2. Projection Of Points

Projection:- It is representation of an object on a 2D. plane.

Projectors:- The lines or rays drawn from the object to the plane is called projectors.

Ortho Graphic Projections:-

It is a parallel projections in which the projectors are parallel to each other and perpendicular to the plane of projection.

IInd angle OP Above HP Behind VP	Ist angle OP Above HP Infront of VP
IIIrd angle OP Below HP Behind VP	IVth angle OP Below HP Infront of VP

Above HP
Behind VP

X ——— Y

Below HP
Infront of VP

① (a) A point 'A' is 20mm above HP and 30mm infront of VP. Draw its projection.

(b) A point 'B' is 20mm above HP and 30mm behind VP.

Draw its projections.

(C) A point 'C' is 20mm below HP and 30mm behind VP. Draw its projections.

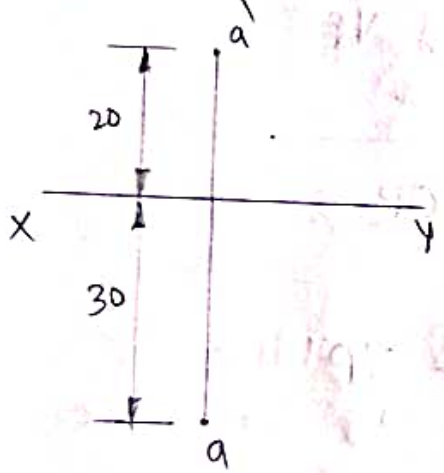
(D) A point 'D' is 20mm below HP and 30mm infront of VP. Draw its projections.

(E) A point 'E' is on HP and 30mm infront of VP. Draw its projections.

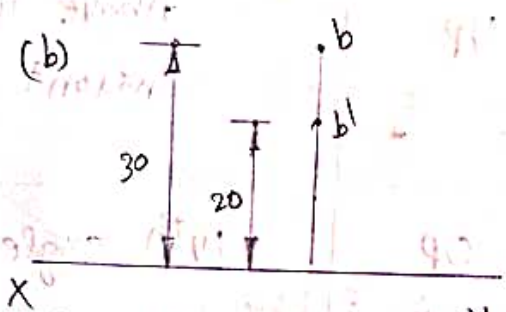
(F) A point 'F' is on VP and 20mm above HP. Draw its projections.

(G) A point 'G' is lying on both HP and VP. Draw its projections.

(a)

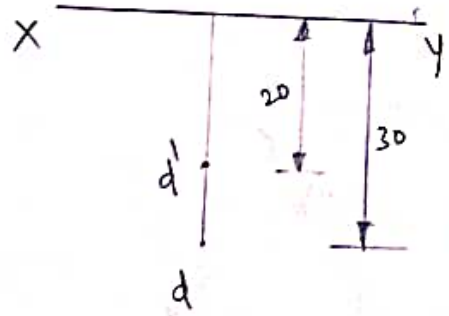


(b)

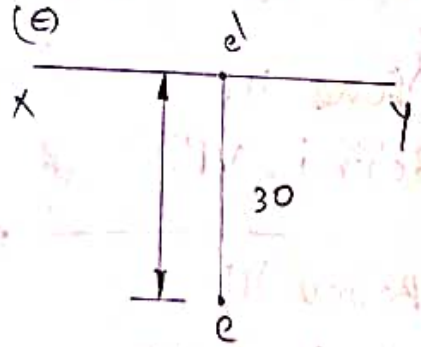


(c)

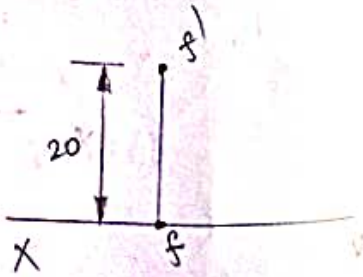
(D)



(E)

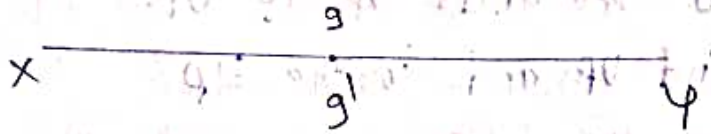


(F)



(G)

(G)



(2) Draw the projections on the following points on a common reference line.

