

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.



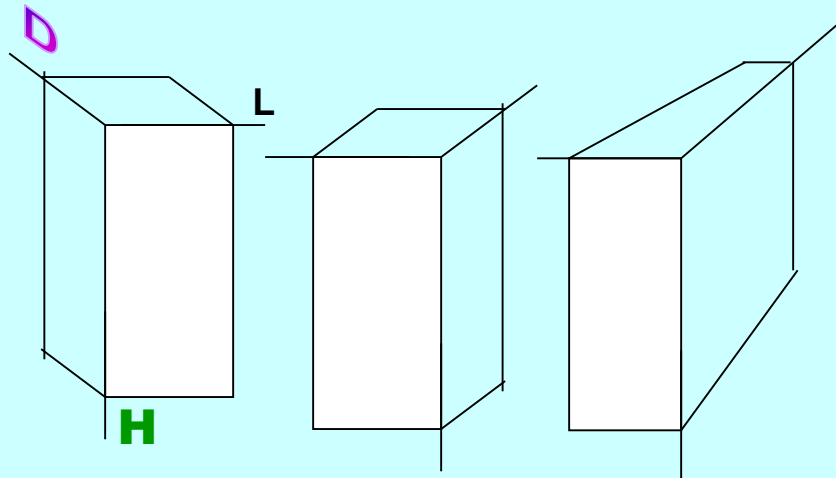
TYPICAL CONDITION.

IN THIS 3-D DRAWING OF AN OBJECT,
ALL THREE DIMENSIONAL AXES ARE
MENTAINED AT EQUAL INCLINATIONS
WITH EACH OTHER.(120°)

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.**

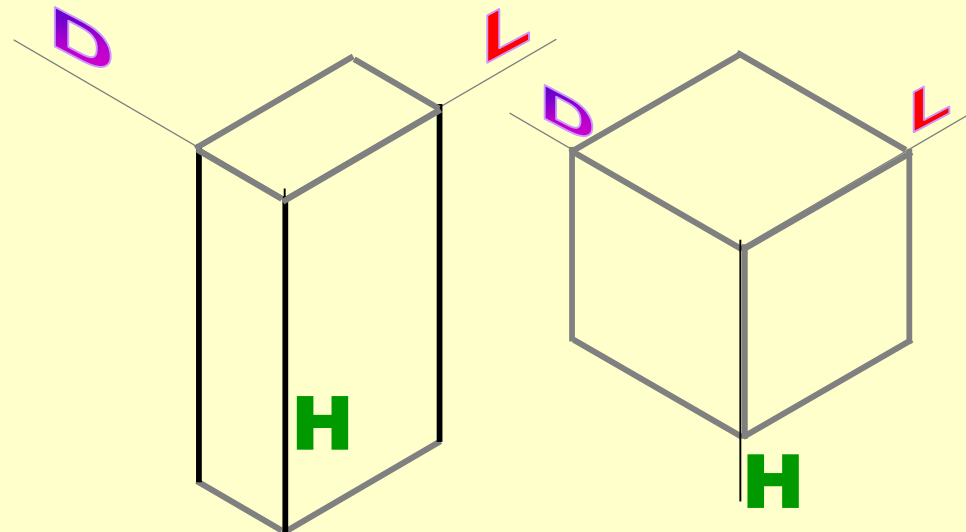
HERE NO SPECIFIC RELATION
AMONG H, L & D AXES IS MENTAINED.



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
EDUAL INCLINATION AMONG H, L & D AXES.
EACH IS 120° INCLINED WITH OTHER TWO.
HENCE IT IS CALLED **ISOMETRIC DRAWING**

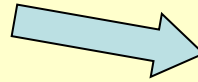


**PURPOSE OF ISOMETRIC DRAWING IS TO UNDERSTAND
OVERALL SHAPE, SIZE & APPEARANCE OF AN OBJECT PRIOR TO IT'S PRODUCTION.**

SOME IMPORTANT TERMS:



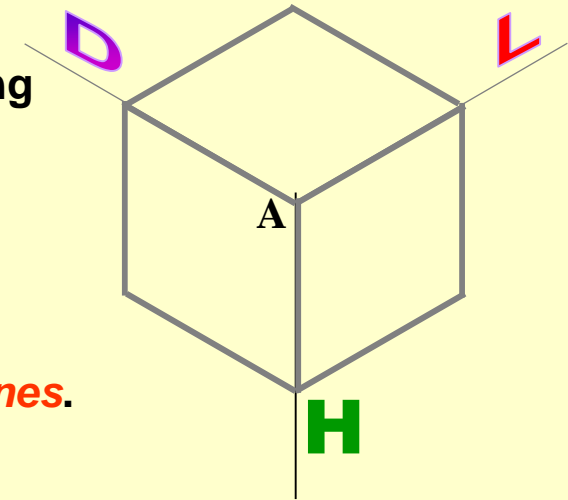
ISOMETRIC AXES, LINES AND PLANES:



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

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

The planes representing the faces 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.

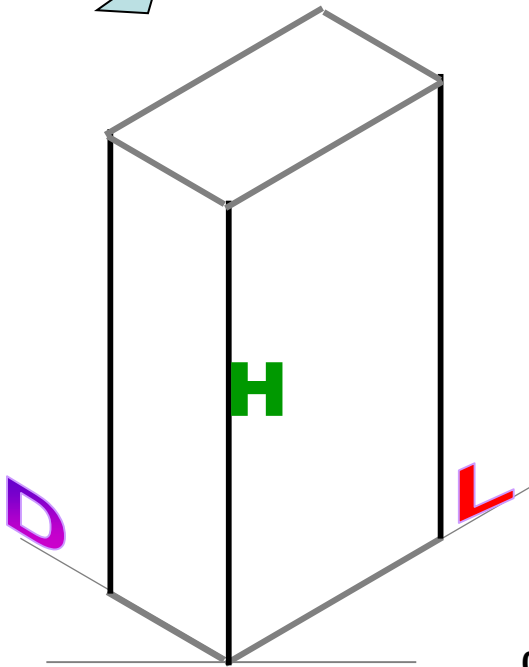
This reduction is 0.815 or $9/11$ (approx.) It forms a reducing scale which is used to draw isometric drawings and is called **Isometric scale**.

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.

TYPES OF ISOMETRIC DRAWINGS

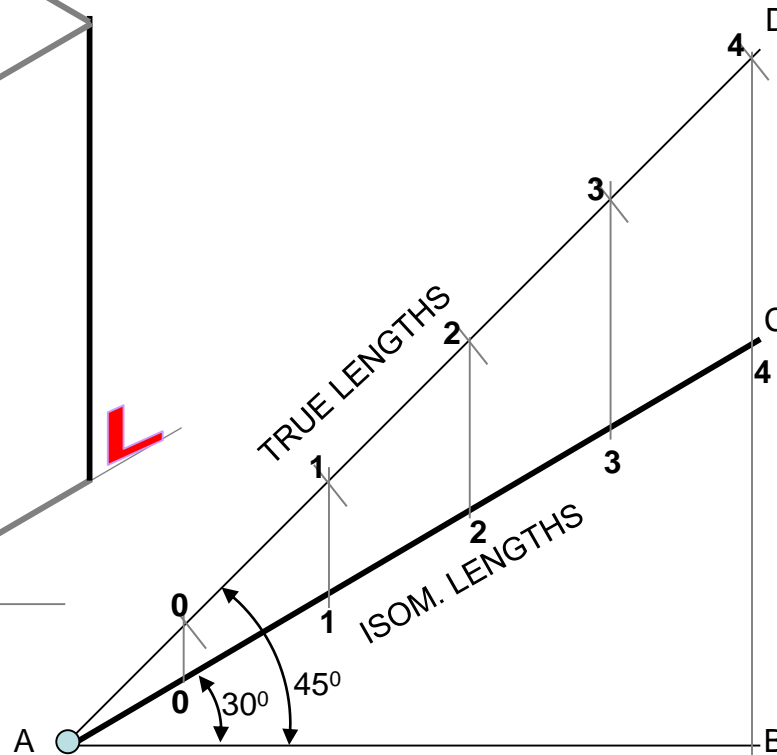
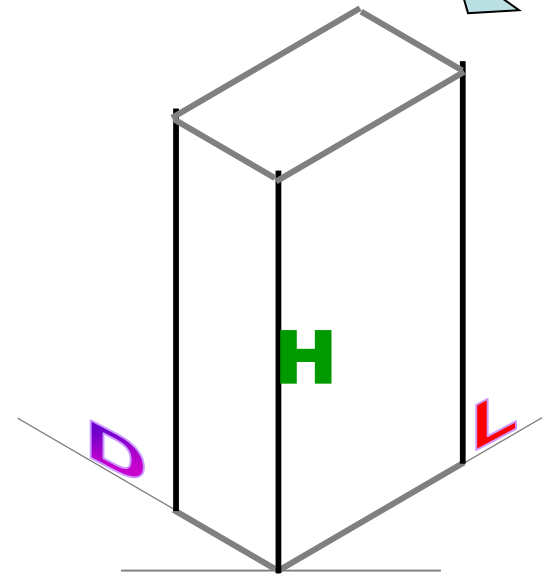
ISOMETRIC VIEW

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° and 45° 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

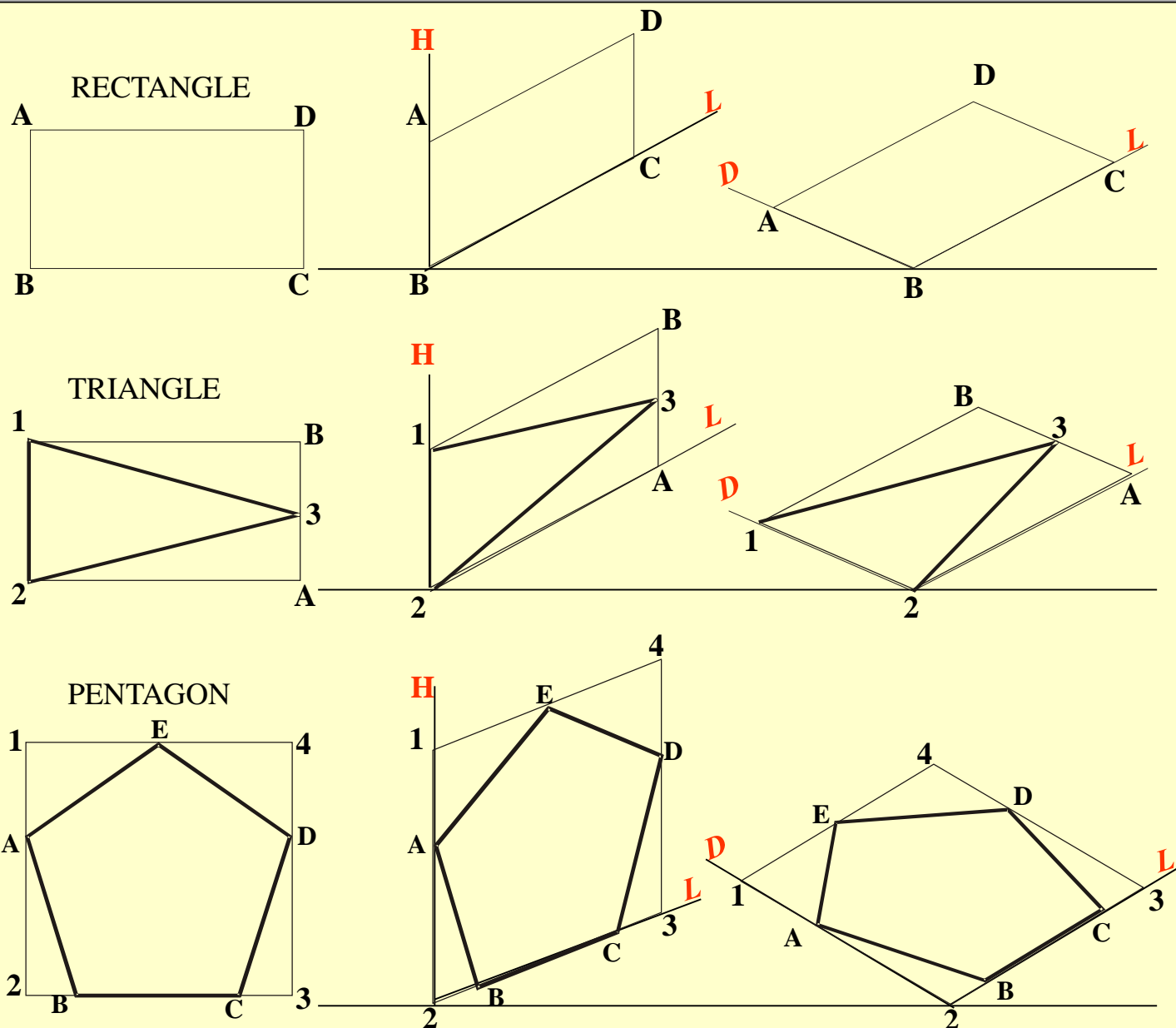
AS THESE ALL ARE
2-D FIGURES
WE REQUIRE ONLY TWO
ISOMETRIC AXES.

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

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

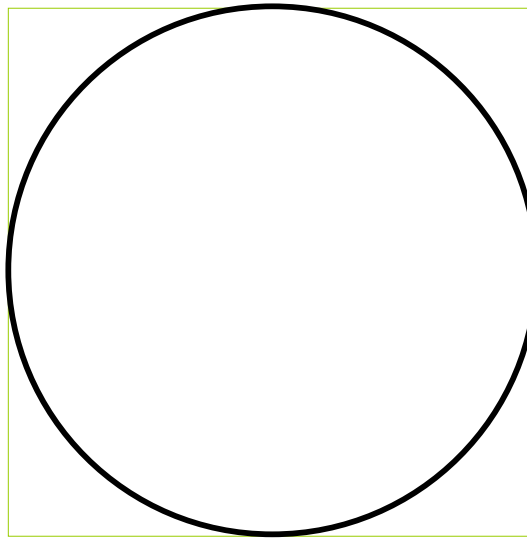
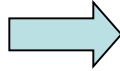
Shapes containing
Inclined lines should
be enclosed in a
rectangle as shown.
Then first draw isom.
of that rectangle and
then inscribe that
shape as it is.

SHAPE

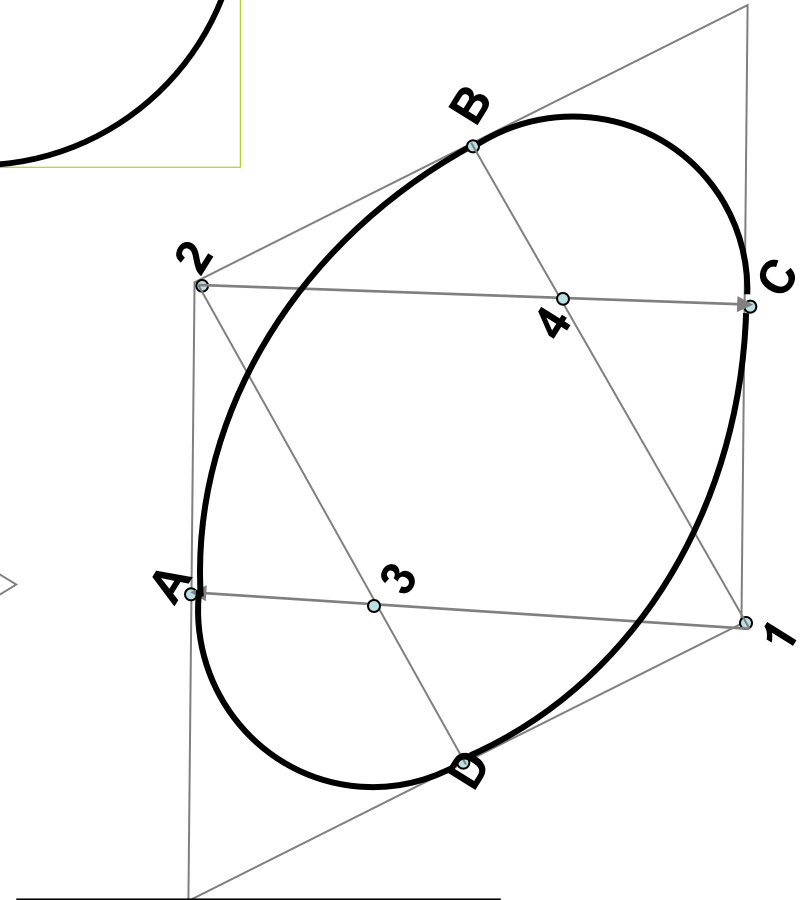
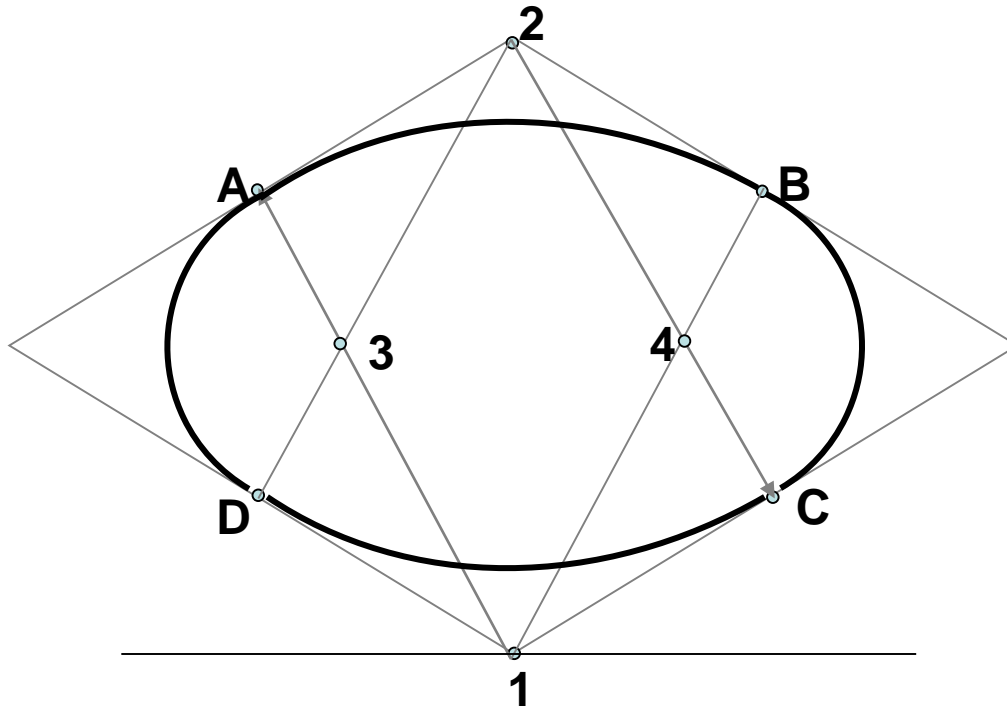
Isometric view if the Shape is
F.V. or T.V.

