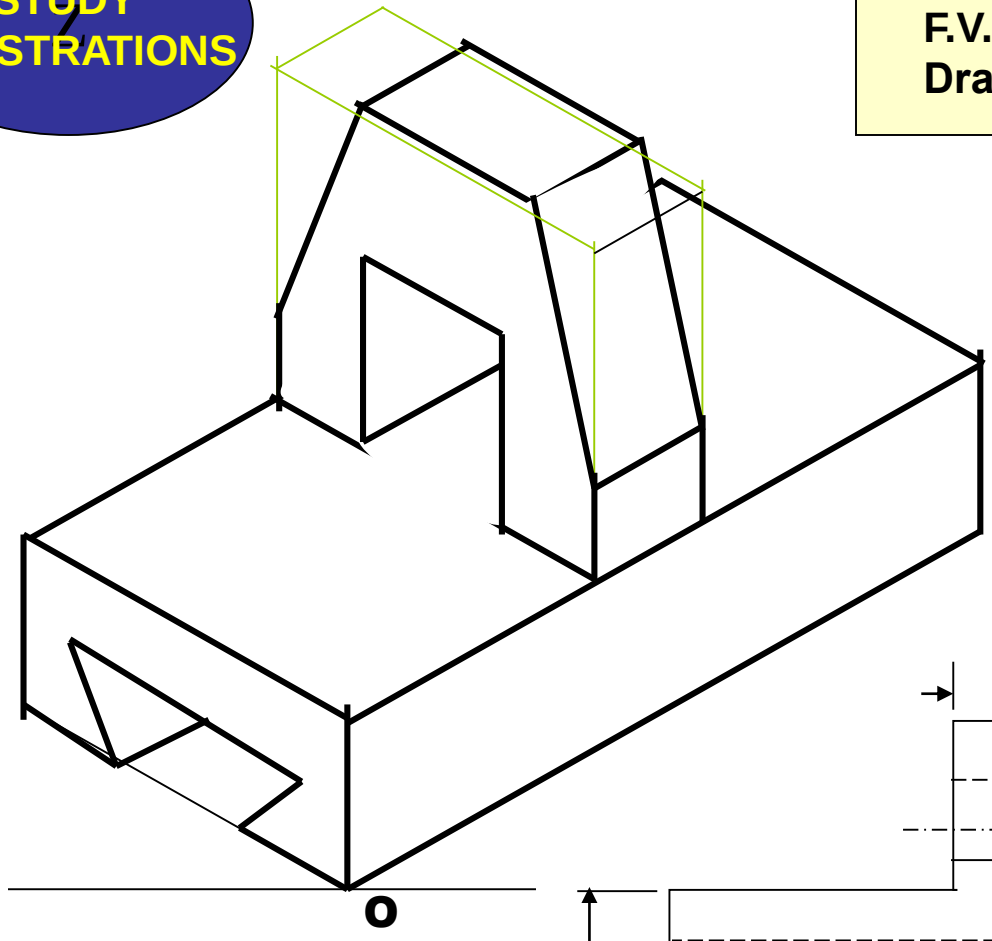

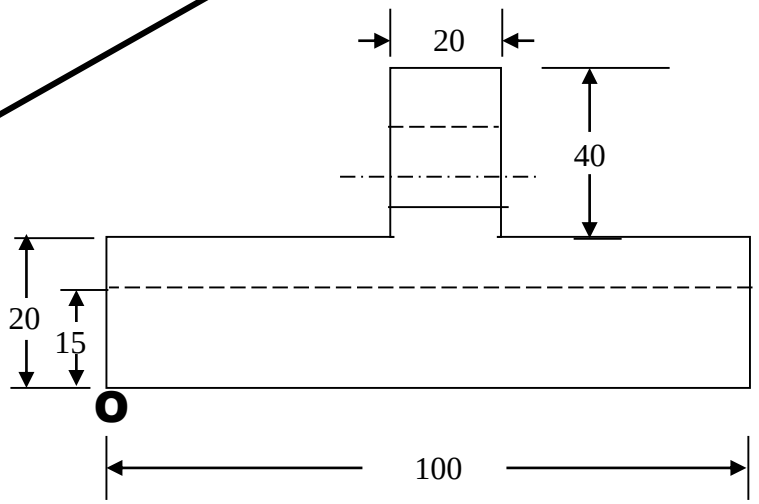


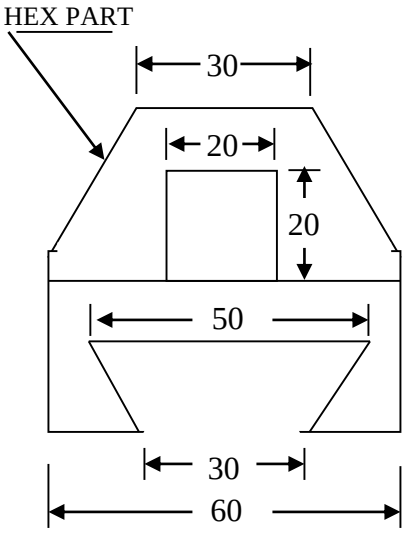

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