

## : TYPES OF LINES :-

SR NO.	TYPE OF LINE	NAME OF LINE	USE OF LINE
1	—	CONTINUOUS THICK	VISIBLE OUTLINE VISIBLE EDGES
2	—	CONTINUOUS THIN ST. OR CURVED	DIMN LINE, EXTN LINE, SECT. LINE LEADER LINE
3	~~~~~	CONTINUOUS THIN FREE HAND	SHORT BREAK, LIMITS OF PARTIAL VIEWS
4	— — —	CONTINUOUS THIN ST. WITH ZIGZAG	LONG BREAKS
5	----	DASHED THIN	HIDDEN EDGES
6	—·—·—	CHAIN LINE THIN	CENTRE LINES
7	—·—·—	CHAIN LINE THIN THICK AT ENDS	CUTTING PLANE LINE
8	—·—·—	CHAIN LINE THIN DOUBLE DASHED	OUTLINE OF ADJACENT PARTS ALTERNATE POSITION OF MOBILE PARTS
9	—	CONTINUOUS LIGHT LINE	PROJN. LINE, CONST. LINE

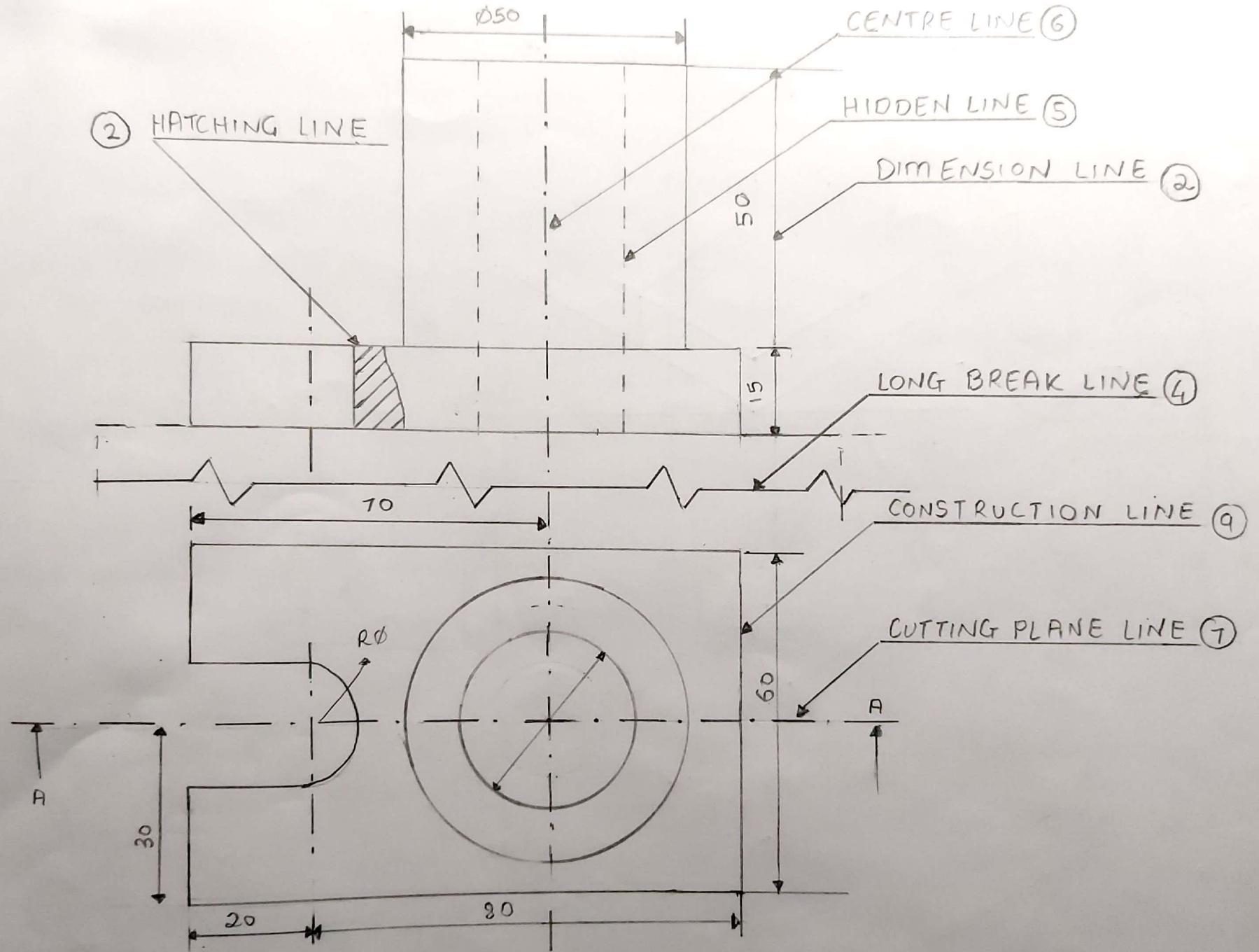
## INDIAN STANDARD PAPER

### SIZES

A0	1189 × 841
A1	841 × 594
A2	594 × 420
A3	420 × 297
A4	297 × 210

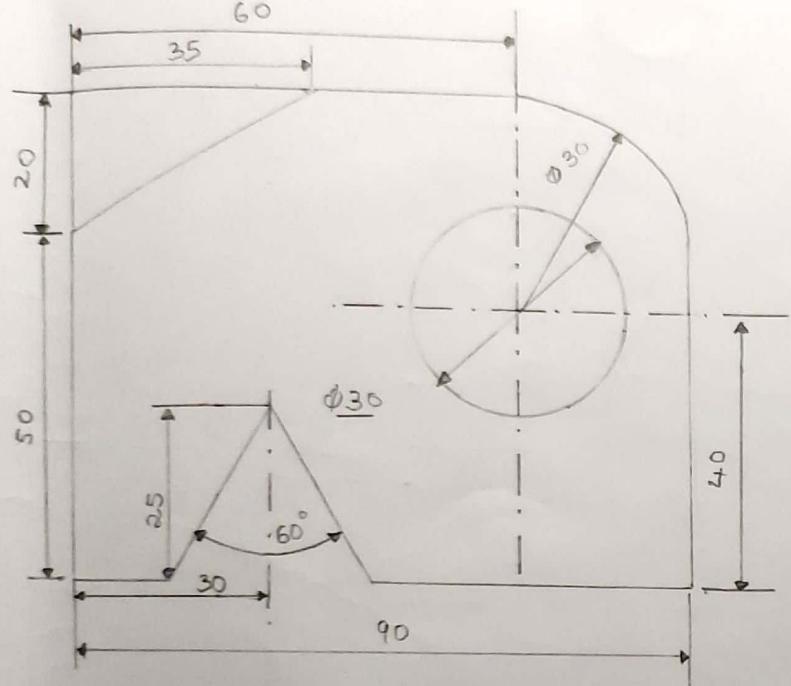
Orthographic projection  
isometric projection

ENGINEERING DRAWING IS A GRAPHICAL LANGUAGE. IT IS USED BY ENGINEERS TO CONVEY THEIR IDEAS REGARDING THE OBJECTS, CLEARLY AND ACCURATELY, IN SIMPLEST AND SHORTEST WAY. THE GOOD KNOWLEDGE OF DRAWING IS ESSENTIAL FOR ALL TECHNICAL PERSONS.

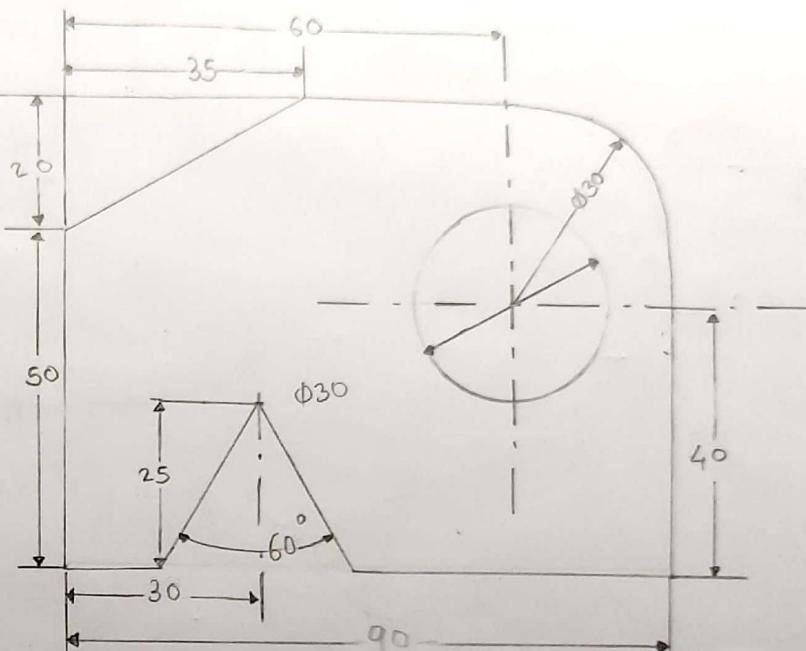


# SYSTEMS OF DIMENSIONING

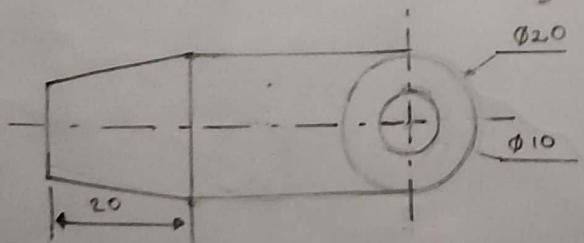
ALIGNED SYSTEM



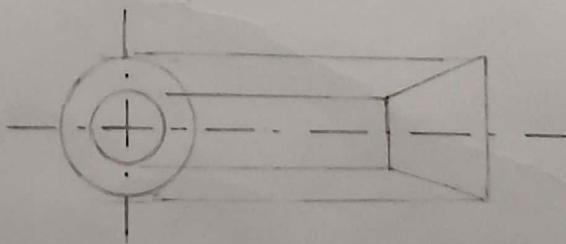
UNIDIRECTIONAL SYSTEM



## : SYMBOLS OF PROJECTION METHODS :

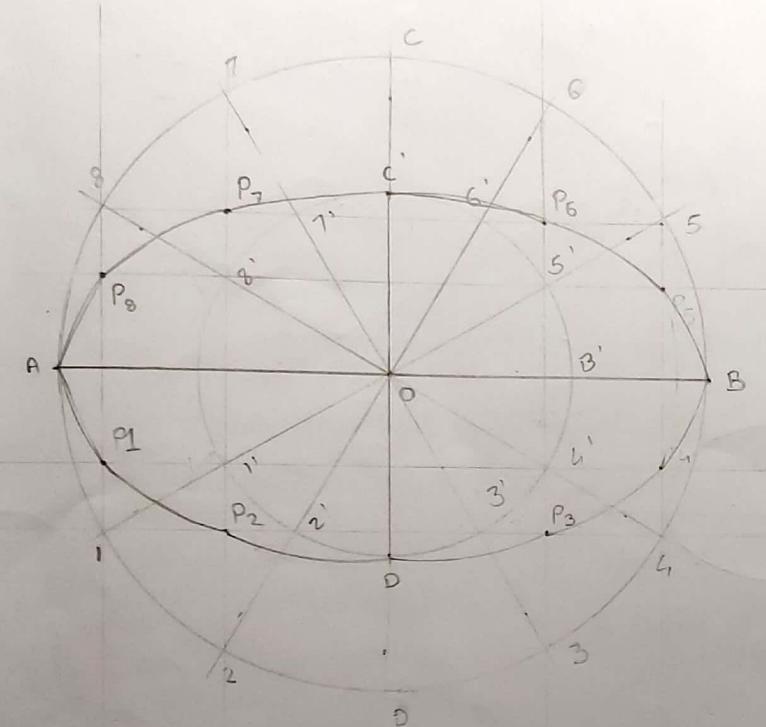


FIRST ANGLE METHOD



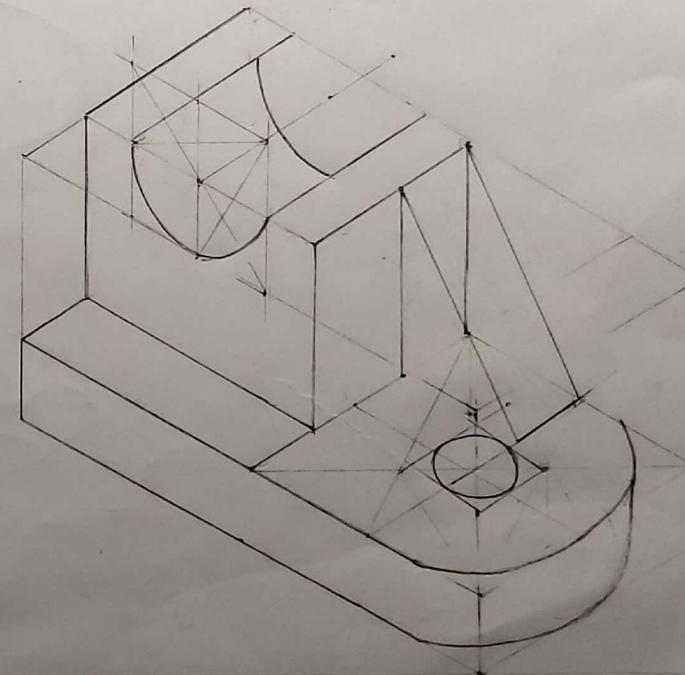
THIRD ANGLE METHOD

Draw an ellipse having major & minor axis 120 mm & 70 mm respectively by concentric circle method



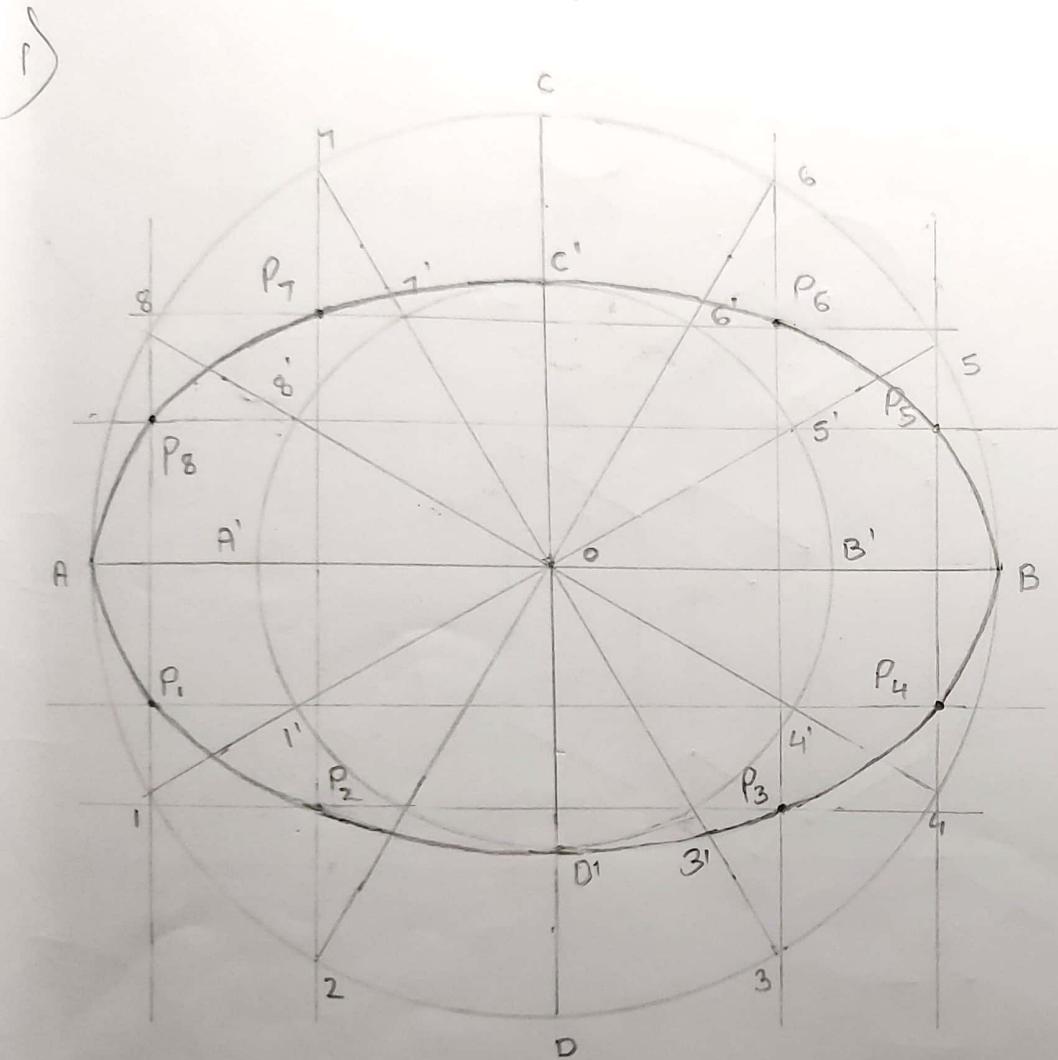
Through point 1 on the major axis draw a line parallel to minor axis CD.

Through point 1' on the minor axis draw a line parallel to major axis CD where two lines intersect each other name it point as P<sub>1</sub>.



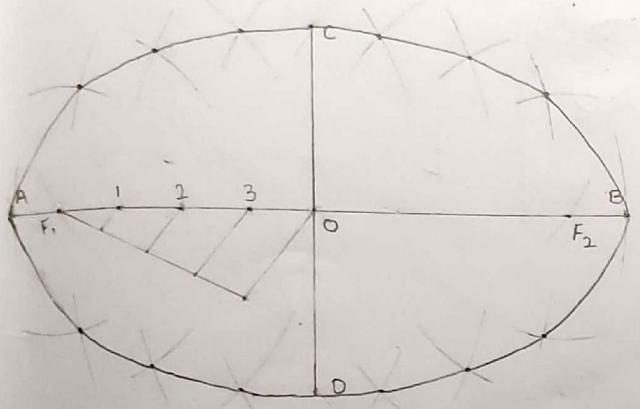
$$\begin{aligned}L &= 100 \\H &= 50 \\W &= 50\end{aligned}$$

$M_i A = 70 \text{ mm}$   $M_j A = 110 \text{ mm}$



Name: Aashish Kumar  
Roll No: 44

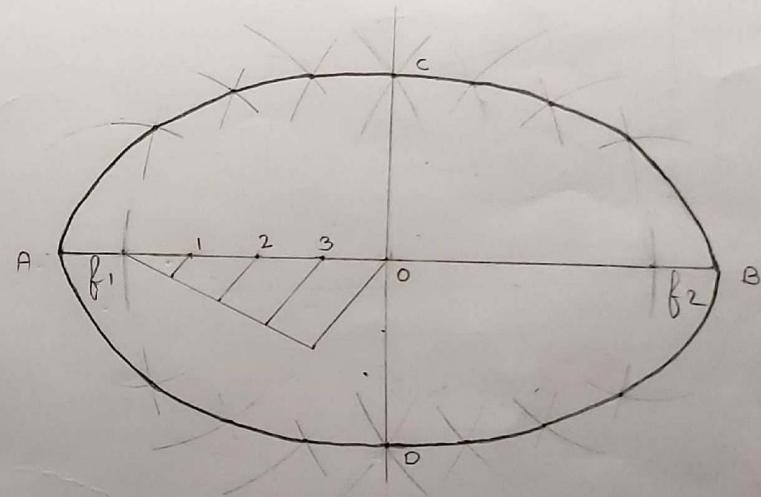
draw an ellipse by arc of circle method major axis 120mm minor axis 70mm



Cut arc from C  
to form  $F_1$  &  $F_2$

A-1 distance is the compass &  $F_1$  as centre &  
cut the arc above  $f_1$  & below  $f_1$  &  $f_2$   
Take B-1 distance as radius & cut the arc  
above and below  $f_1$  &  $f_2$

(2) A-2 B-2



Assignment Prob 1:

Two fixed points  $f_1$  &  $f_2$  are 100mm apart  
draw the path traced out by a point  
P major axis = 125mm

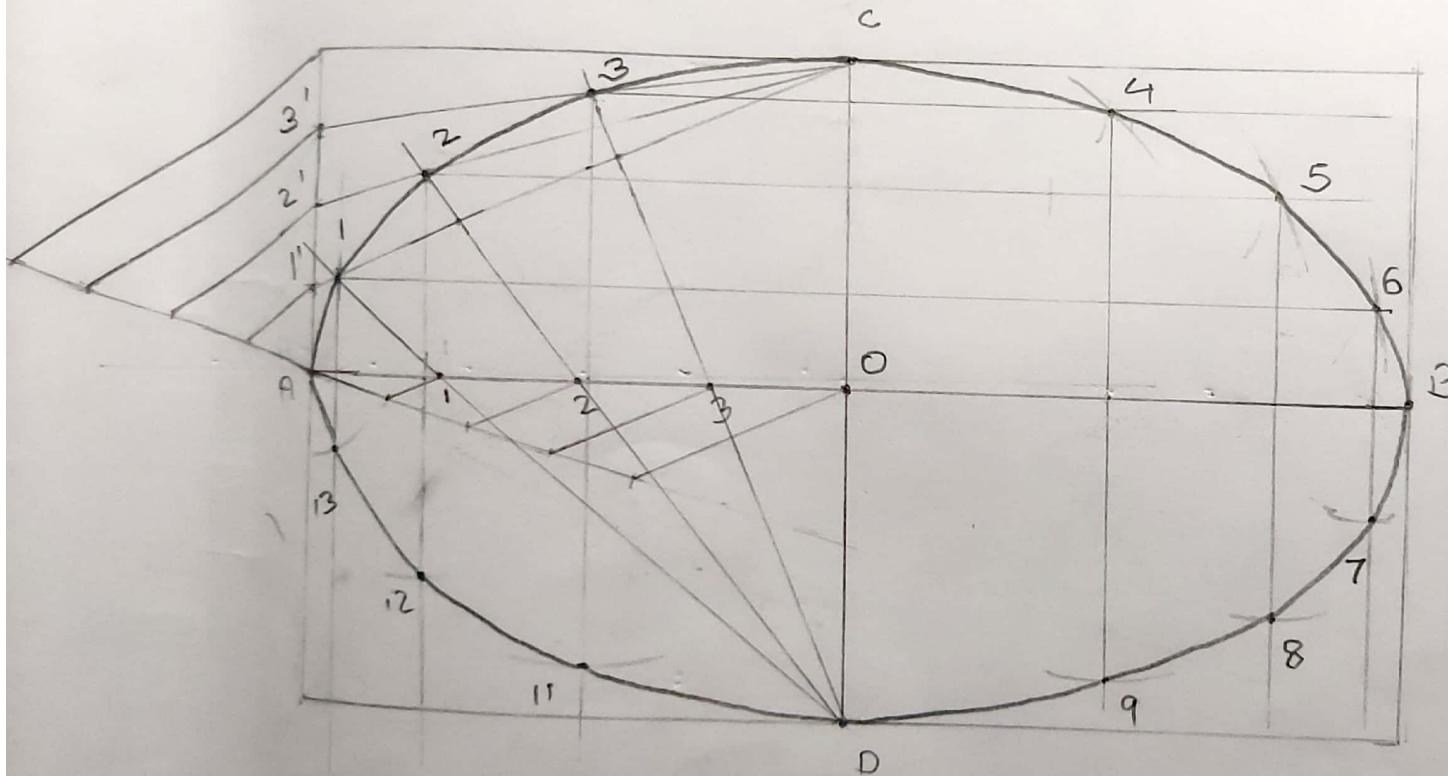
minor axis = 70mm  
major axis = 125mm

NAME: Aashish Kumar

ROLL NO: 44

Ellipse by oblong method : Q) Draw the ellipse by oblong rectangle

Aashish Kumar 44



Pract

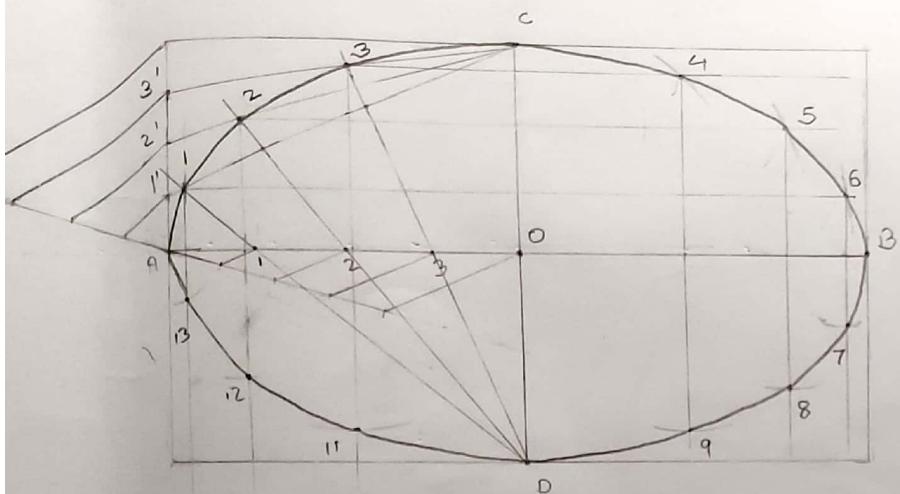
The foci

major ax  
rectangle

rectangle

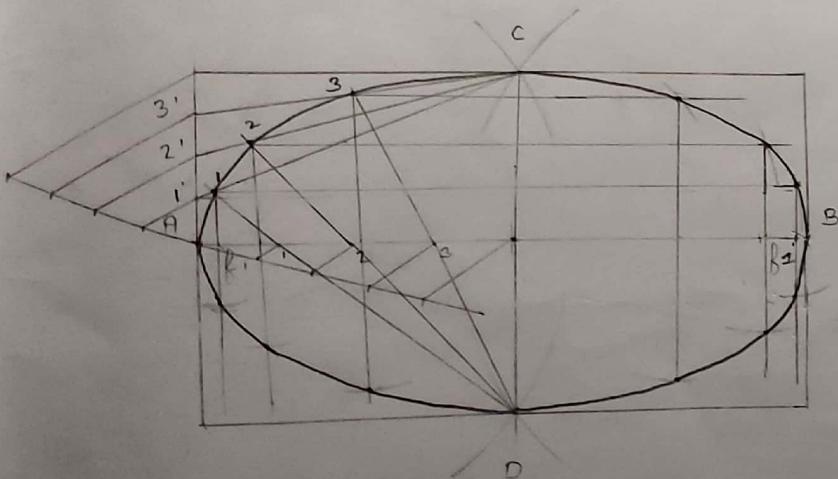
major axis

Aashish Kumar 4,4



Practical prob

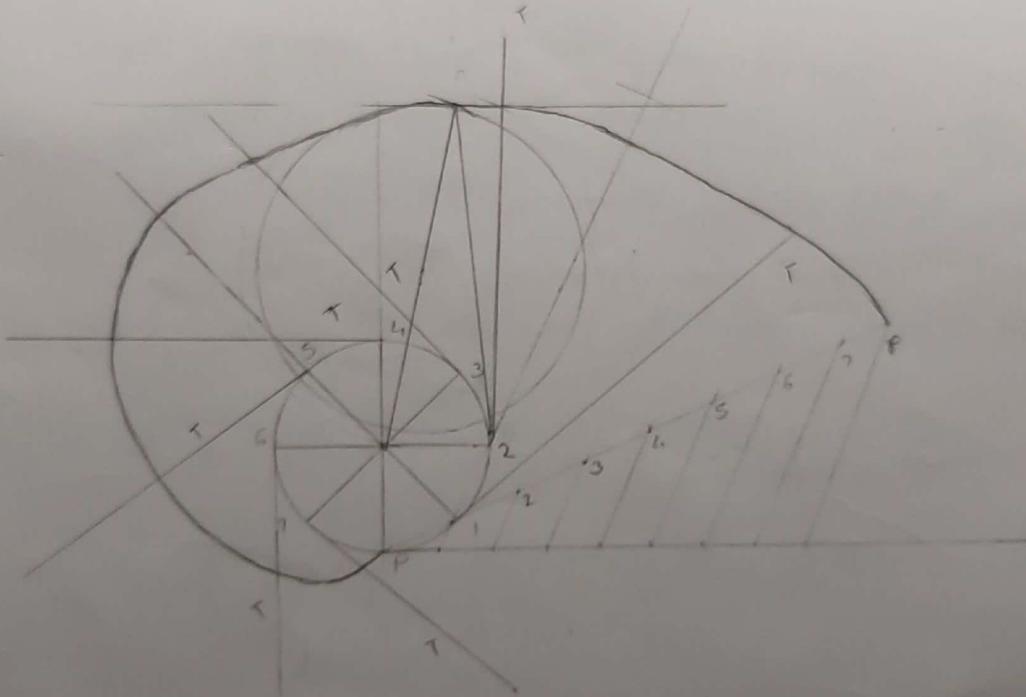
The foci of an ellipse are 90mm apart. The major axis = 110 mm long. Draw an ellipse by rectangle method.



Involute: It is a locus of a point on the straight line which rolls without slipping around a polygon or the circumference of a circle. It is also defined as locus of the end of the thread unwound from the circle keeping the thread always tight.