STUDY ILLUSTRATIONS

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



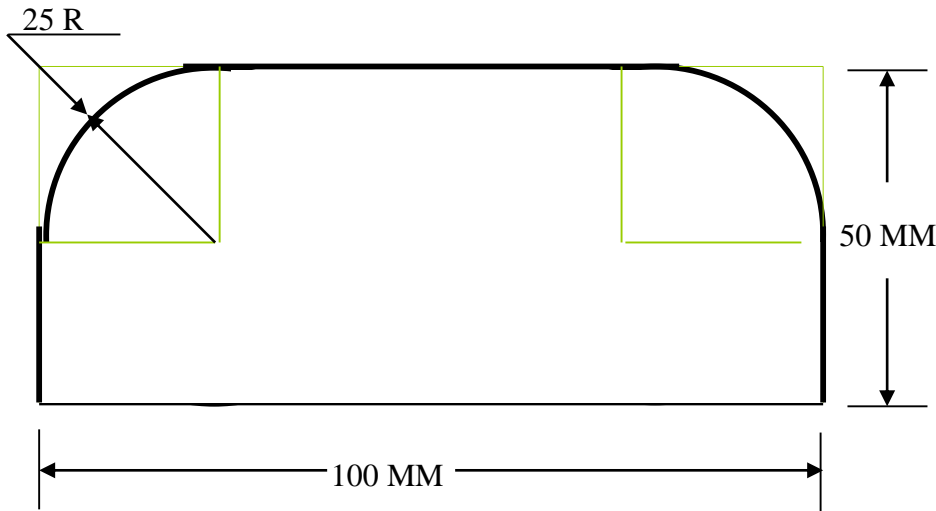
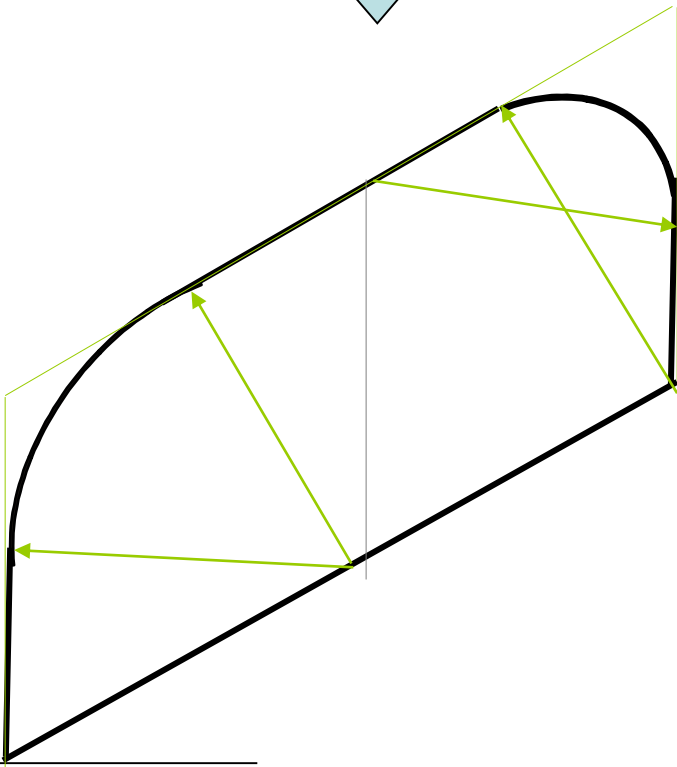
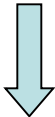
**FIRST ENCLOSE IT IN A SQUARE.
IT'S ISOMETRIC IS A RHOMBUS WITH
D & L AXES FOR TOP VIEW.
THEN USE H & L AXES FOR ISOMETRIC
WHEN IT IS FRONT VIEW.
FOR CONSTRUCTION USE RHOMBUS
METHOD SHOWN HERE. STUDY IT.**



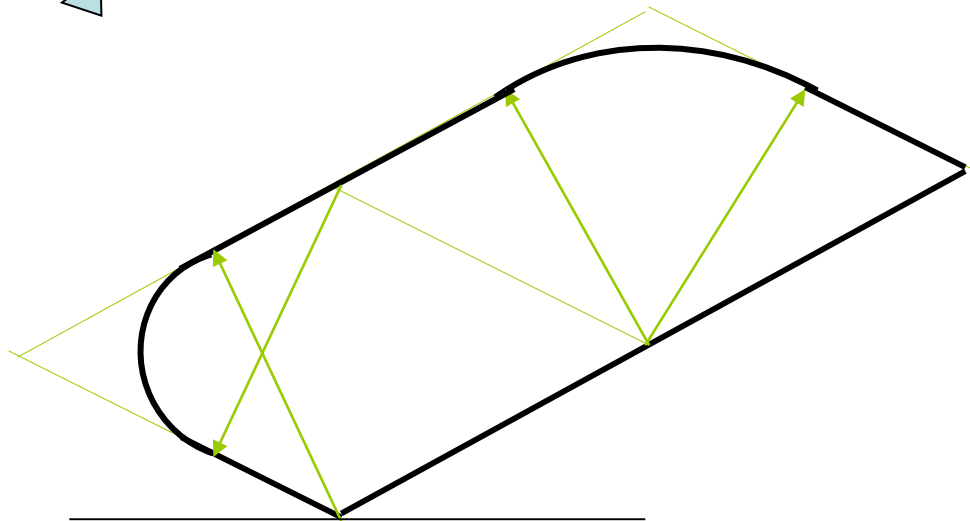
STUDY ILLUSTRATIONS

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.)

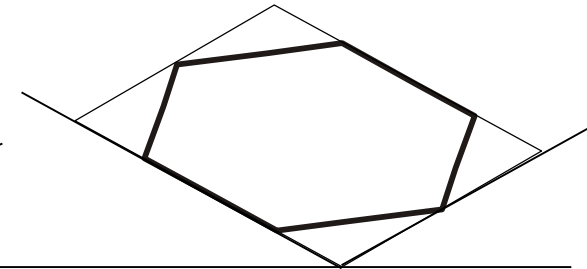
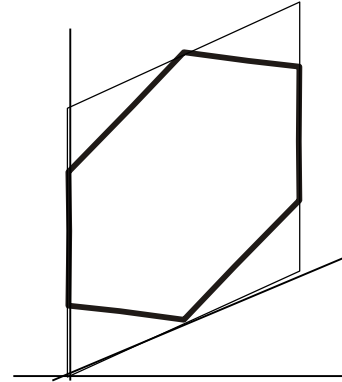
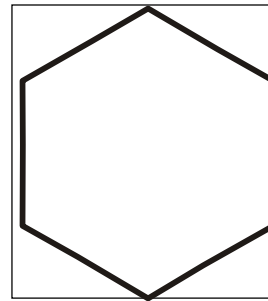
SHAPE

IF F.V.

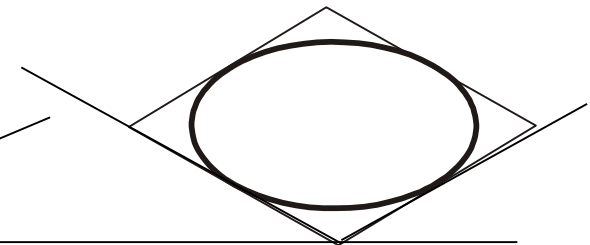
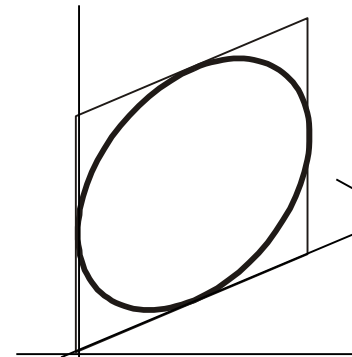
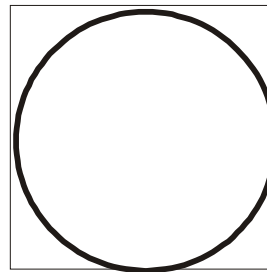
IF T.V.

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HEXAGON

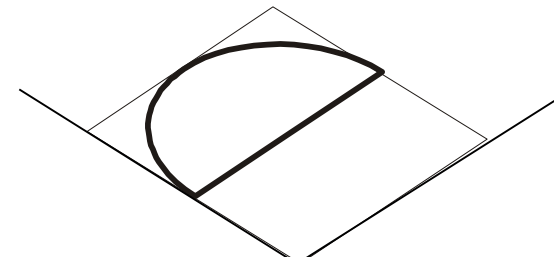
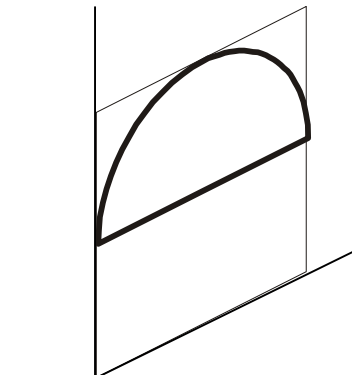
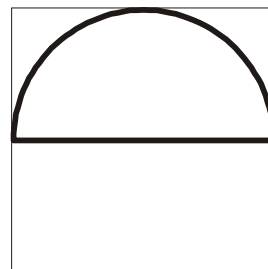


CIRCLE



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

SEMI CIRCLE

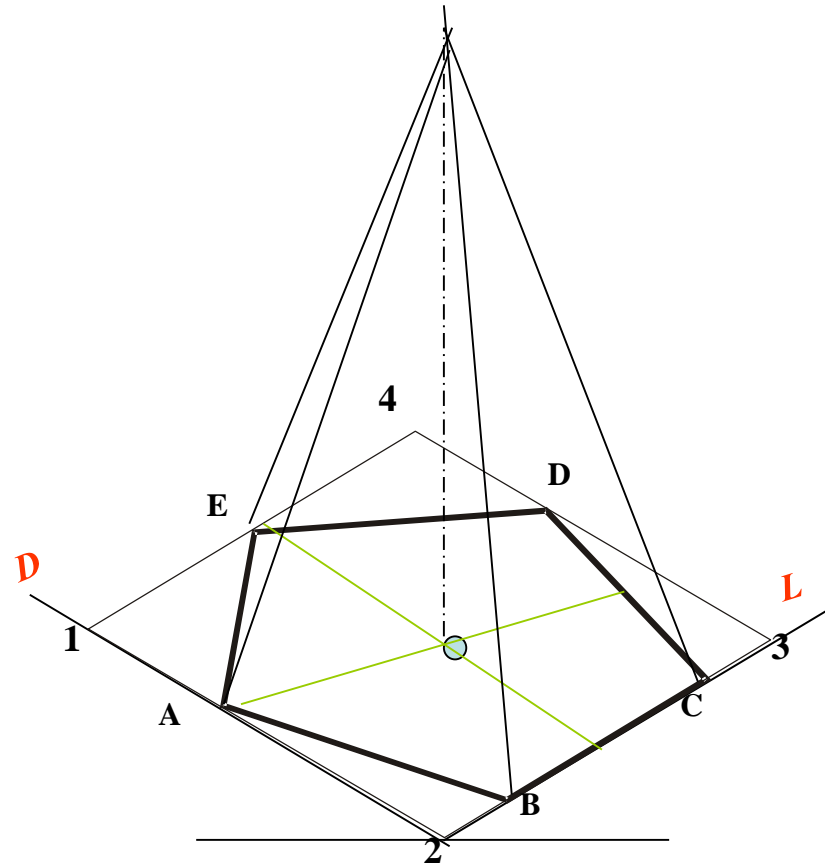
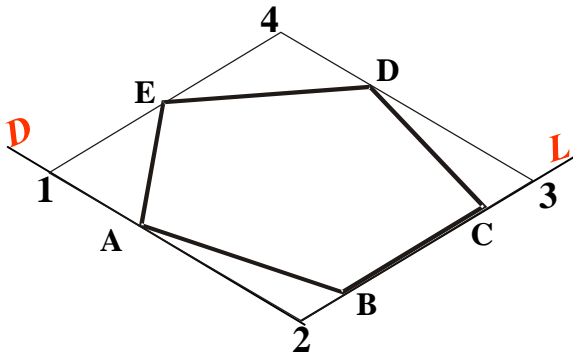


STUDY ILLUSTRATIONS

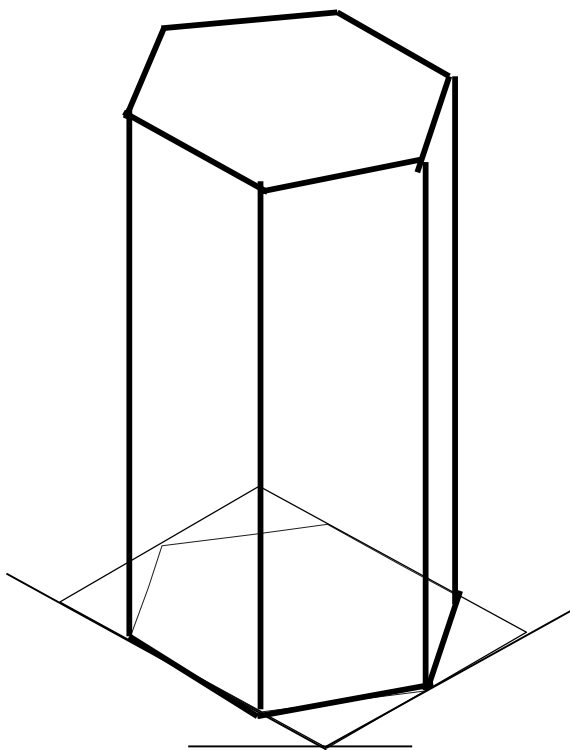
ISOMETRIC VIEW OF PENTAGONAL PYRAMID STANDING ON H.P.

(Height is added from center of pentagon)

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

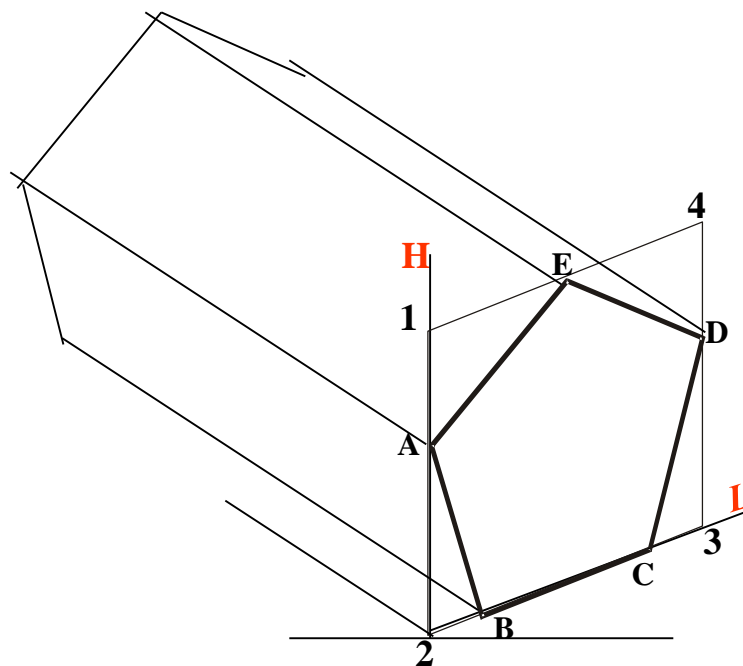


STUDY ILLUSTRATIONS



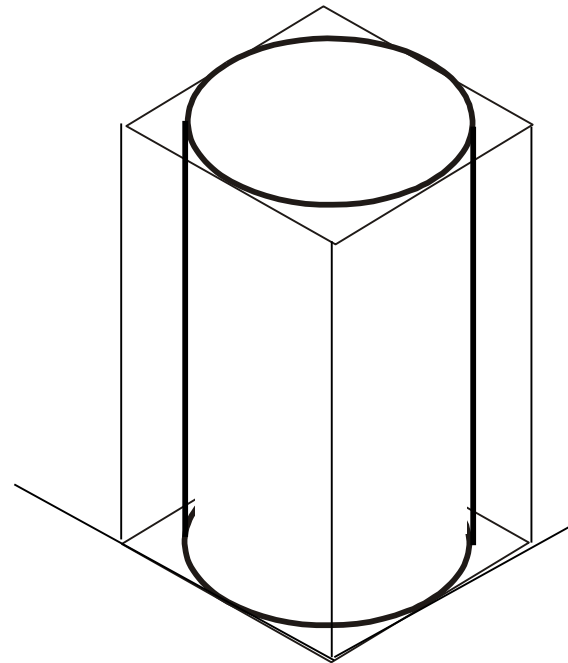
ISOMETRIC VIEW OF
HEXAGONAL PRISM
STANDING ON H.P.

ISOMETRIC VIEW OF
PENTAGONAL PRISM
LYING ON H.P.

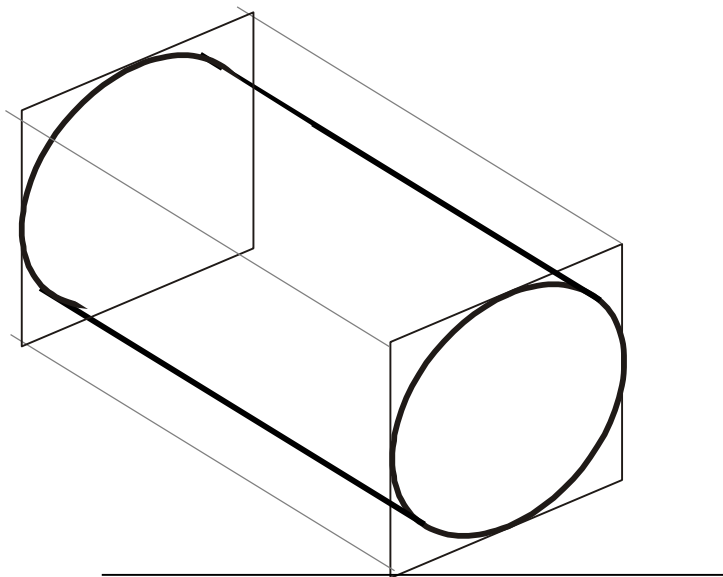


STUDY ILLUSTRATIONS

CYLINDER STANDING ON H.P.

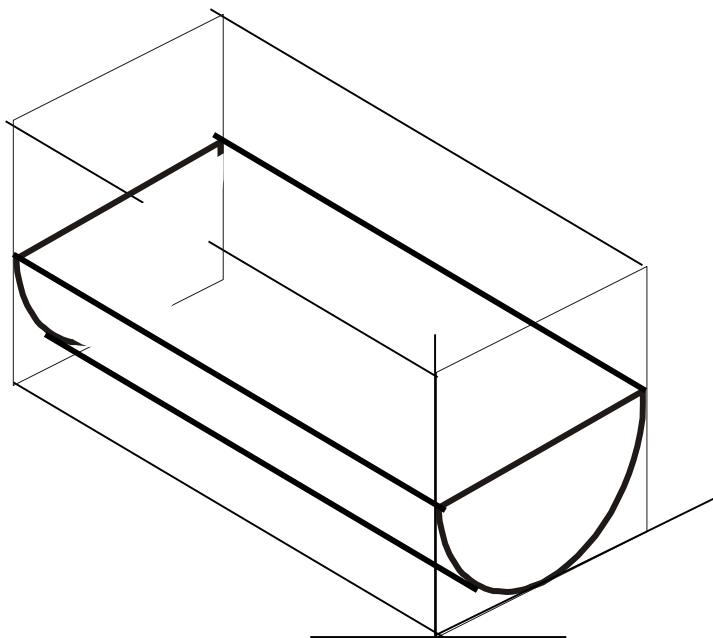


CYLINDER LYING ON H.P.