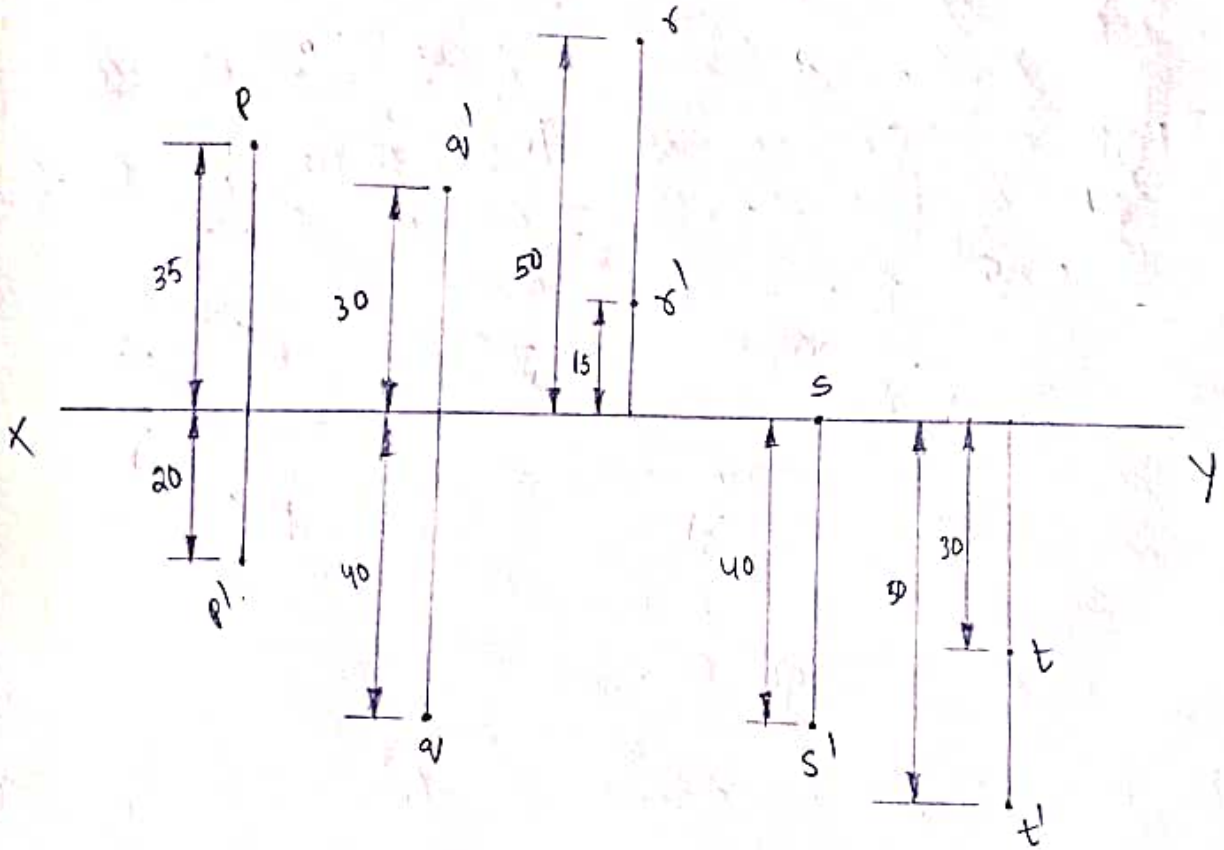
(a) P, 35mm behind the VP and 20mm below HP.

(b) Q, 40mm infront of VP and 30mm above HP.

(c) R, 50mm behind the VP and 15mm above the HP.

(d) S, 40mm below HP and in the VP.

(e) T, 30mm infront of VP and 50mm below HP.



(3). Draw the projections of the following points on a common reference line.

(a) P, 40mm below HP and in the VP.