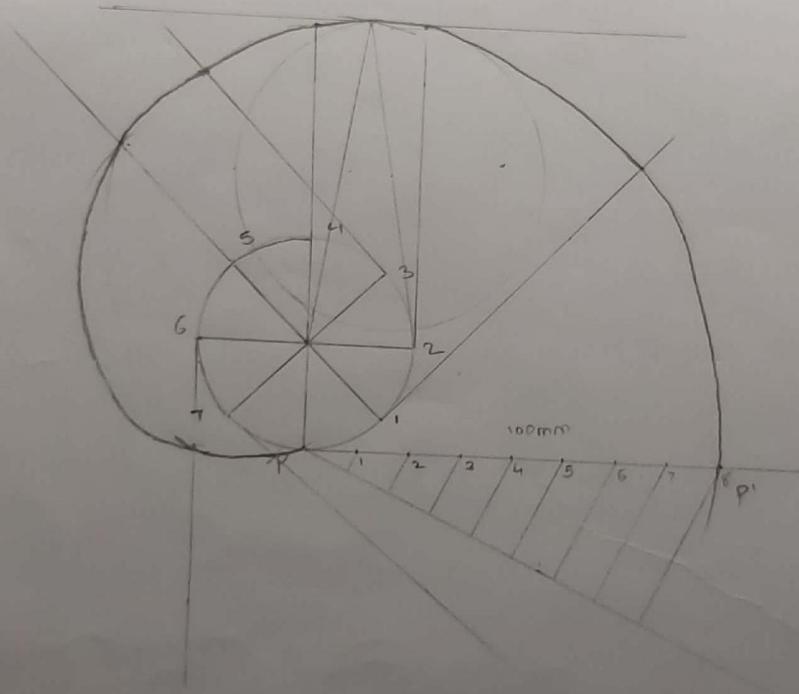
Draw an involute of the circle of 60mm diameter also draw a normal and tangent to the point 100mm from the centre of a circle

$$\begin{aligned} \text{OD} &= D + 40\text{mm} \\ &= 125.7 \end{aligned}$$



Assignment Prob

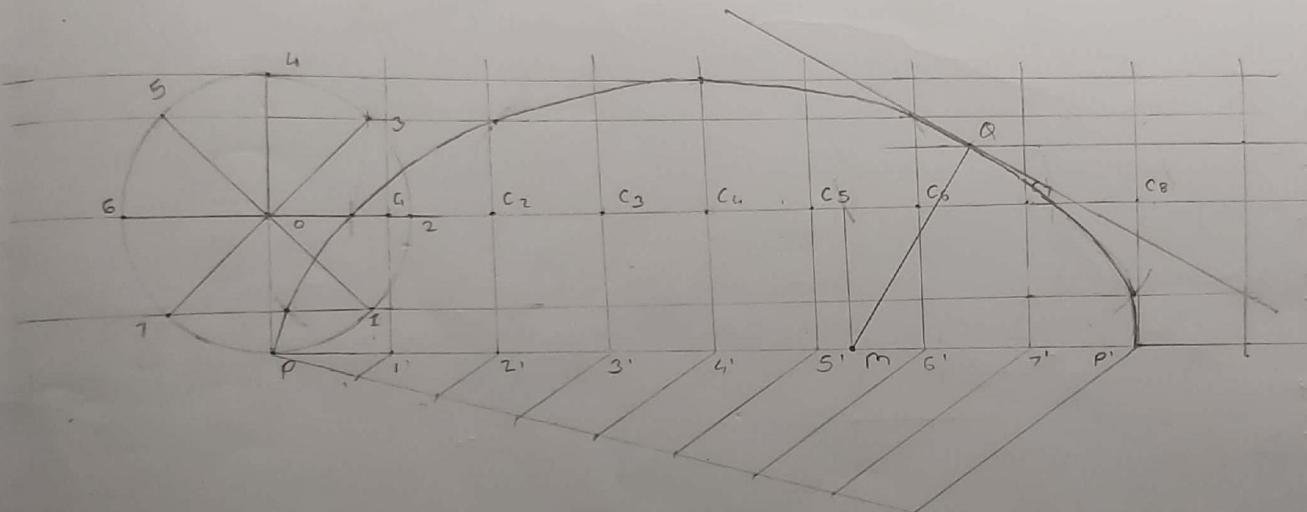
One end of ET 100mm long is attached to Circumference of circular disc of 60mm dia draw  
the part of the frame end of it such that it is completely wound around disc keeping always tight  
ND : 100 mm



Cycloid: It is defined as the locus traced out by a point on the circumference of the circle which rolls along a fixed straight line without slipping. Prob.

- ① A circle of 50 mm diameter rolls along a straight line without slipping draw the curve traced out by a point 'P' on the circumference for one complete revolution of circle. Draw tangent to the curve at point 60 mm from base line  $\pi D = 50 \times \pi = 157 \text{ mm}$

①

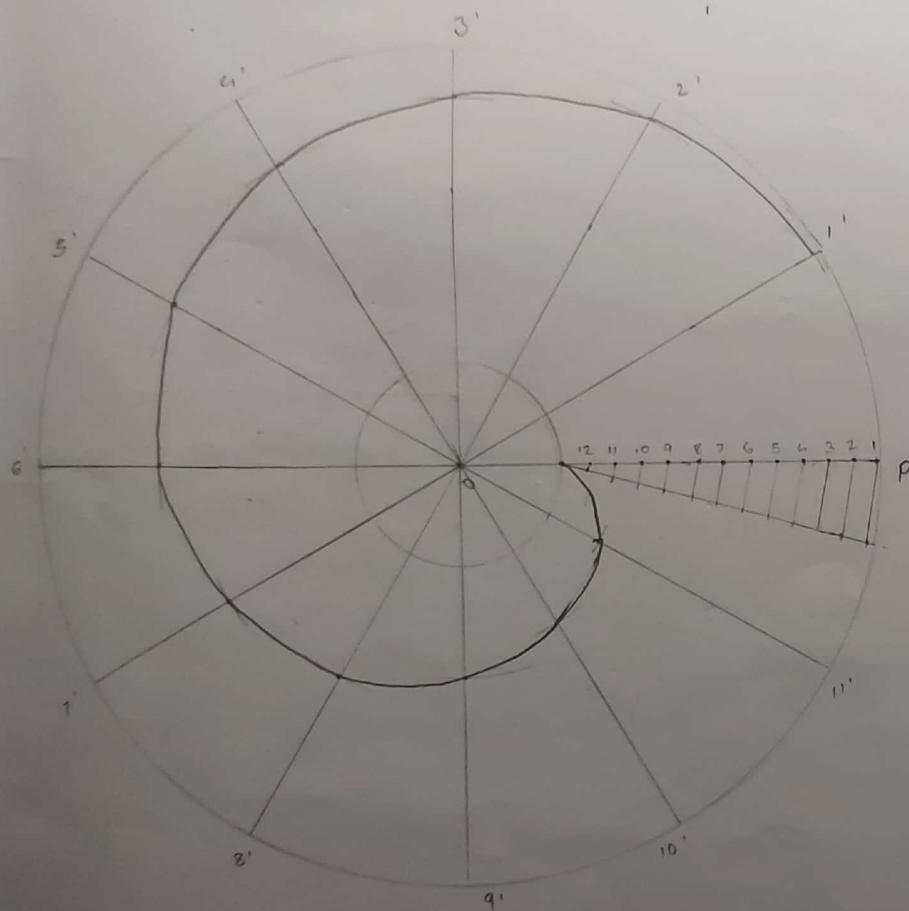


Take C<sub>1</sub> as a centre and radius  
= 25 mm, Put an arc on generator  
..

Spiral: A point between moving uniformly along a straight line, which is rotating about its center and its pole with uniform angular velocity. Each revolution formed as convolution.

$$\begin{aligned} SR &= 80 \text{ mm} \\ CR &= 20 \text{ mm} \end{aligned}$$

Take 0 to 1 as radius & 0 as centre

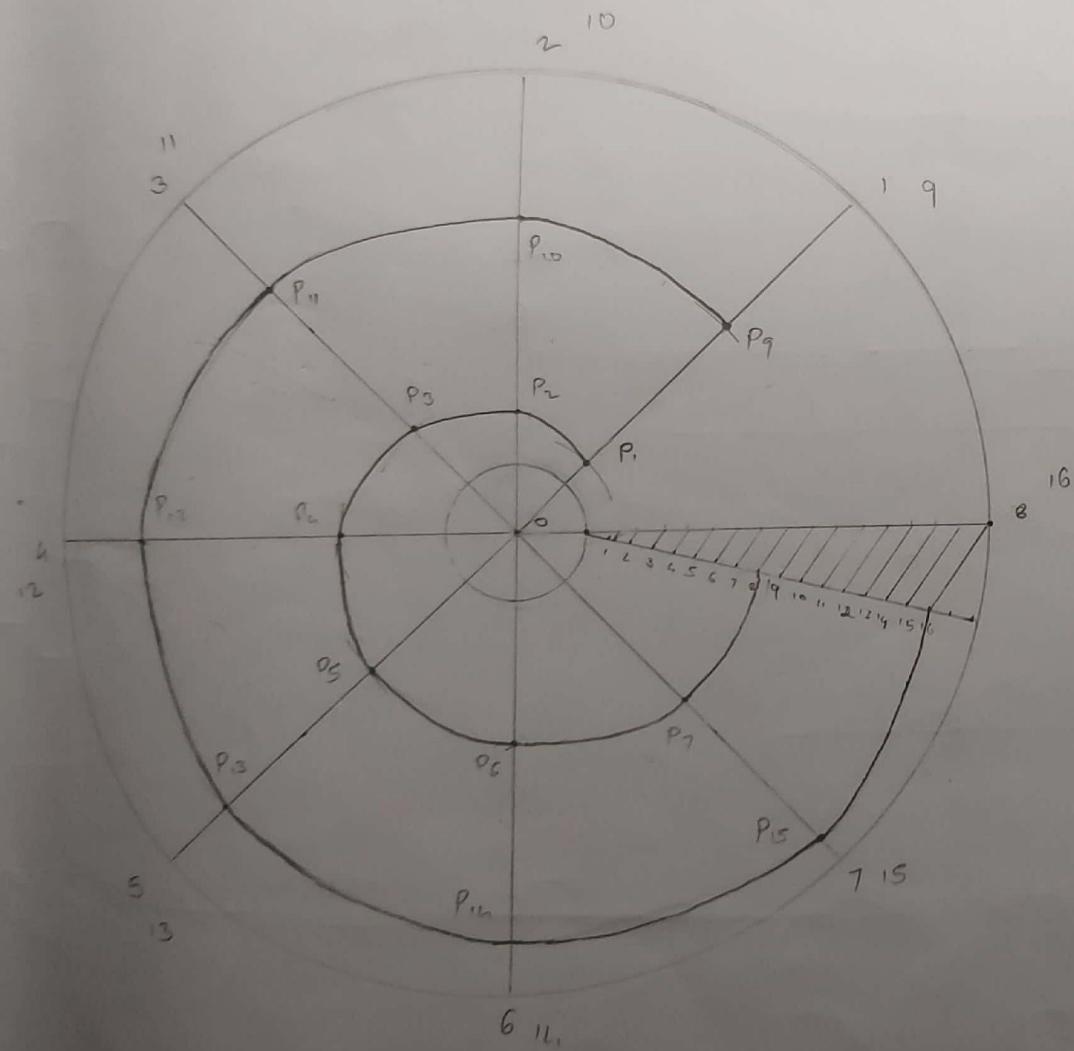


Spiral for single convolution

construct an archimedean spiral of two convolution given the greatest radius 84 mm & shortest  
radius 12 mm

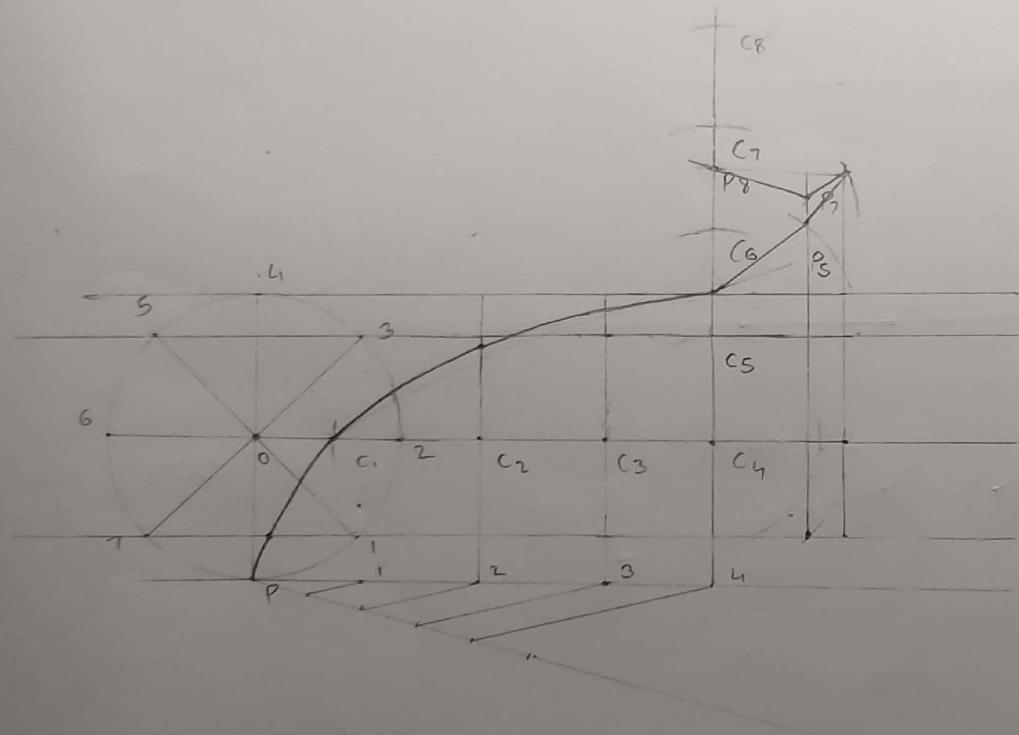
sheet No 2

1st prob



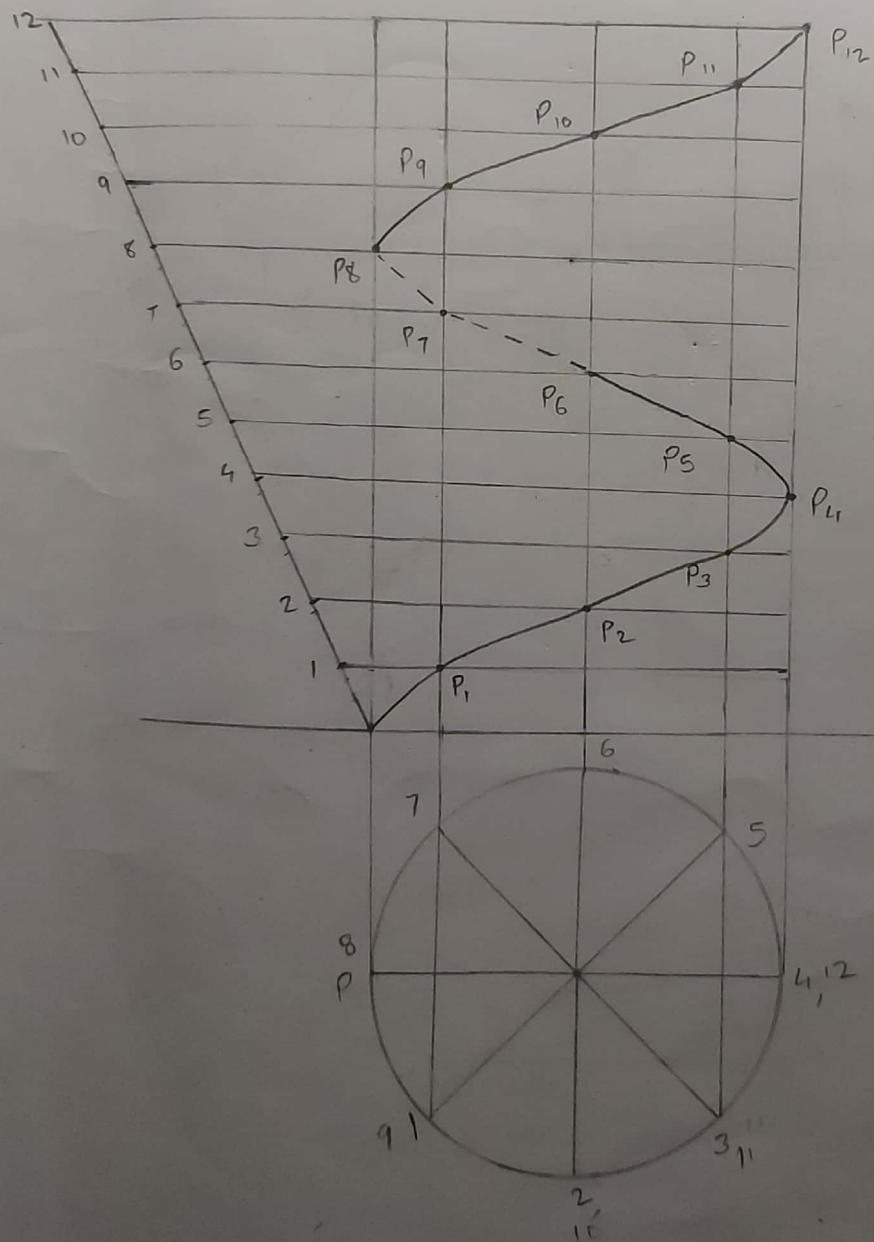
A beam of 50 mm diameter rolls towards the right on a horizontal for half revolution and then on a vertical wall in the upward direction for the remaining half revolution without slipping. Draw the locus of point P on the circumference of the wheel. Take initial point of contact with the floor. Name the curve.

Sheet 2 Prob 2



- ① Helix on cone: Draw a helix of one convolution upon a pitch 75 mm. Also develop the surface of the cone, show
- ② Helix on cylinder: Draw a cylindrical helix of diameter
- sheet No 2 prob 3

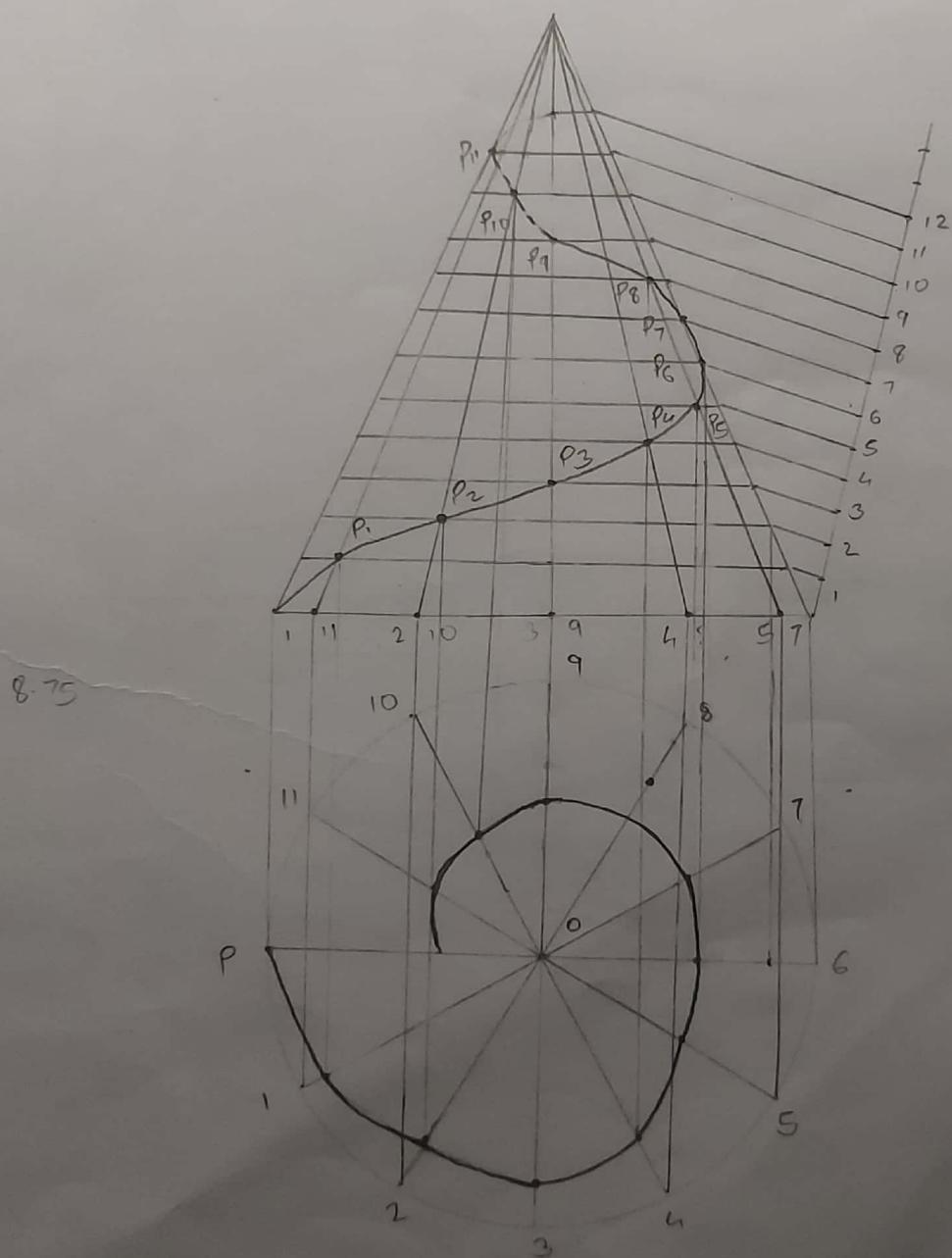
$$8+4=12$$



olution upon a cone, diameter of base = 80mm height 100mm  
cone, show helix on it.  
is of diameter 60 mm and pitch 70 mm for one  
and half revolution of  
angle of helix -

$$8+4=12$$

$$h = n \times p = 1.5 \times 70 \\ = 105 \text{ mm}$$



I quad  
(F.V) front view  
(T.V) Top view

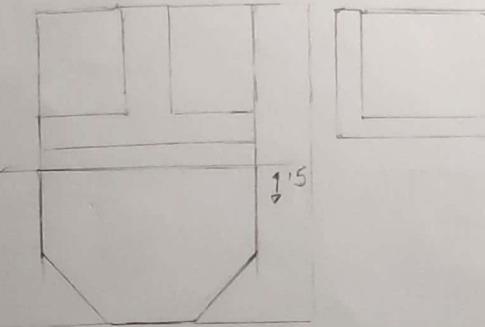
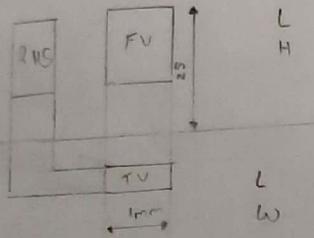
II quad  
opposite  
to 1st  
quad

Front view  
• length (l)  
• width (w)

Top view  
• length (l)  
• width (w)

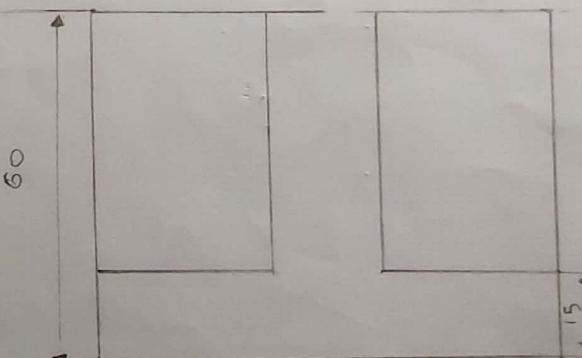
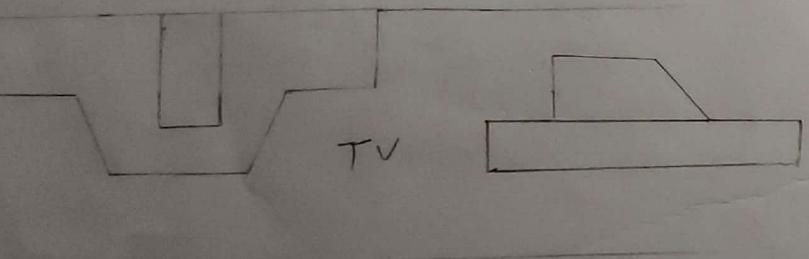
1st quadrant: object & observer  
plan & observe  
3rd quadrant: plan is bis  
observe & object  
SV-LHS

SV-LHS

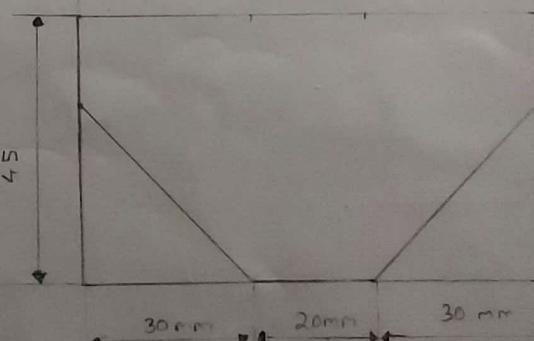
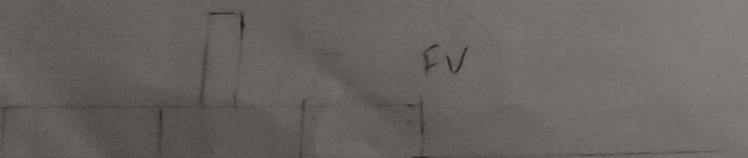


RHS	FV	SV	LHS
LHS	T.V	SV	RHS

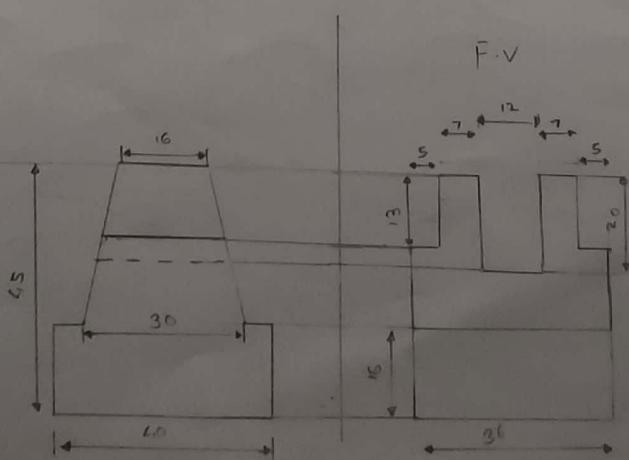
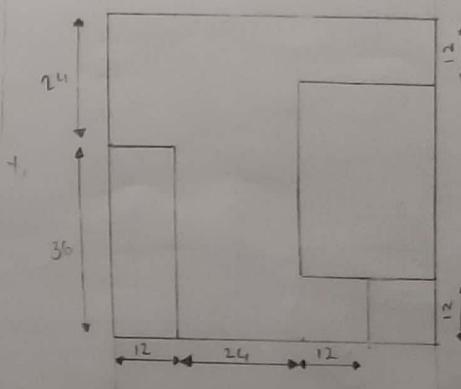
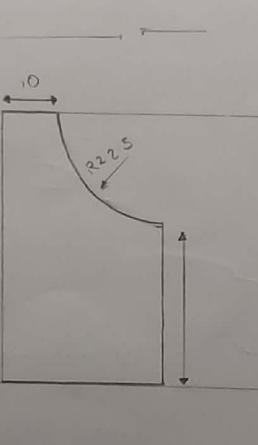
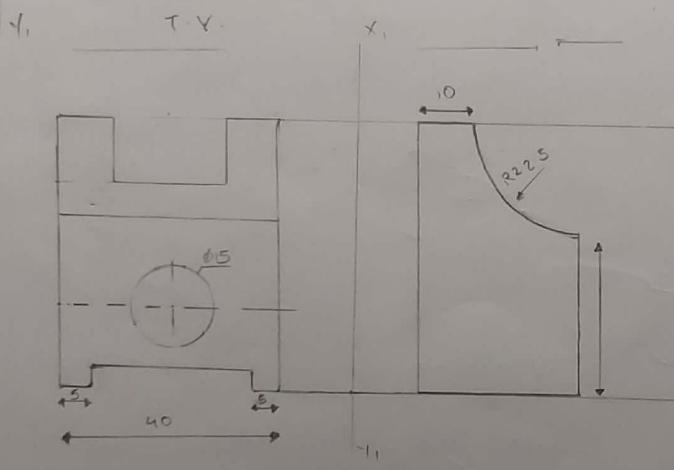
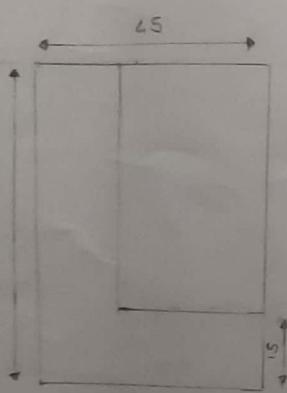
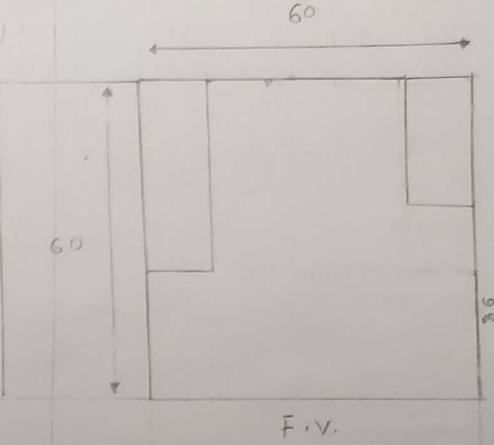
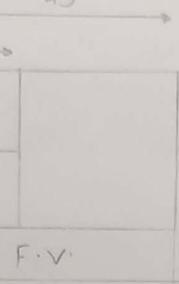
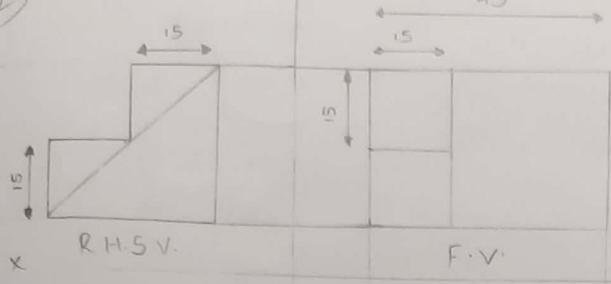
F.V