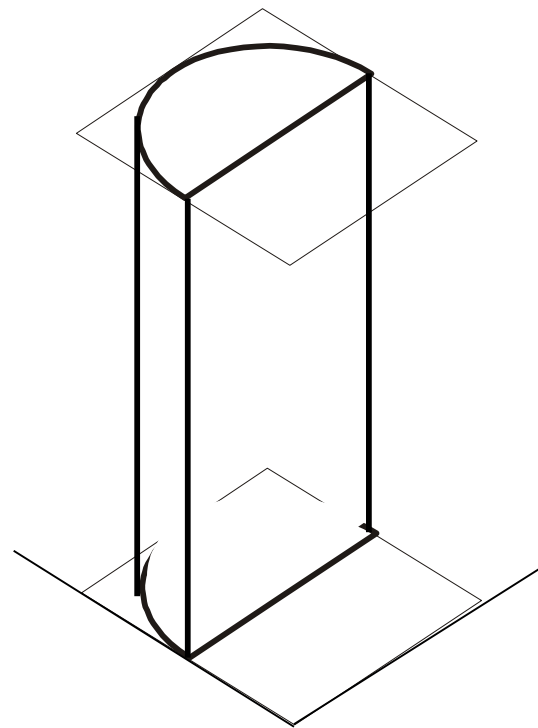


STUDY ILLUSTRATIONS

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

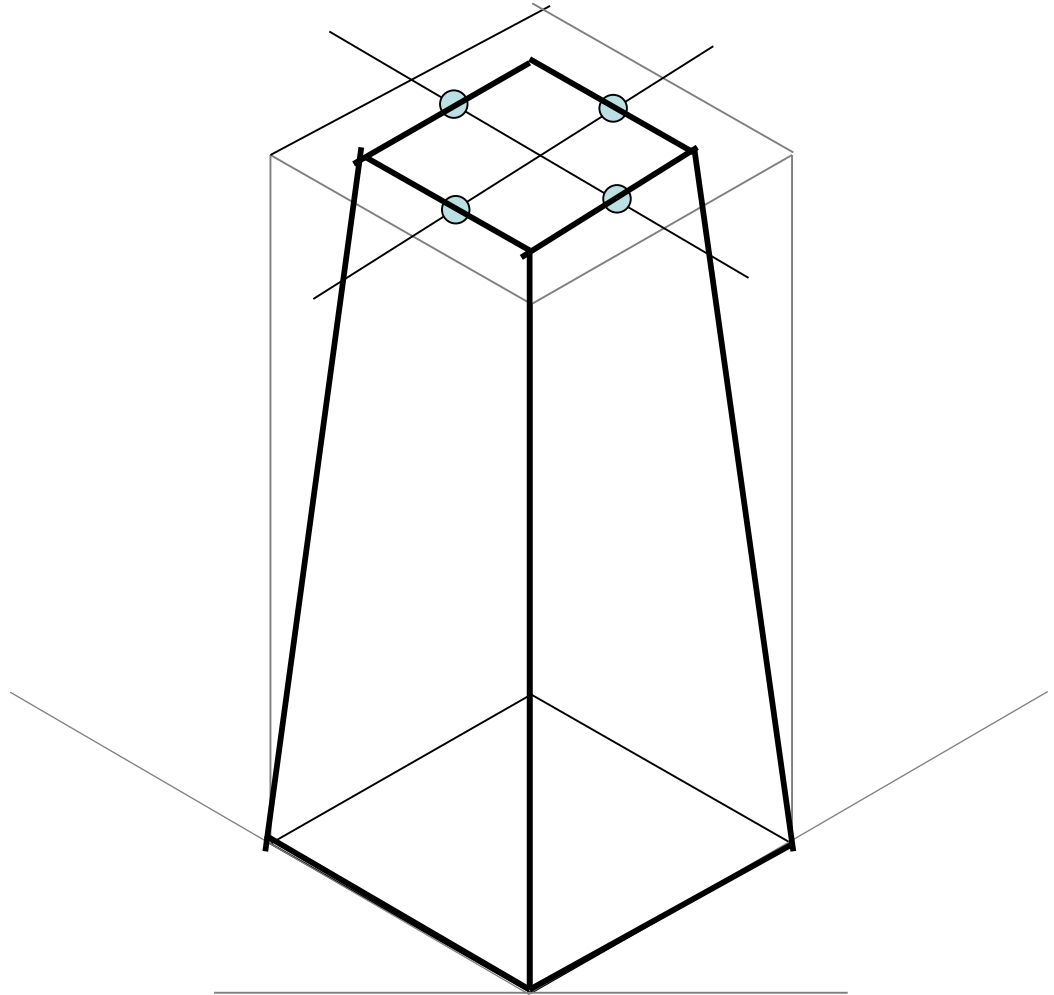
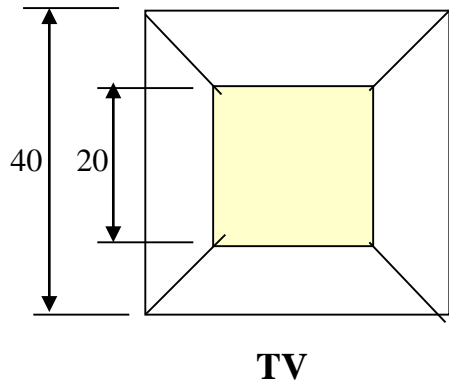
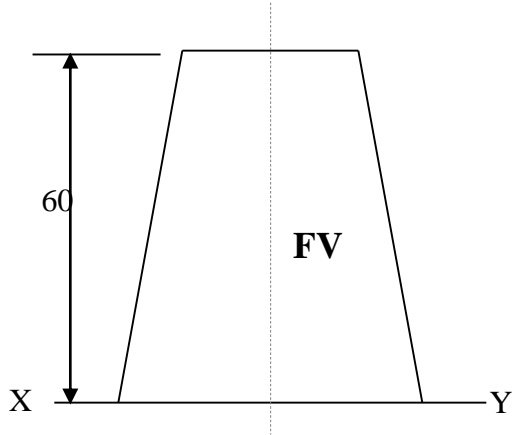


HALF CYLINDER LYING ON H.P. (with flat face // to H.P.)



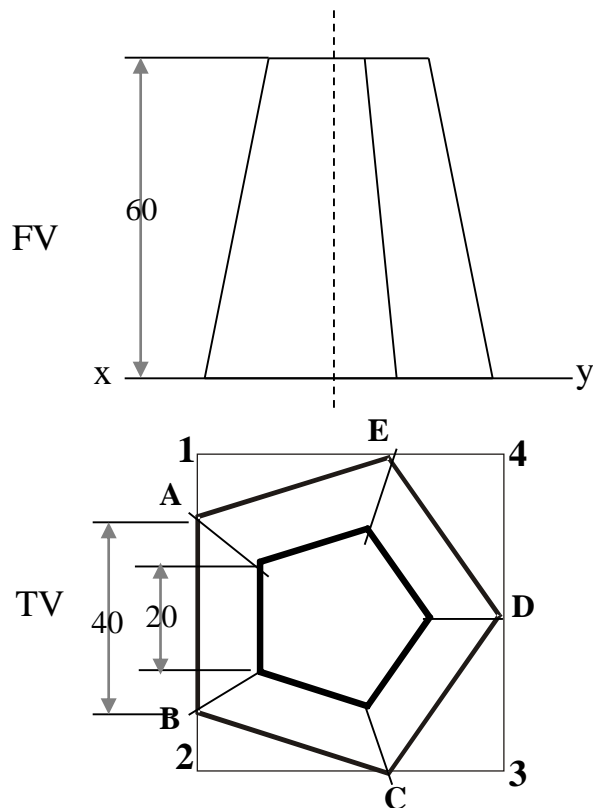
STUDY ILLUSTRATIONS

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



STUDY ILLUSTRATION

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



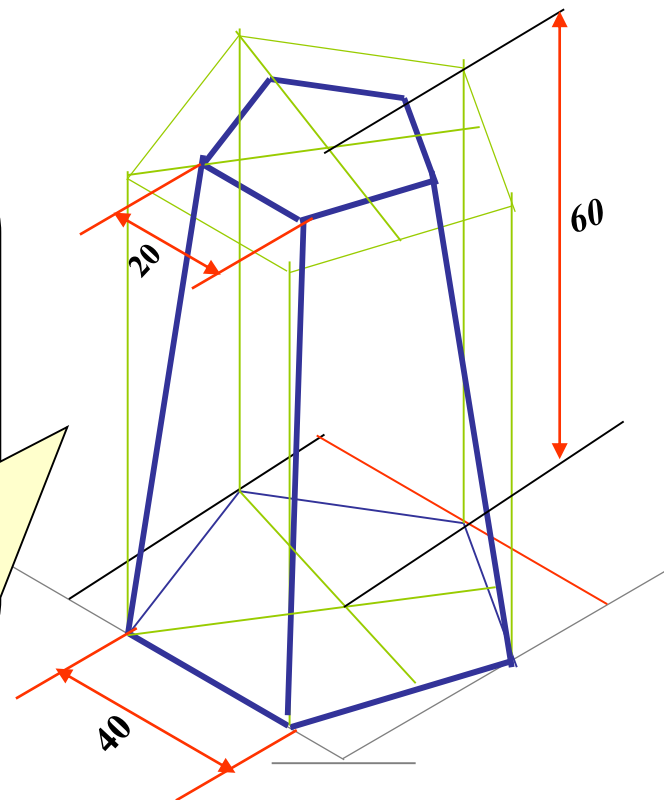
SOLUTION STEPS:

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.

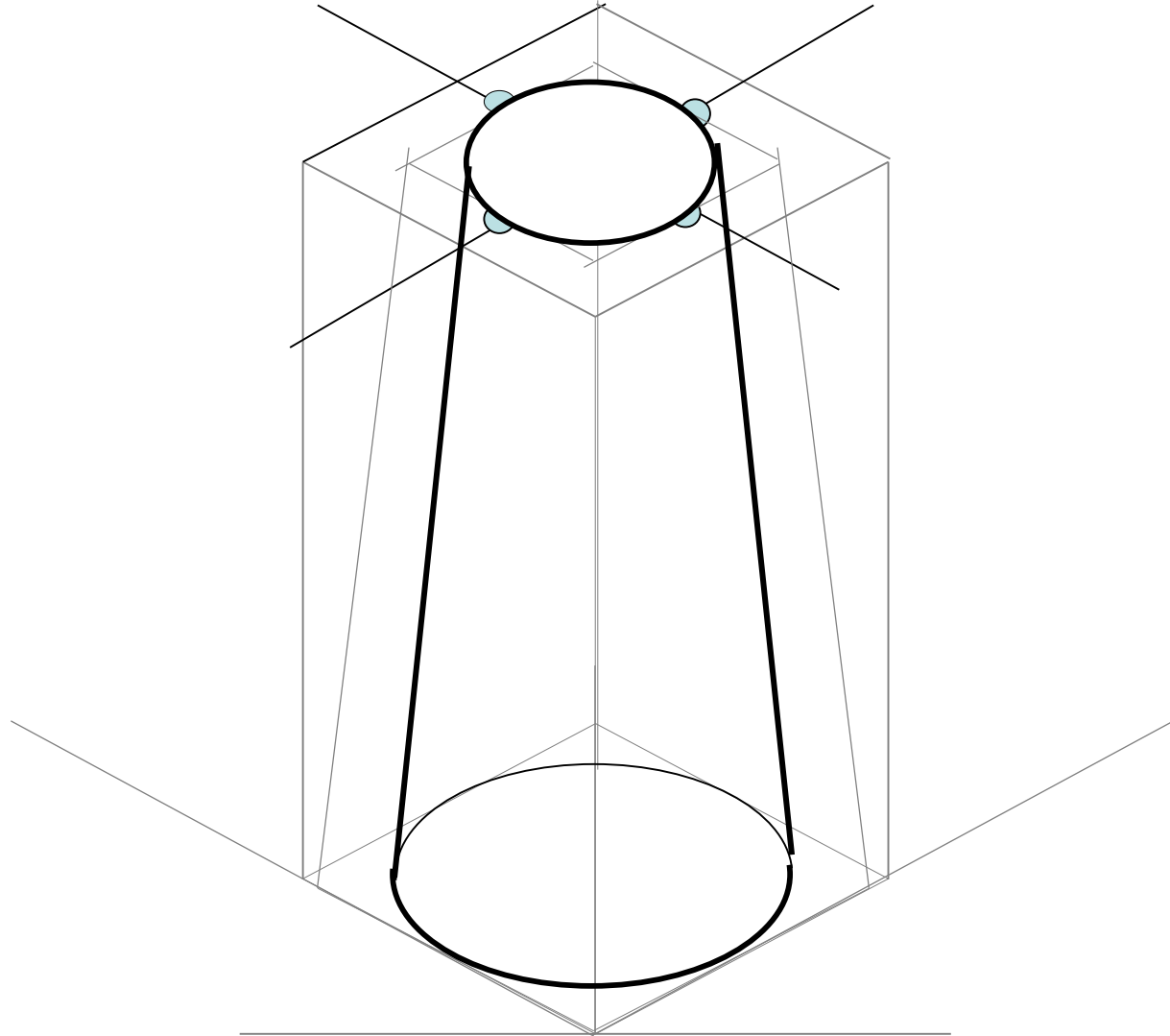
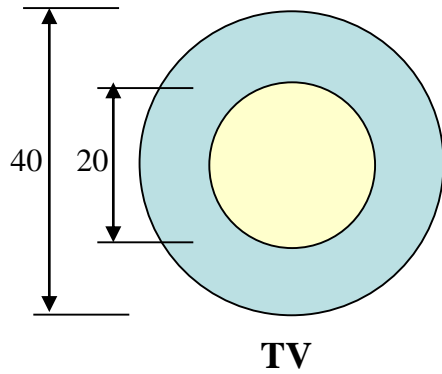
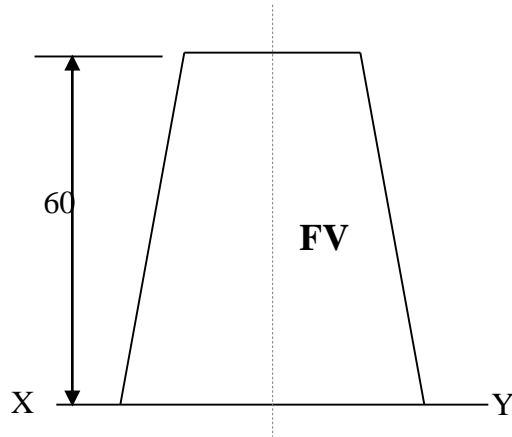
ISOMETRIC VIEW OF FRUSTUM OF PENTAGONAL PYRAMID



STUDY ILLUSTRATIONS

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

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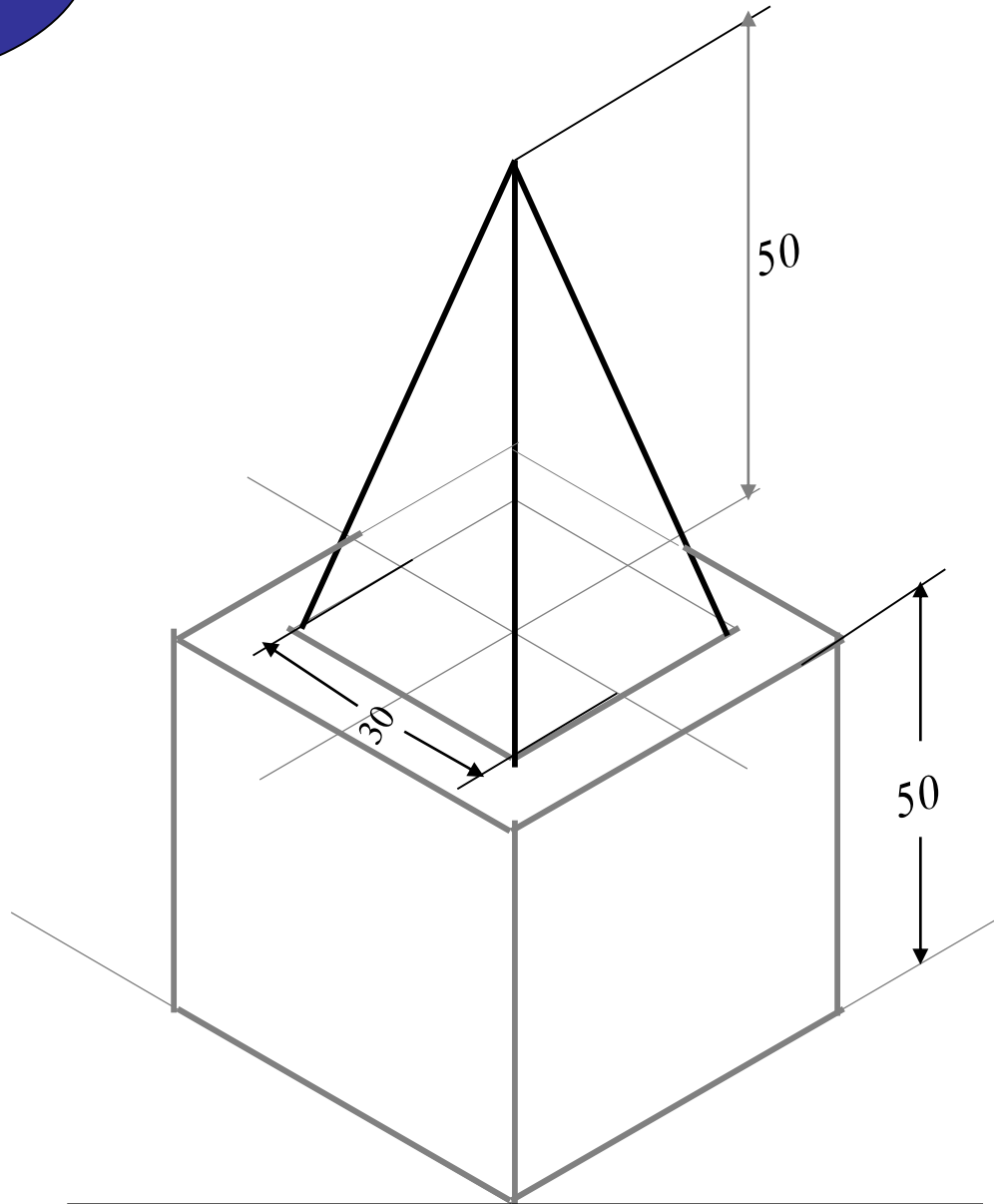


STUDY ILLUSTRATIONS



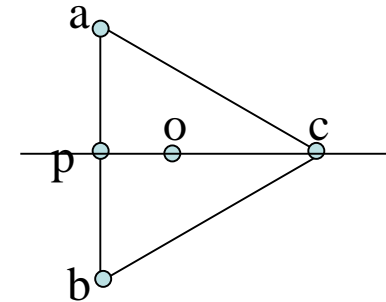
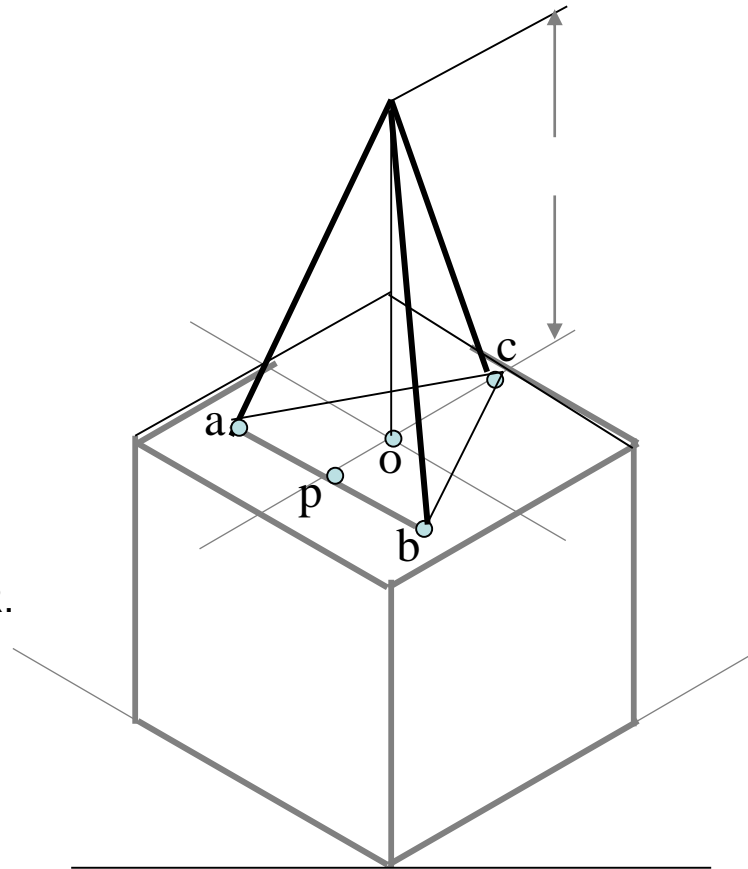
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PROBLEM: A SQUARE PYRAMID OF 30 MM BASE SIDES AND 50 MM LONG AXIS, IS CENTRALLY PLACED ON THE TOP OF A CUBE OF 50 MM LONG EDGES. DRAW ISOMETRIC VIEW OF THE PAIR.