(b) Q, 35mm behind VP and in the HP

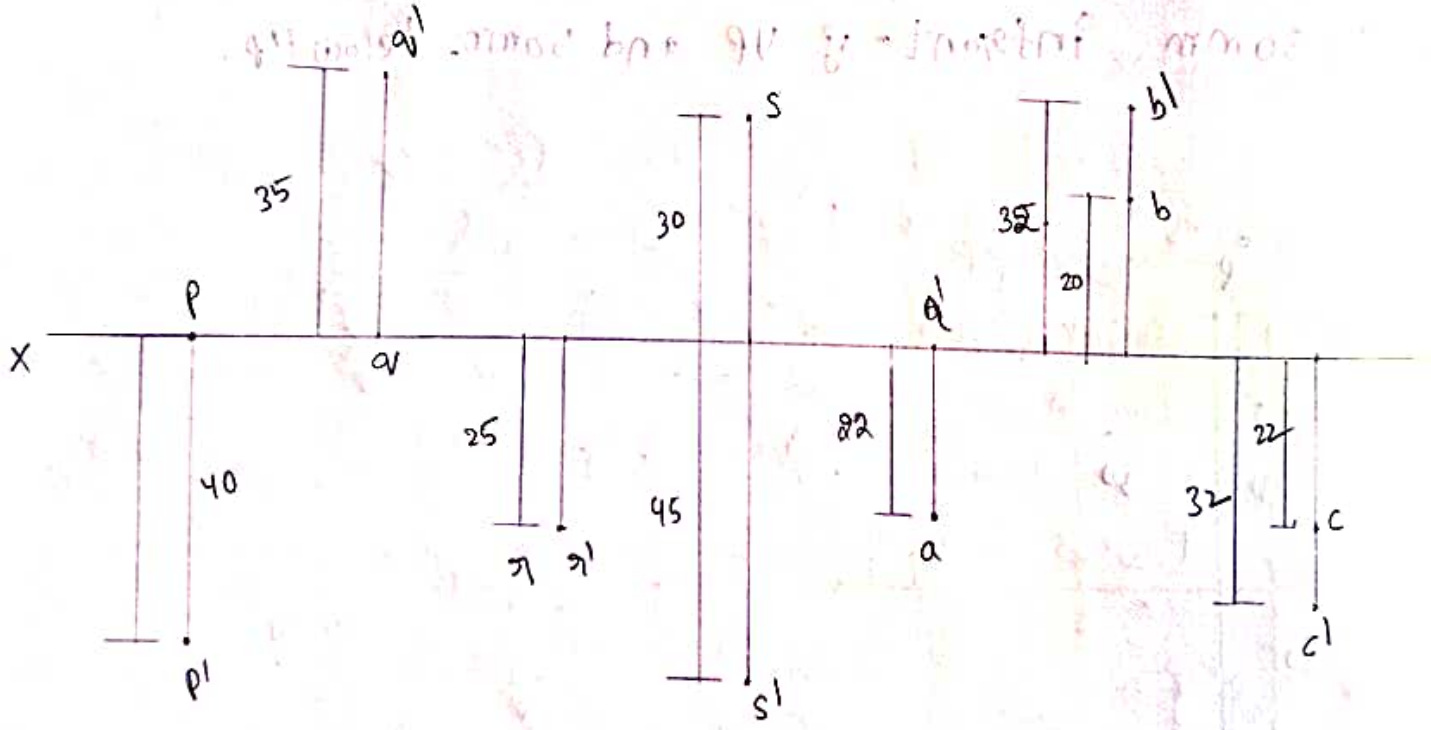
(c) R, 25mm below HP and 25mm infront of VP

(d) S, 30mm behind VP and 45mm below HP

(e) A, lies in the HP and 22mm infront of VP

(f) B, lies 20mm behind the VP and 32mm above HP

(g) C, lies 32mm below HP and 22mm infront of VP.



(3). Draw the projections of the following points on the same reference line, keeping the projectors 30mm apart.

(i) A, 30mm above HP, and 30mm infront of VP

(ii) B, 45mm below HP, and 30mm behind VP.