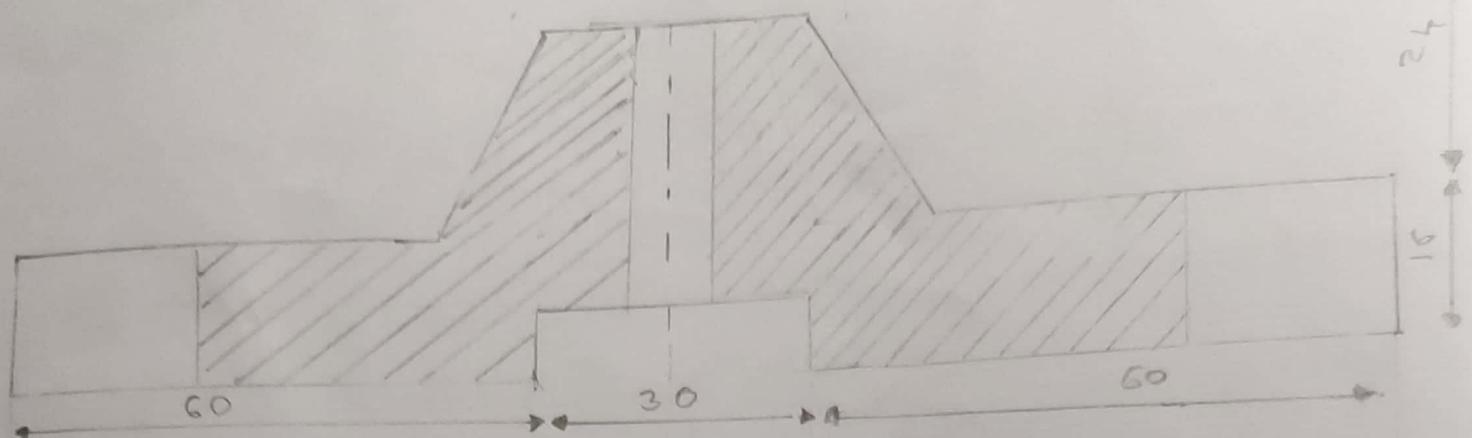


X

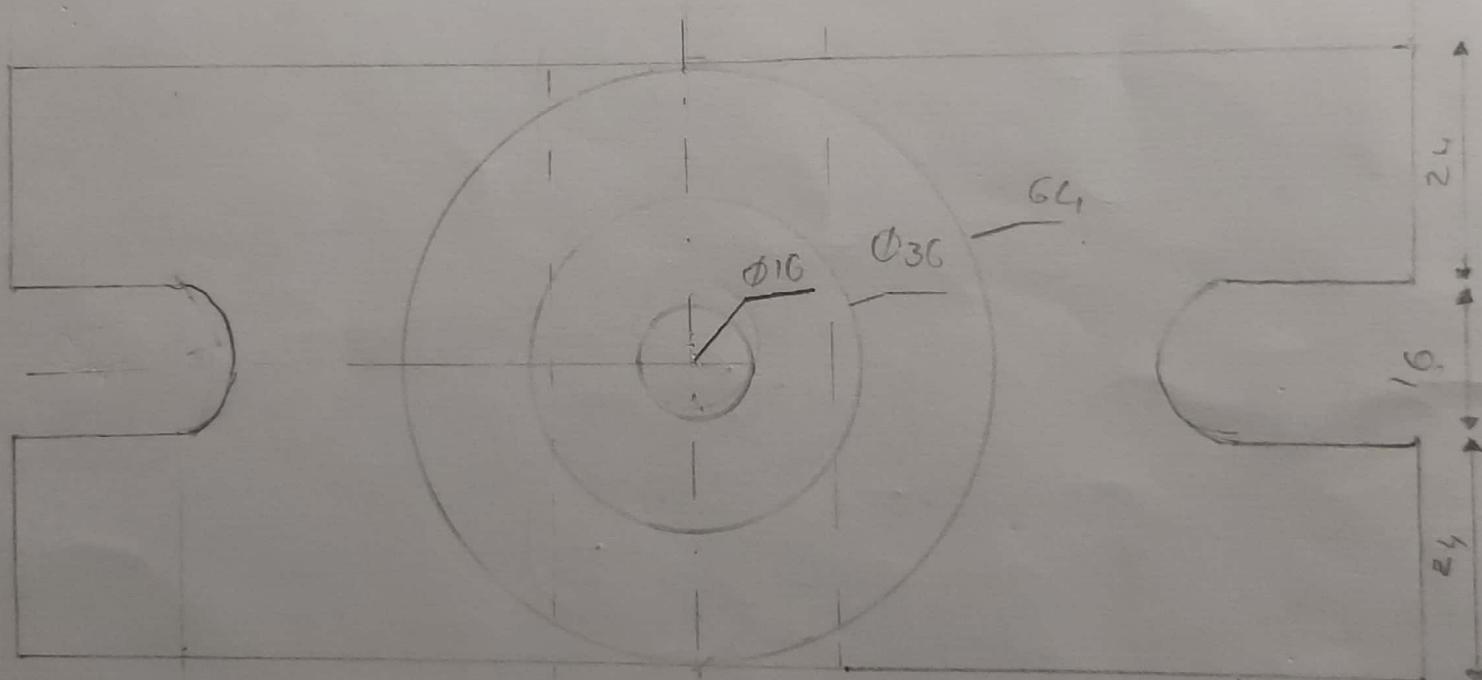


T.V

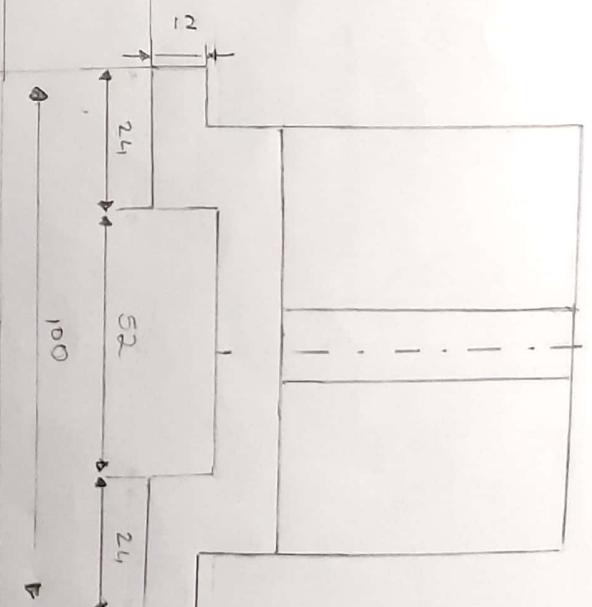
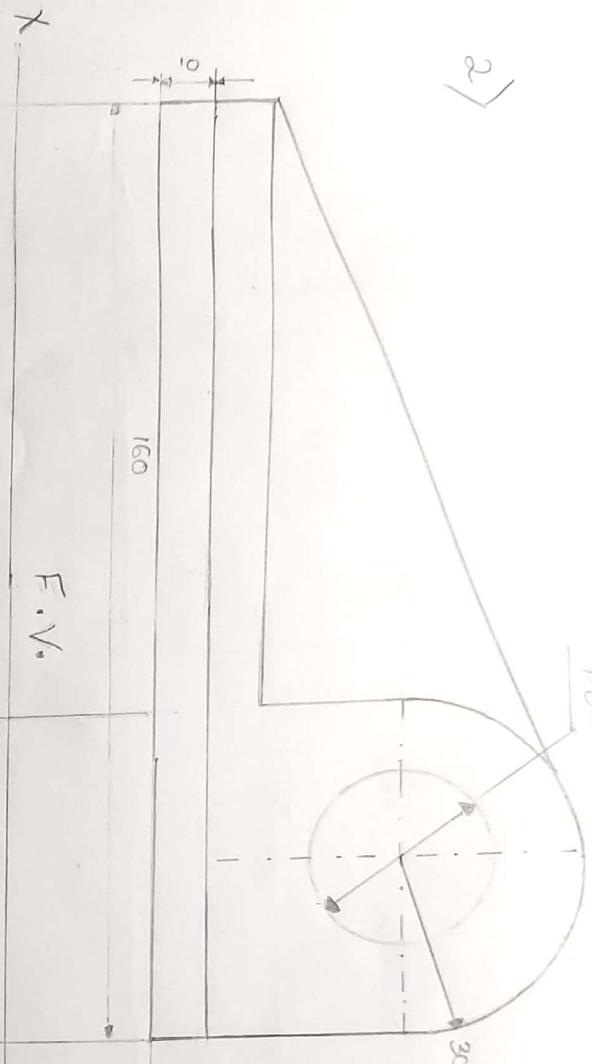
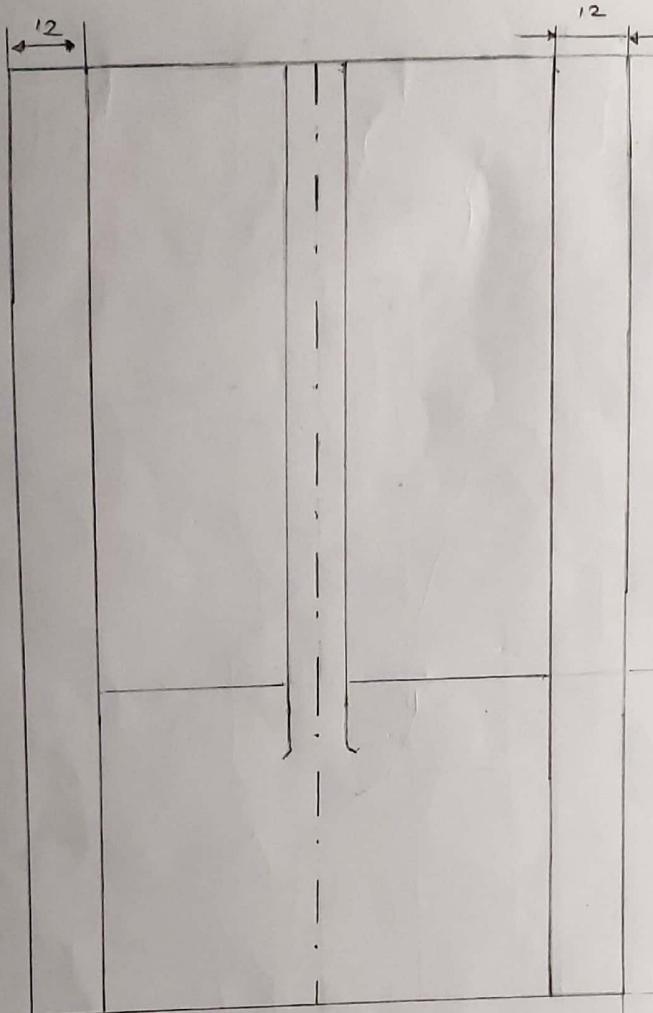




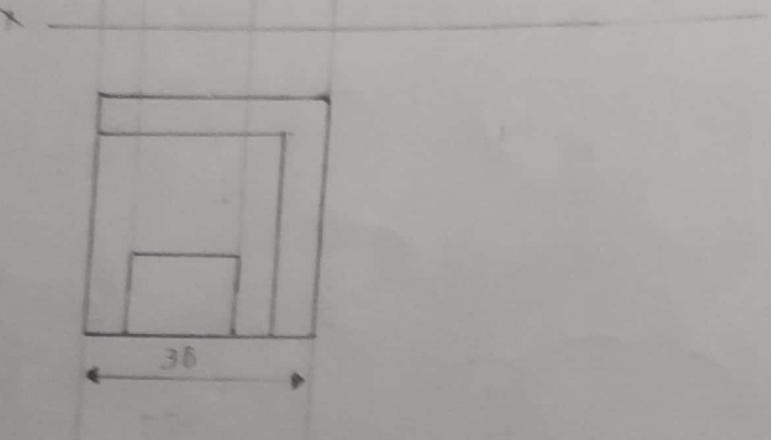
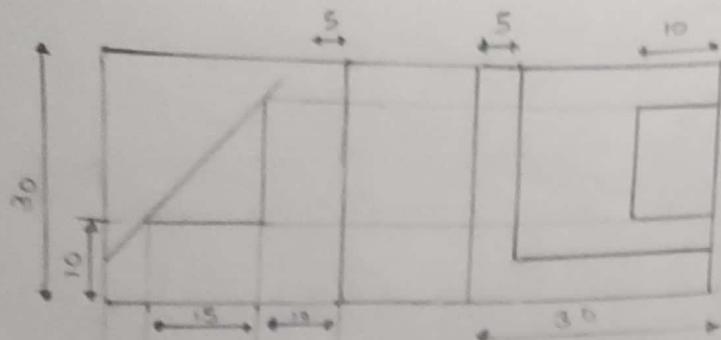
FV



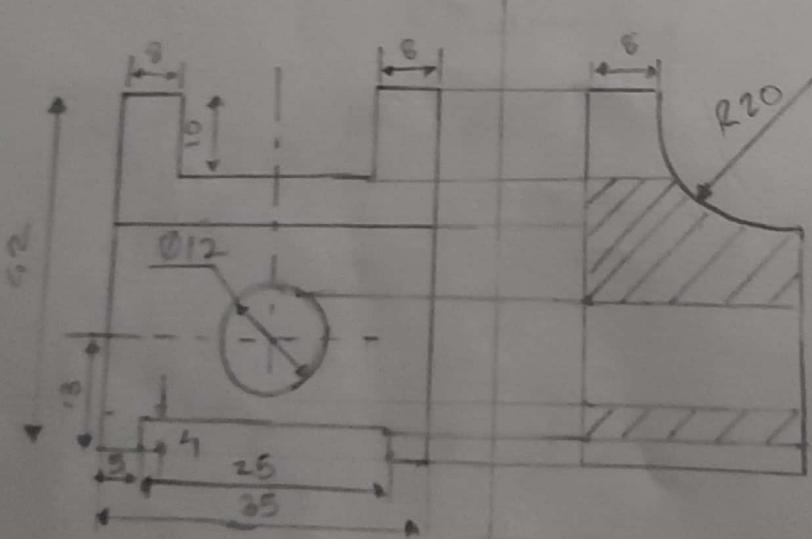
TV

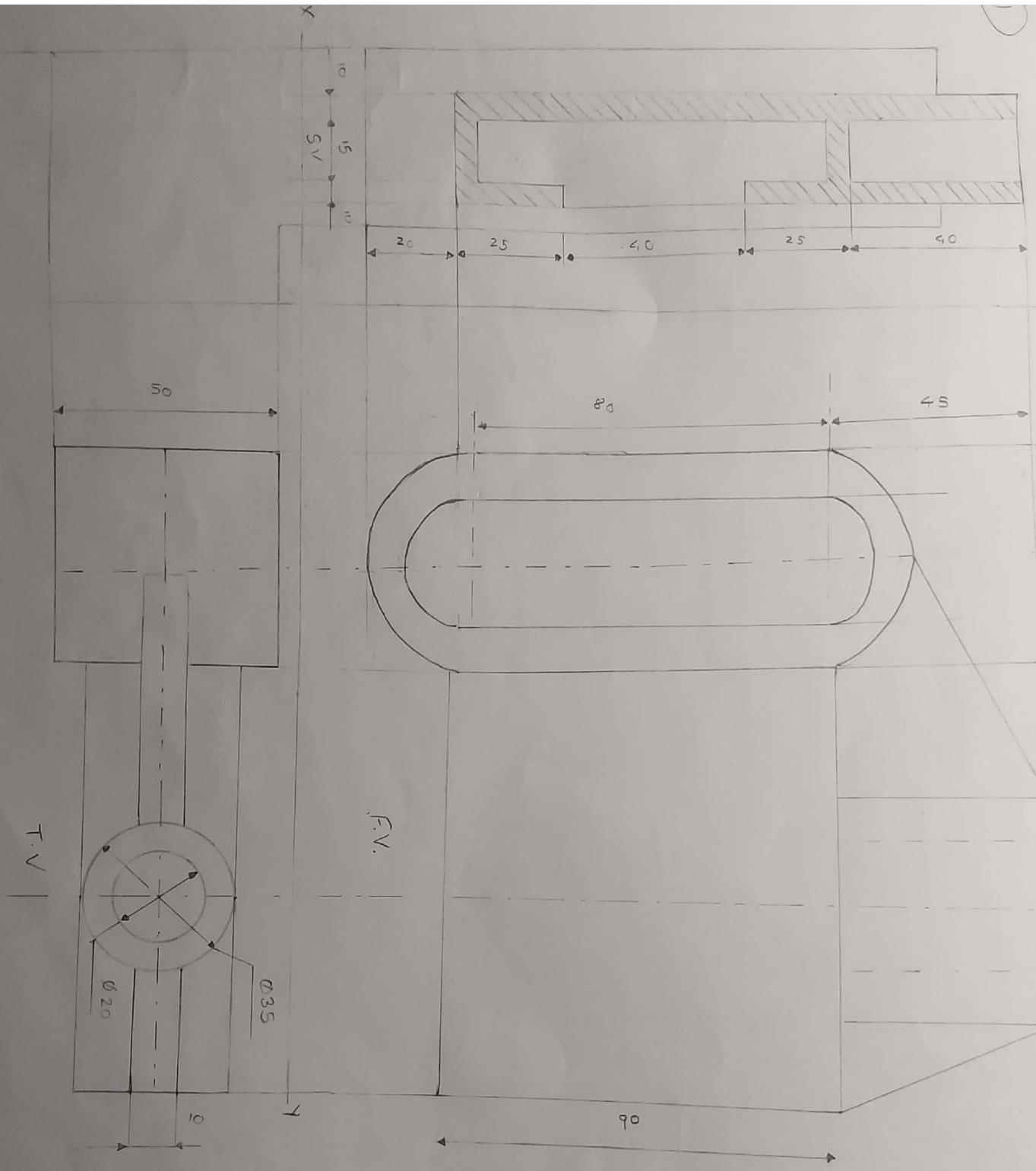


Name: Ashish Kumar  
Roll No: 44

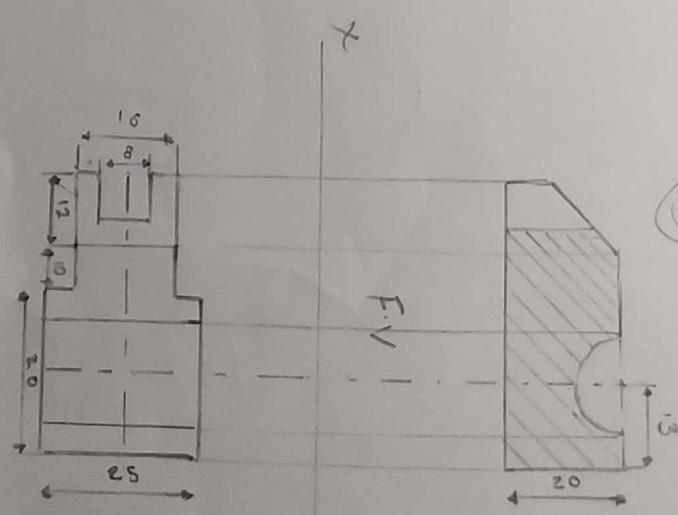


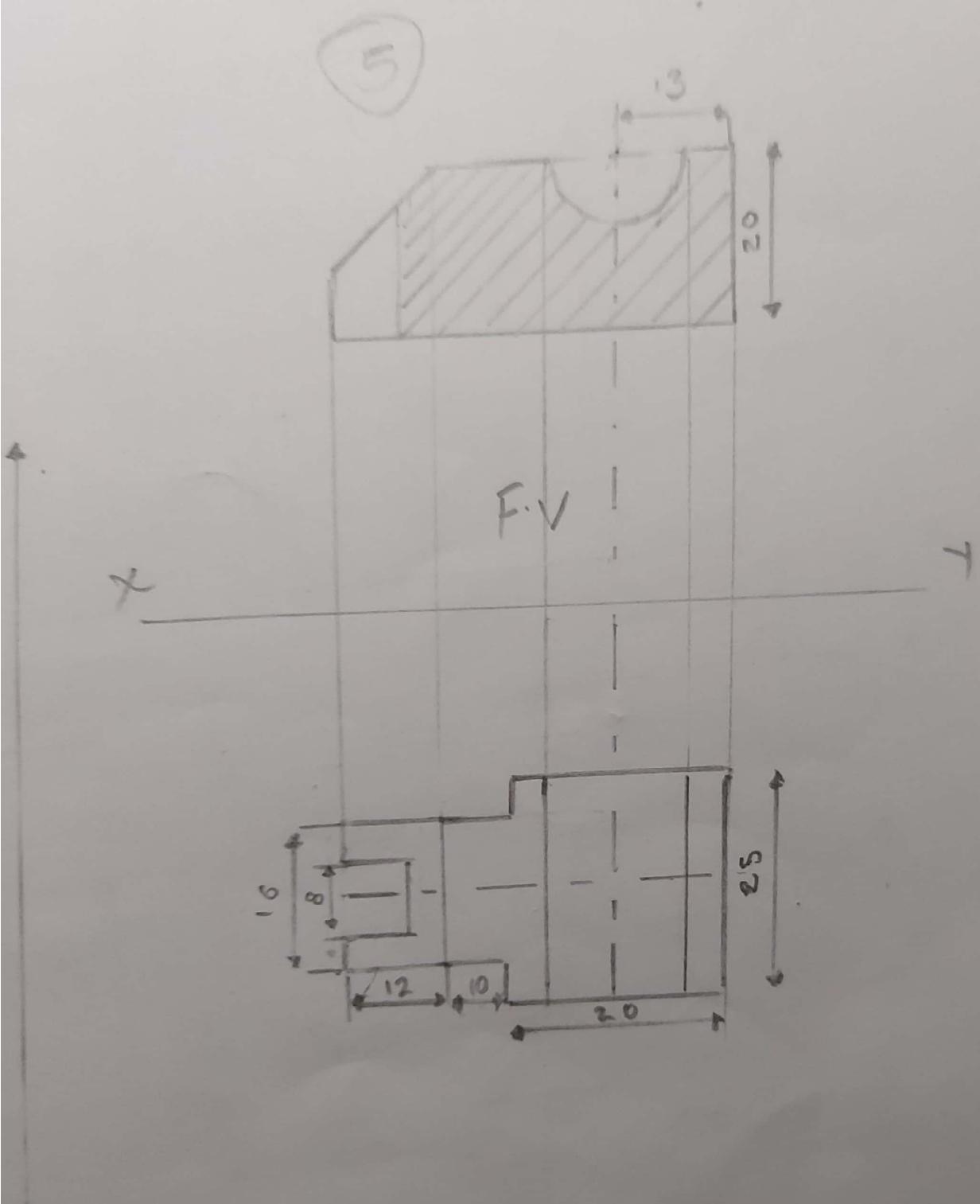
(B)

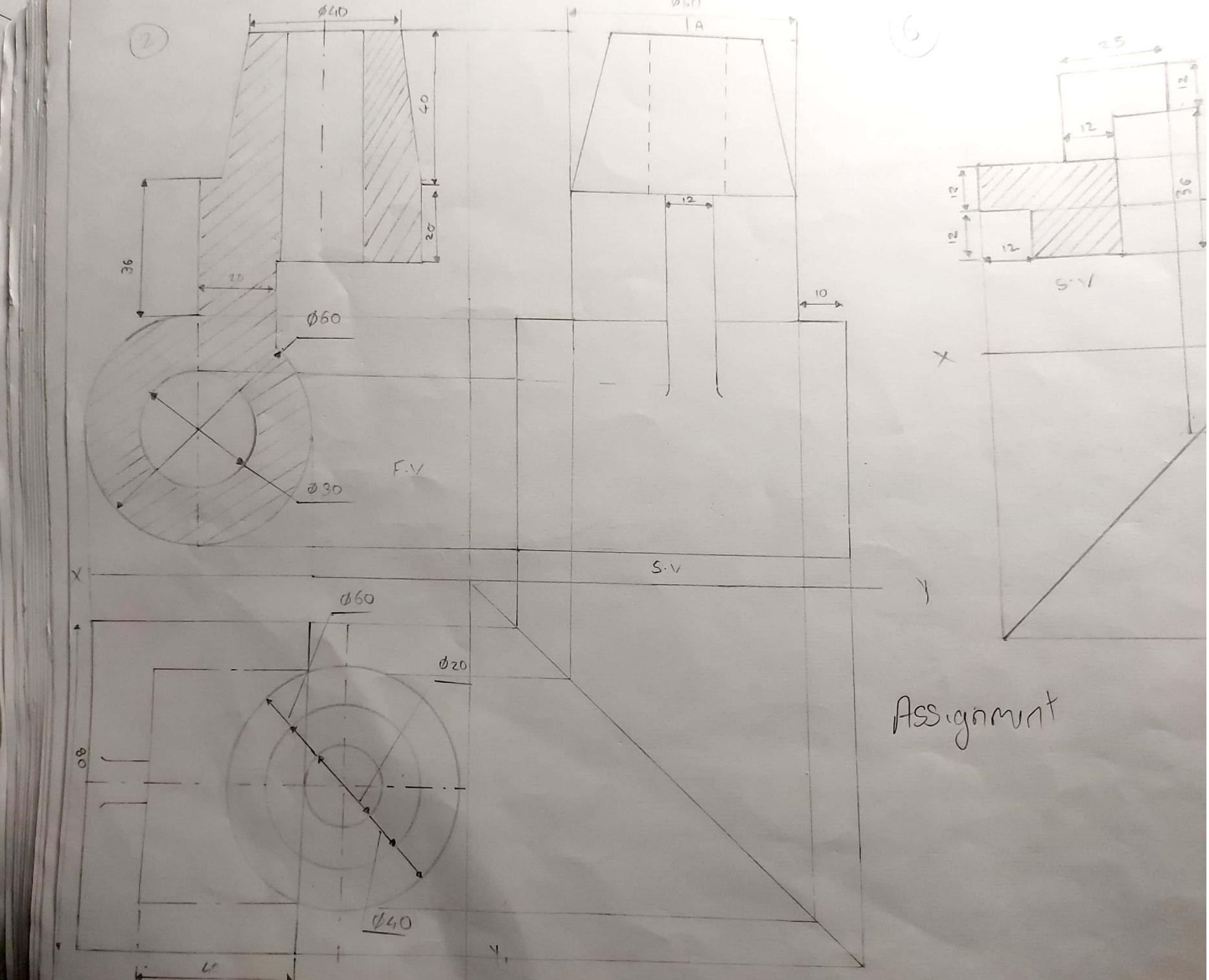




Acessório

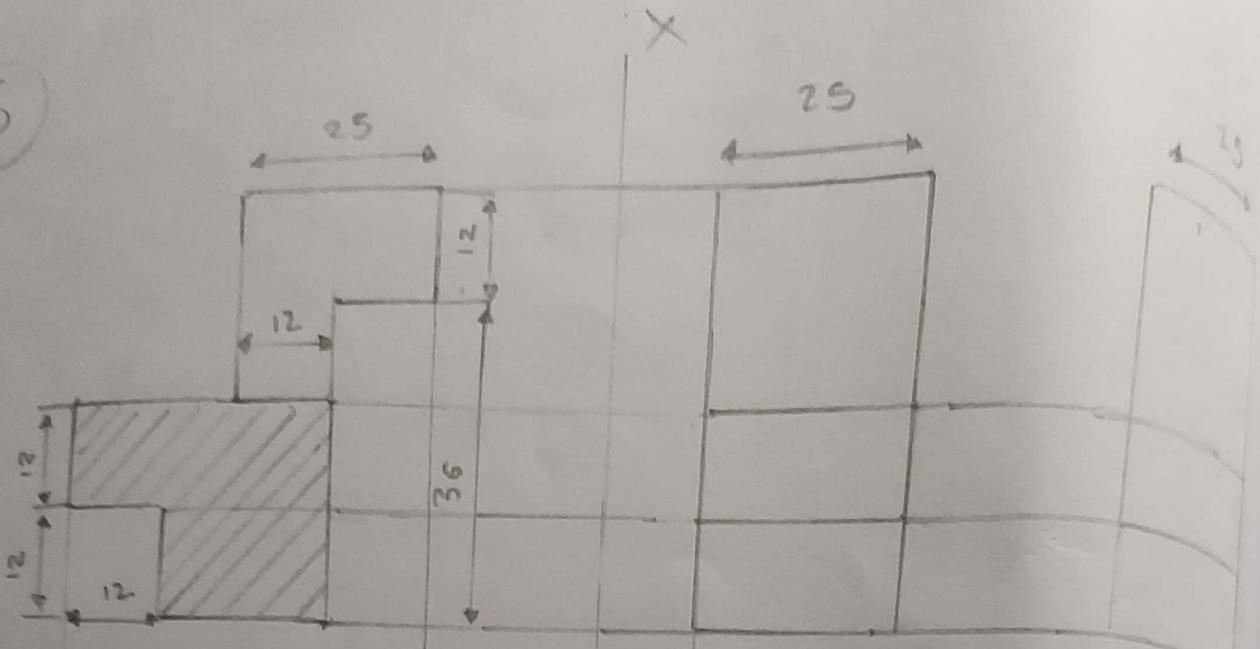






Scanned with CamScanner

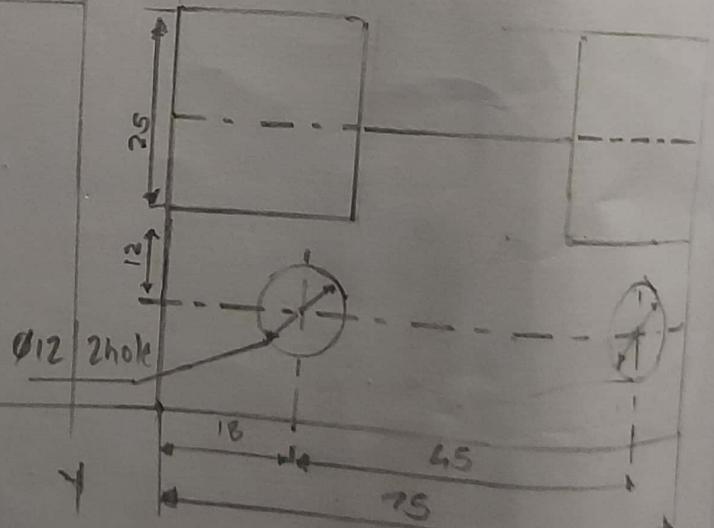
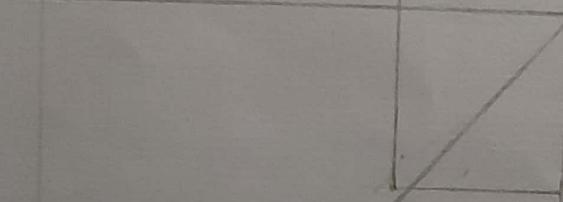
(6)



S.V

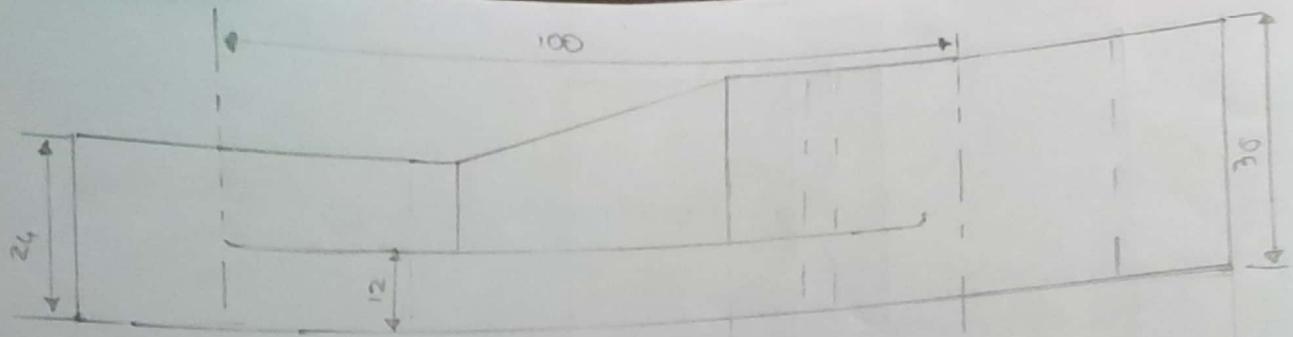
F.V

X



T.V

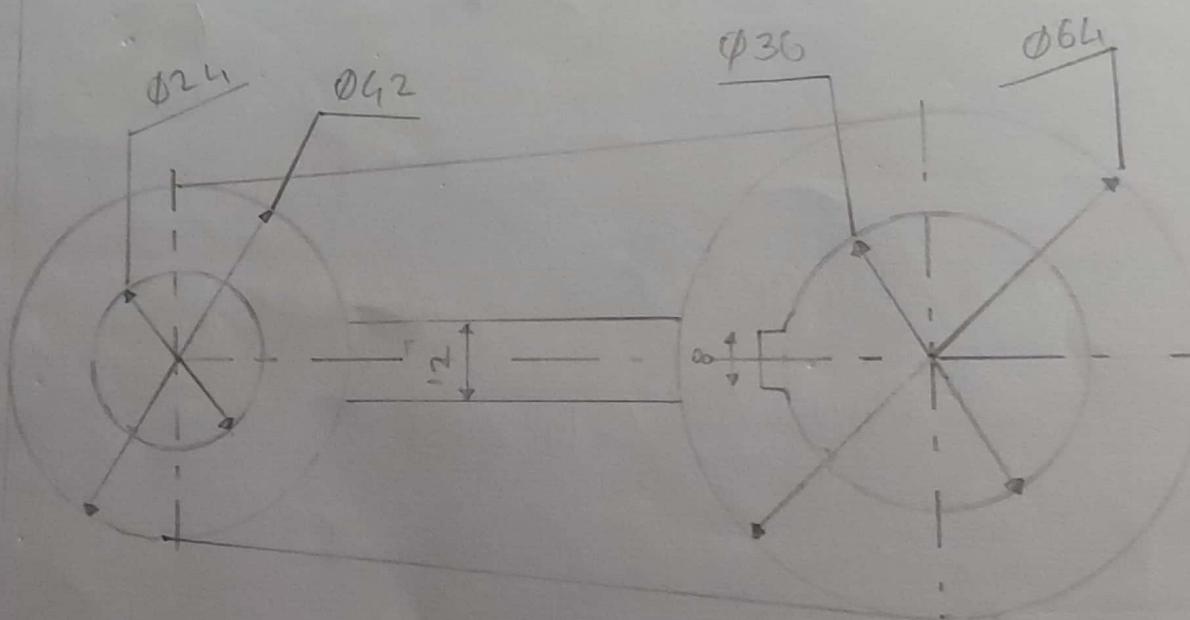
②



F.V.