STUDY ILLUSTRATIONS

PROBLEM: A TRIANGULAR PYRAMID OF 30 MM BASE SIDES AND 50 MM LONG AXIS, IS CENTRALLY PLACED ON THE TOP OF A CUBE OF 50 MM LONG EDGES. DRAW ISOMETRIC VIEW OF THE PAIR.



SOLUTION HINTS.

TO DRAW ISOMETRIC OF A CUBE IS SIMPLE. DRAW IT AS USUAL.

BUT FOR PYRAMID AS IT'S BASE IS AN EQUILATERAL TRIANGLE, IT CAN NOT BE DRAWN DIRECTLY. SUPPORT OF IT'S TV IS REQUIRED.

SO DRAW TRIANGLE AS A TV, SEPARATELY AND NAME VARIOUS POINTS AS SHOWN.

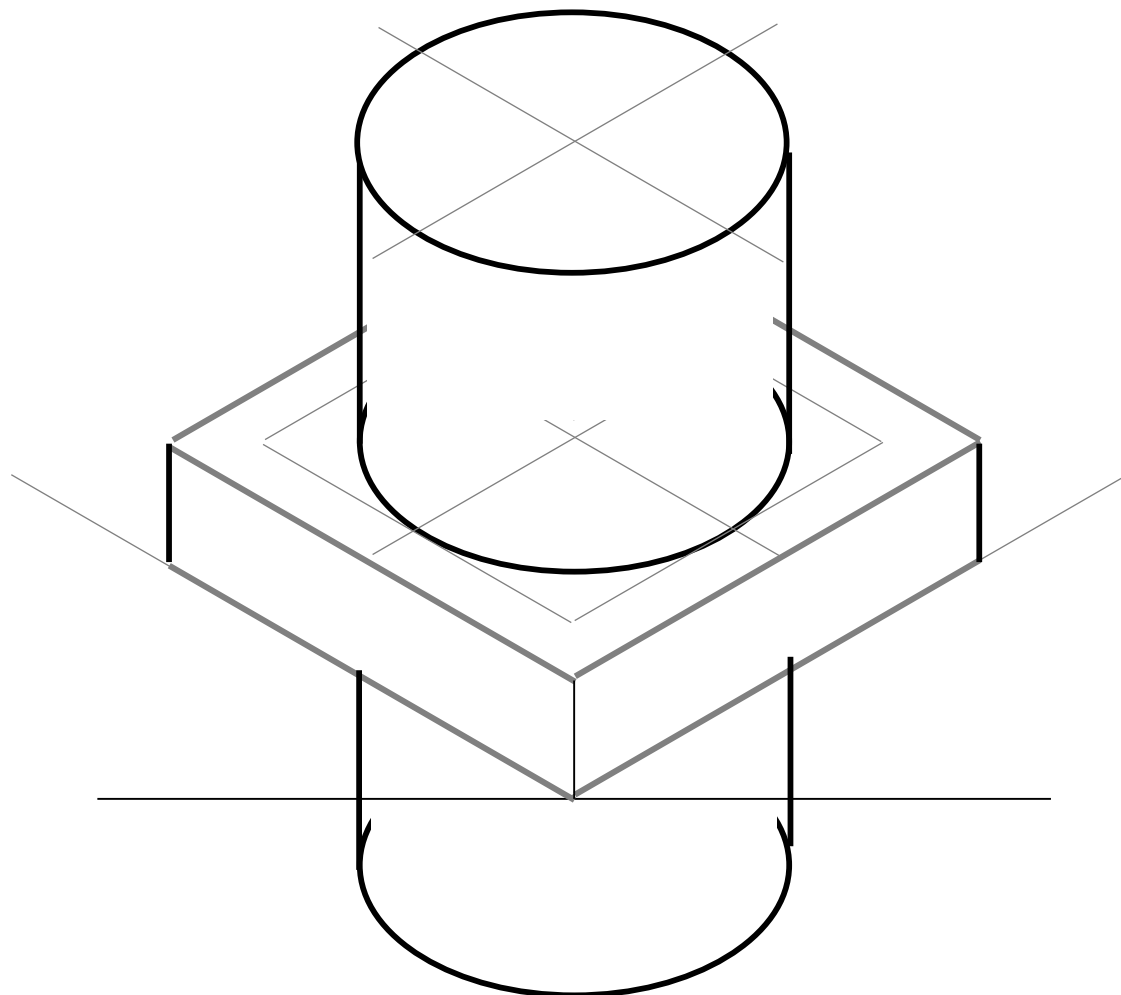
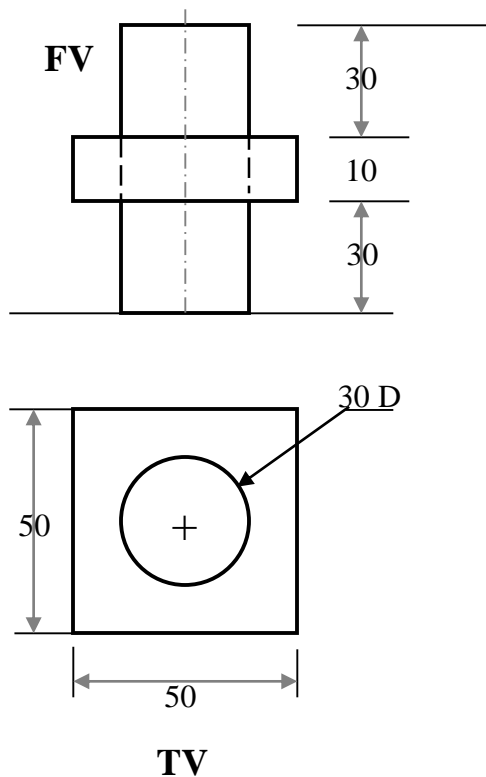
AFTER THIS PLACE IT ON THE TOP OF CUBE AS SHOWN.

THEN ADD HEIGHT FROM IT'S CENTER AND COMPLETE IT'S ISOMETRIC AS SHOWN.

STUDY ILLUSTRATIONS

PROBLEM:

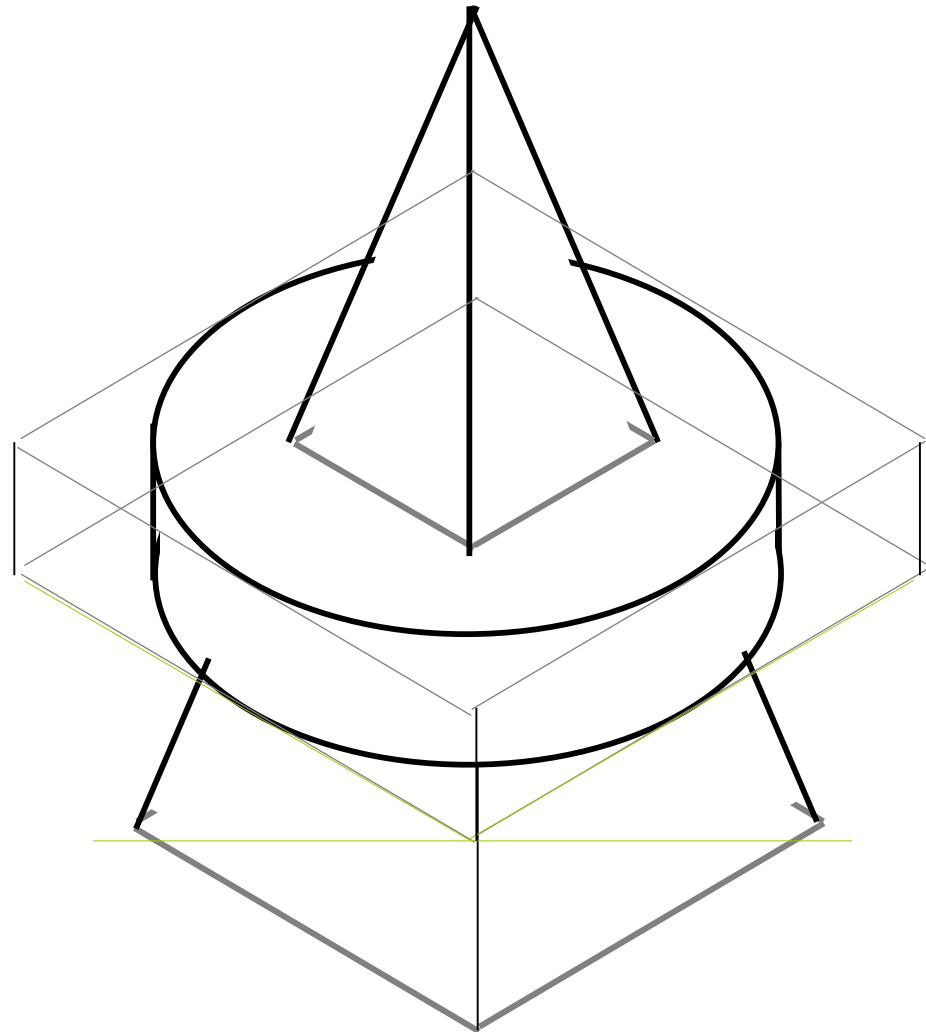
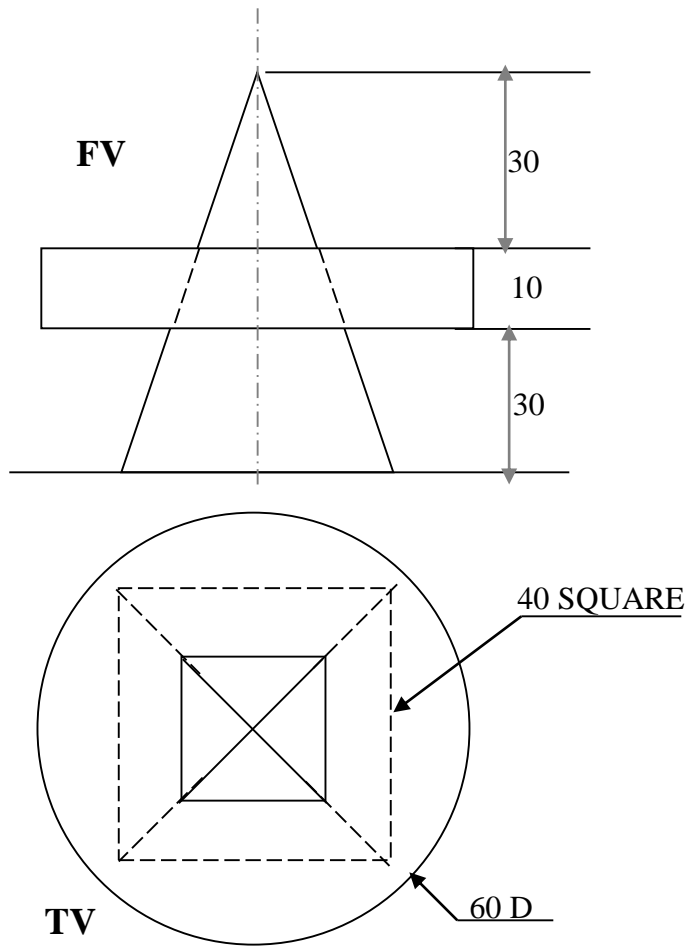
A SQUARE PLATE IS PIERCED THROUGH CENTRALLY BY A CYLINDER WHICH COMES OUT EQUALLY FROM BOTH FACES OF PLATE. IT'S FV & TV ARE SHOWN. DRAW ISOMETRIC VIEW.



STUDY ILLUSTRATIONS

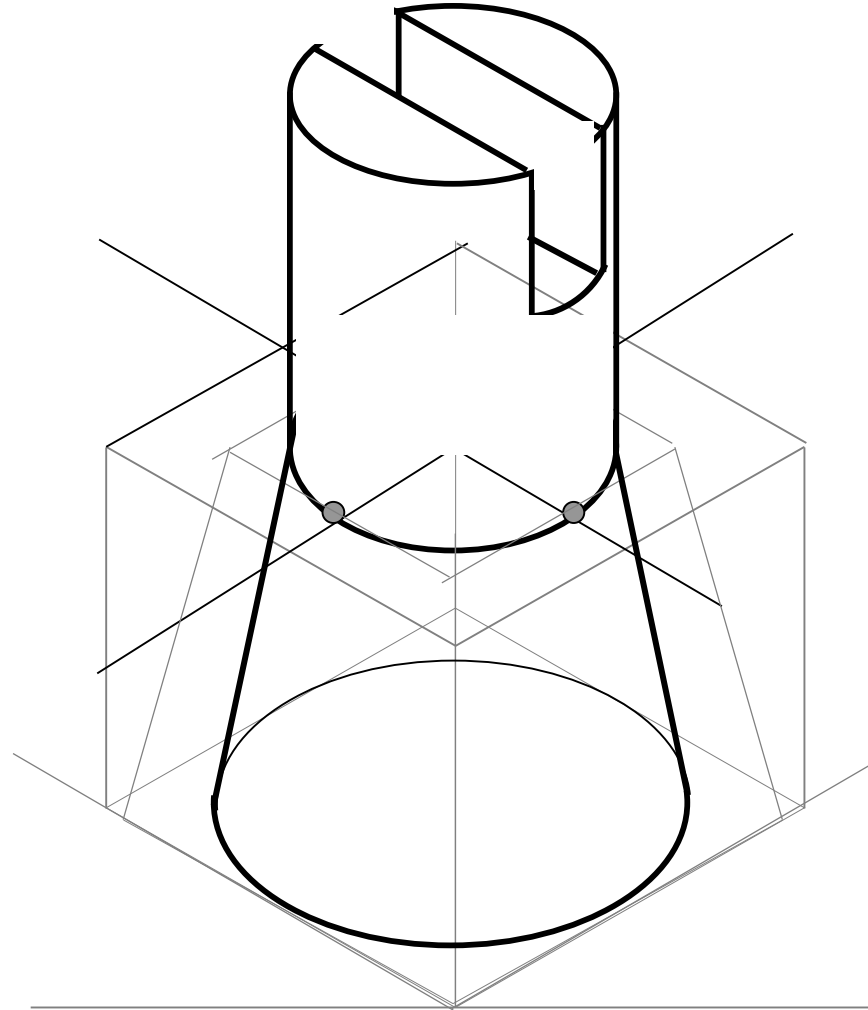
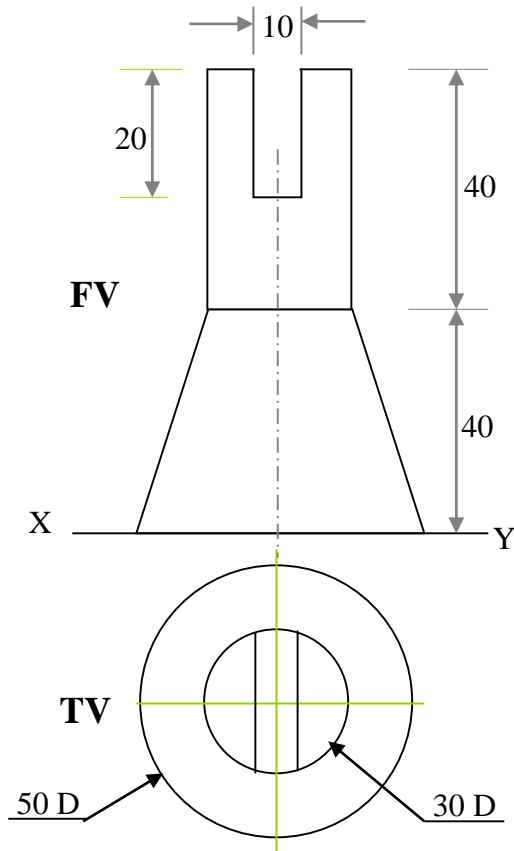
PROBLEM:

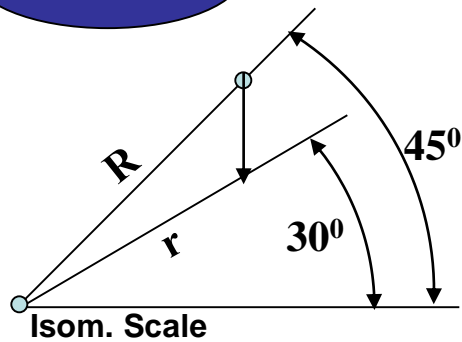
A CIRCULAR PLATE IS PIERCED THROUGH CENTRALLY BY A SQUARE PYRAMID WHICH COMES OUT EQUALLY FROM BOTH FACES OF PLATE. IT'S FV & TV ARE SHOWN. DRAW ISOMETRIC VIEW.



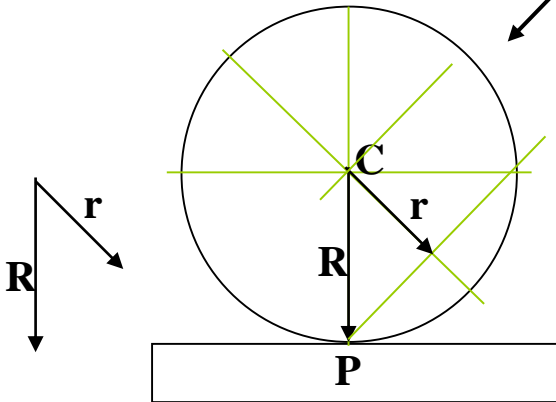
STUDY ILLUSTRATIONS

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

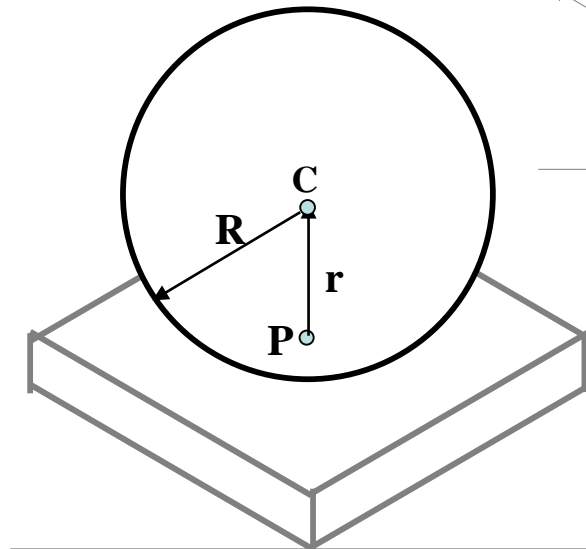




Iso-Direction

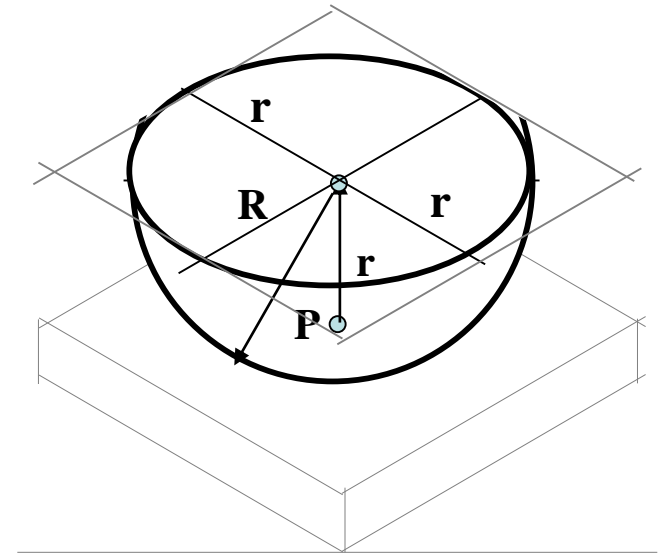


C = Center of Sphere.
P = Point of contact
R = True Radius of Sphere
r = Isometric Radius.



TO DRAW ISOMETRIC PROJECTION OF A SPHERE

1. FIRST DRAW ISOMETRIC OF SQUARE PLATE.
2. LOCATE IT'S CENTER. NAME IT P.
3. FROM P DRAW 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.