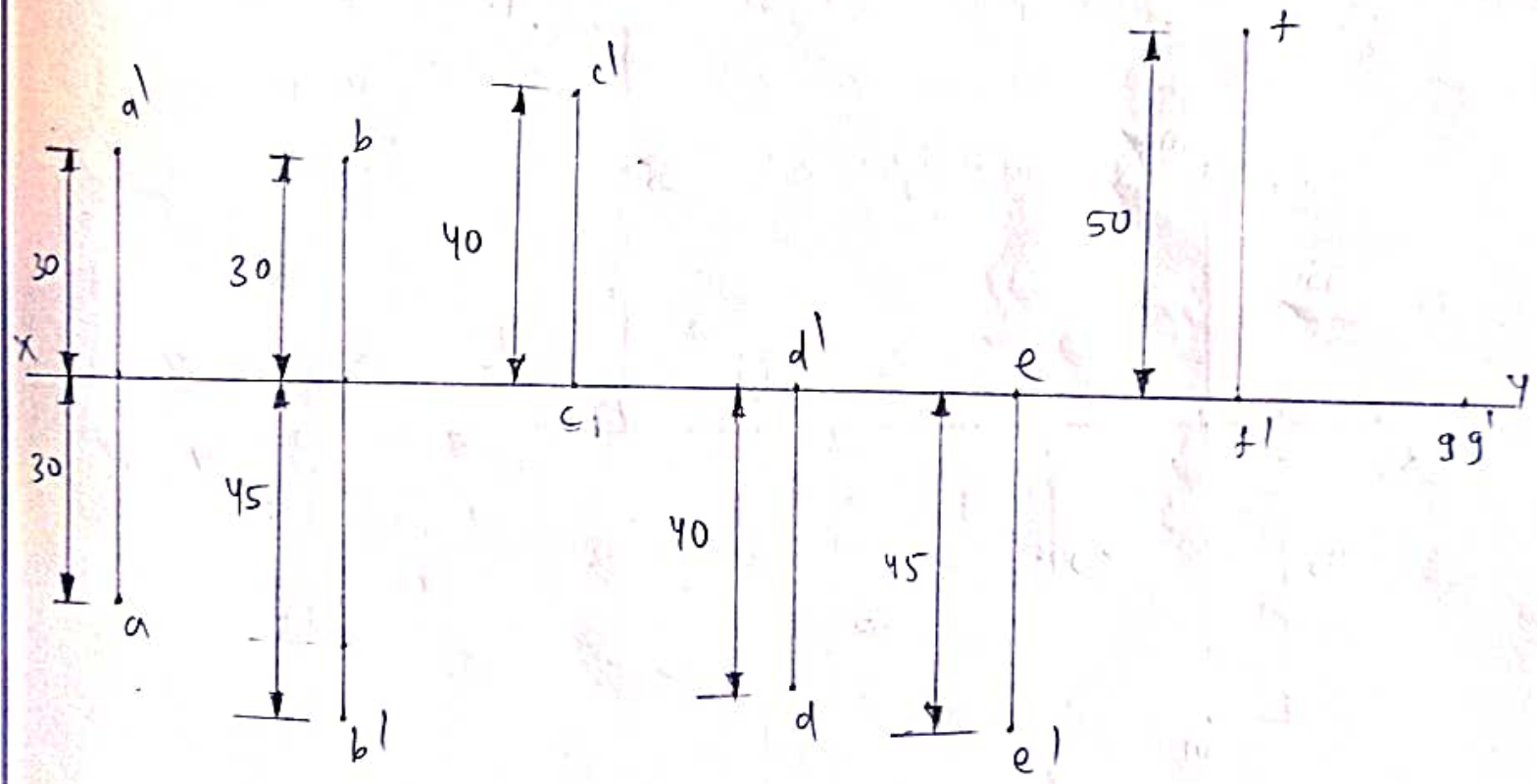
(iii) C, 40mm above HP and in the VP.

(iv) D, 40mm infront of VP and in HP.

(v) E, 45mm below HP and in VP.

(vi) F, 50mm behind VP and in the HP.

(vii) G, in both HP and VP.