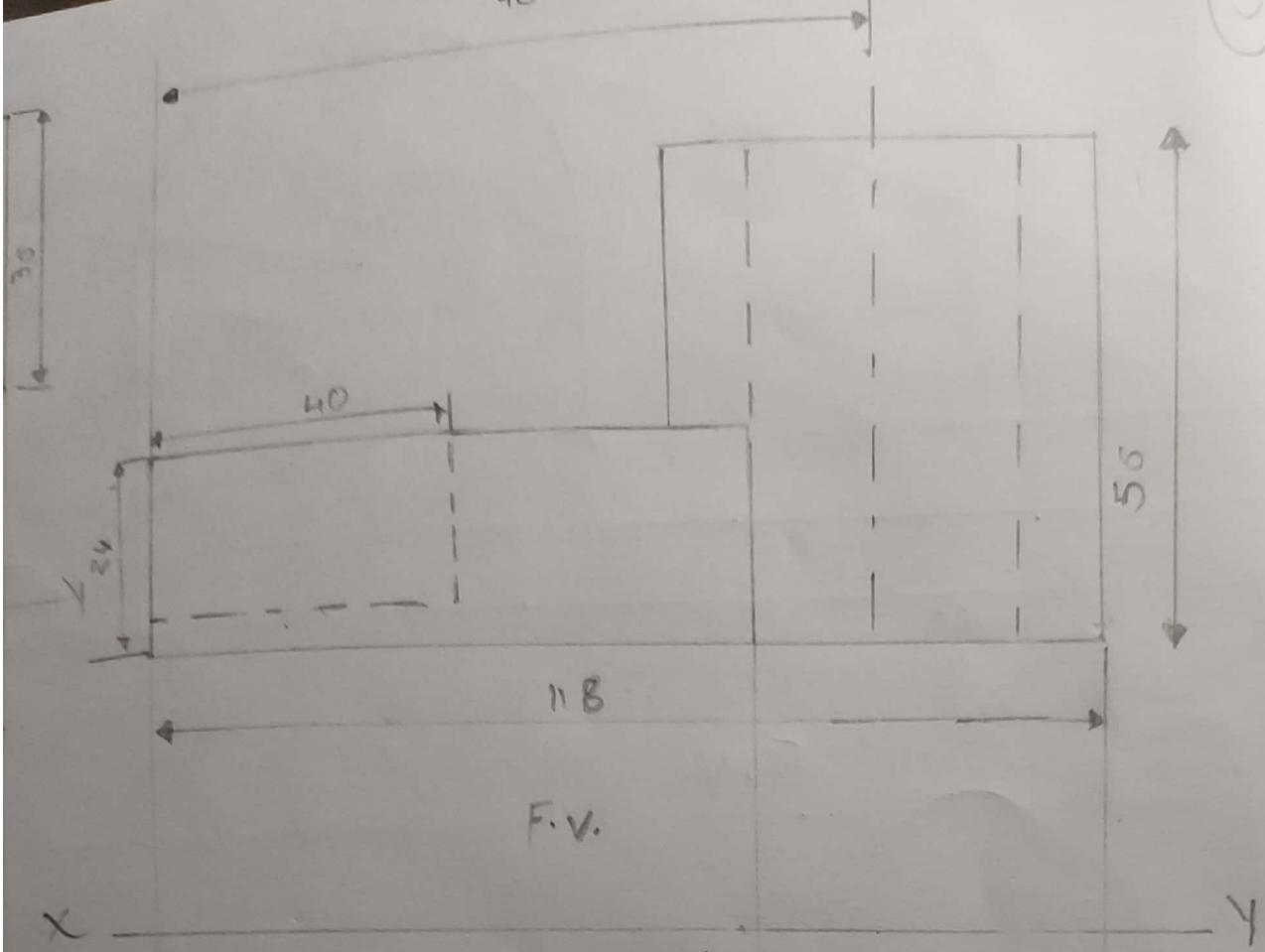
X

24



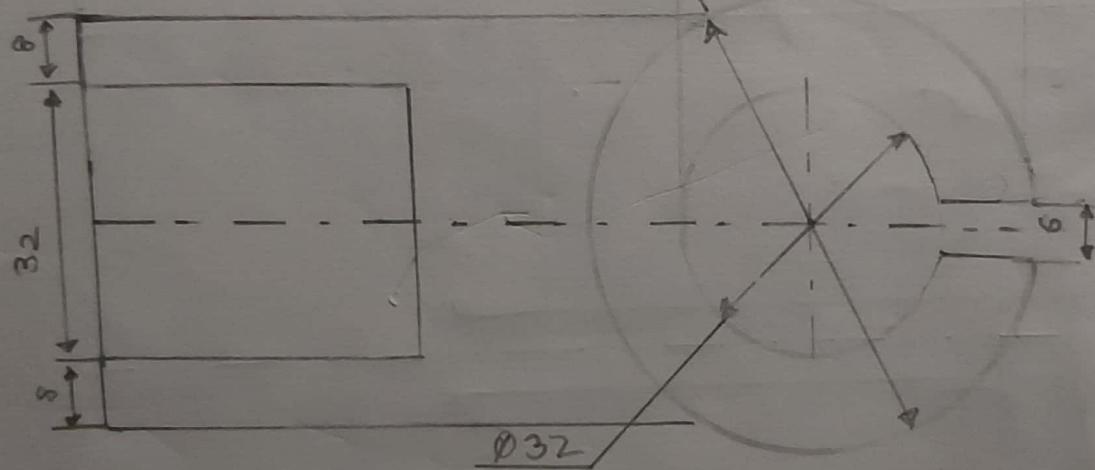
T.V.

X



F.V.

X Y



T.V.

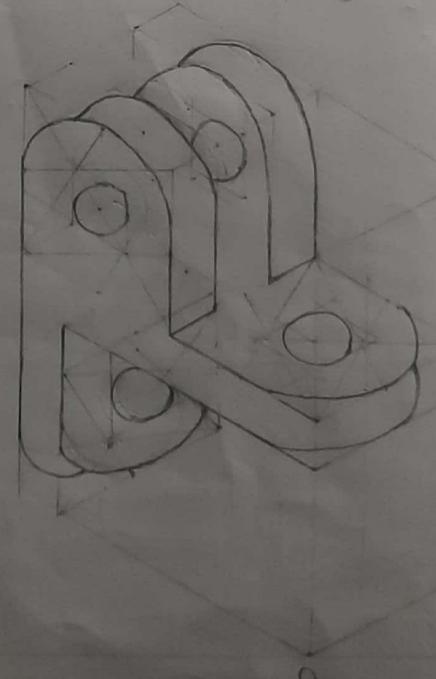
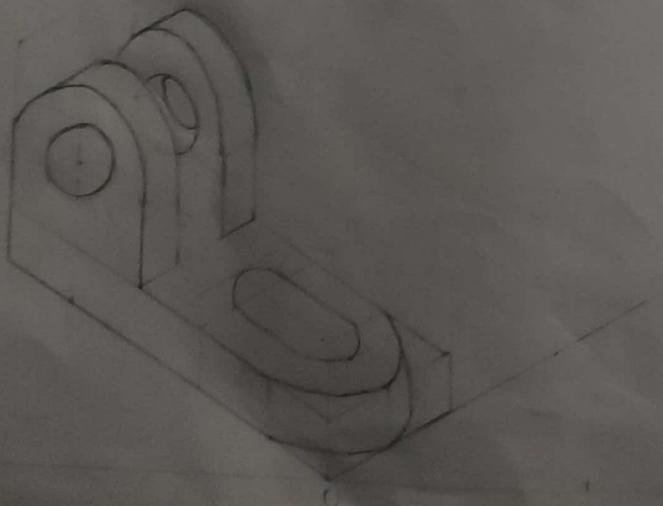
Isometric Projection-Pictorial view  
Visualising the shape of the whole object in its 3-D form all the two or three orthographic views have to be drawn mentally about its shape and simultaneously conclusion has to be drawn showing 3 or more no. of faces in one again after find that they must prepare pictorial drawing showing 3 or more no. of faces in one view to convey the technical information to any person.

Pictorial drawings are obtained by projecting a object only on one plane of projection.

Types of PP:

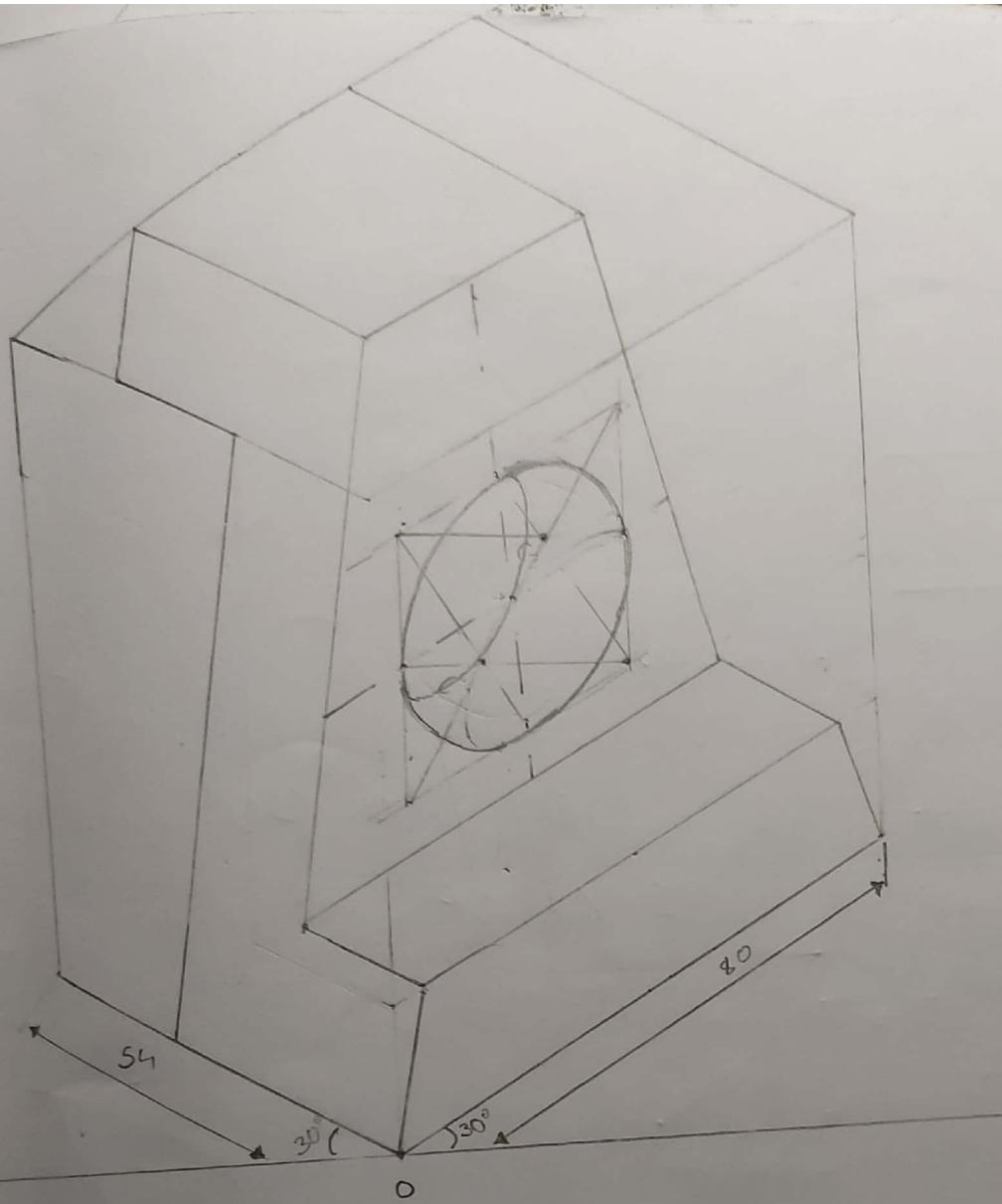
- a) Isometric projection
- b) Pictorial projection:
  - a) An isometric projection is a projection in which 3d of a solid are not only shown in one view but also the dimension can be measured from it.
  - b) The object as it appears instead of its true shape & size.

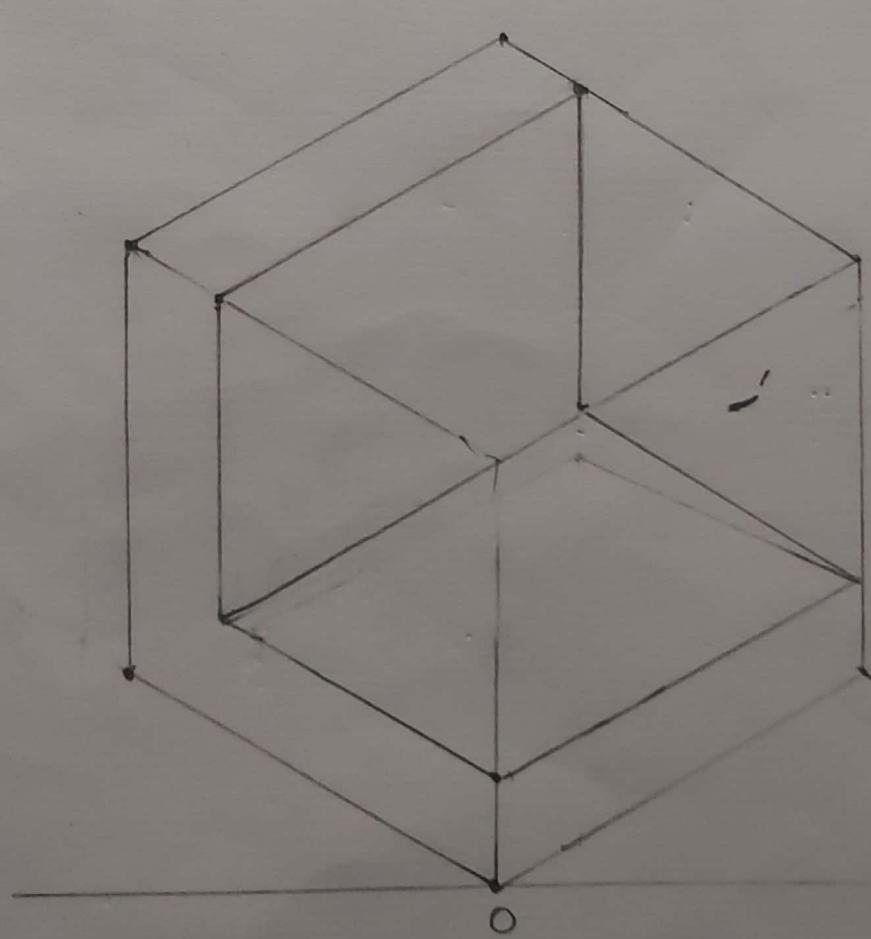
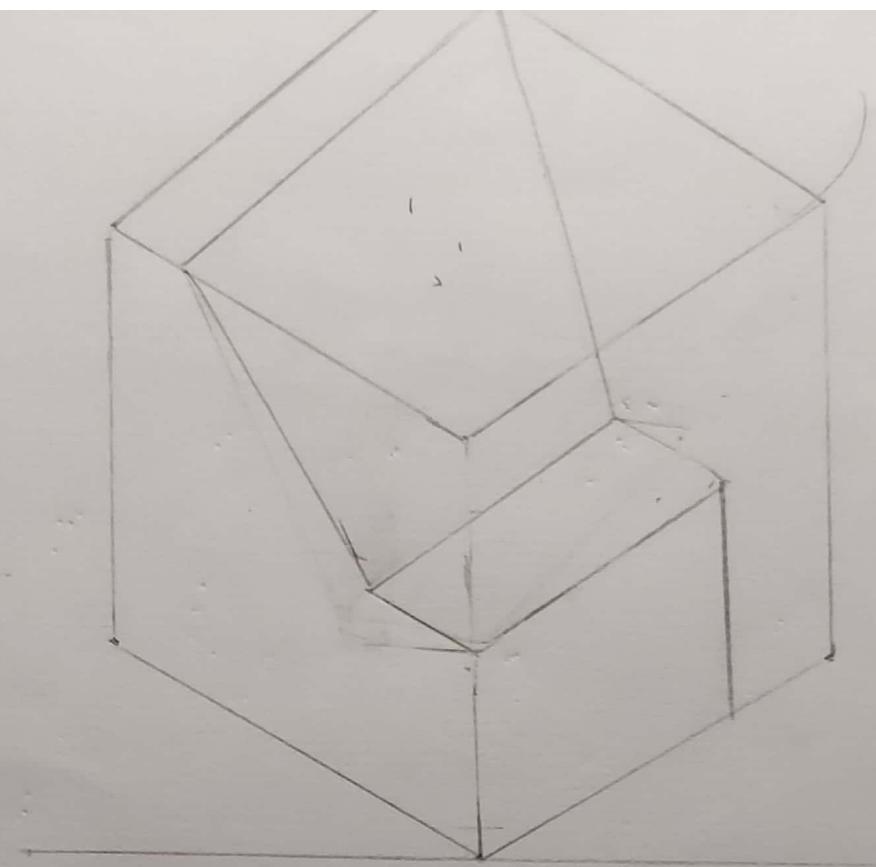
Name: Aashish Kumar W: 30°  
Roll No. 44 H: 75  
L: 60

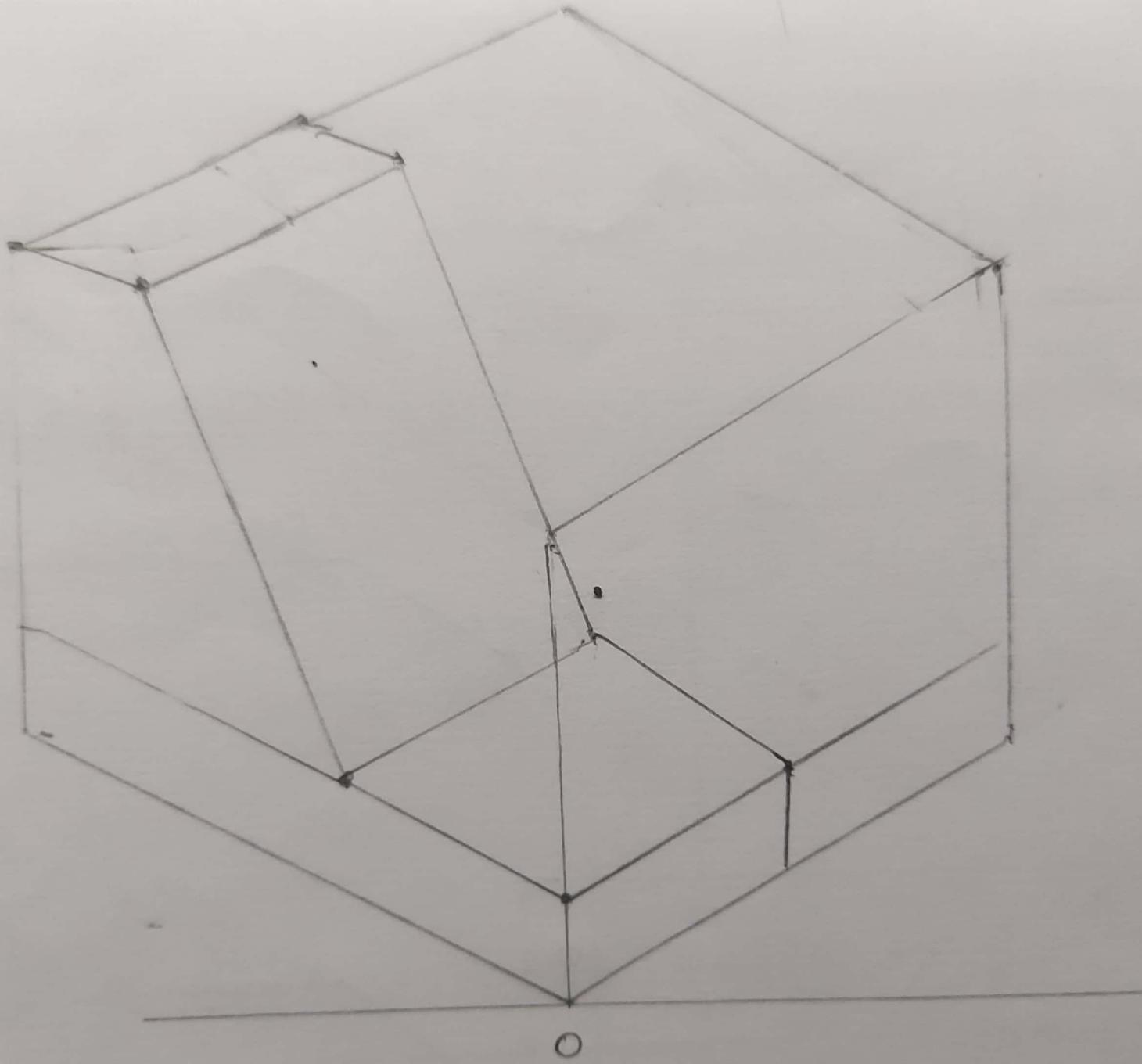


Sheet - 3  
Name: Aashish Kumar  
Roll No. 44

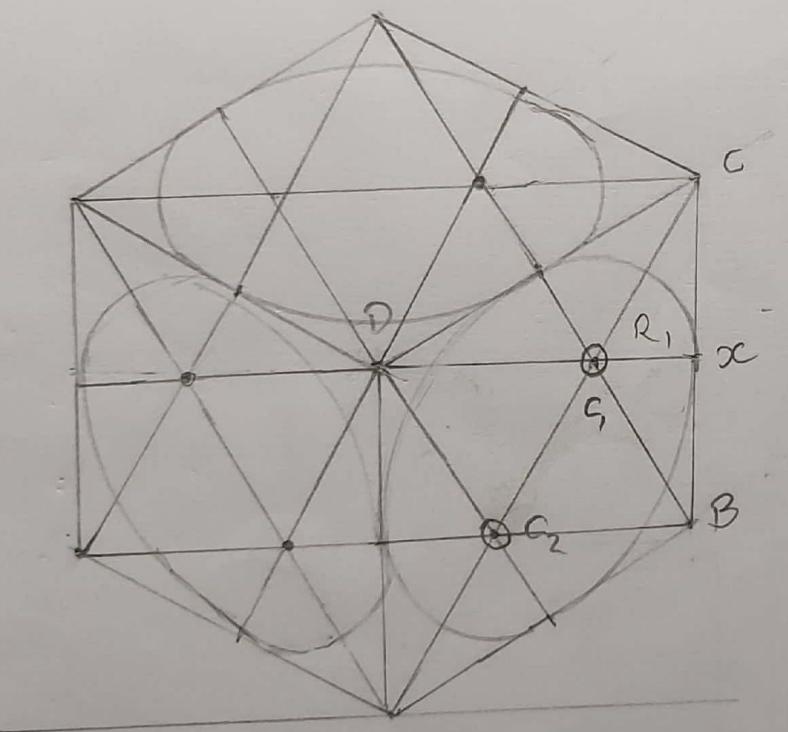
Name: Anchit Kur  
Roll No: 44





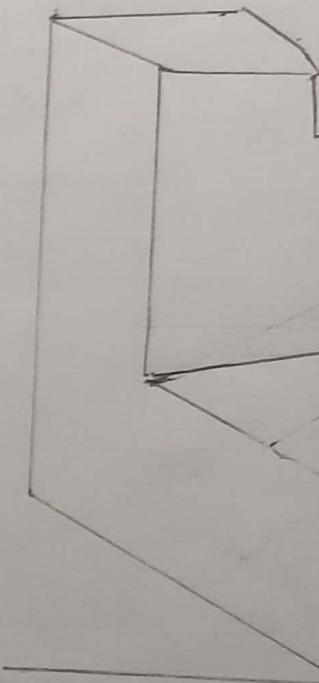


Draw an isometric circle : Draw an circle of 60mm diameter C isometric



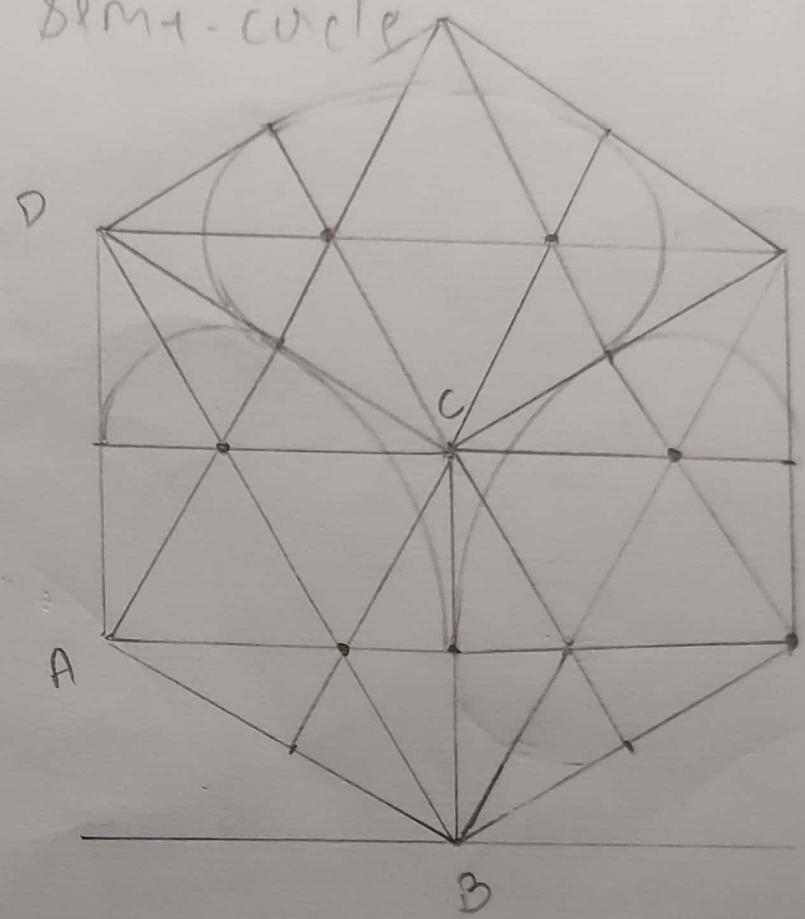
$$C_1 x = r$$
$$D x = R$$

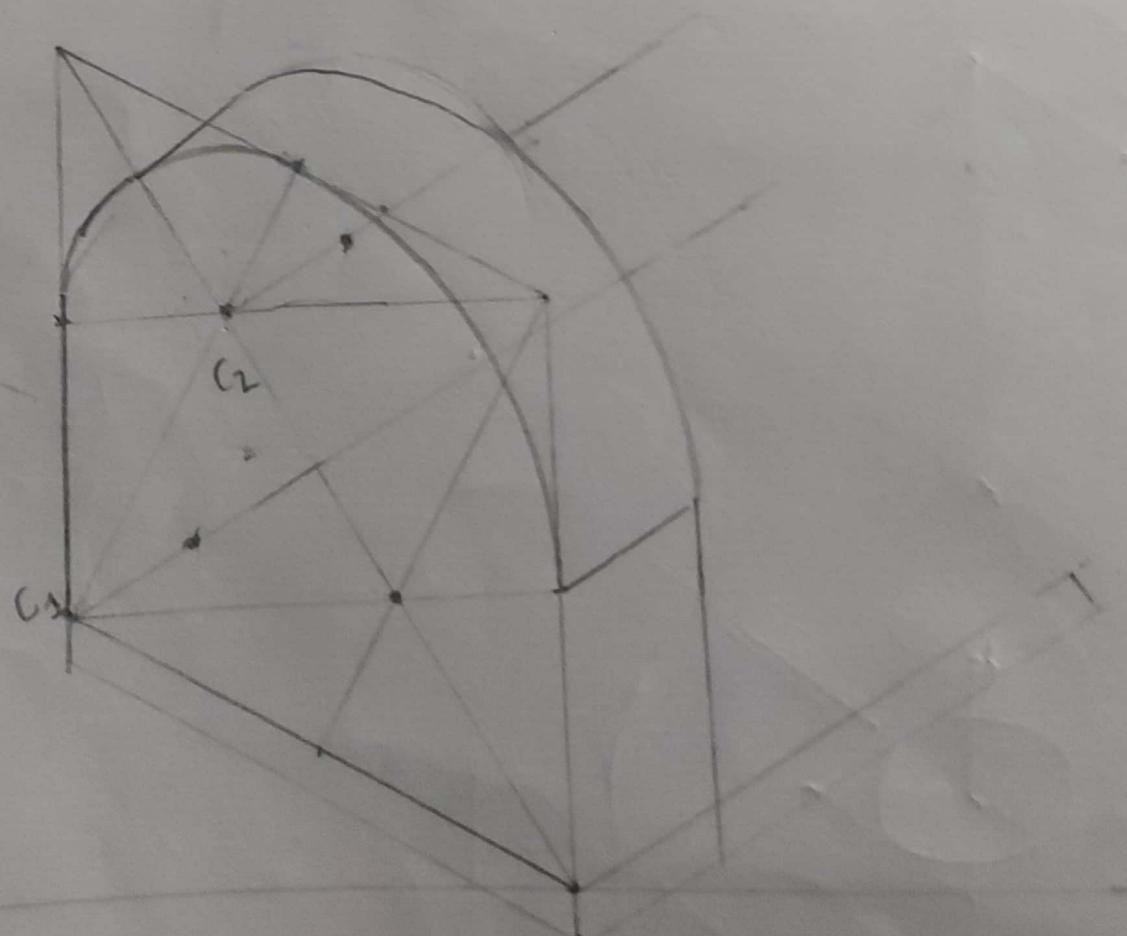
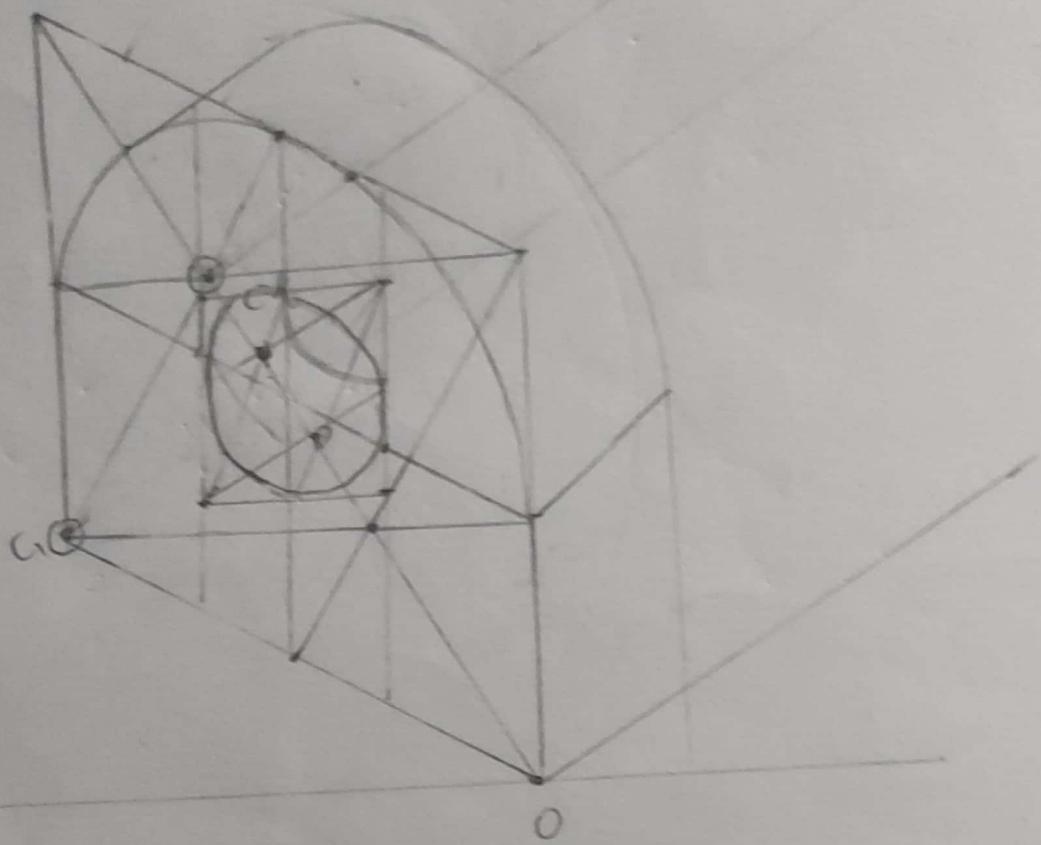
$$L=100$$
$$W=50$$