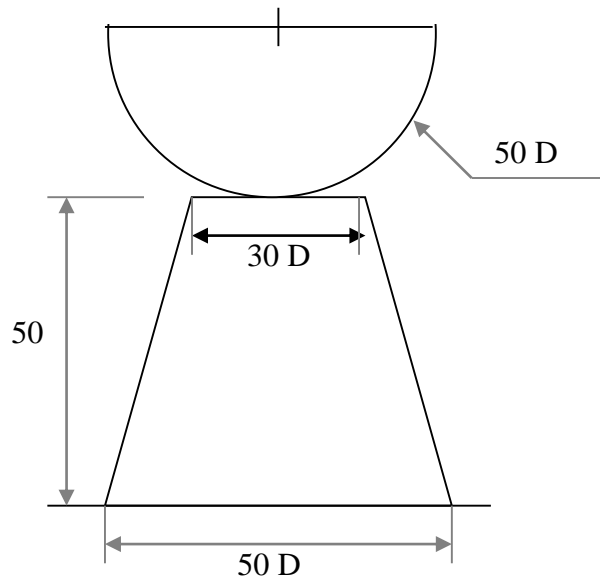


TO DRAW ISOMETRIC PROJECTION OF A HEMISPHERE

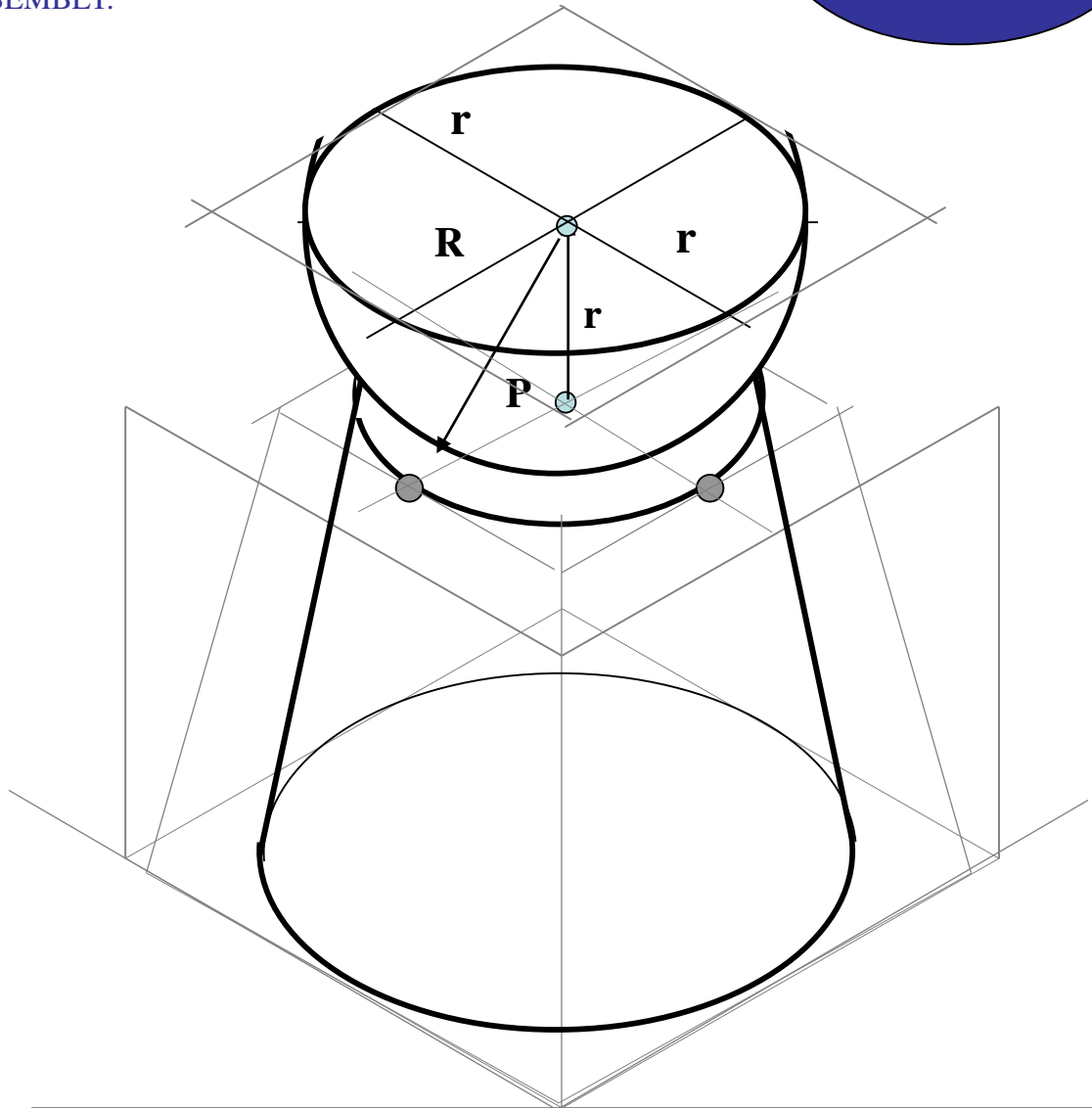
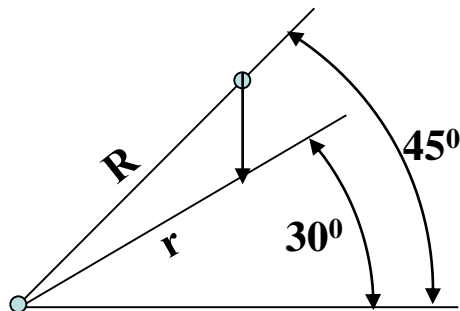
Adopt same procedure.
 Draw lower semicircle only.
 Then around 'C' construct Rhombus of Sides equal to Isometric Diameter.
 For this use iso-scale.
 Then construct ellipse in this Rhombus as usual
 And Complete Isometric-Projection of Hemi-sphere.

PROBLEM:

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

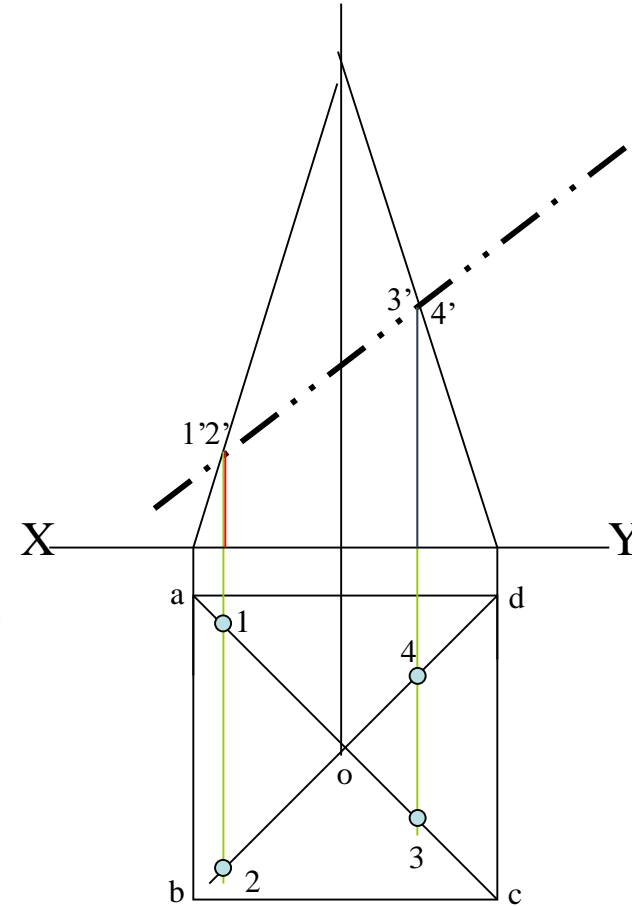
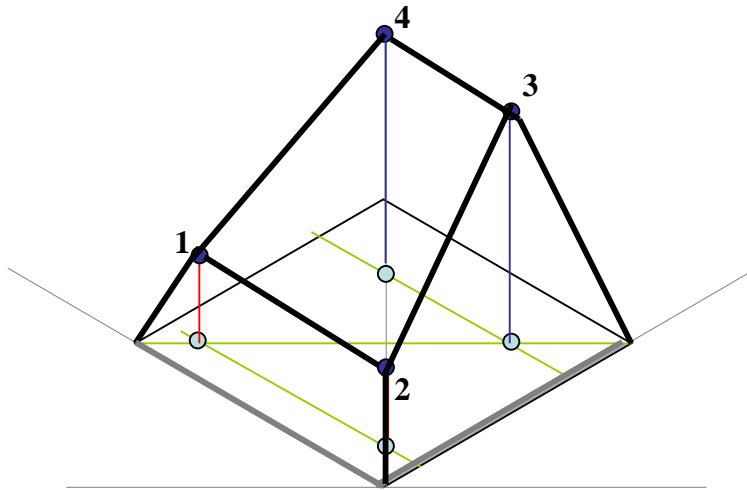


**FIRST CONSTRUCT ISOMETRIC SCALE.
USE THIS SCALE FOR ALL DIMENSIONS
IN THIS PROBLEM.**



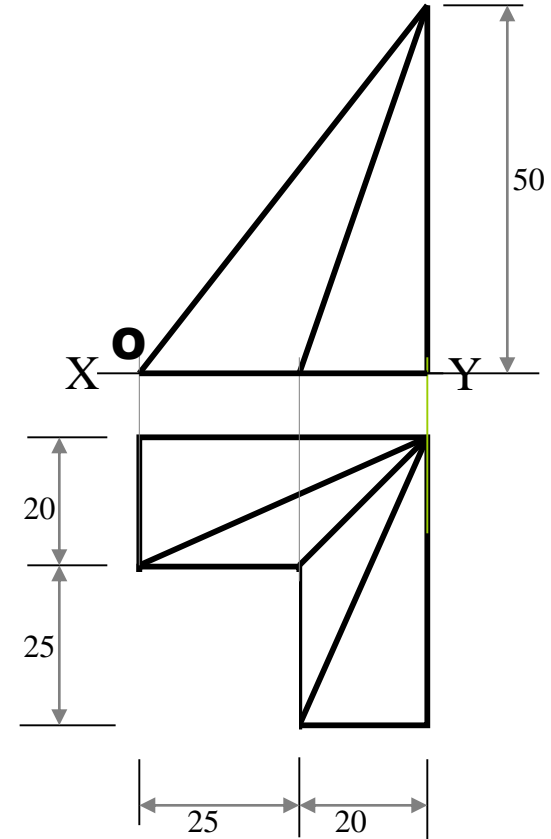
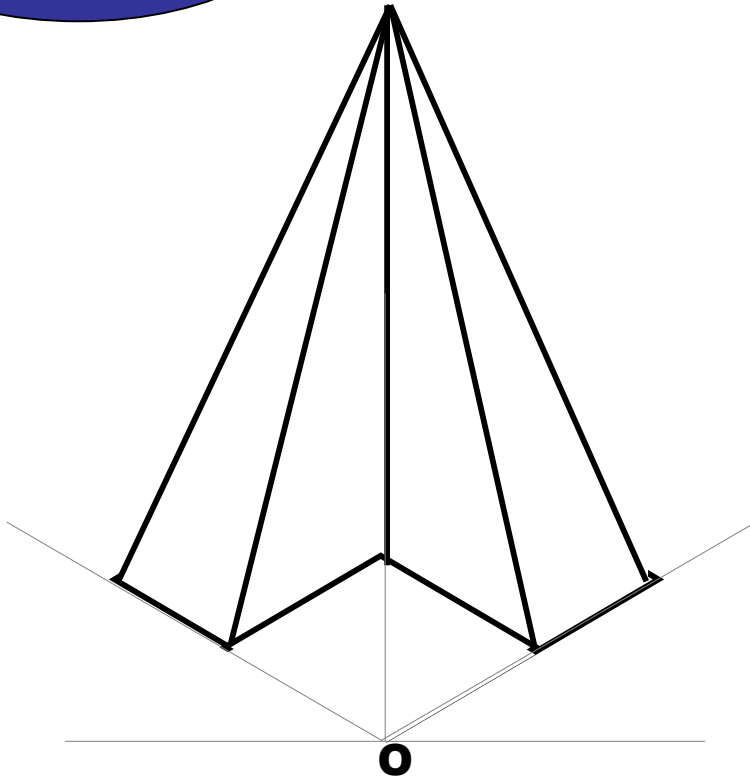
STUDY ILLUSTRATIONS

A SQUARE PYRAMID OF 40 MM BASE SIDES AND 60 MM AXIS IS CUT BY AN INCLINED SECTION PLANE THROUGH THE MID POINT OF AXIS AS SHOWN. DRAW ISOMETRIC VIEW OF SECTION OF PYRAMID.



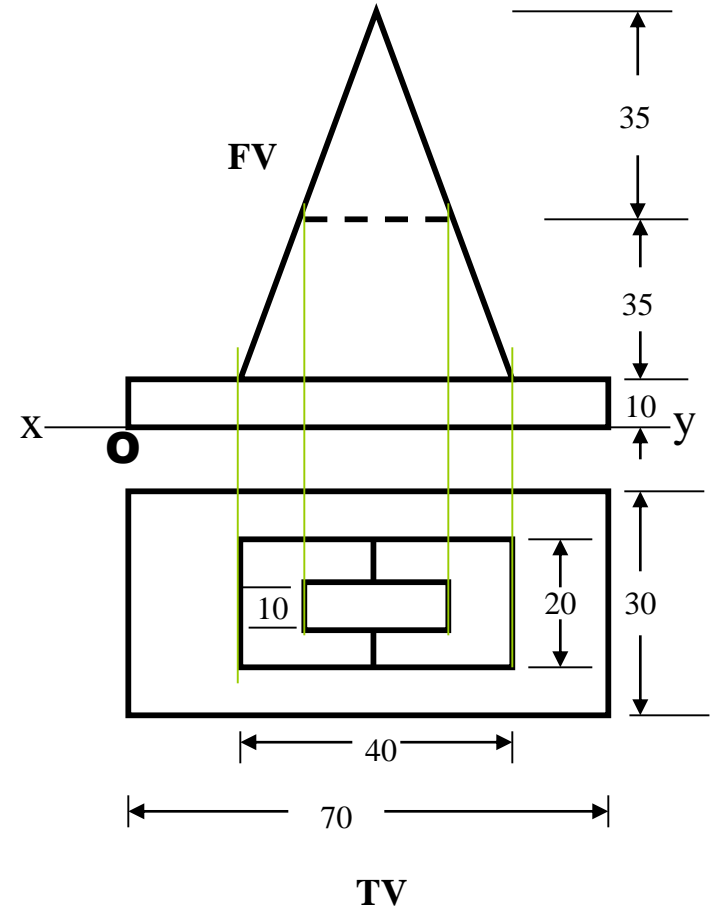
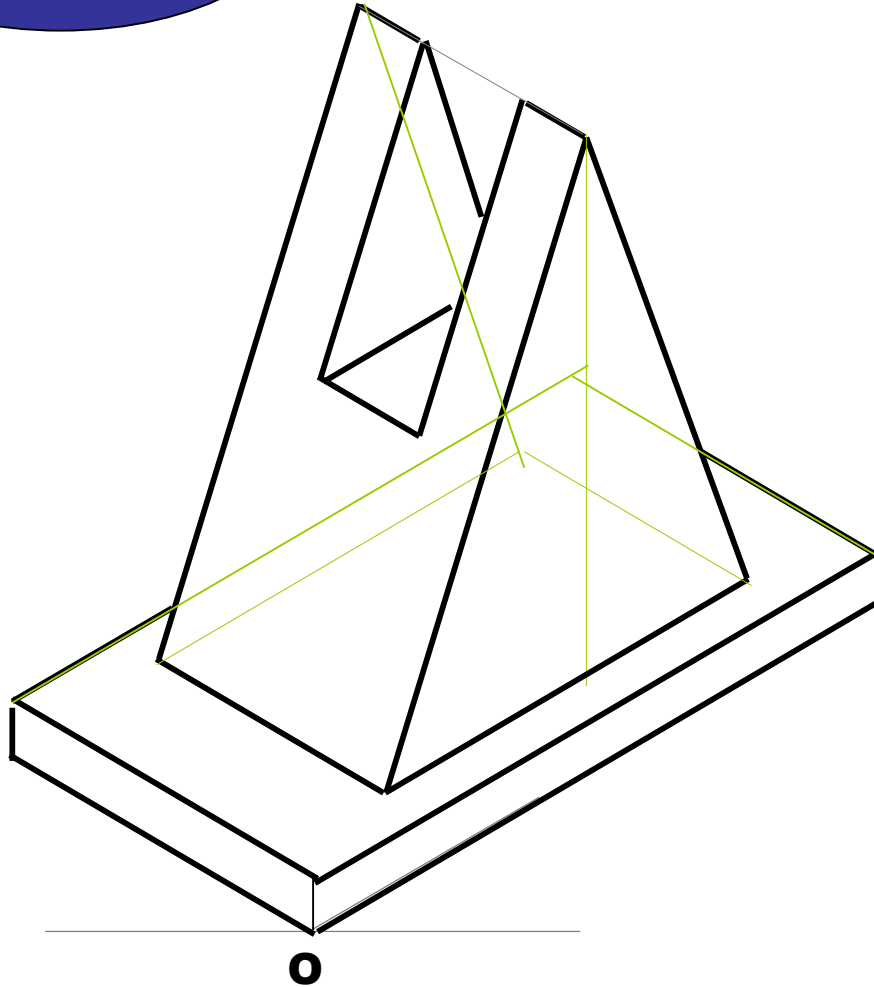
STUDY ILLUSTRATIONS

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



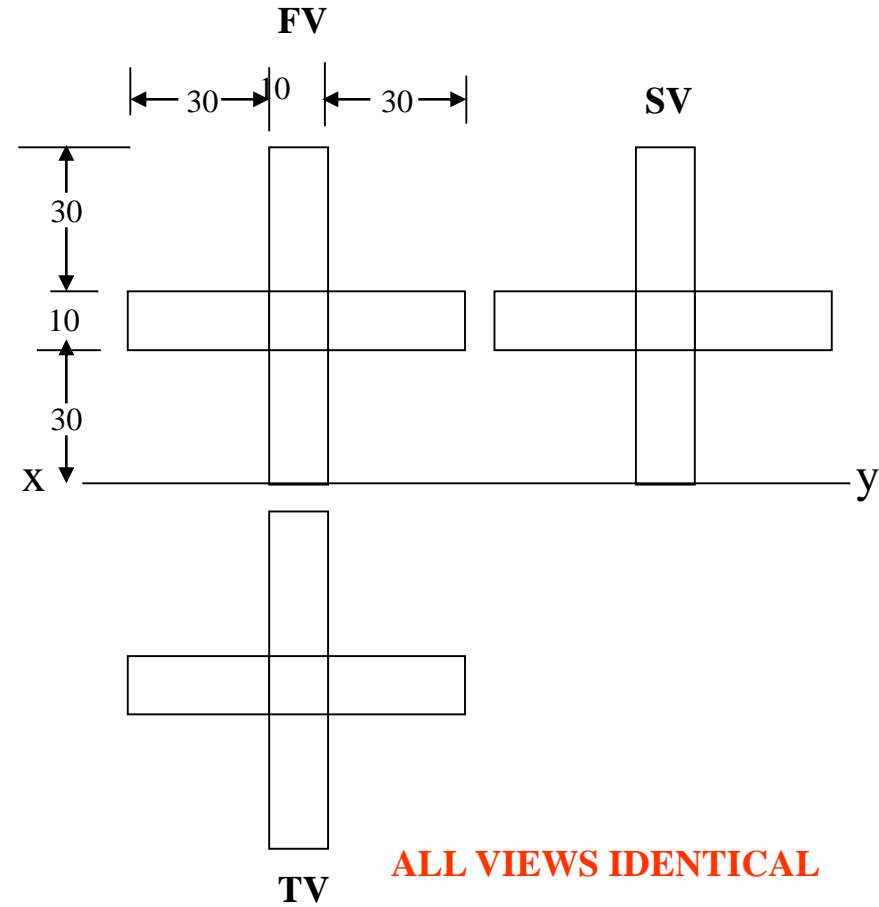
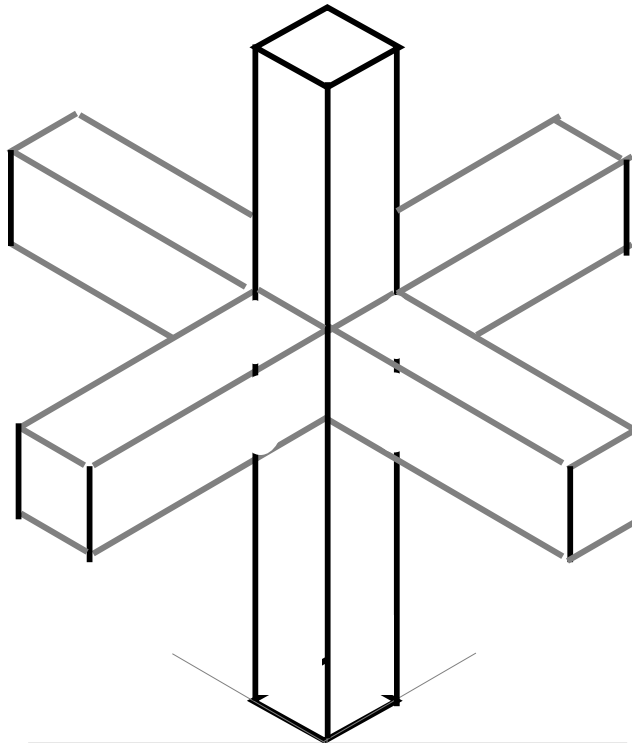
STUDY ILLUSTRATIONS

F.V. & T.V. of an object are given. Draw its isometric view.