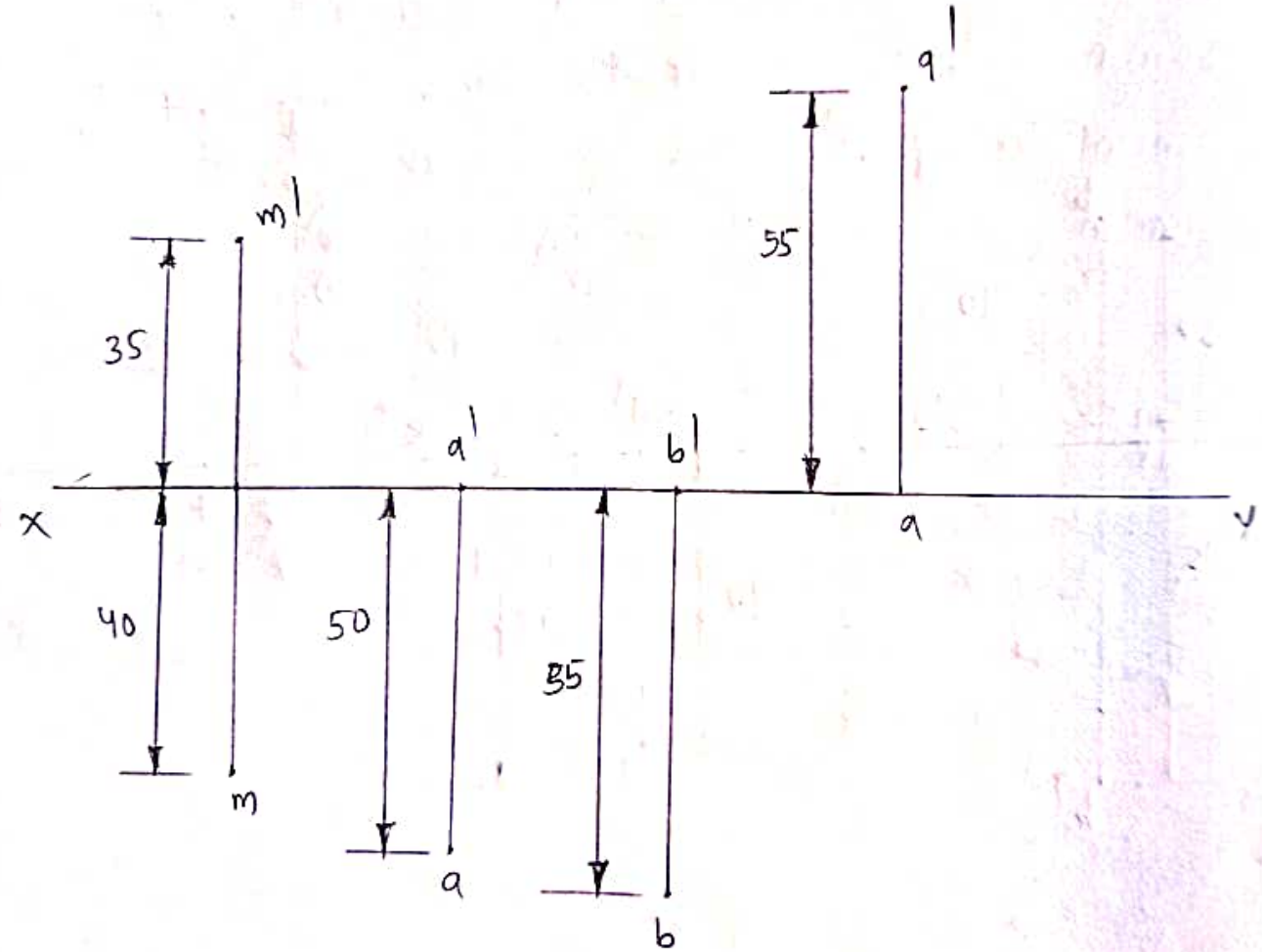


(5) (i) A point 'm' is 35mm above HP and VP. Draw its projections.

(ii) Draw the projections of a point 'A' lying on HP and 50mm infront of VP.

(iii) Draw the projections of a point 'B' lying on HP and 55mm infront of VP.

(iv) Draw the projections of a point A lying on HP and 55mm above HP.