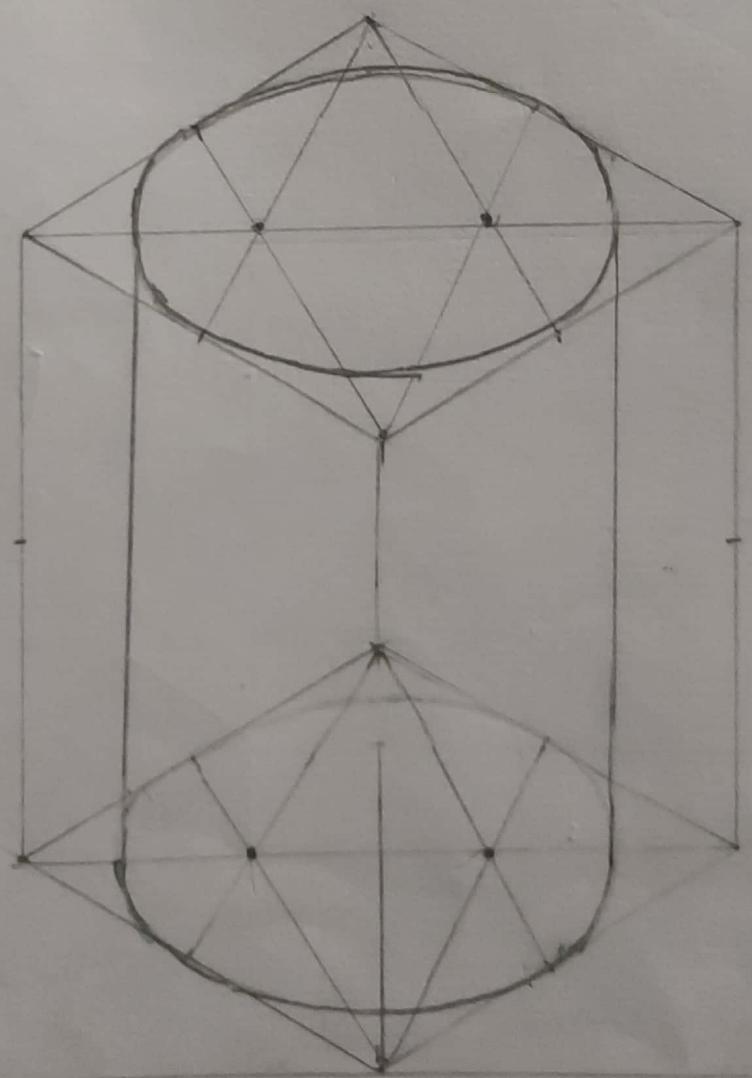
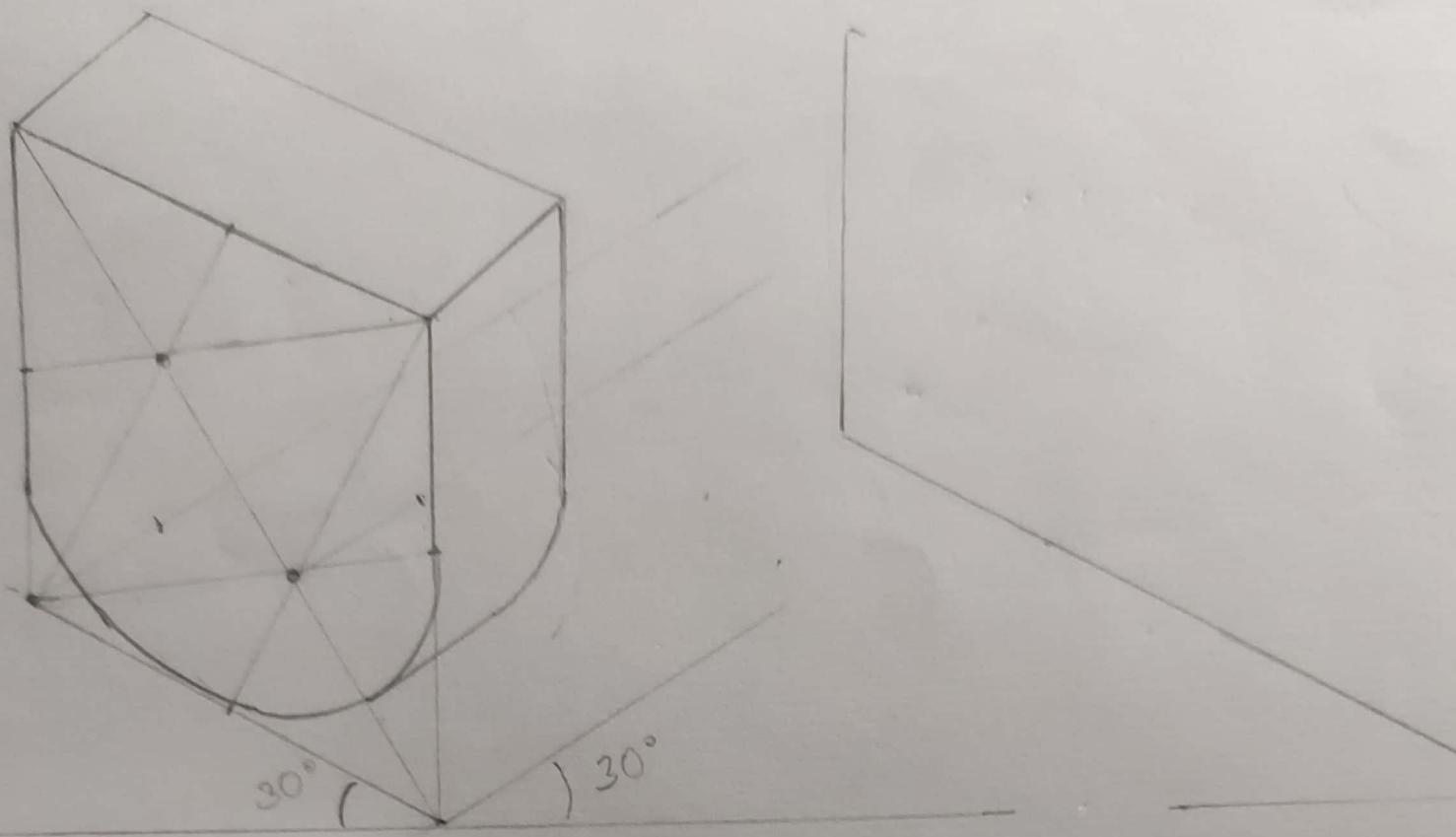


Construction of semi-circles

Construction of semi-circle







# Assignment 3-1 Problem

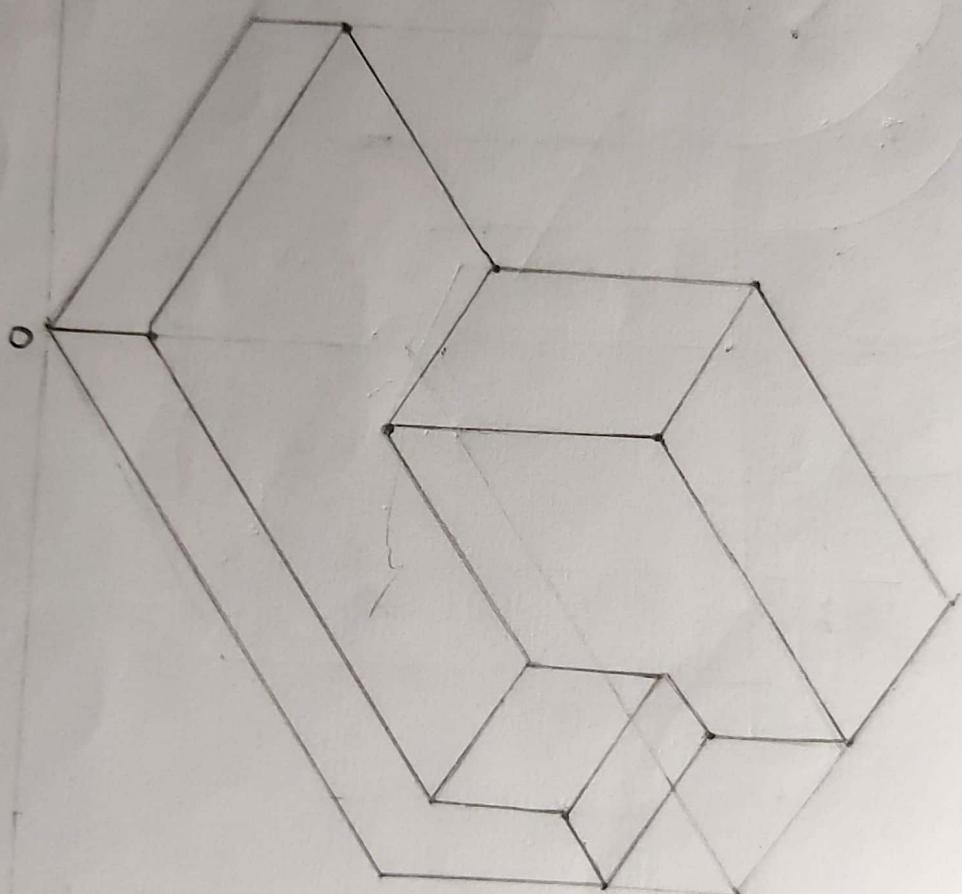
$$L = 70$$

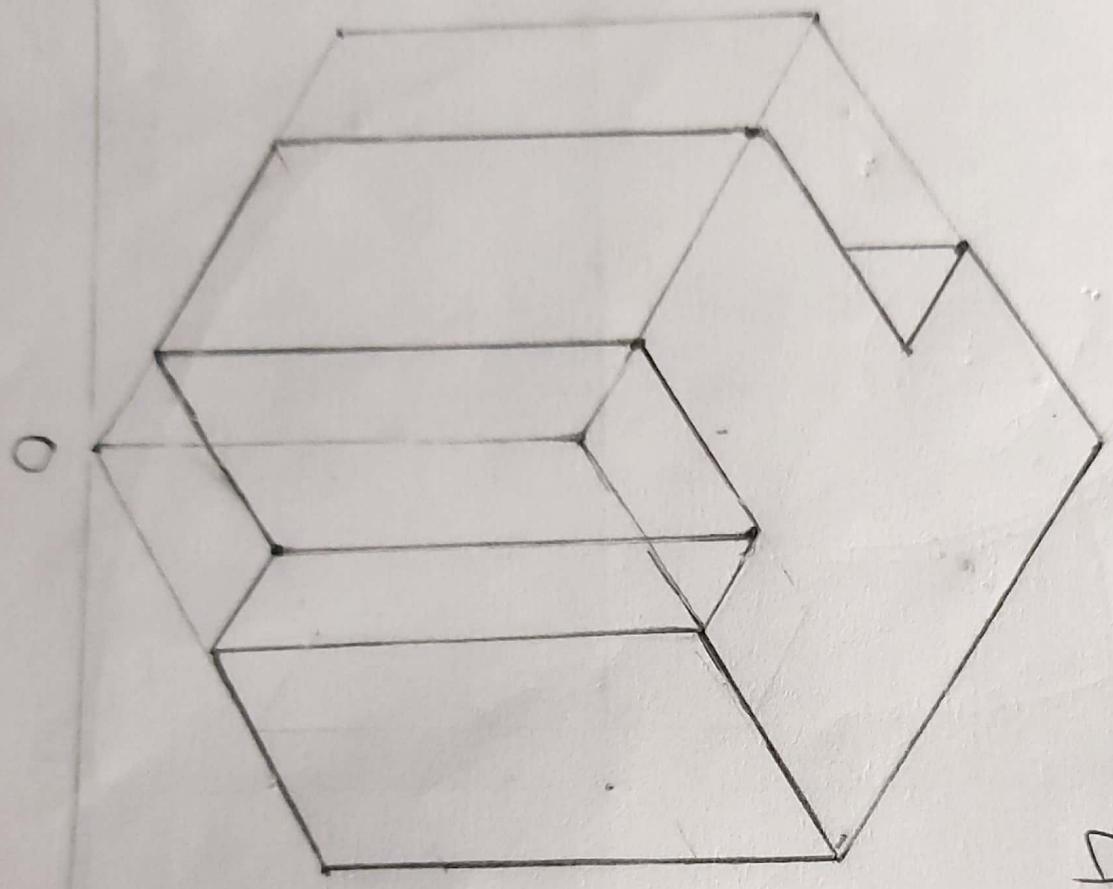
$$H = 60$$

$$\omega = 40$$

Name: Aashish Kumar

Roll No: 64





Sum of exterior angles  
of a polygon

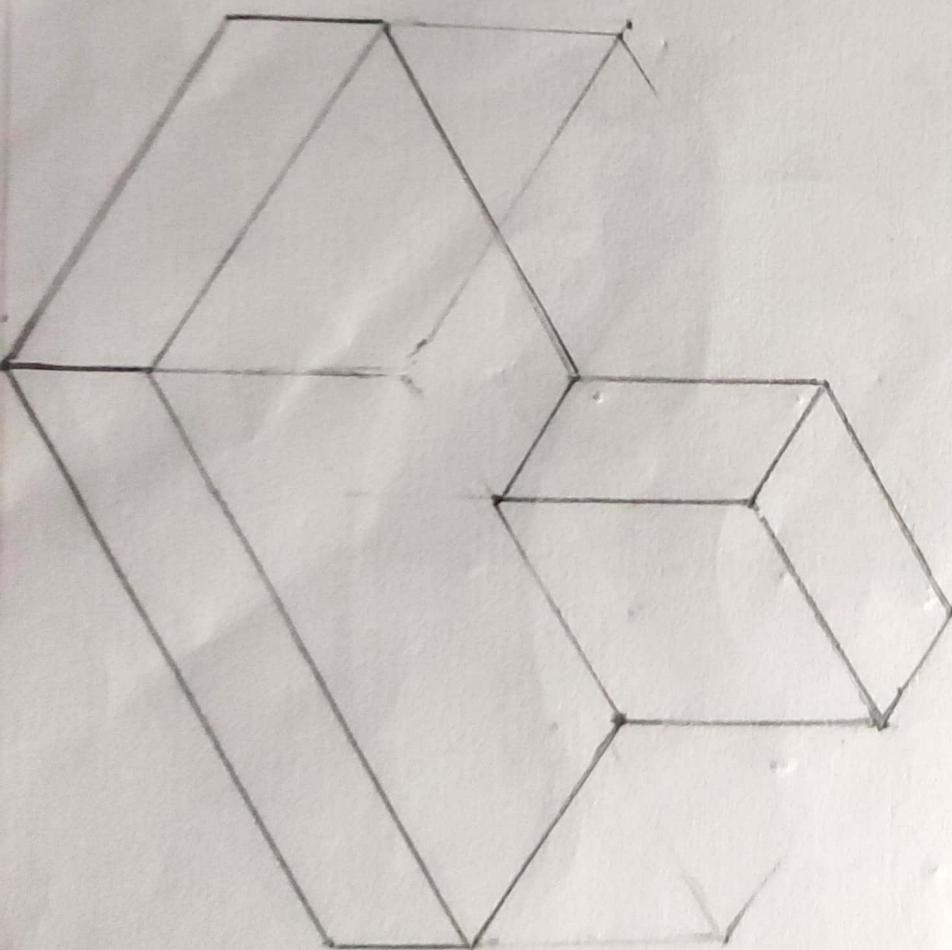
Aashish Kumar

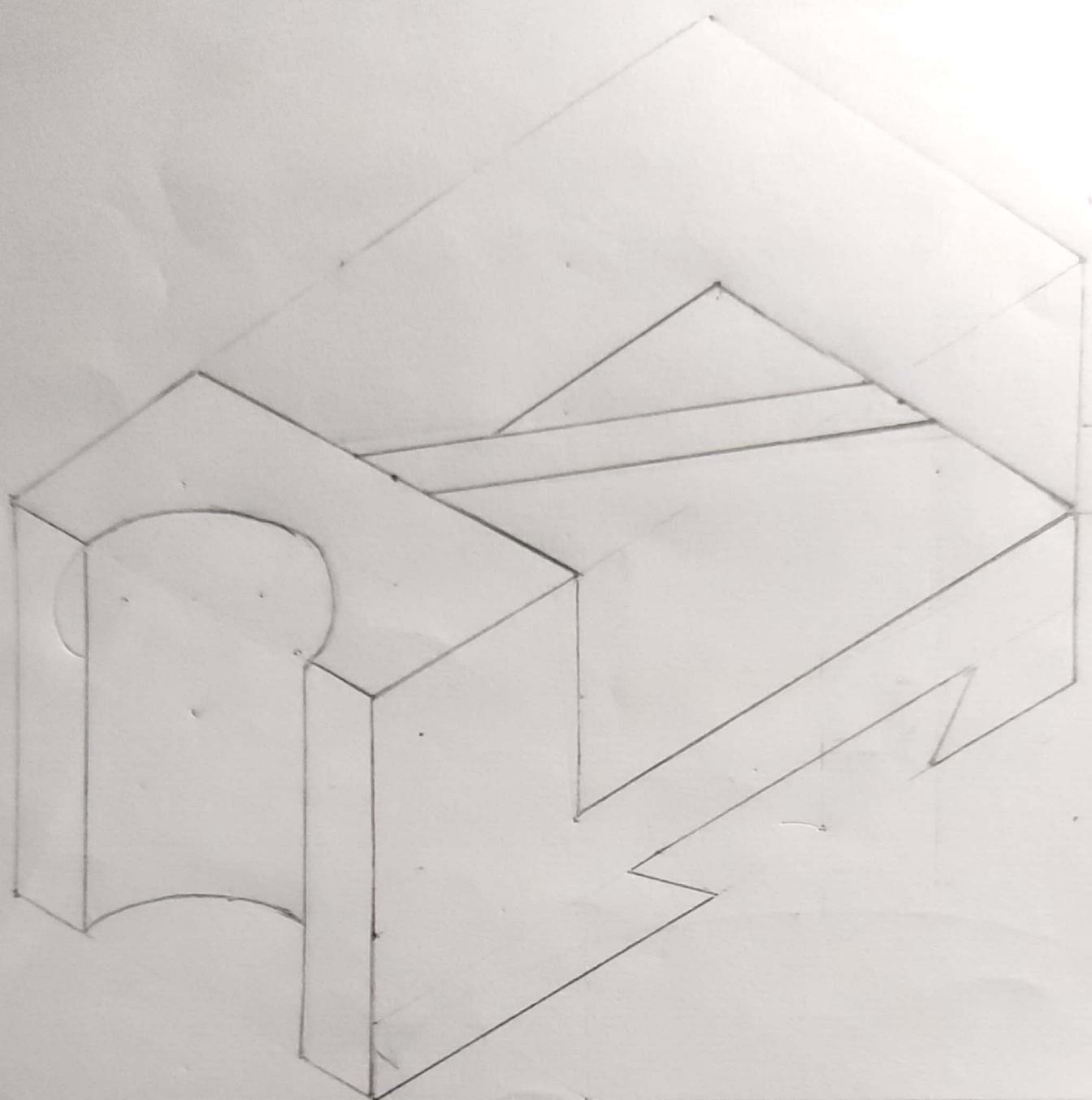
# Assignment Problem

Name: Aashish Kumar

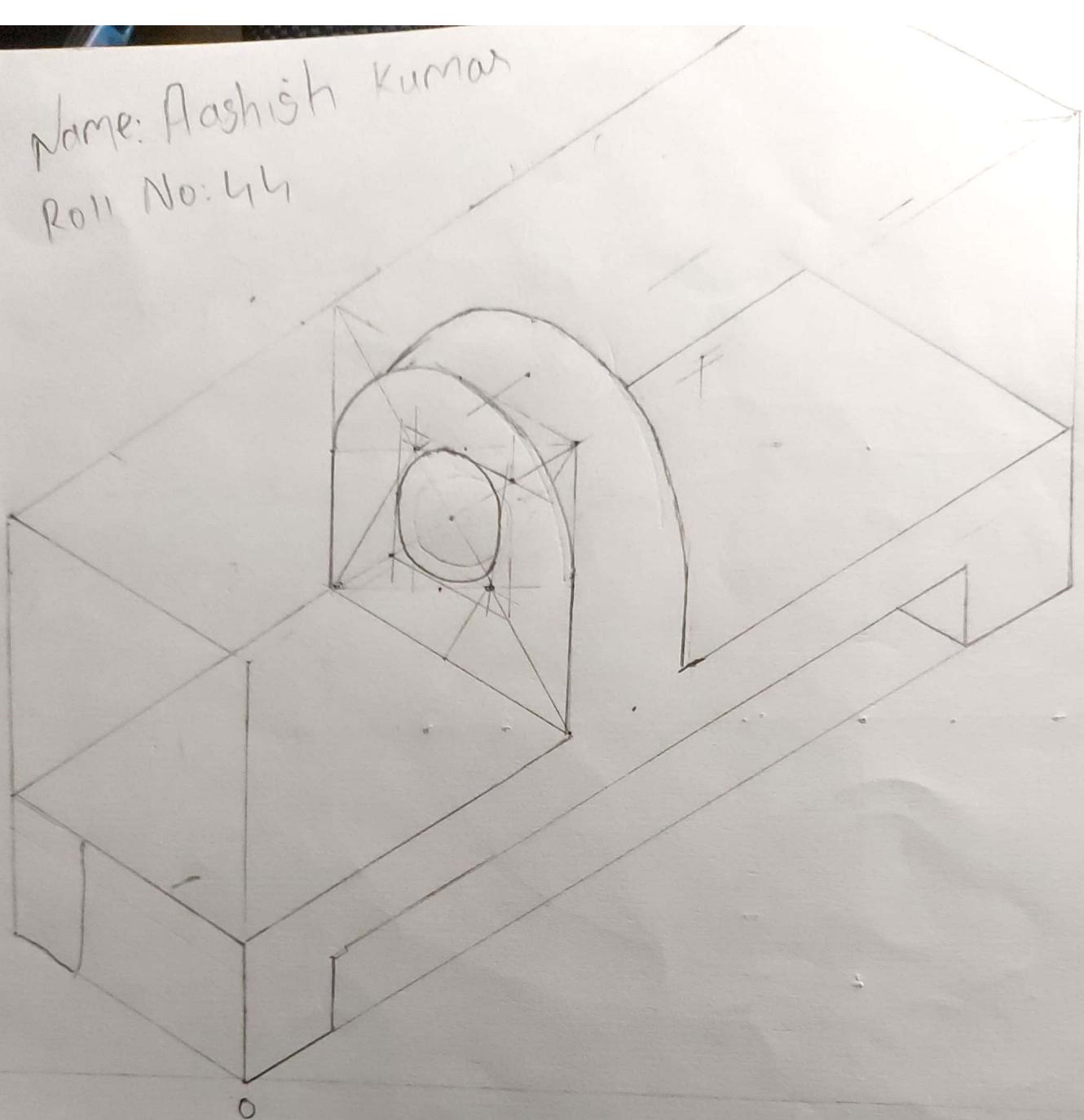
Date:

Doll No: 44





Name: Aashish Kumar  
Roll No: 44

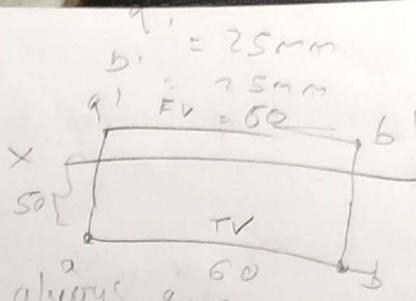


UNIT 4 - Projection of Line    T.L = True length

$a'$   $b'$  = above XY

$ab$  = below XY

Original Length: T.L



PL = Plane Length

Line L  $\perp$  to XY  
VP  
C.V.  $\perp$  to VP  
HP

i) distances of points above & below XY line will be always given

inclined to H.P ( $\parallel$  to V.P)

T.L &  $\theta$  angle  $\rightarrow$  True angle

$\angle$  to VP

E.L = Elevated Length -  $\alpha$

True length & True angle are often given simultaneously

T.L &  $\theta$  angle  $\rightarrow \angle$  to HP

If in one view line is  $\parallel$  to XY line then in other view it is  $\perp$  to XY