STUDY ILLUSTRATIONS

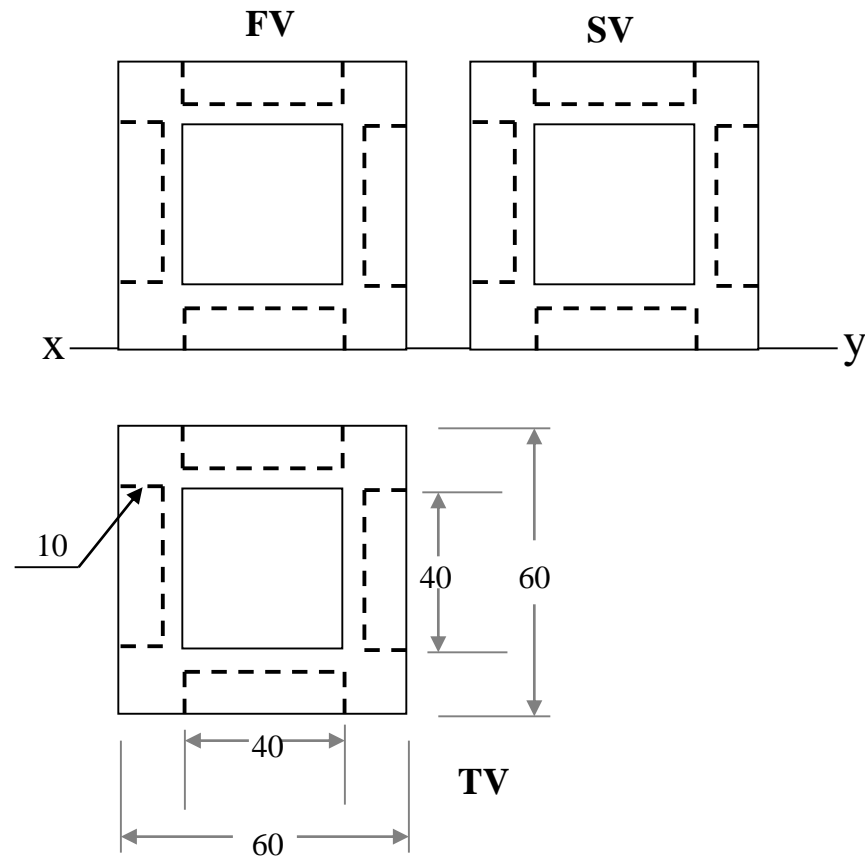
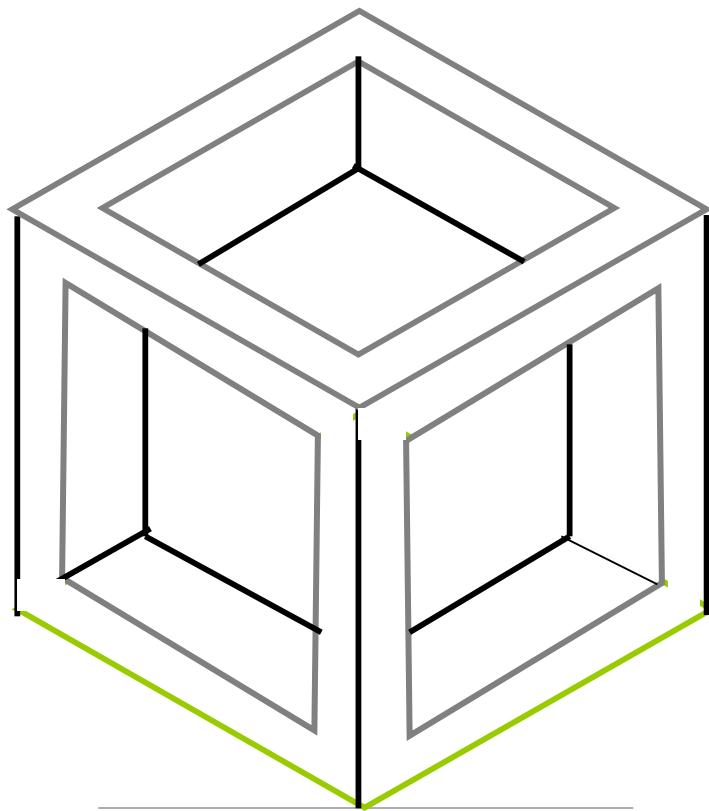
F.V. & T.V. and S.V. of an object are given. Draw its isometric view.



STUDY ILLUSTRATIONS

F.V. & T.V. and S.V. of an object are given. Draw its isometric view.

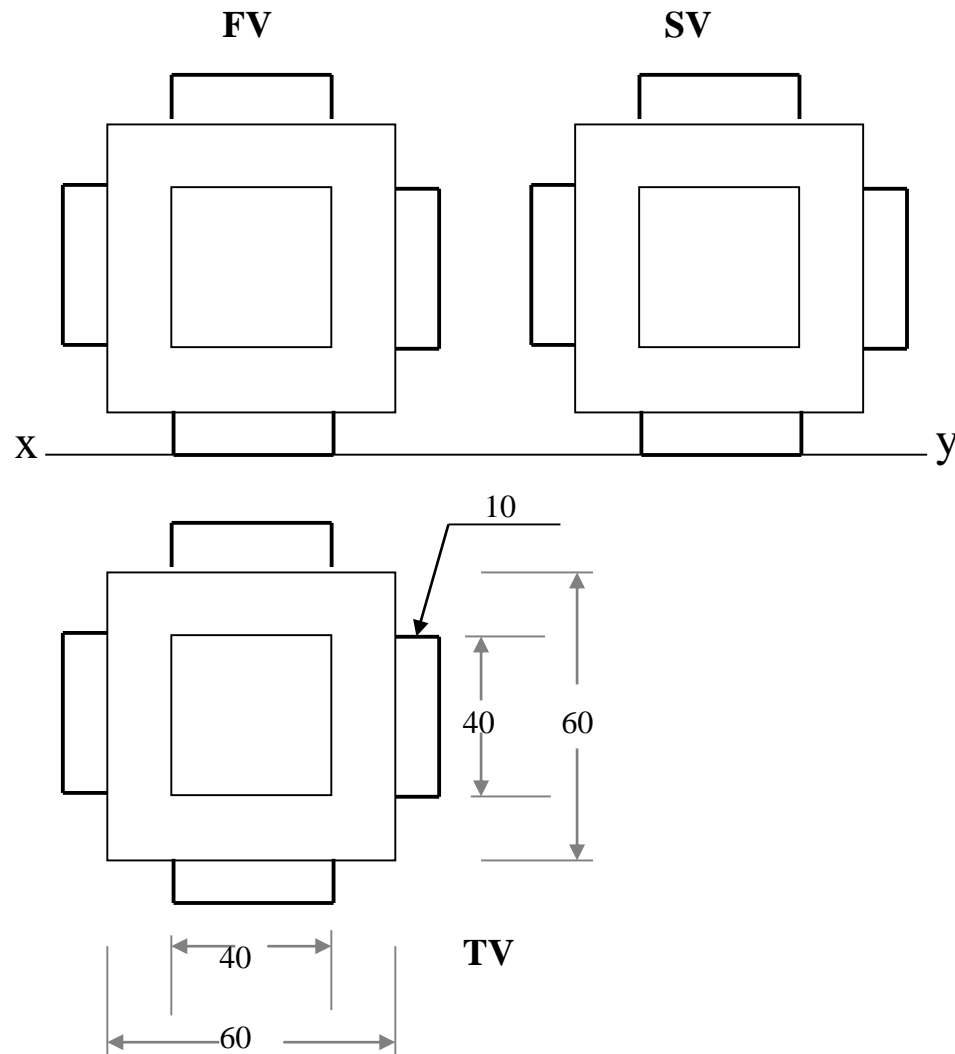
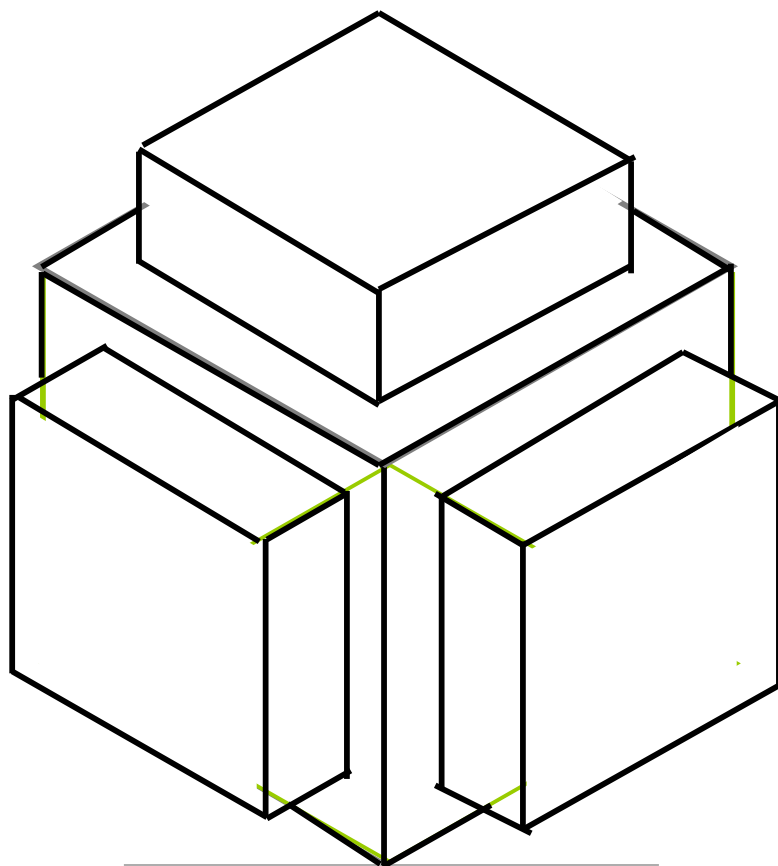
ALL VIEWS IDENTICAL



**STUDY
ILLUSTRATIONS**

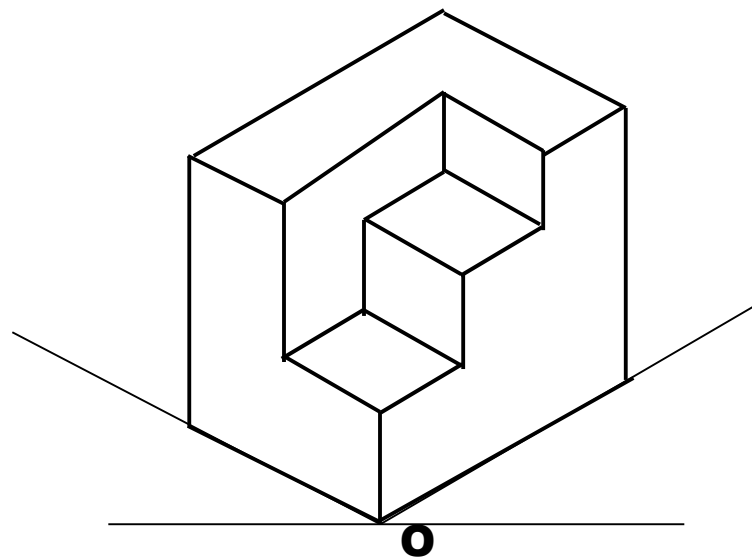
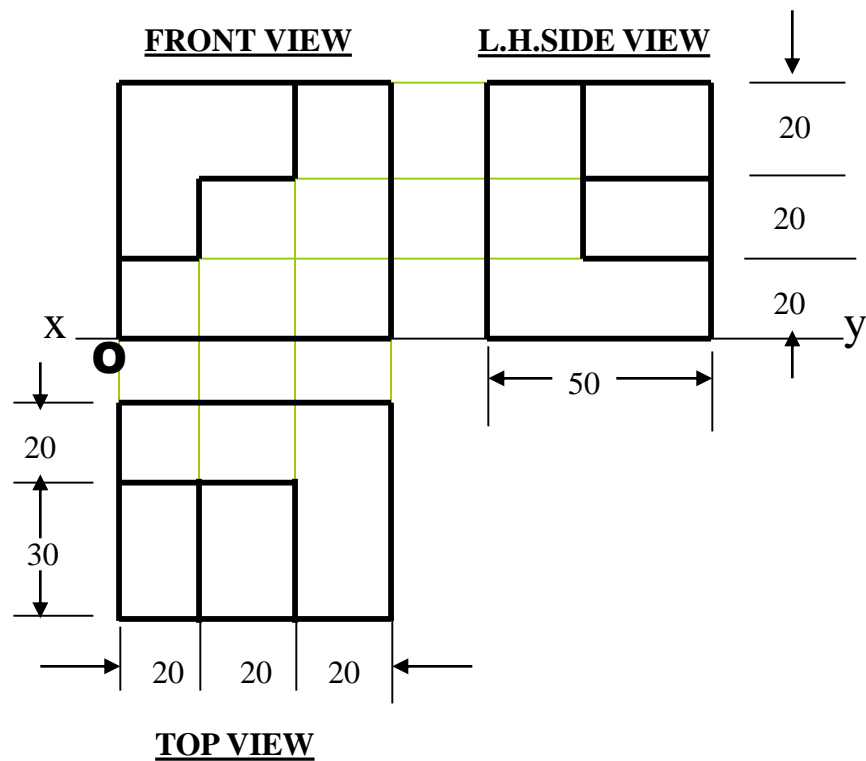
F.V. & T.V. and S.V. of an object are given. Draw its isometric view.

ALL VIEWS IDENTICAL



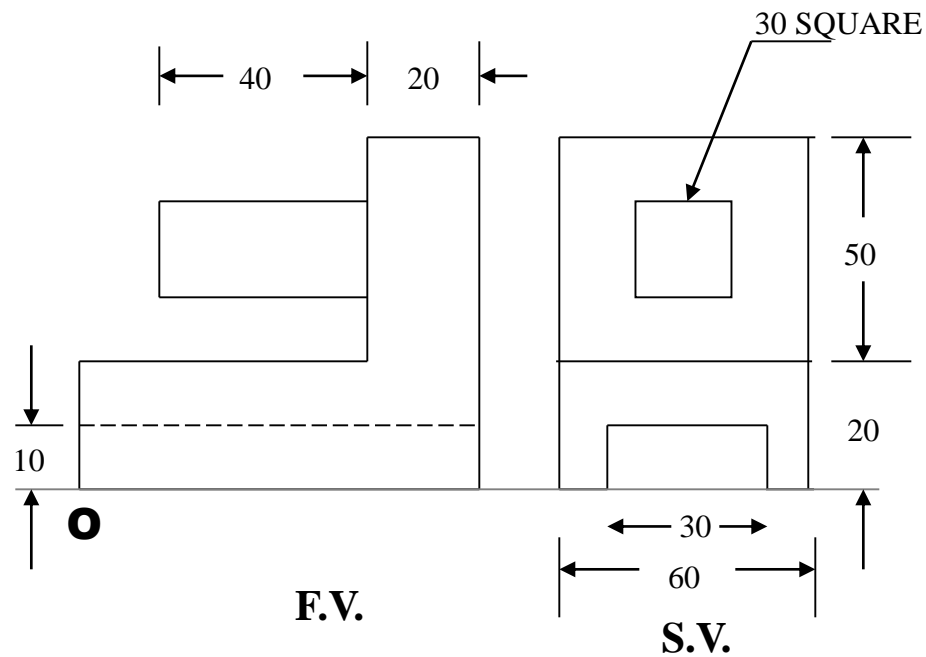
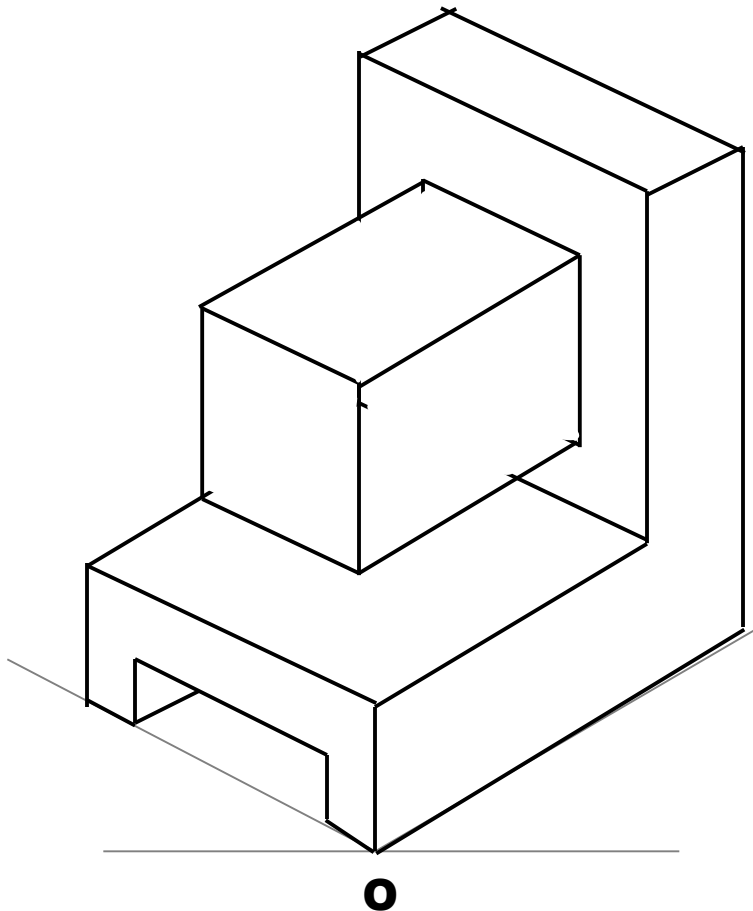
F.V. & T.V. and S.V. of an object are given. Draw its isometric view.