PL  $\perp$  XY

EL  $\parallel$  XY

five given data!  
should be given

$\theta$ :  $\alpha$  T.L  
 $\beta$ :  $\phi$  PL  
 $\beta$ :  $\phi$  E.L

T.L  $\parallel$  VP

Projection Distance: Come from PL & EL

$\alpha$  = Angle made by +

$\beta$  = Angle made by

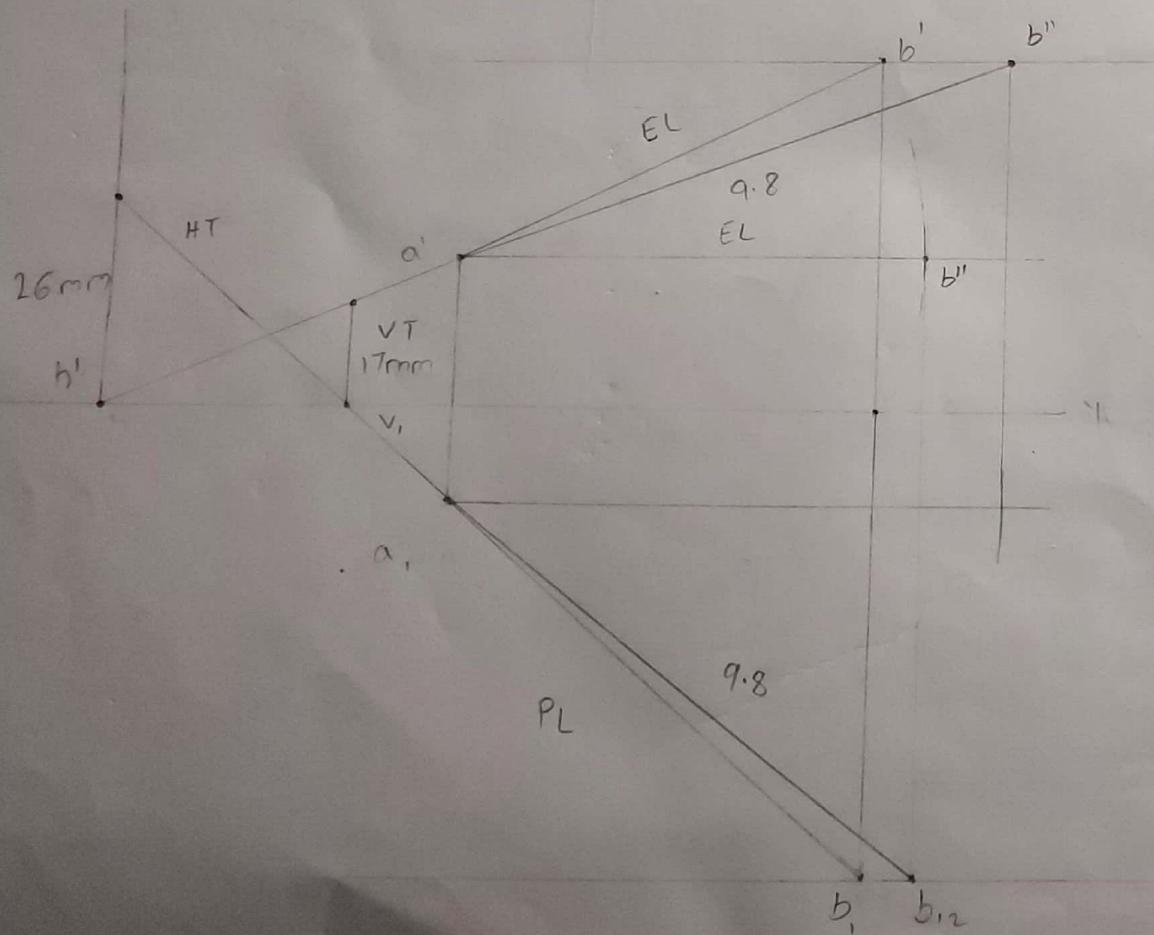
vice versa

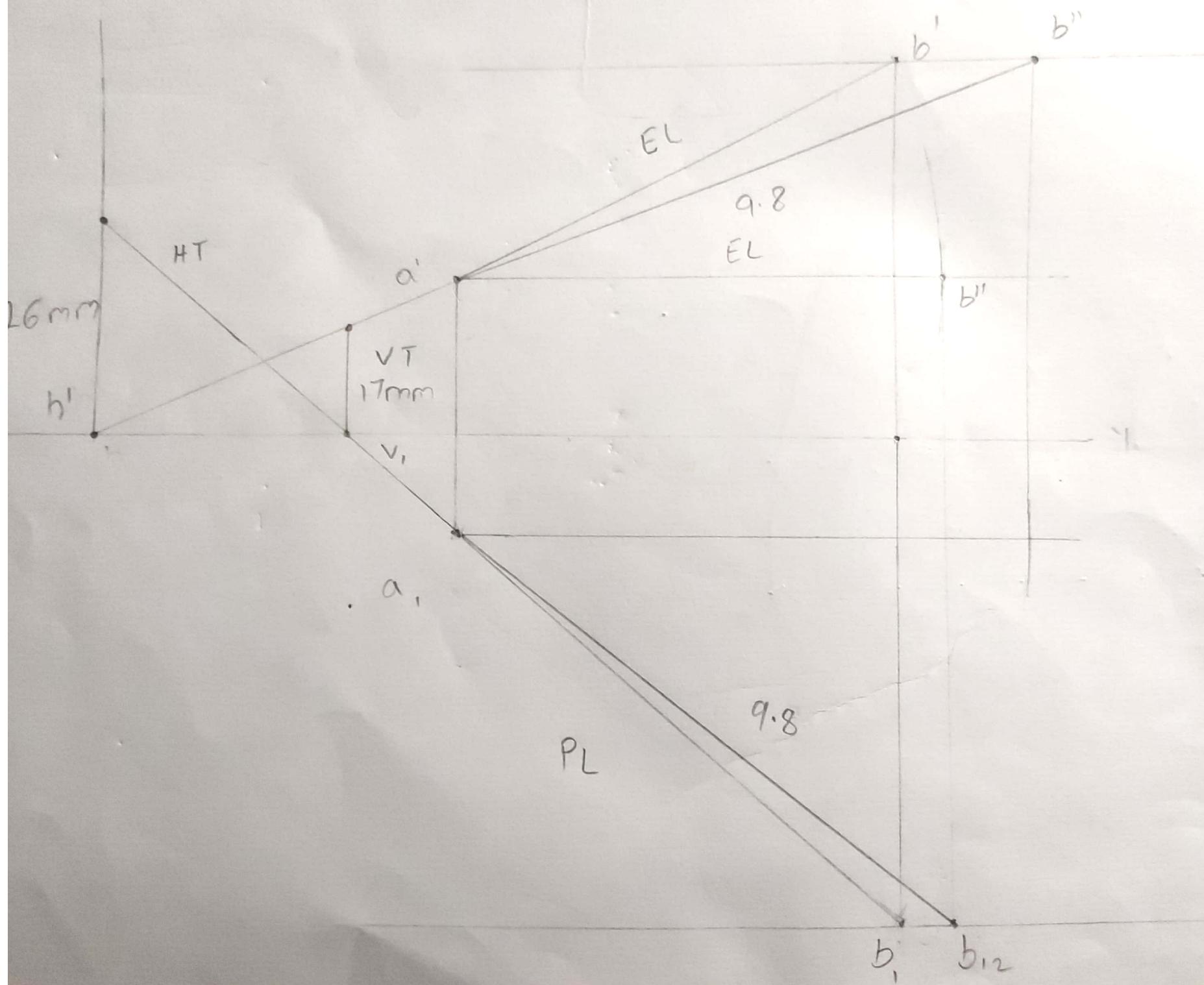
A line AB has its end A HT (Horizontal trace) Extension of HP 25 mm above HP & 15 mm in front of VP VT (Vertical trace) Extension of VP and end B 60 mm above HP and 75 mm in front of V.P. Distance between the end projectors of the line is 70 mm. Draw projections of line, find T.L and True inclination with HP & VP. Also locate HT & VT.  $\alpha \& \beta$  always greater than  $\theta L$  PD = 70 mm.

$$b' = 60 \text{ mm} \uparrow \quad b_1 = 75 \downarrow$$

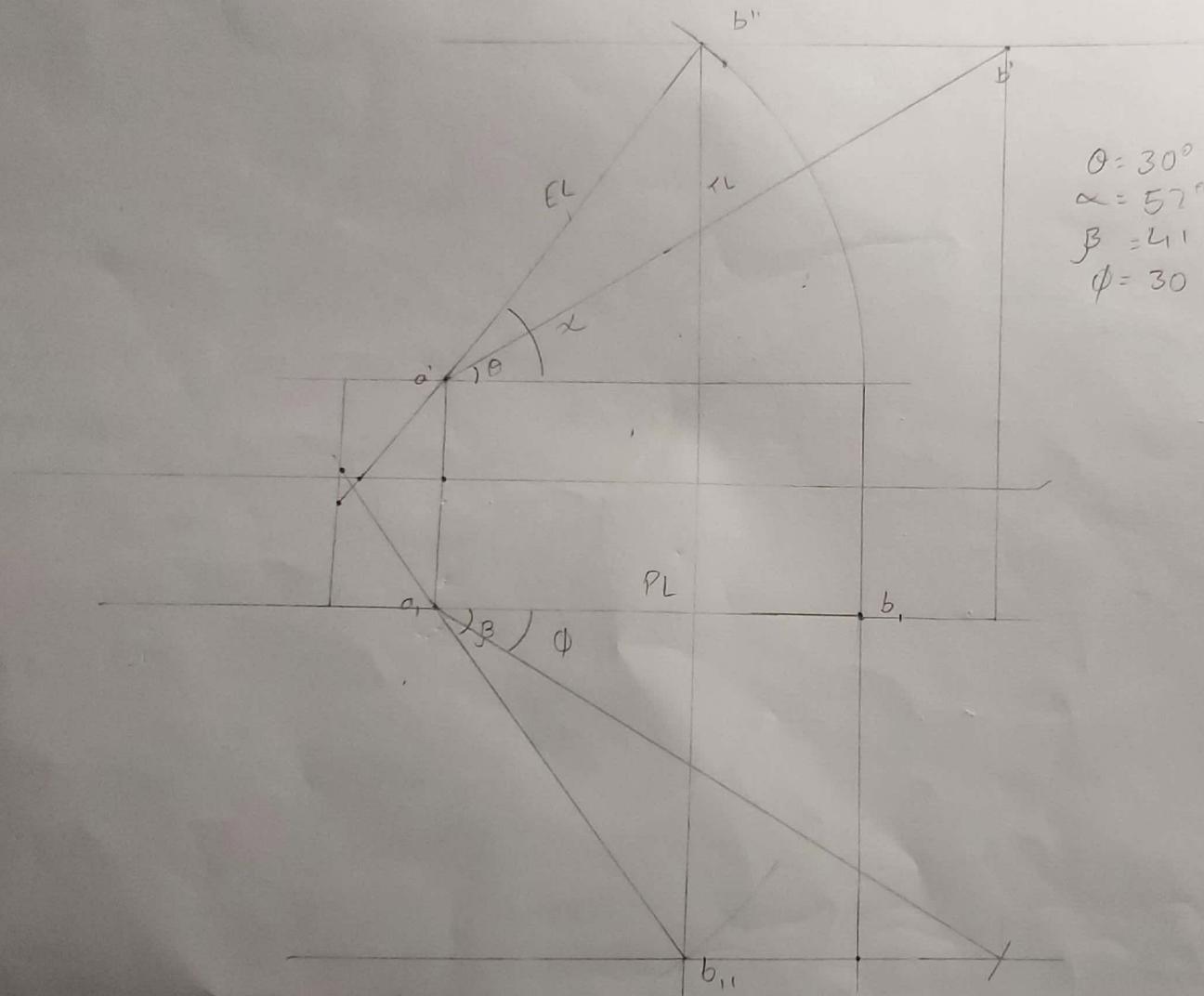
$$a' \uparrow 25 \text{ mm} \quad a_1 \downarrow = 15 \text{ mm}$$

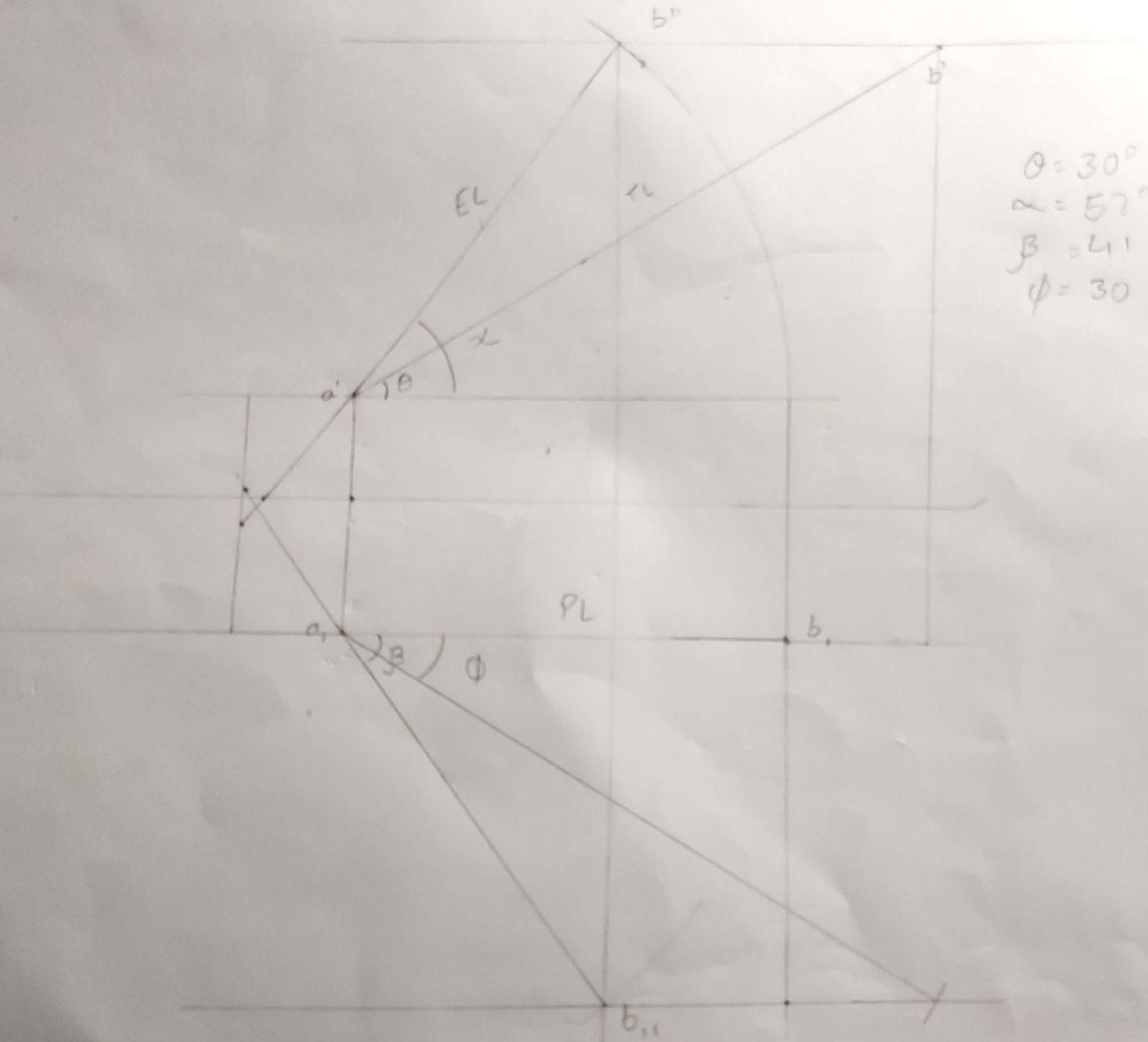
Dr





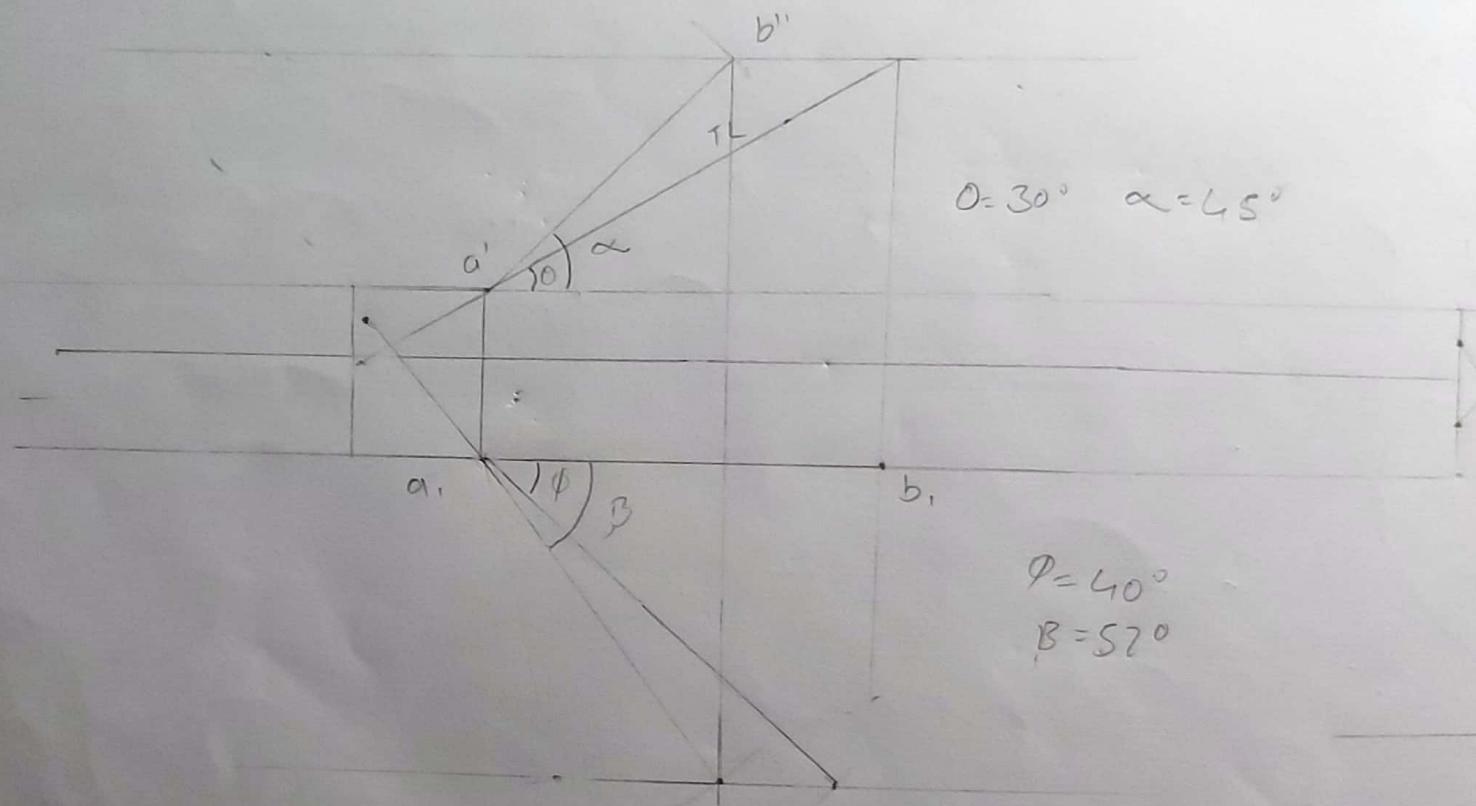
Draw Projections of Line TL = 130 mm  $\theta = 30^\circ$  A $\perp$  20 mm HP  $\downarrow$  25 mm in front of V.E.  
EL = 85 mm Draw Locate HT & VT Sheet No 5 Prob 1





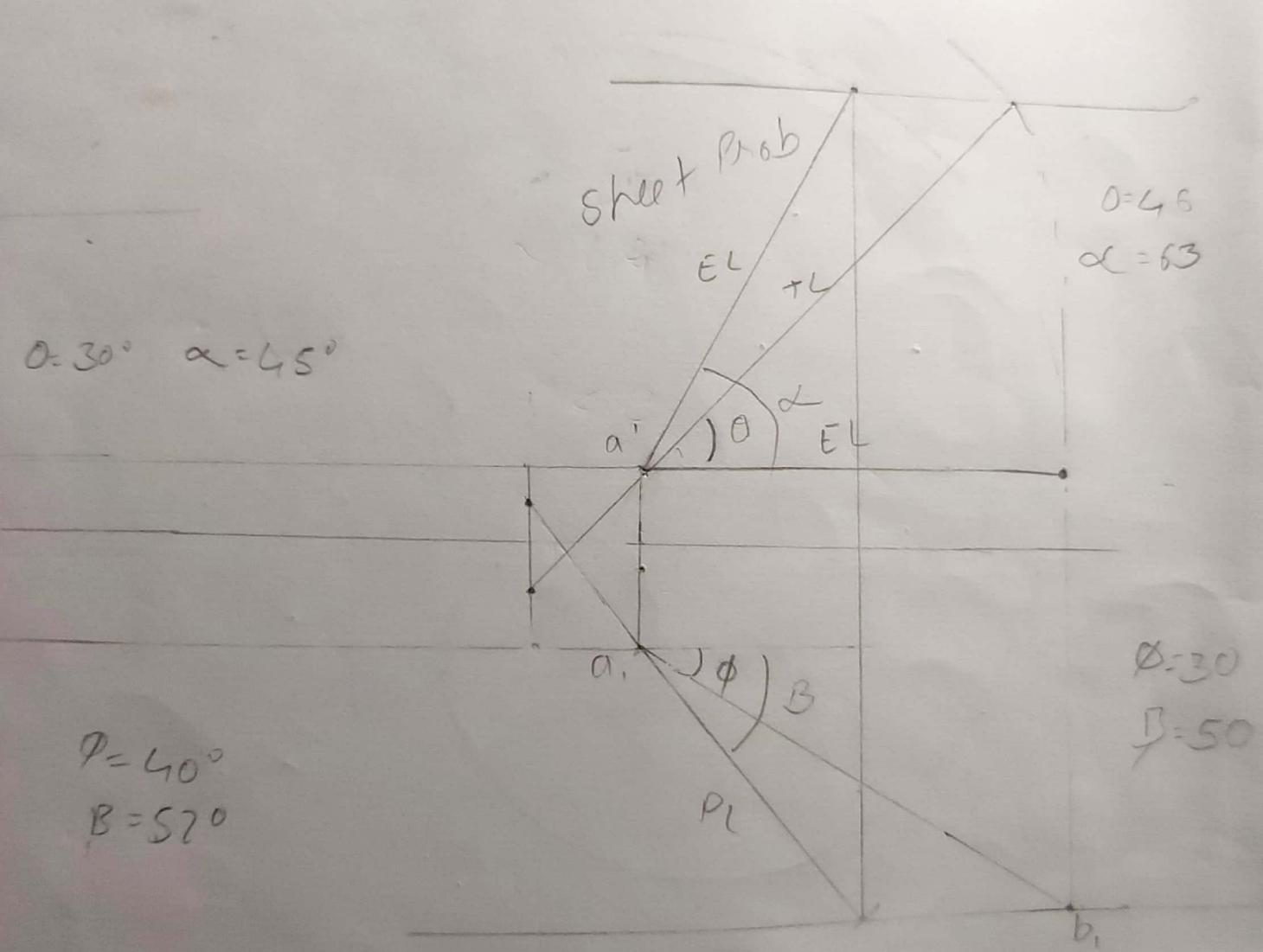
$$\begin{aligned}\theta &= 30^\circ \\ \alpha &= 57^\circ \\ \beta &= 41^\circ \\ \phi &= 30^\circ\end{aligned}$$

A line AB 70 mm long is inclined at an angle of  $30^\circ$  to VP above HP and 15 mm in front of VP. The F.V. of line is 50 mm of line. TL = 70 mm  $\theta = 30^\circ$   $a' = 10 \text{ mm}$   $a_1 = 15 \text{ mm}$  EL = 50. Line AB 70 mm long is inclined at an angle of  $30^\circ$  to VP, 15 mm in front of VP. TV of line is 50 mm  $a'_1 = 10 \text{ mm}$   $a_1 = 15 \text{ mm}$  VP  $\phi$  HPO

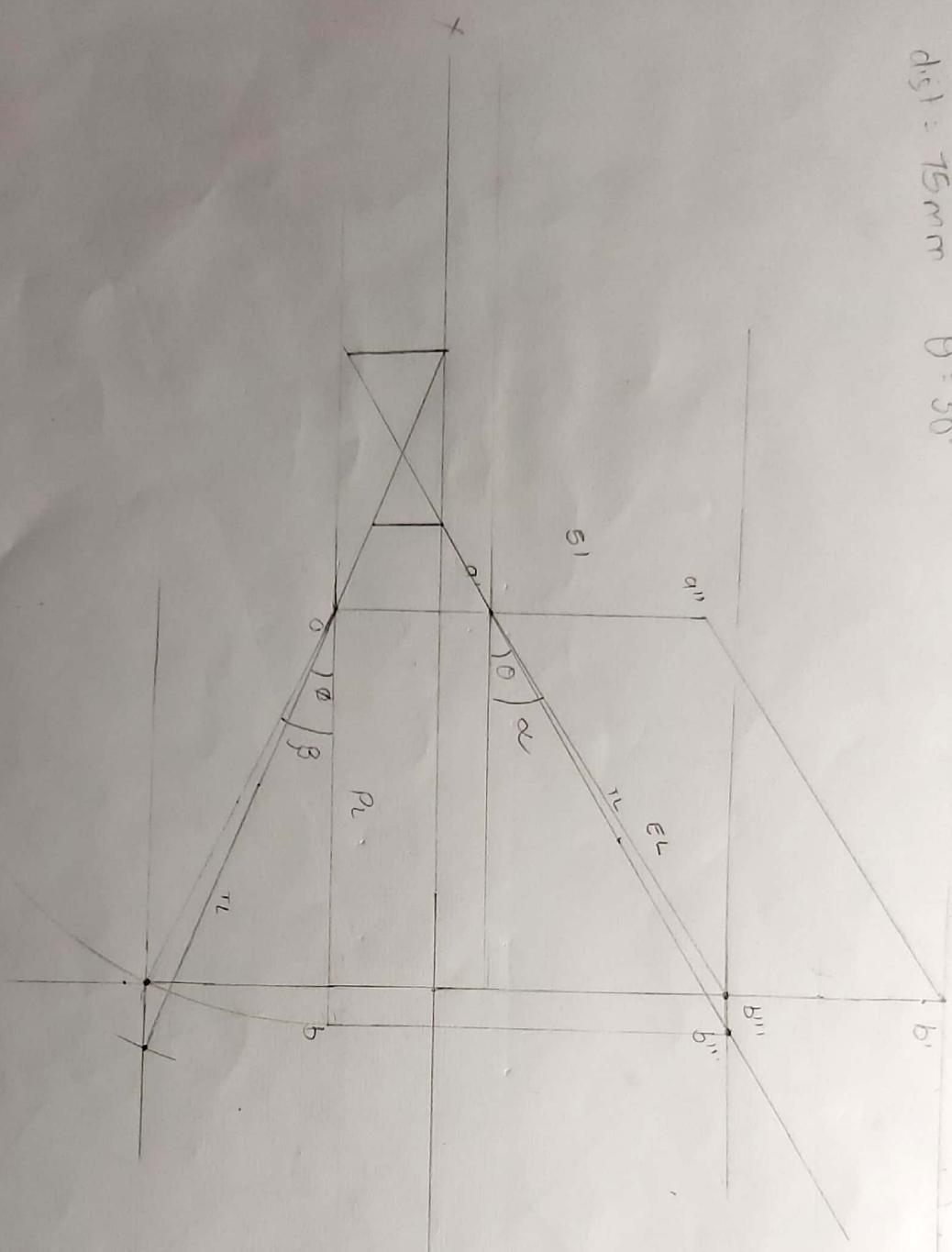


angle of  $30^\circ$  to HP it is inclined  
 F.V. of line is 50 mm draw the projection  
 $a_1 = 15 \text{ mm}$   $EL = 50 \text{ mm}$   
 angle of  $30^\circ$  to VP and P 10 mm above HP &  
 $a'_1 = 10 \text{ mm} \uparrow$   $a_1 = 15 \text{ mm} \perp$   $TC = 70 \text{ mm}$   $\phi = 30^\circ$   $PL = 50 \text{ mm}$

$$EL = 58 \text{ mm}$$



A line AB 45 mm long making an angle of  $30^\circ$  with HP lies 20 mm in front of VP and is 100 mm above HP. The distance between the 1st and 3rd projections is 75 mm. Draw the projections of line AB as 45 mm long (T.L.)  
 $\alpha = 20 \text{ mm}$ ,  $\beta = 160 \text{ mm}$   
 $\text{dist} = 75 \text{ mm}$ ,  $\theta = 30^\circ$



Name: Pachch Kumar  
Roll No: 4

Assume a

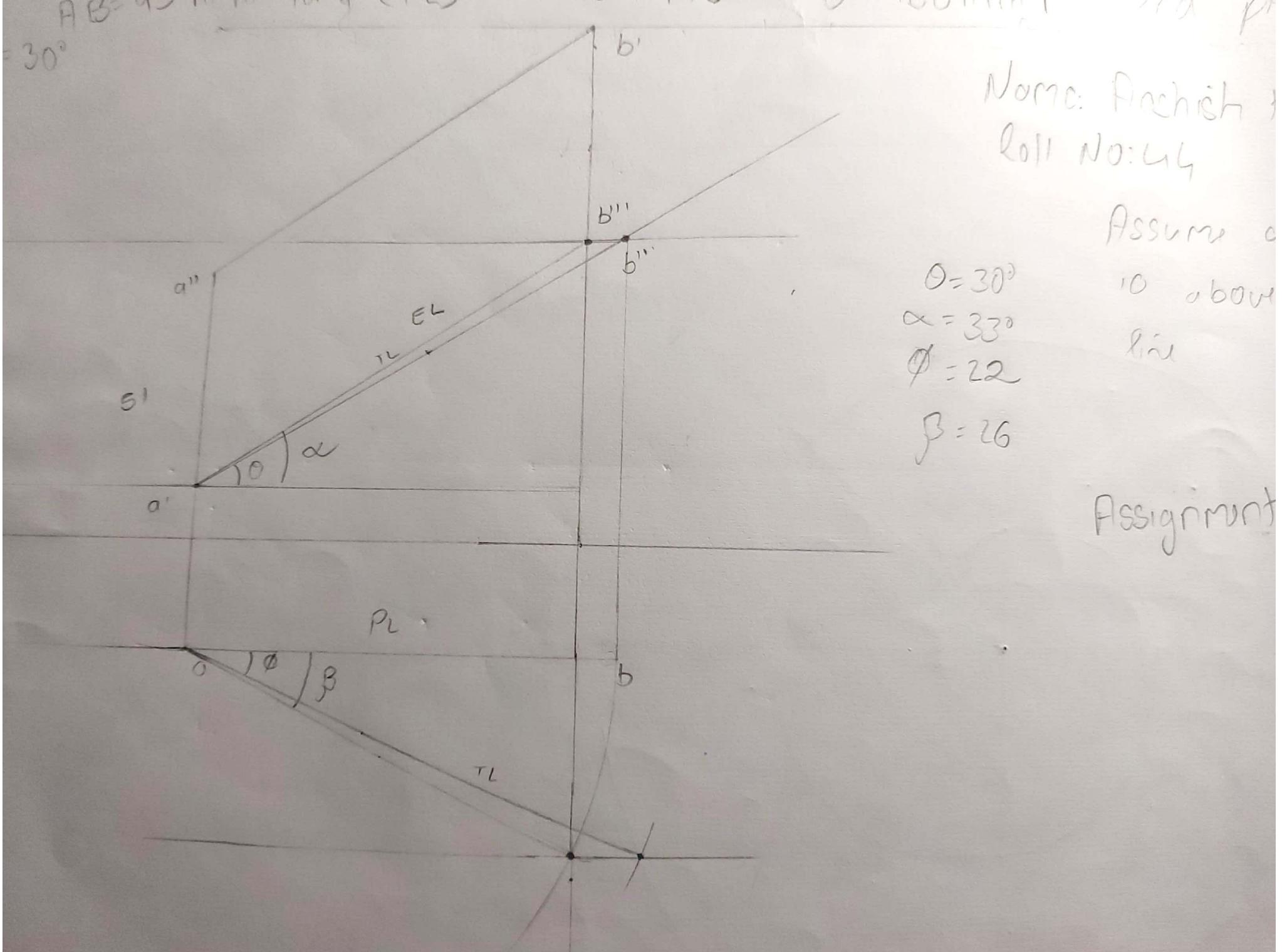
$$\theta = 30^\circ$$

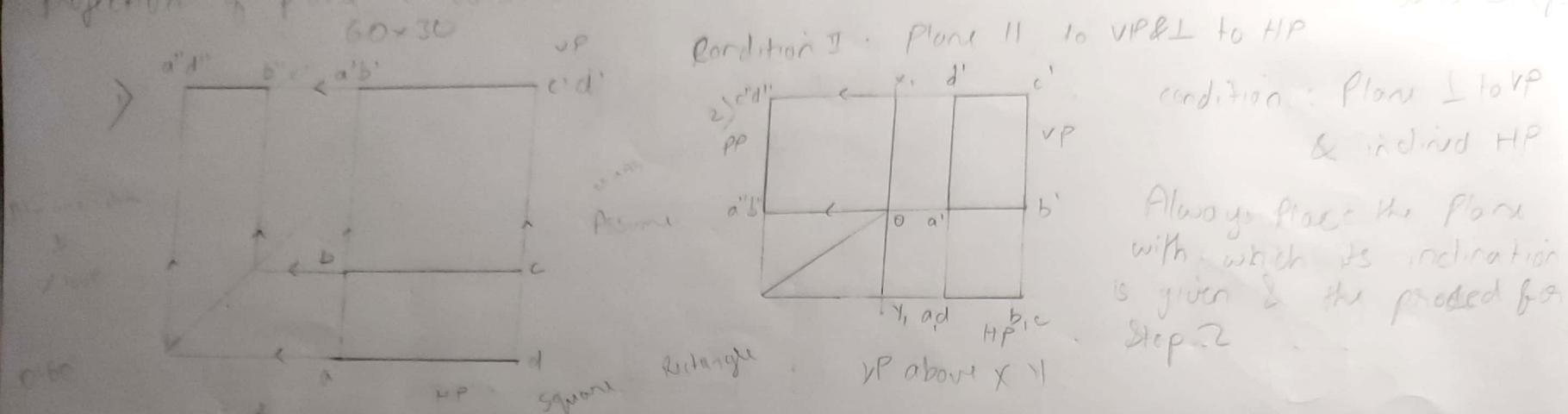
$$\alpha = 33^\circ$$

$$\phi = 22$$

$$r_u = 7$$

Assignment 4





A square plate whose side has one of the edges  $\perp$  to HP and inclined to  $30^\circ$  with the VP towards projection.

If the surface of the plane  $\perp$  to HP

& it is  $\parallel$  to VP &  $\perp$  to HP

then the 3 case of plane 1  
in both the plane

the surface of the plane  $\perp$  to VP &

it is  $\perp$  to VP &  $\perp$  to HP then

is also case of plane 1 to

the plane 3rd case  
inclined to both the plane

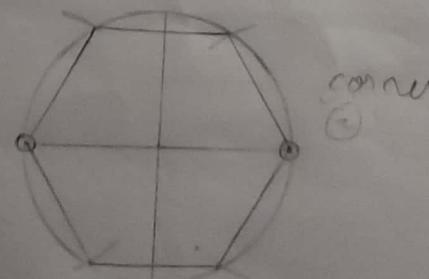
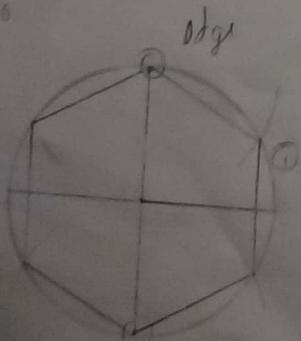
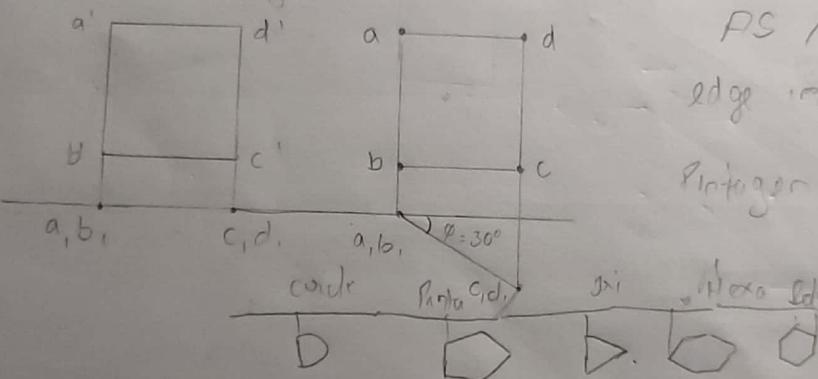
plane inclination

edge inclination

indication of the edge

the plane indication

draw the plane  
plane inclination  
edge inclination

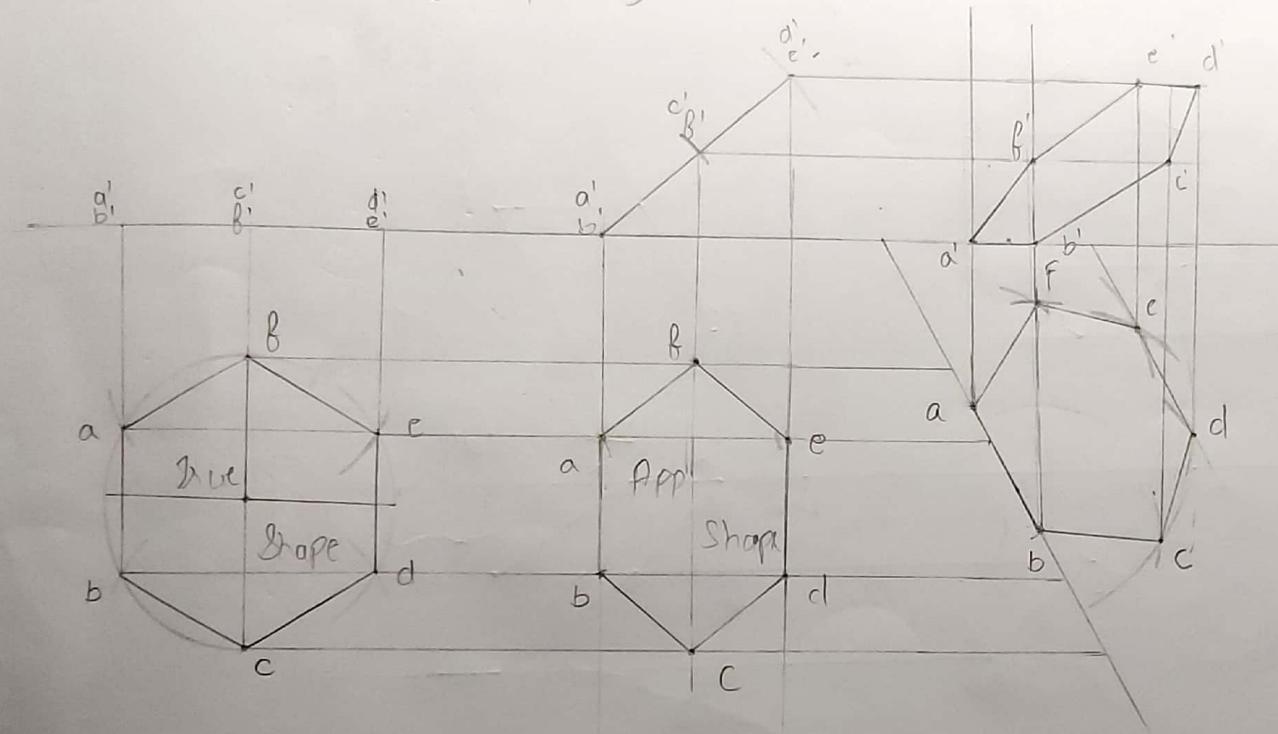


Draw the projection of regular hexagon of 25 mm side having one of its edge in the HP and inclined at  $60^\circ$  to the VP. and its surface making an angle  $60^\circ$  with the HP.

when surface inclination is given then it is known inclination

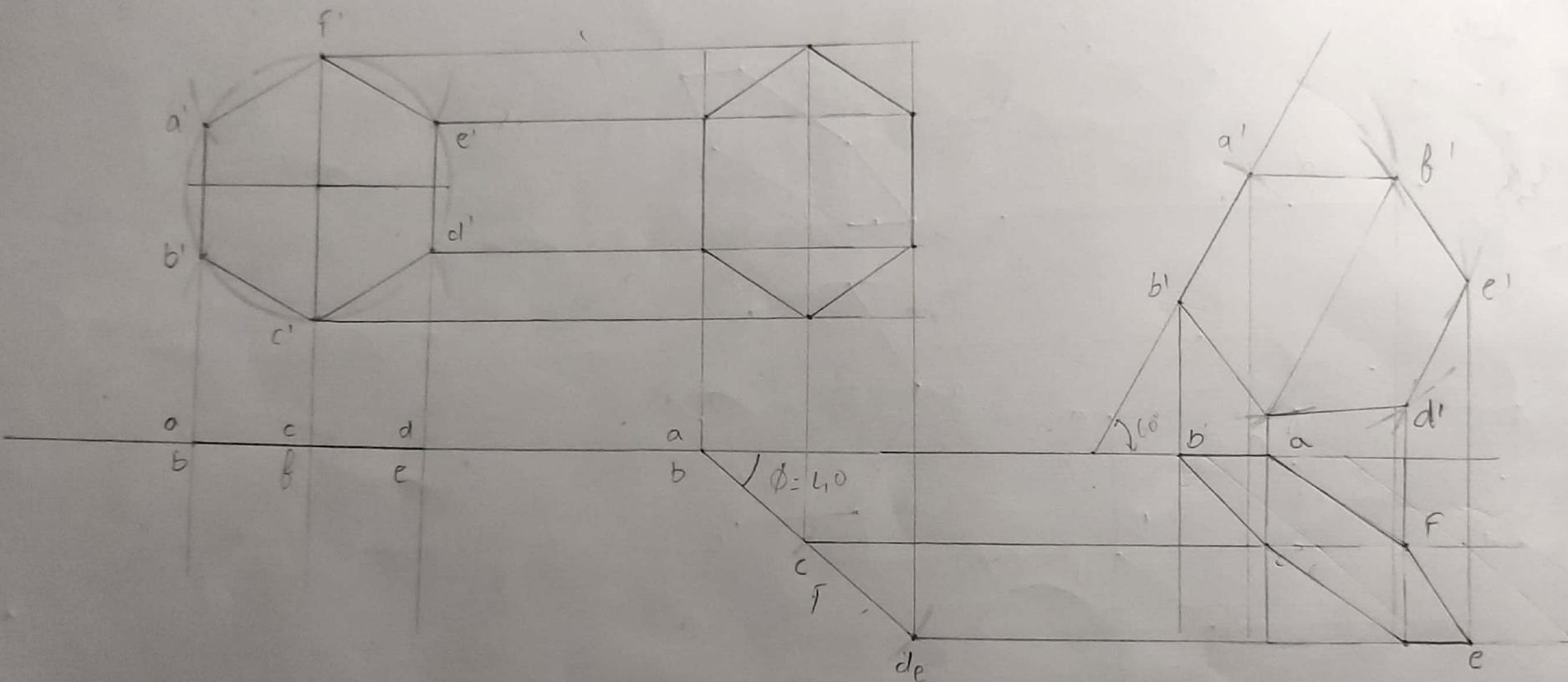
surface  $\rightarrow$  plane  $\rightarrow$  slanting  
 If the edge is not given find out for the surface inclination  
 is given

Sheet Prob



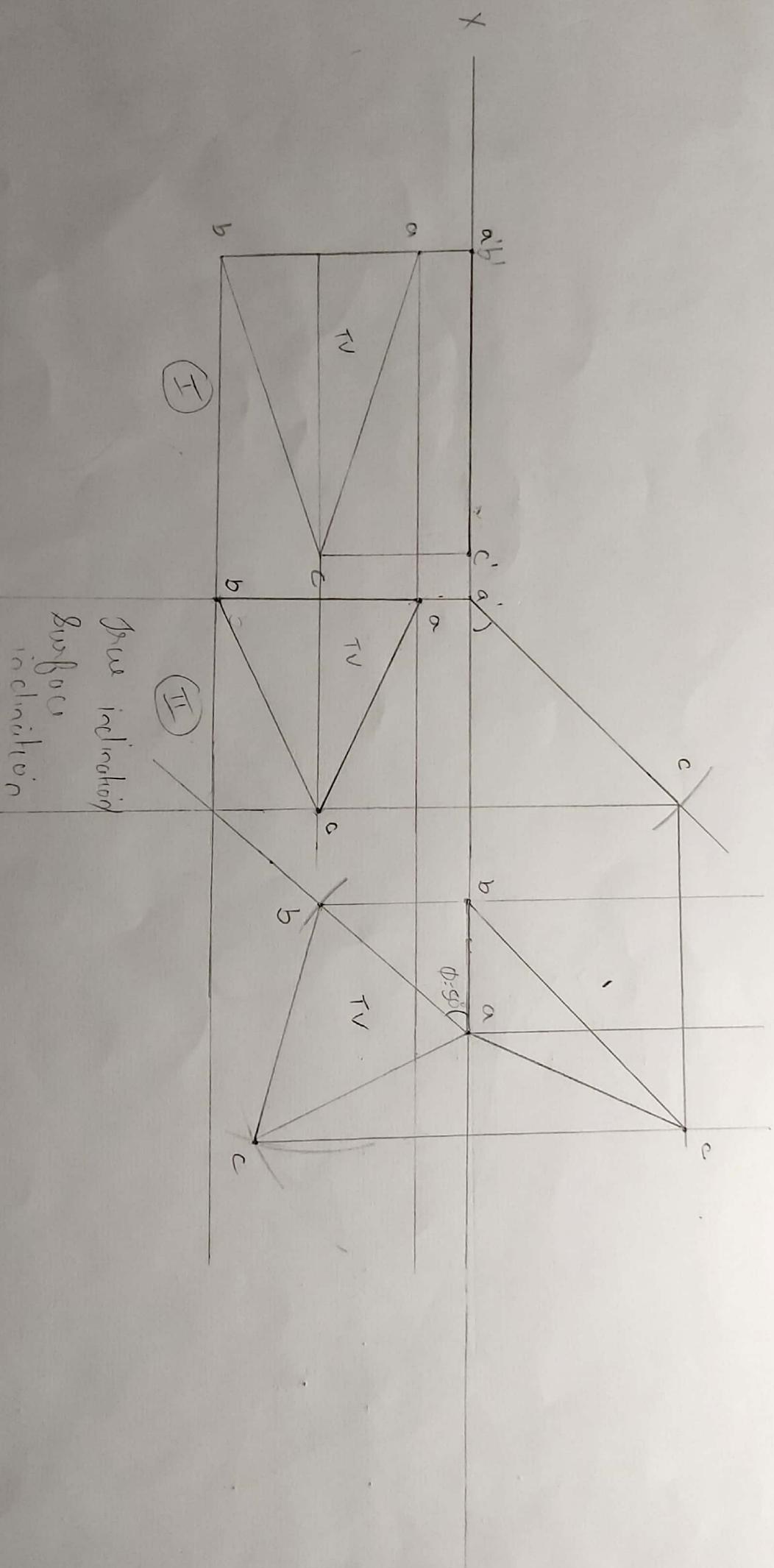
Draw the projections of a regular hexagon of side 100 mm in the VP and inclined at  $60^\circ$  to the HP and the surface making an angle of  $40^\circ$  with the VP

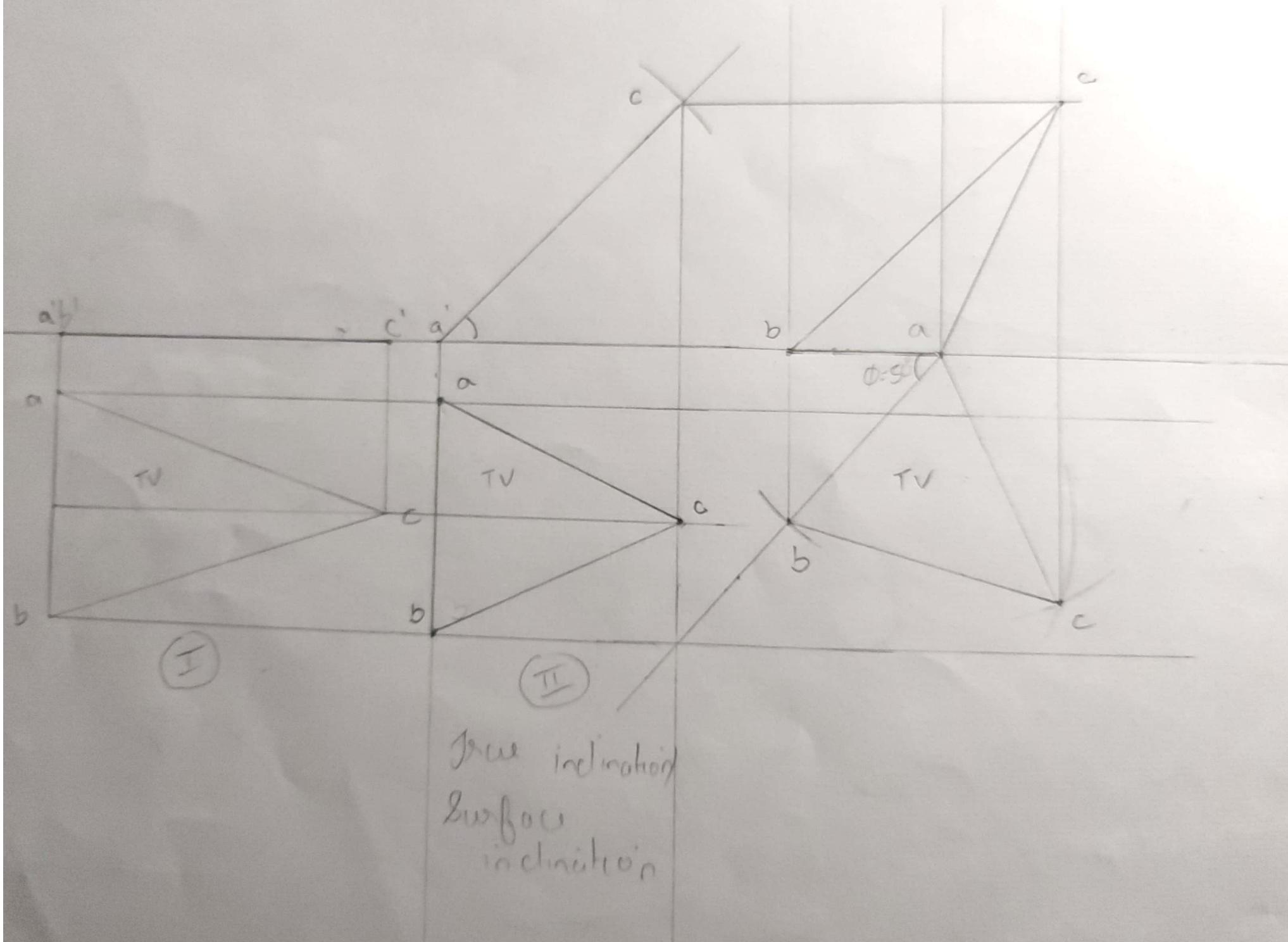
Name: Ashish Kumar  
Roll No. 44



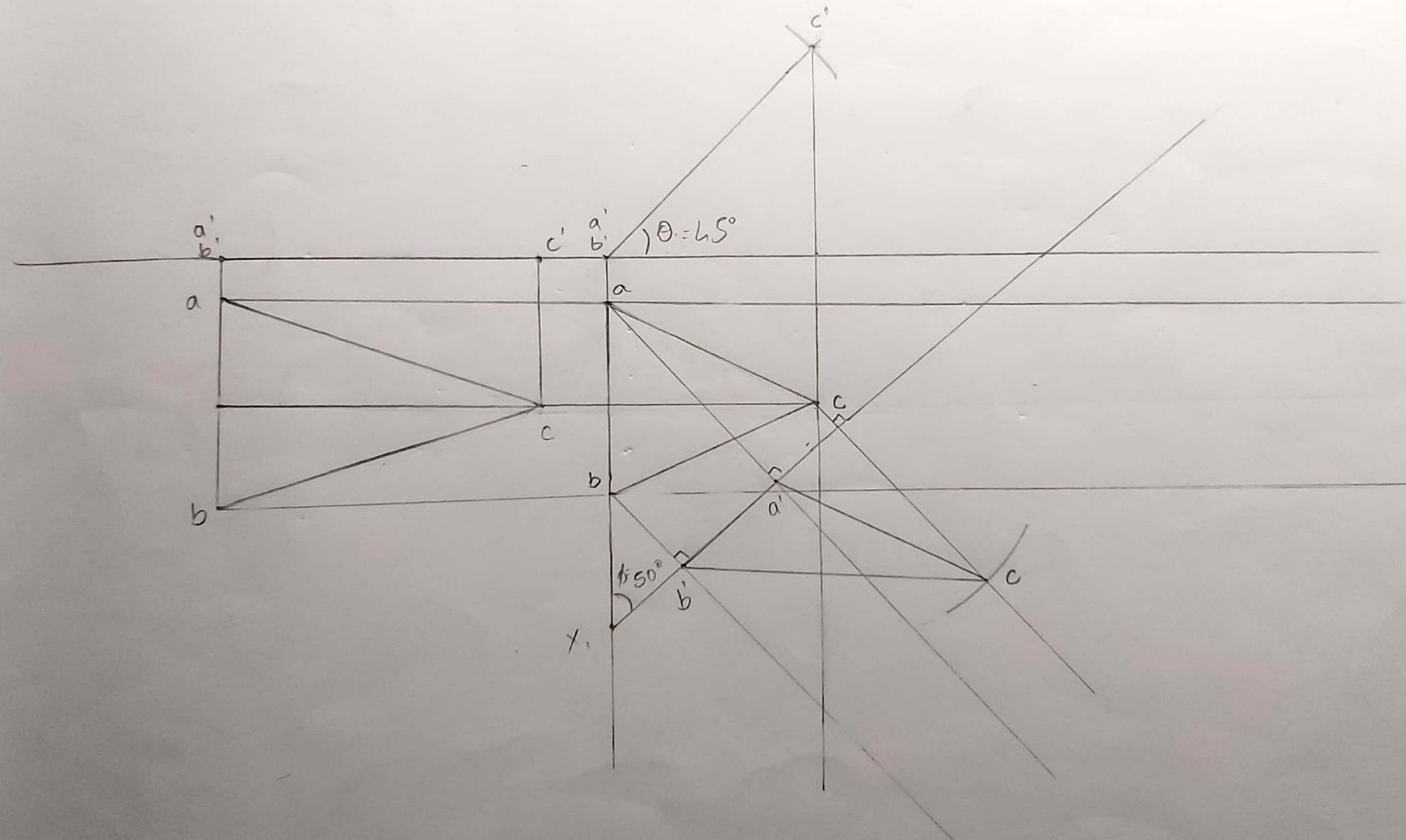
An isosceles triangle having its base horizontal and all other sides are inclined to the H.P. Draw projection of plane when its surface is inclined to the H.P. and making an angle  $50^\circ$  to the V.P. The base is on the H.P. and making an angle  $50^\circ$  to the H.P.

Assignment 5 is 1st part

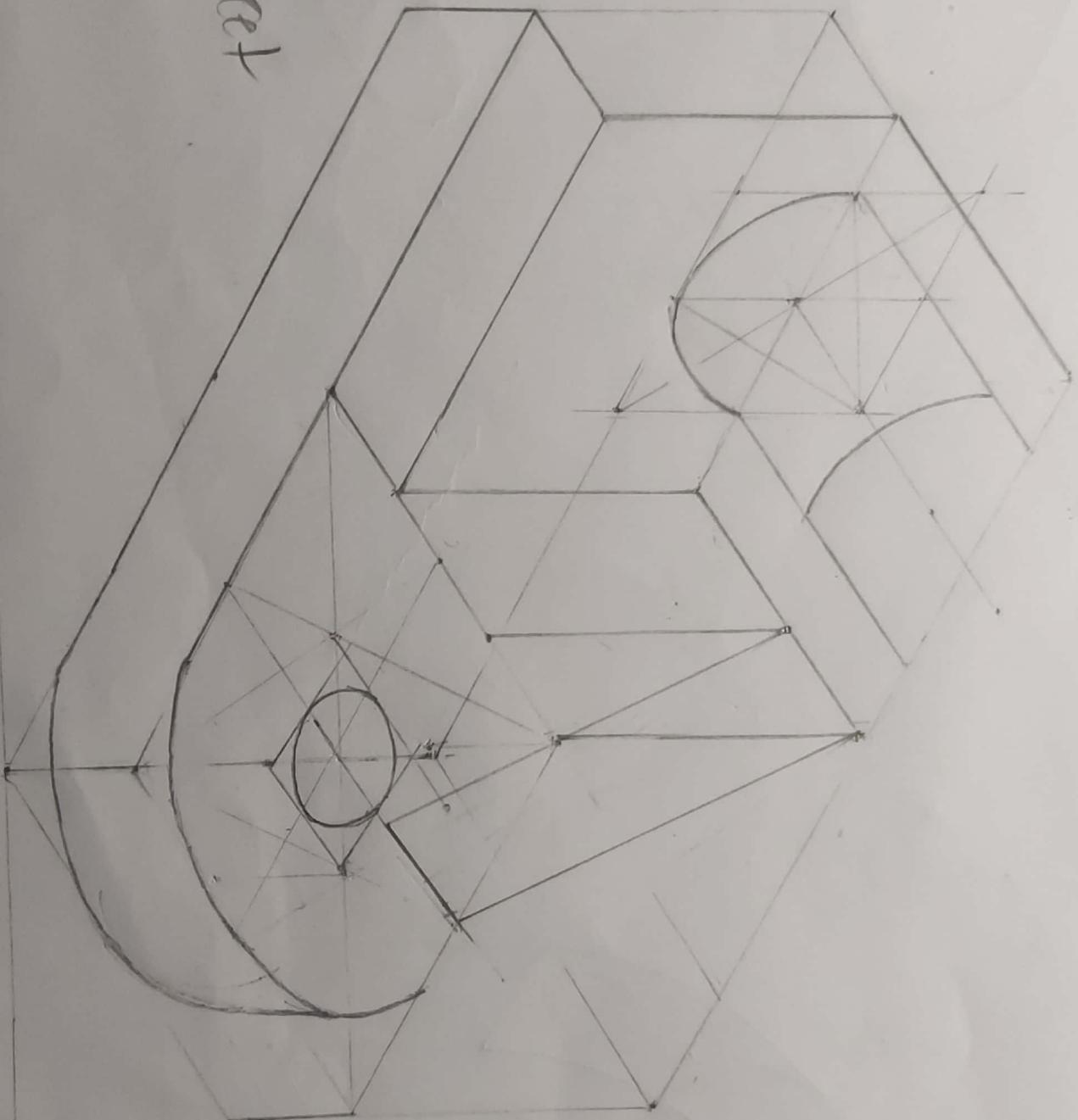




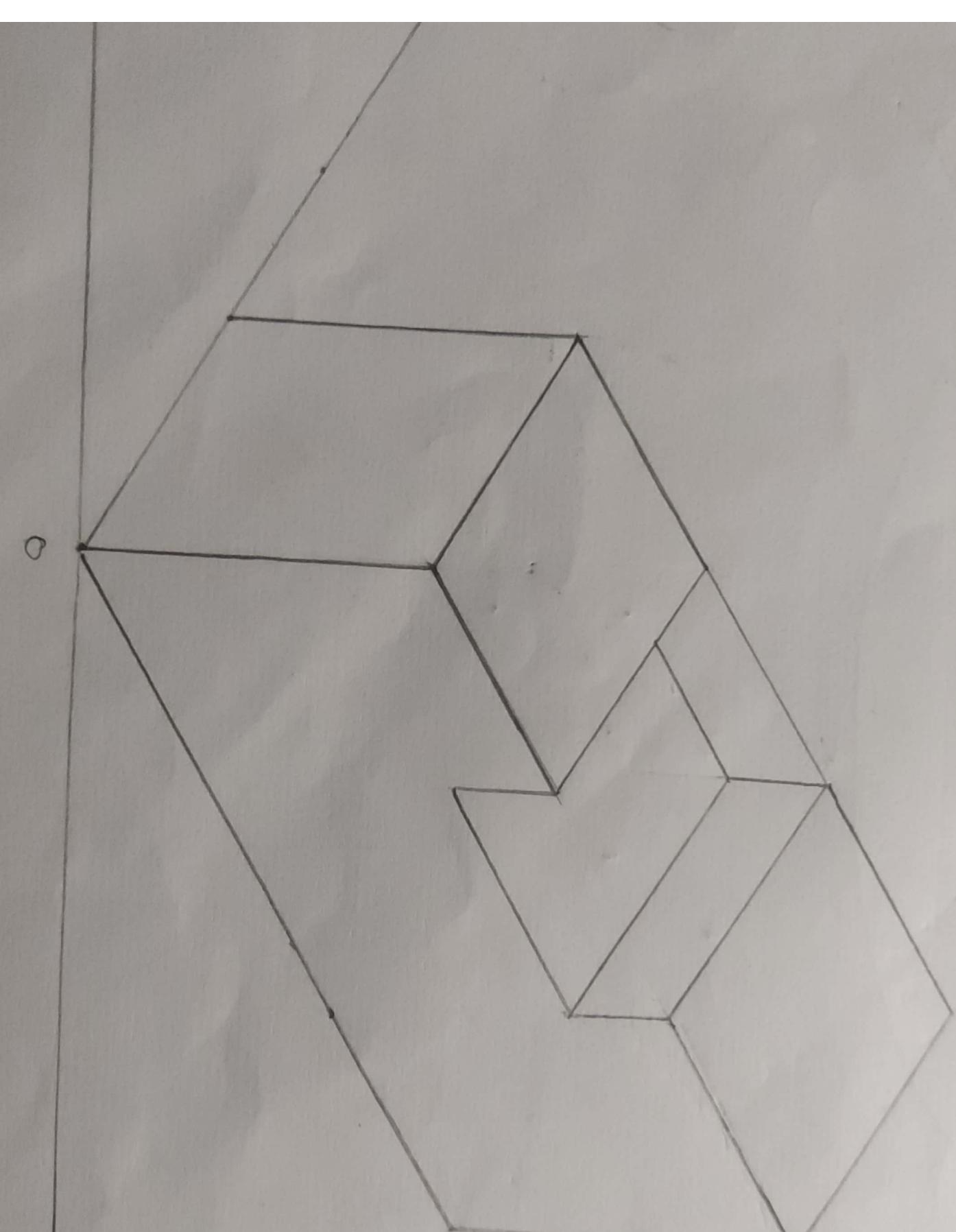
Q Assign PO position. A POC having its base 60 mm and altitude 6  
Sheet 7 2nd Prob.