ORTHOGRAPHIC PROJECTIONS



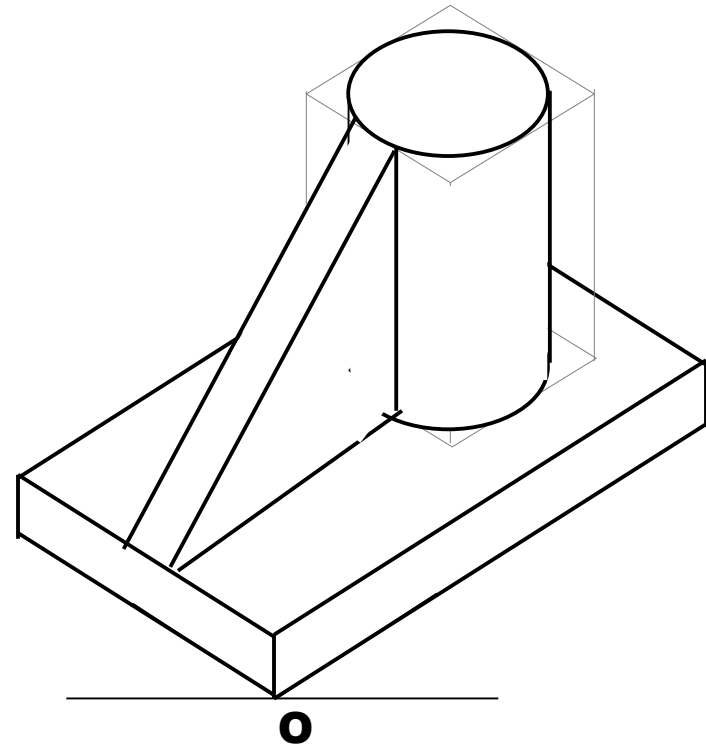
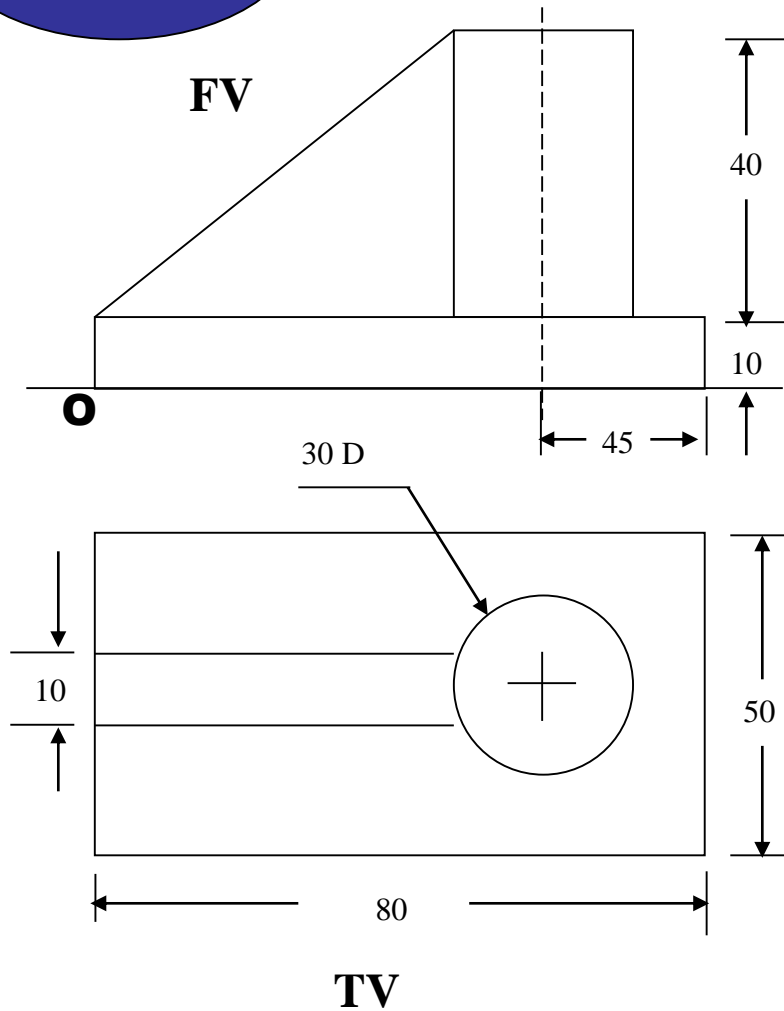
STUDY ILLUSTRATIONS

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



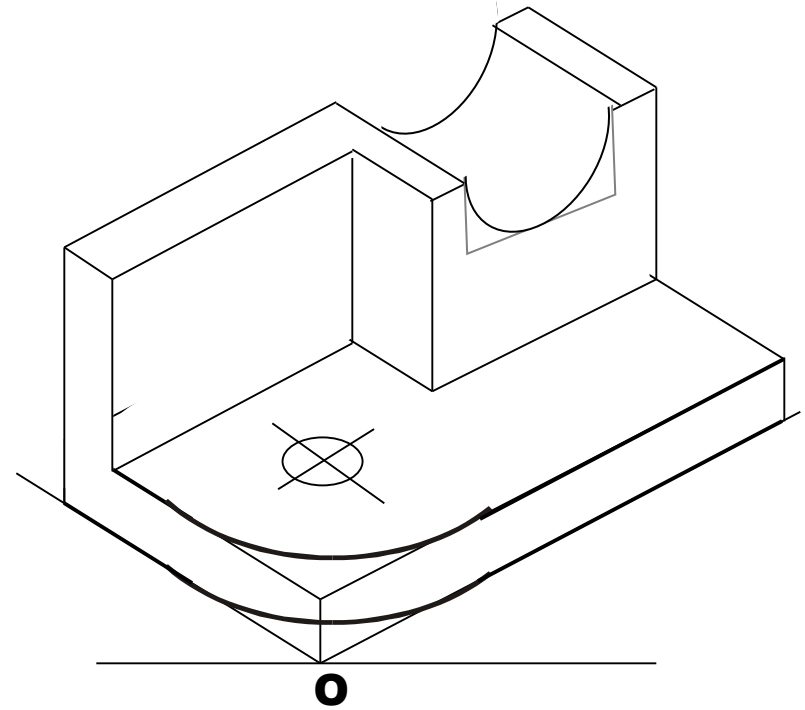
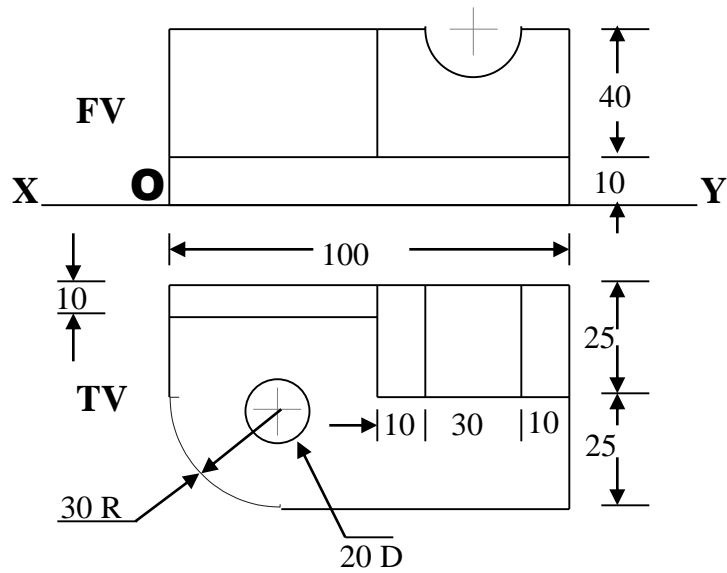
**STUDY
ILLUSTRATIONS**

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



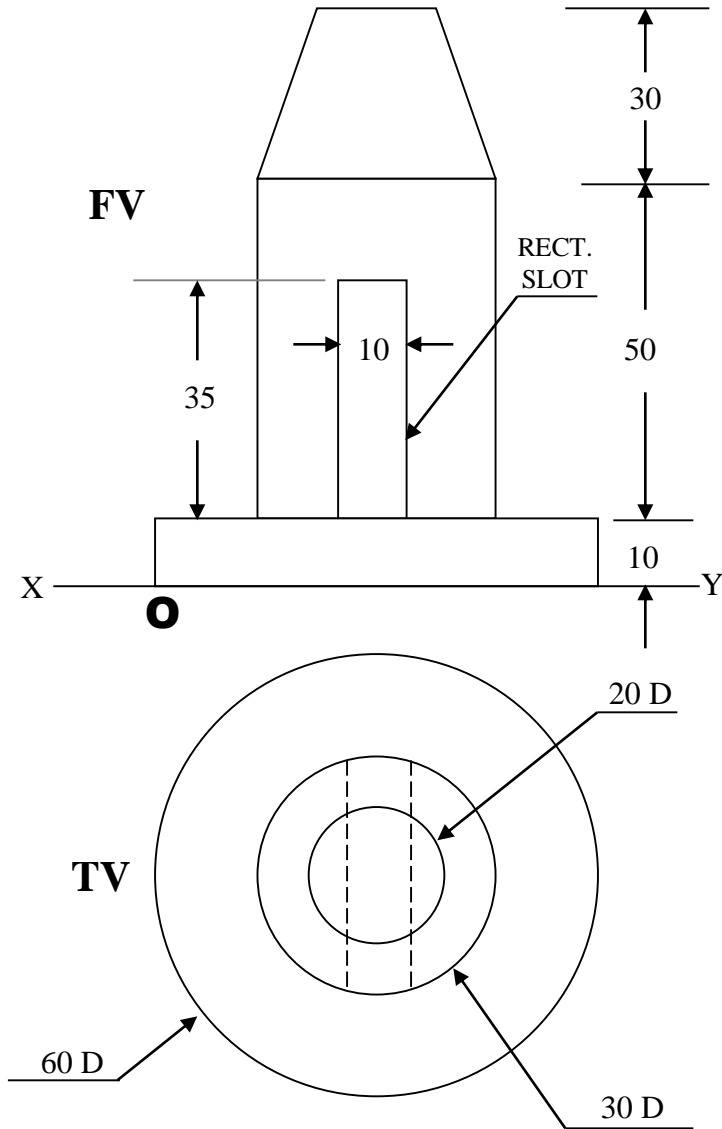
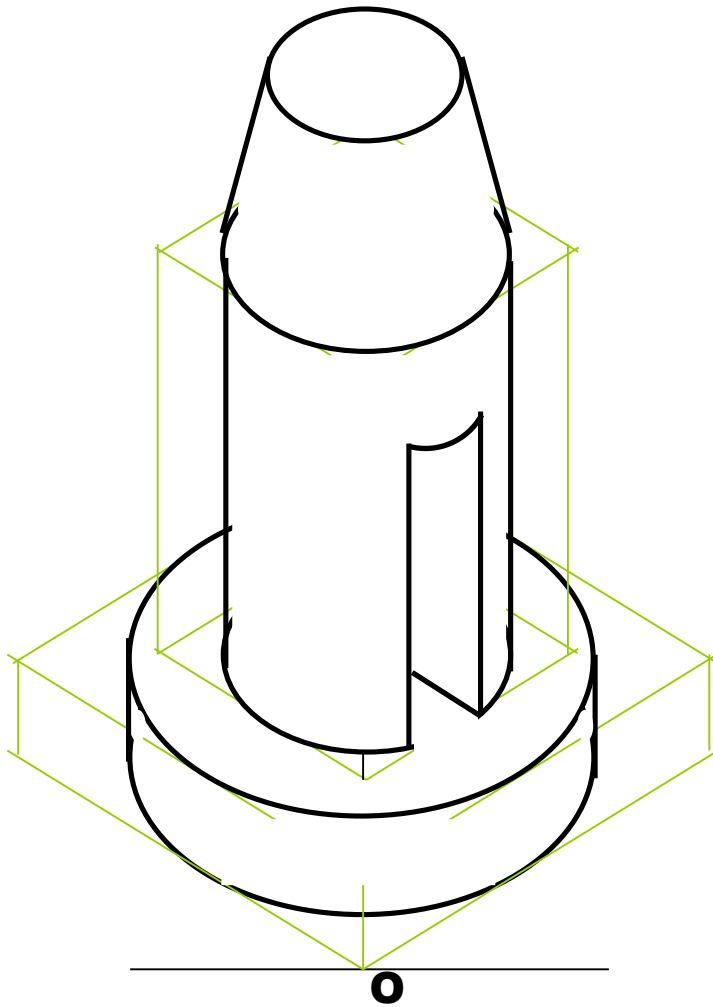
**STUDY
ILLUSTRATIONS**

F.V. & T.V. of an object are given. Draw its isometric view.



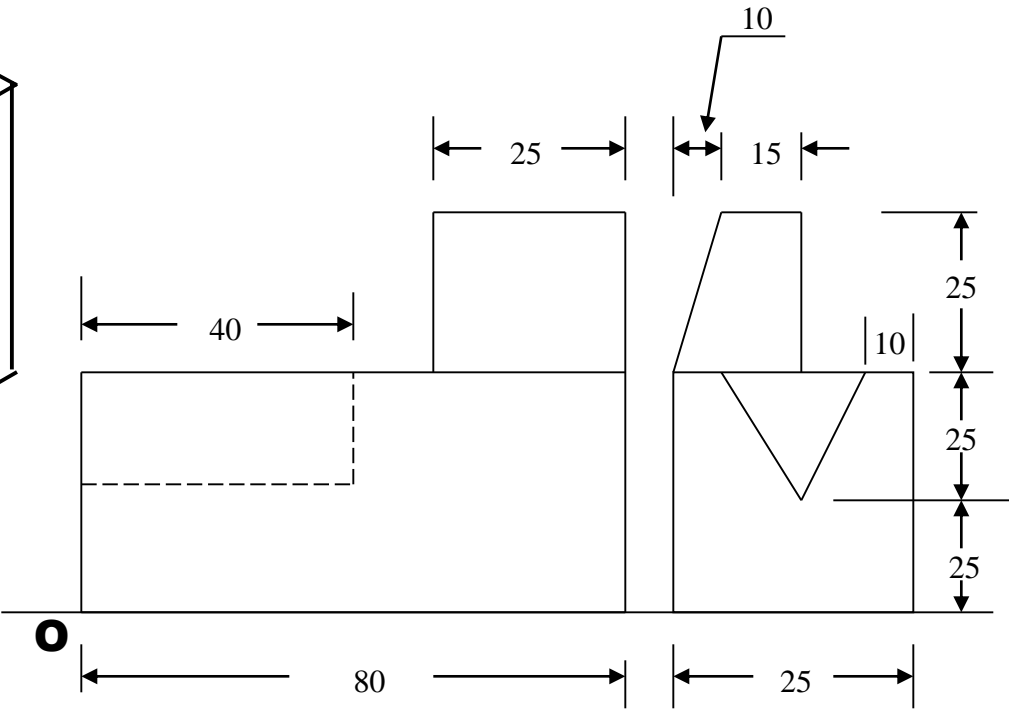
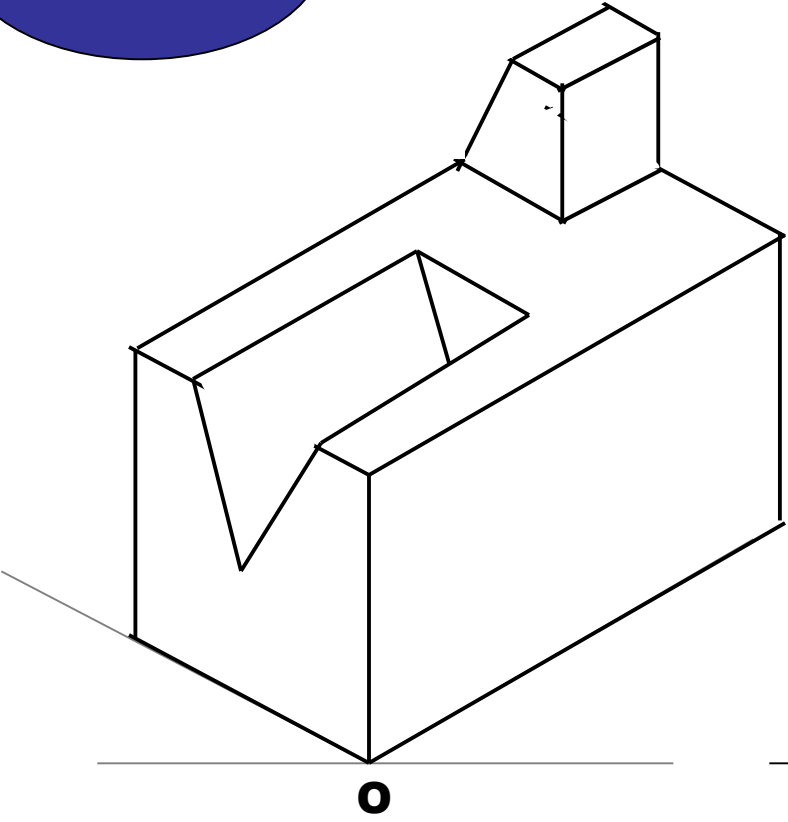
**STUDY
ILLUSTRATIONS**

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



**STUDY
ILLUSTRATIONS**

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

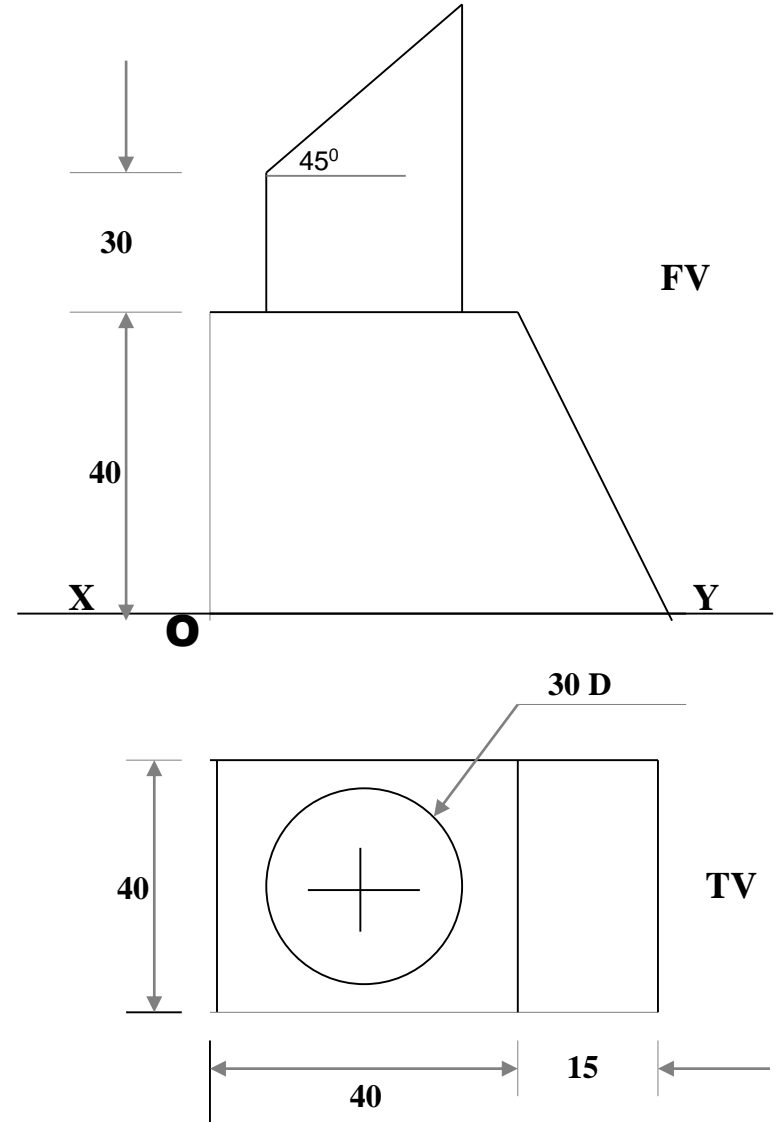
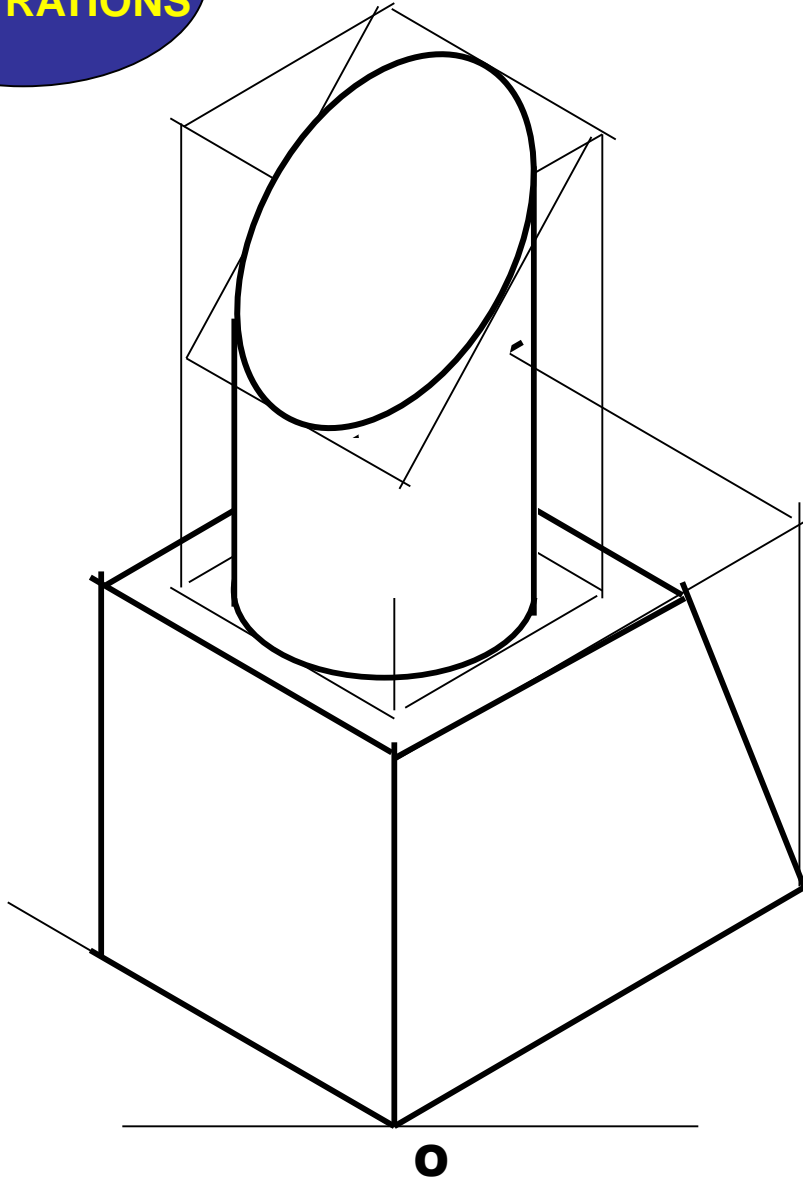


F.V.