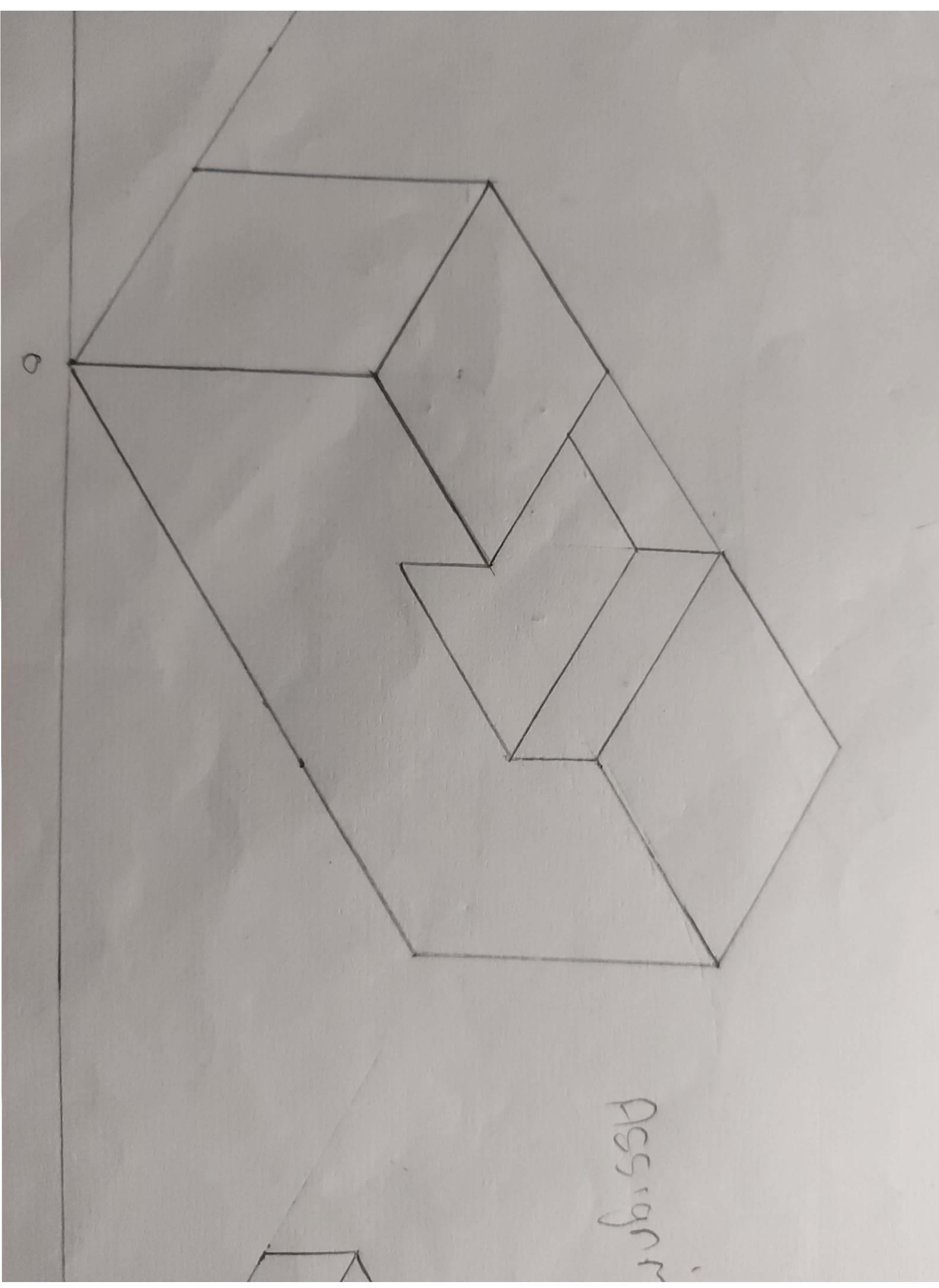


Sheet



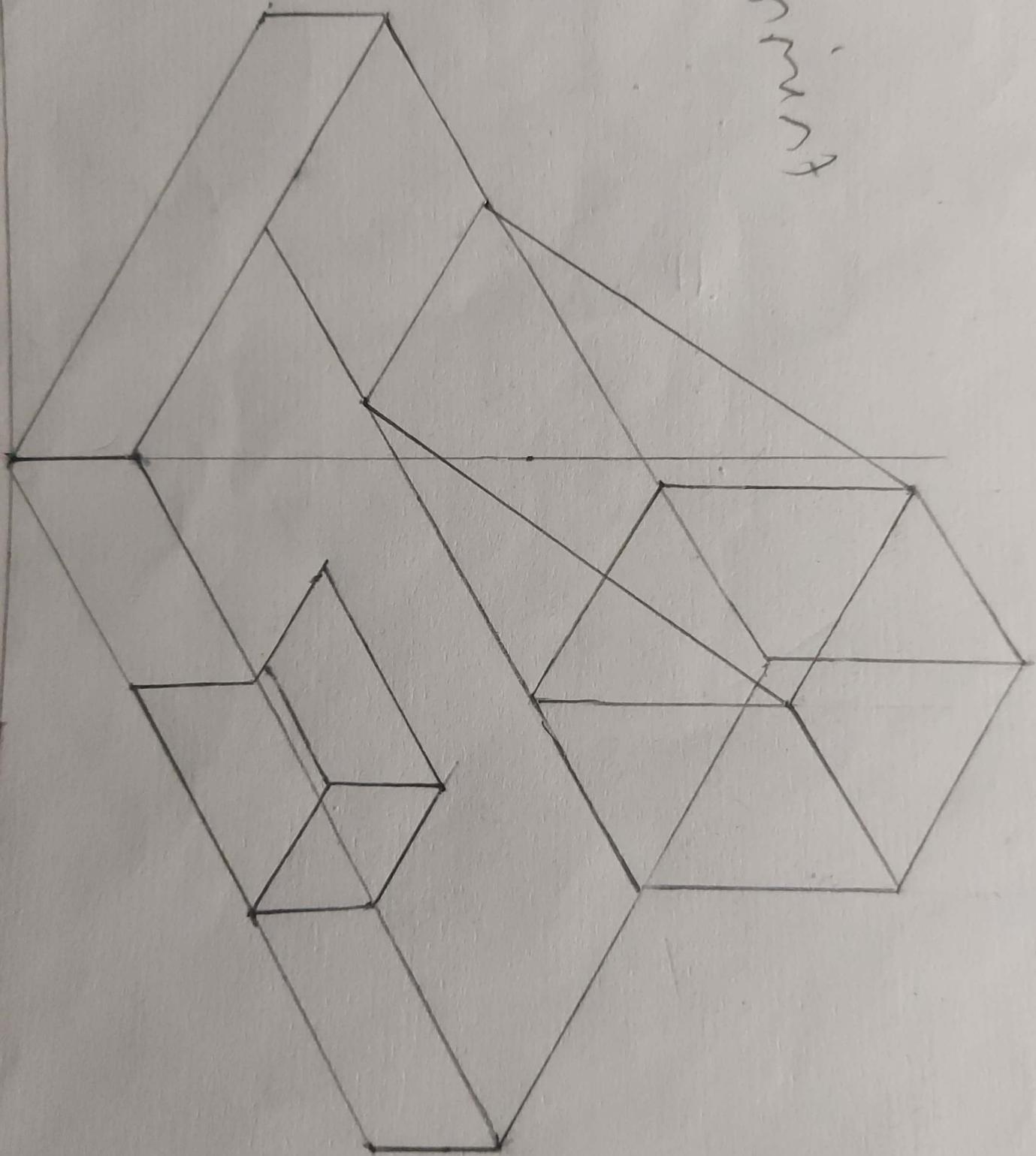
$l = 100$   
 $H = 50$   
 $w = 50$





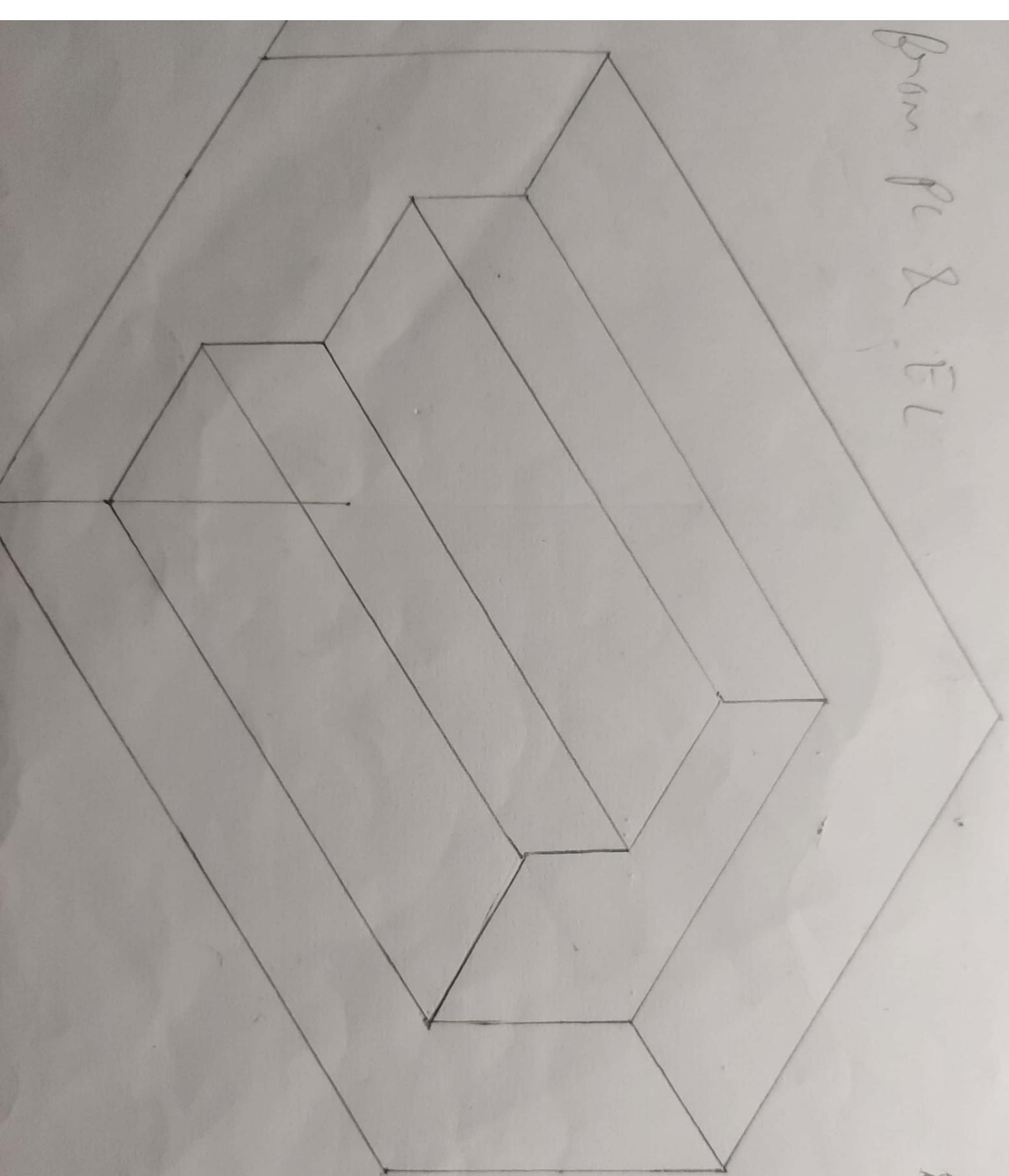
Assignment

Assignment



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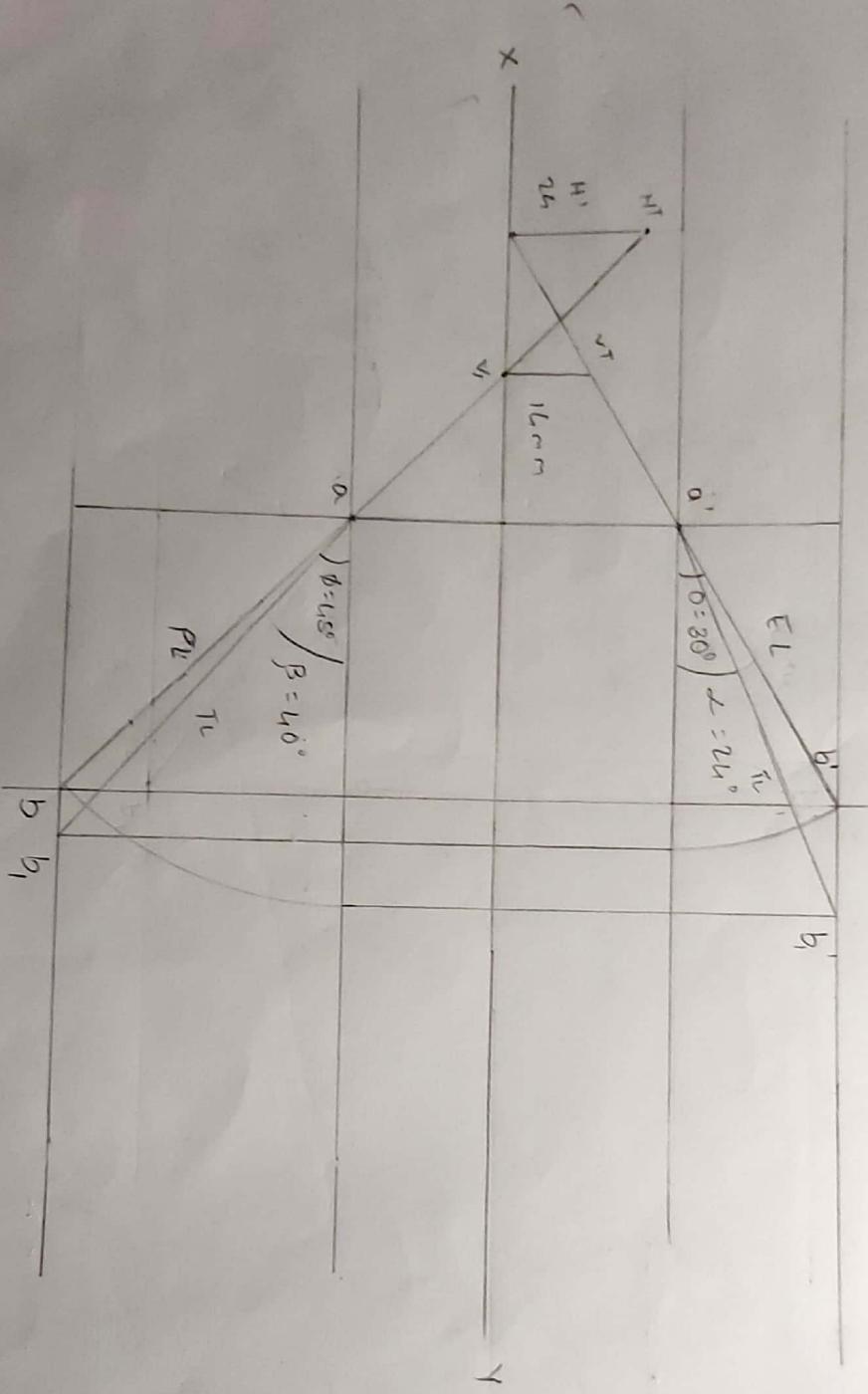
Breit -



Line AB has end A 30 mm above the HP and 25 mm below the VP.  
 VP line makes  $30^\circ$  to the HP &  $45^\circ$  to the VP. Distance between the projections of the ends A and B is 47 mm. Draw the projections of the line, find its true length and project it.

Given:  $d = 47 \text{ mm}$   
 $\phi = 45^\circ$   $\theta = 30^\circ$   
 $\alpha = 45^\circ$

Assignment - 1  
 T.L = 72



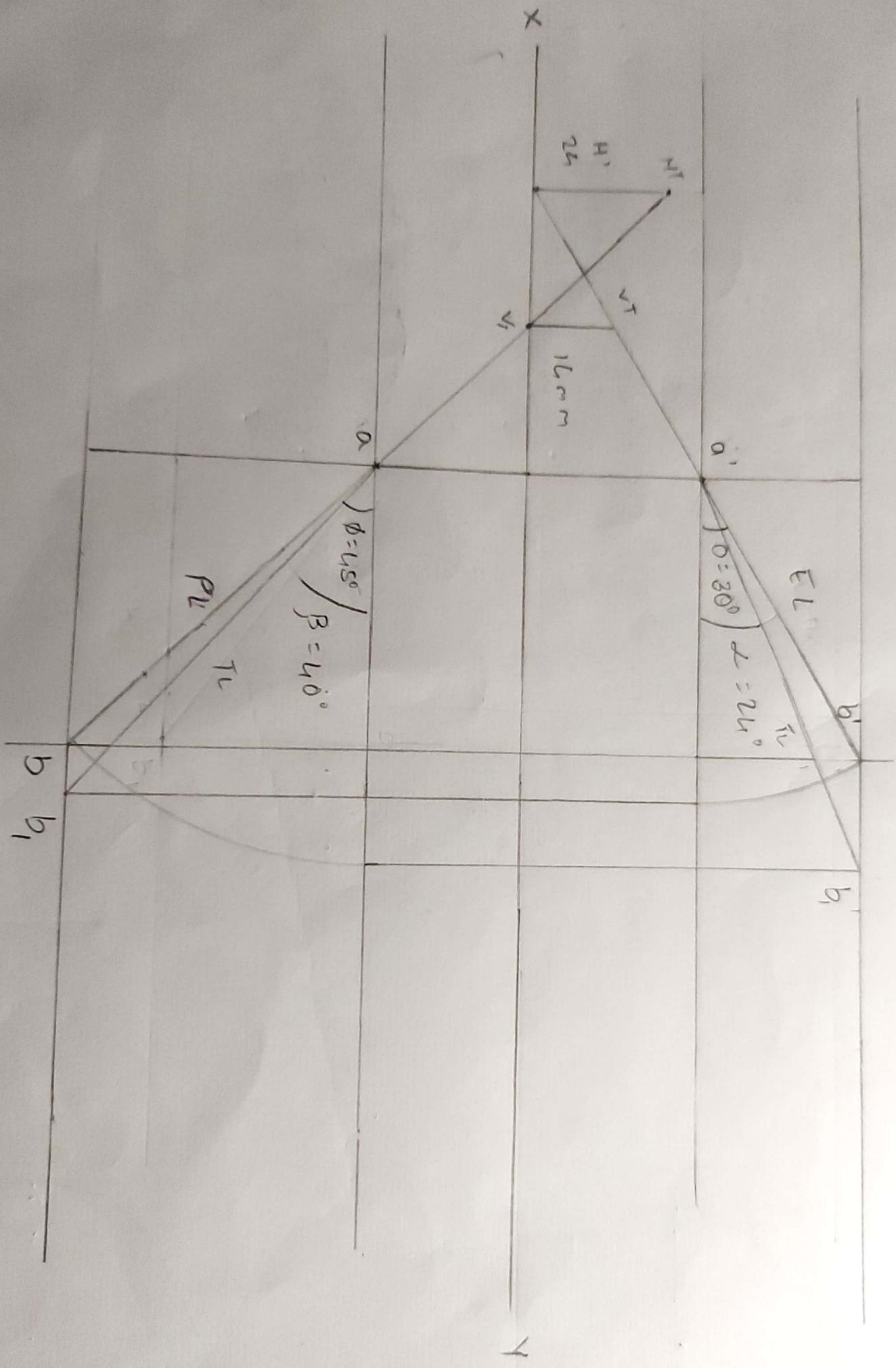
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$$\phi = 45^\circ$$

$$\theta = 30^\circ$$

$$d = 47 \text{ mm}$$

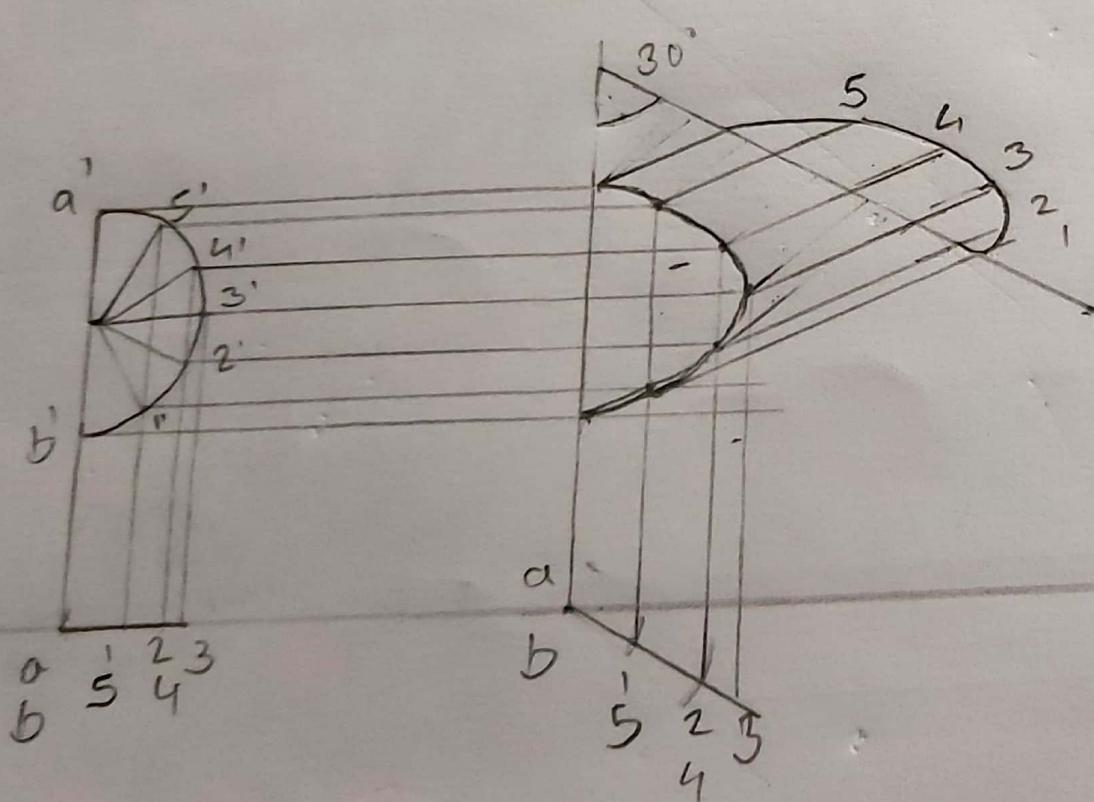
$$T_L = 72$$



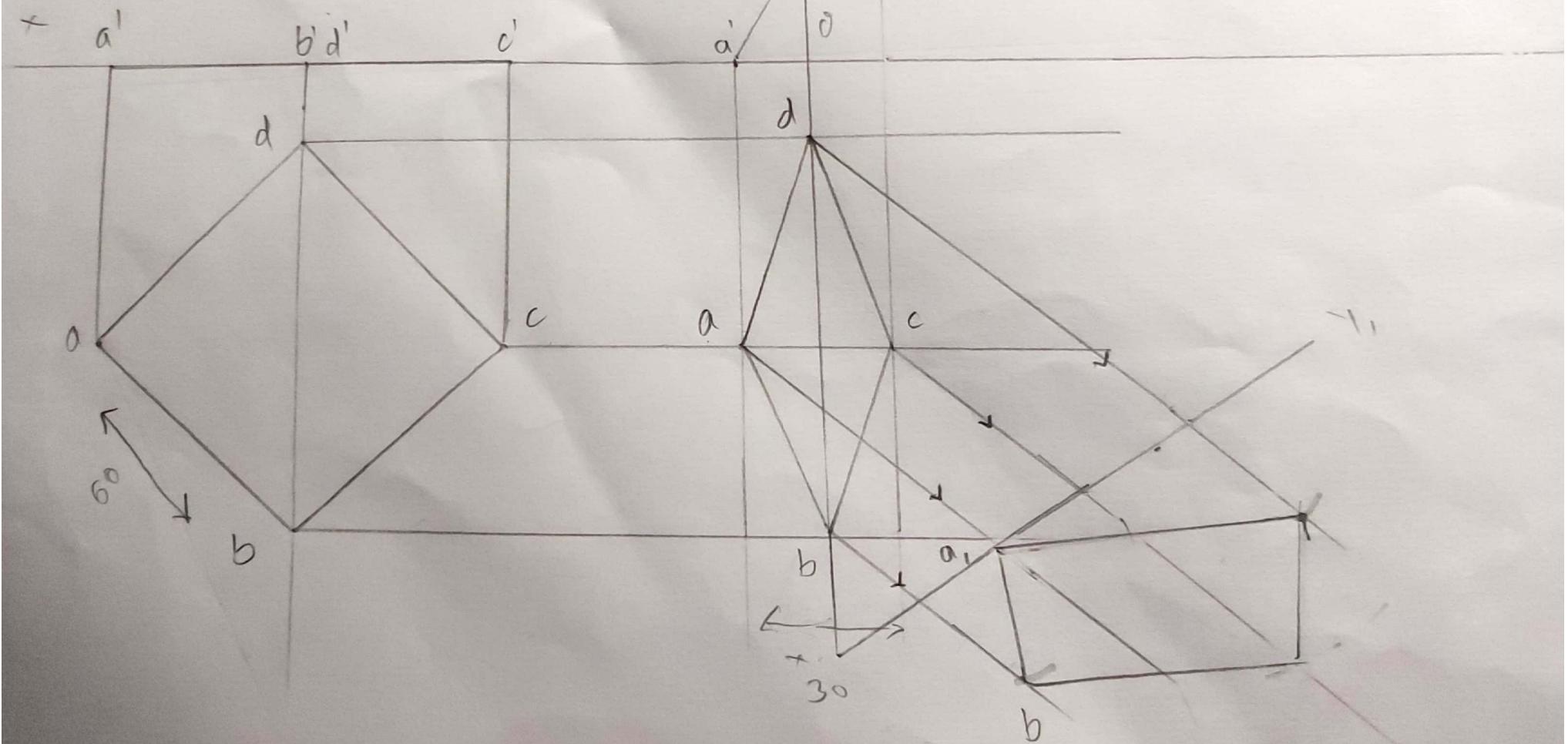
A semicircular plate of width 100 mm at 30° & surface of the plate makes an angle of 60° to the horizontal.

Name: Aashish Kumar

Roll No: 64



$b = 9$   
 $\frac{5}{4} \times 25$   
 A square ABCD of 60 mm side, rest on corner A or plane appears has a 30 mm. draw the with the VP. Also measure inclination of plane with the H.P.



Assignment 8  
S

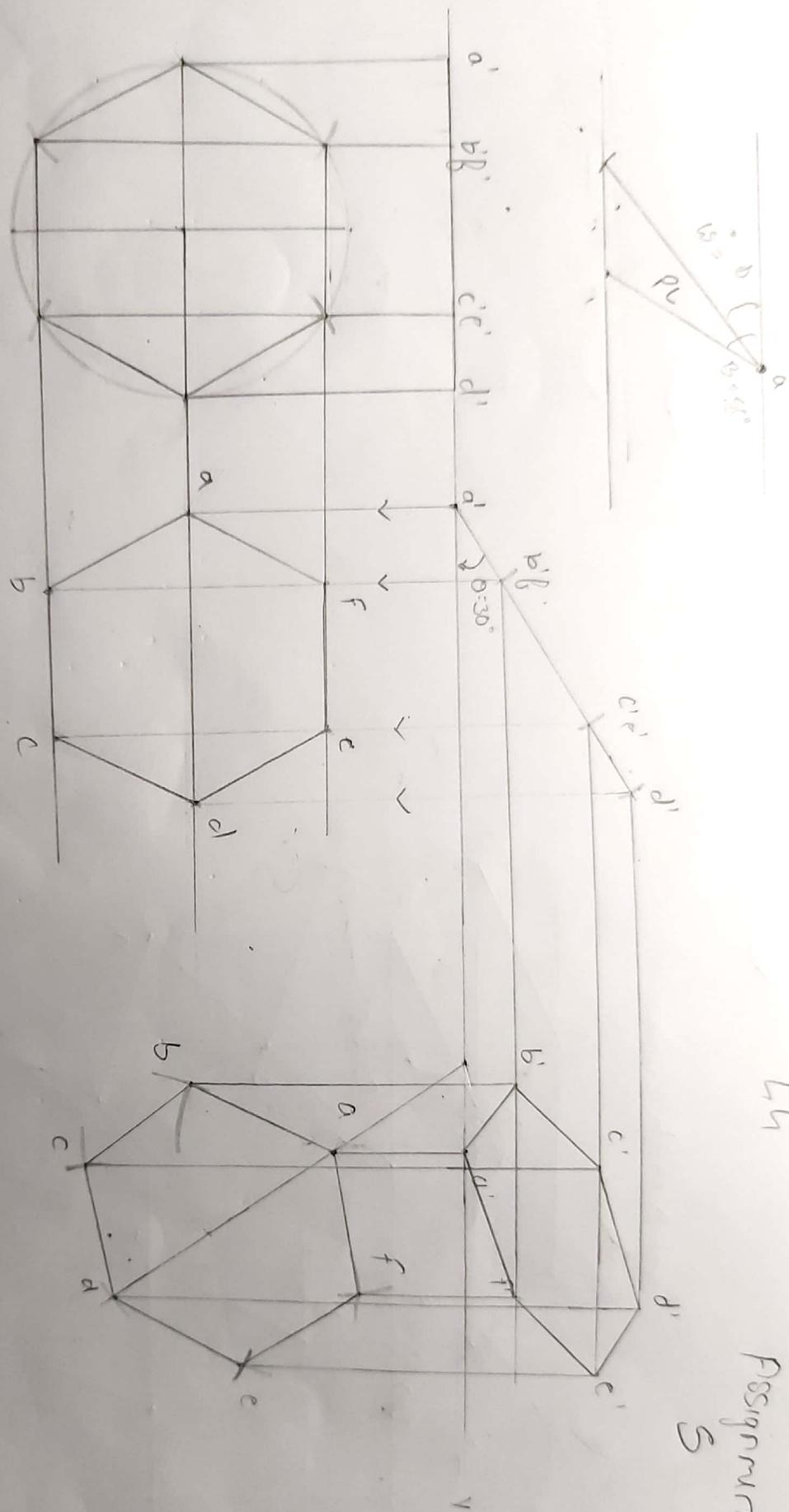
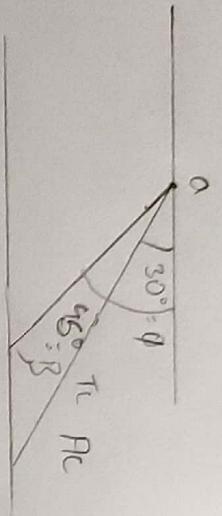


Diagram part of 60 mm side is resting on the HP or G.P.



Name: Ashish Kumar  
Roll No: 44