S.V.

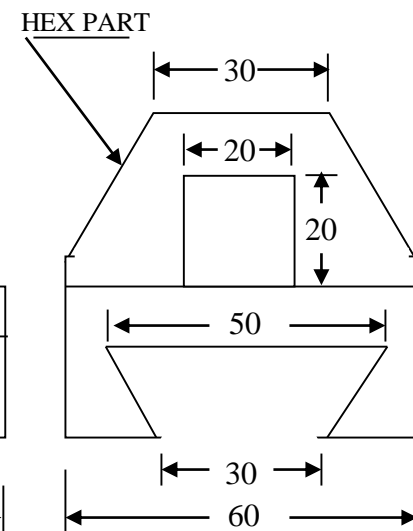
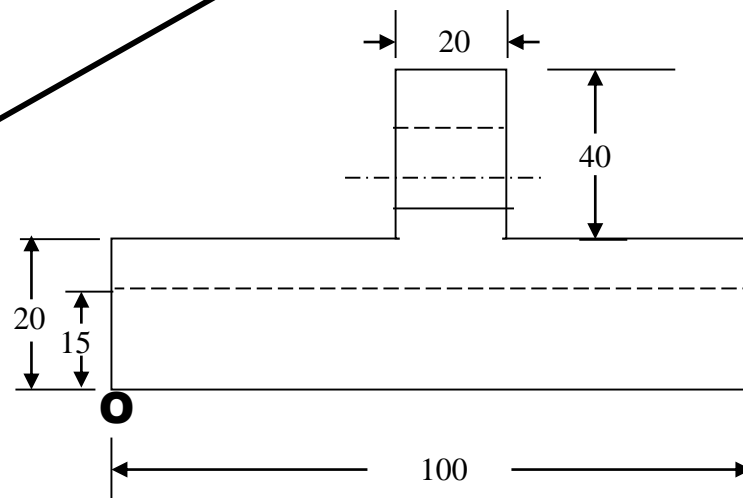
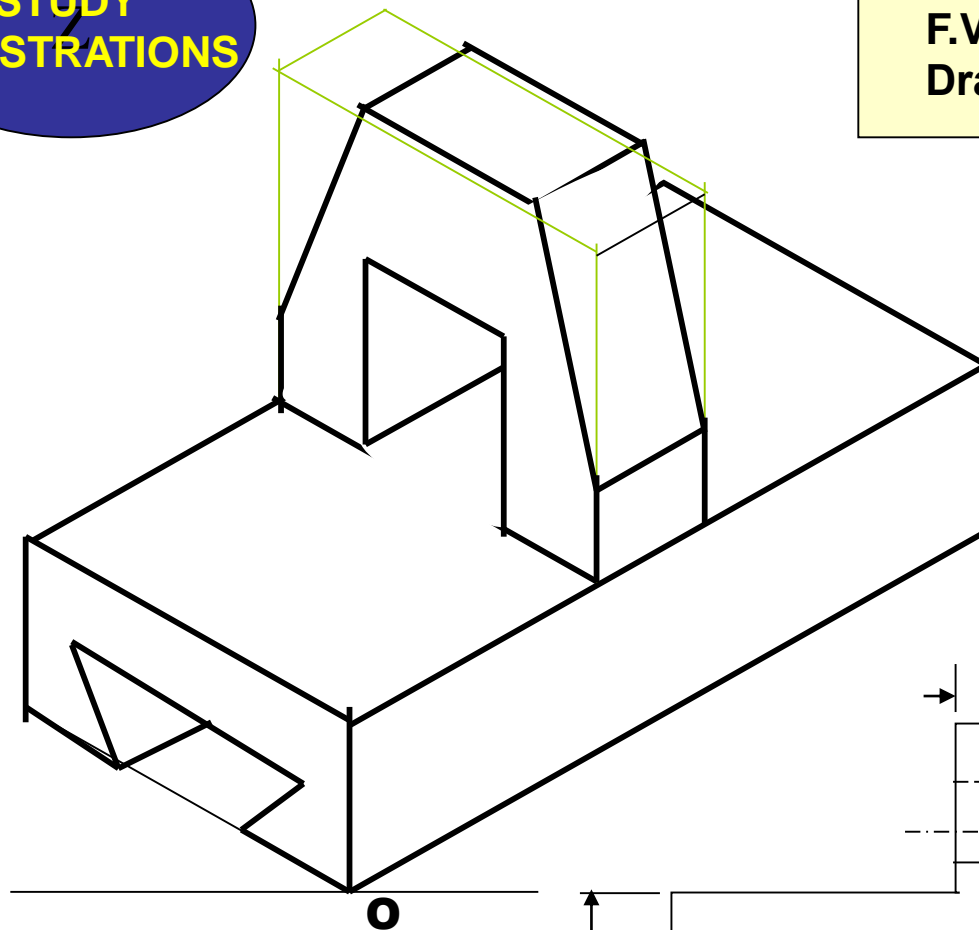
F.V. & T.V. of an object are given. Draw it's isometric view.

**STUDY
ILLUSTRATIONS**



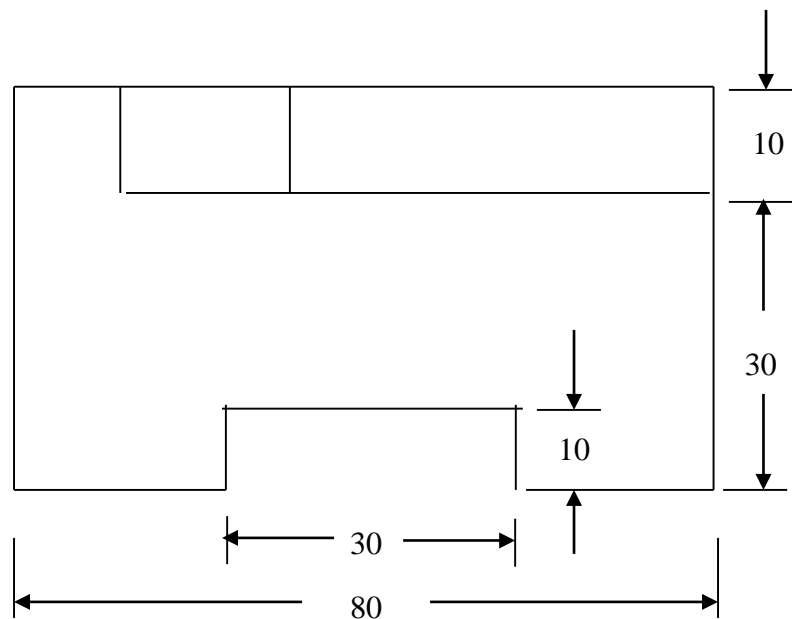
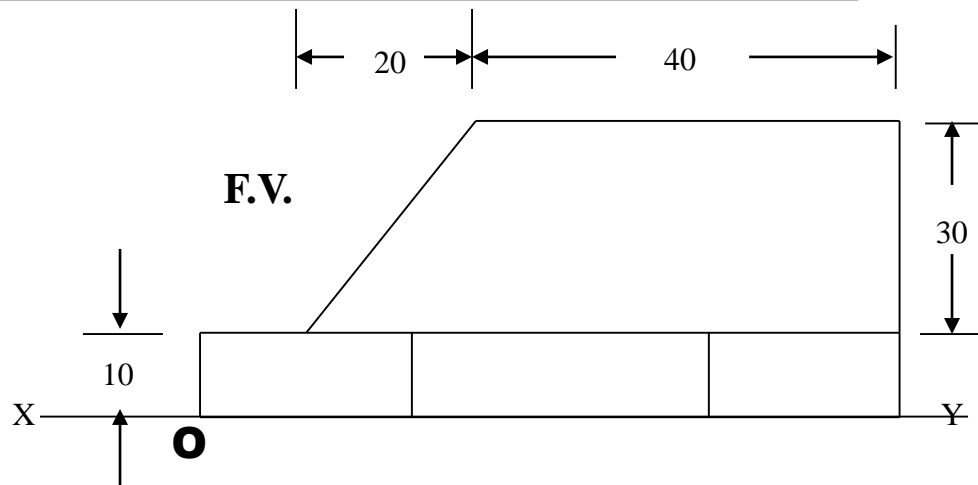
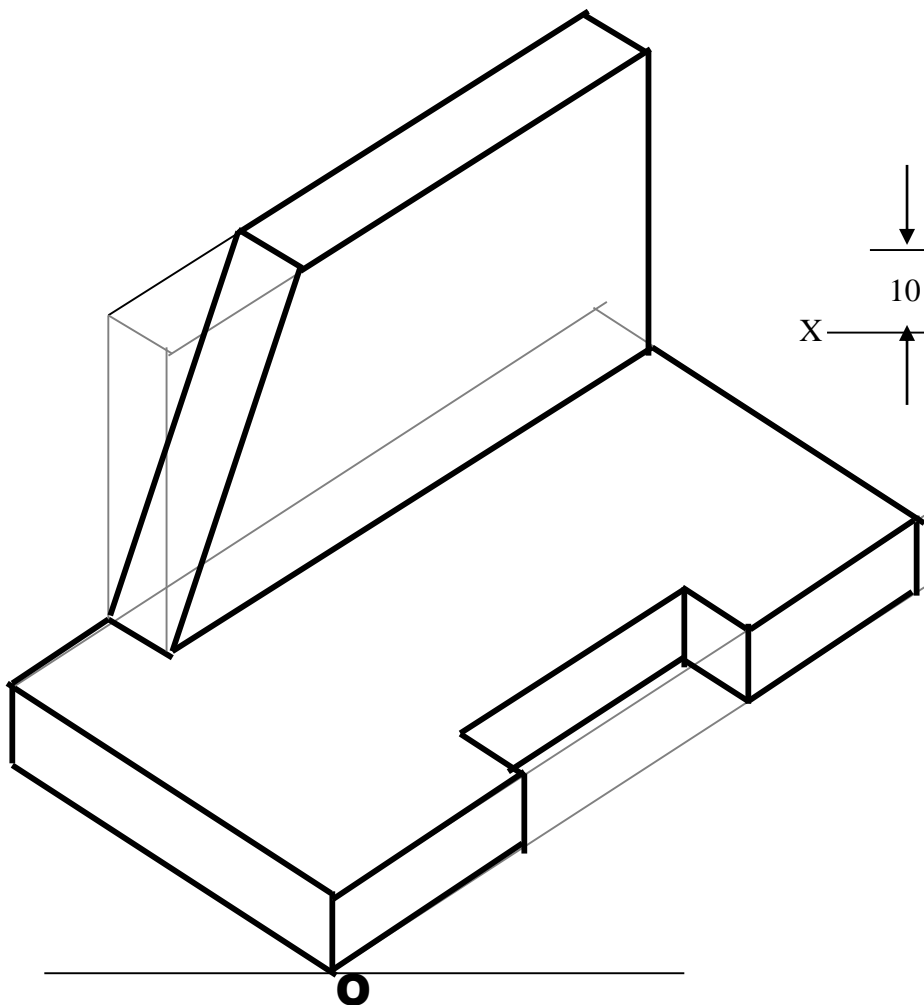
F.V. and S.V. of an object are given.
Draw it's isometric view.

STUDY
ILLUSTRATIONS



STUDY ILLUSTRATIONS

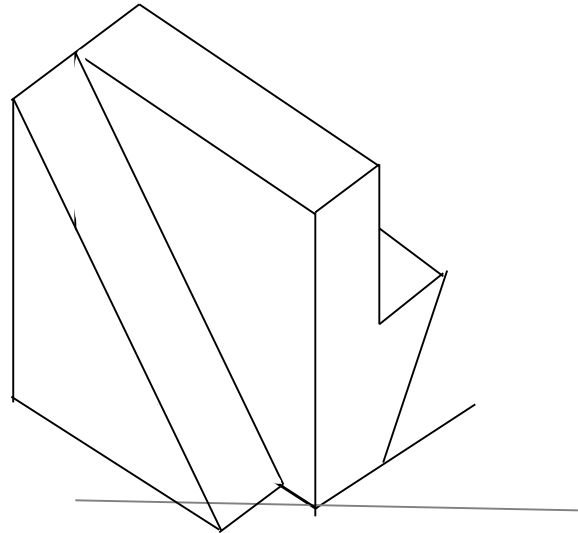
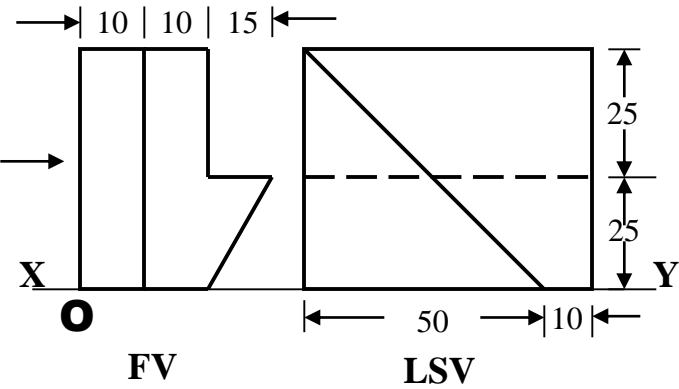
F.V. & T.V. of an object are given. Draw it's isometric view.



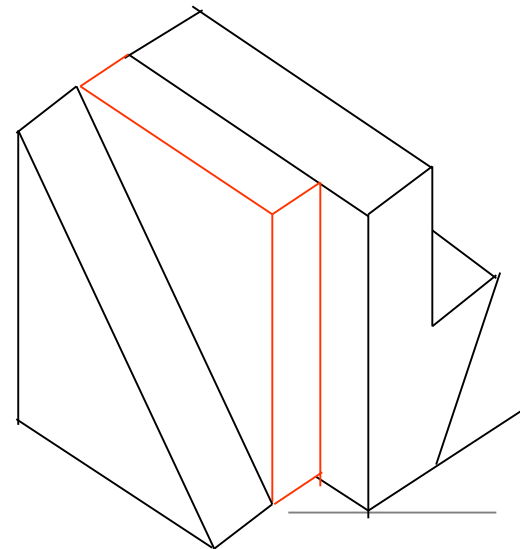
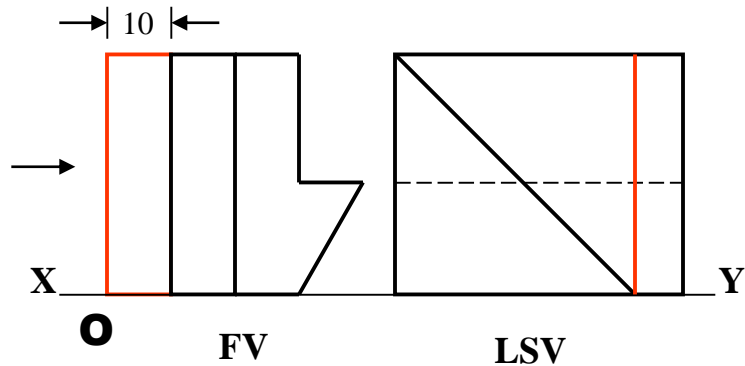
T.V.

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

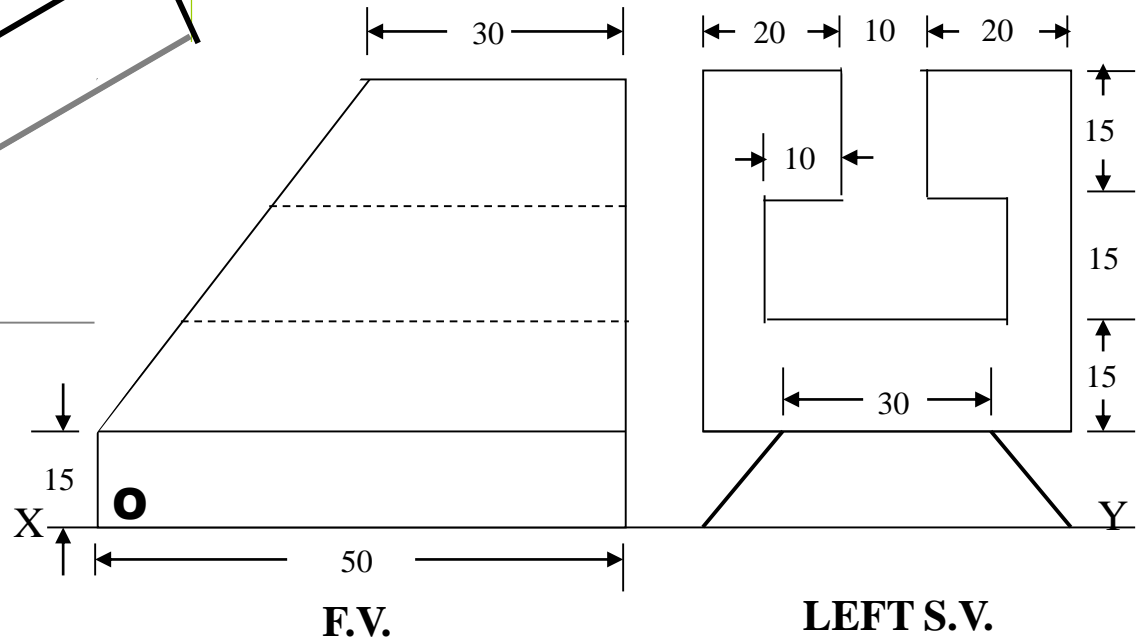
**STUDY
ILLUSTRATIONS**



**NOTE THE SMALL CHZNGE IN 2ND FV & SV.
DRAW ISOMETRIC ACCORDINGLY.**



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



STUDY ILLUSTRATIONS

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