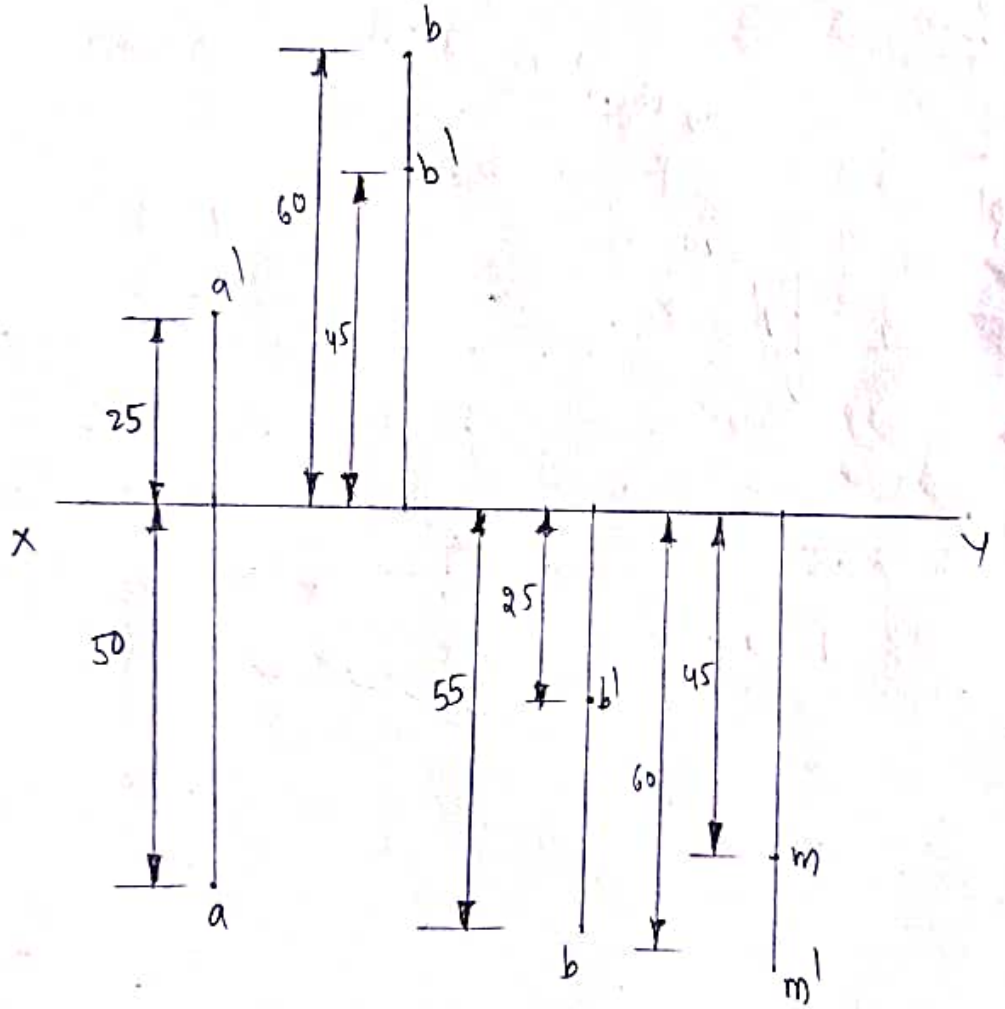


(6). (i) Draw the projections of a point 'A' 25mm above HP, and 50mm infront of VP.

(ii) A point 'B' is 45mm above HP and 60mm behind VP. Draw the projections.

(iii) Draw the projections of a point 'B' 25mm below HP and 55 mm infront of VP.

(iv) A point 'M' is 60mm below HP and 45mm infront of VP. Draw the projections.



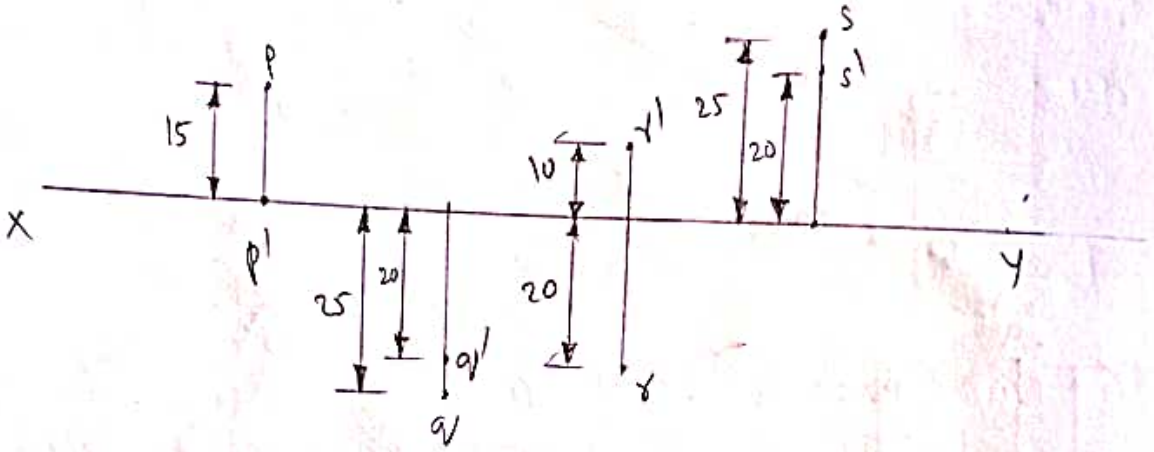
(7) Draw the projections of the following points in different quadrants.

(i) Point 'P', 15mm behind VP and on HP.

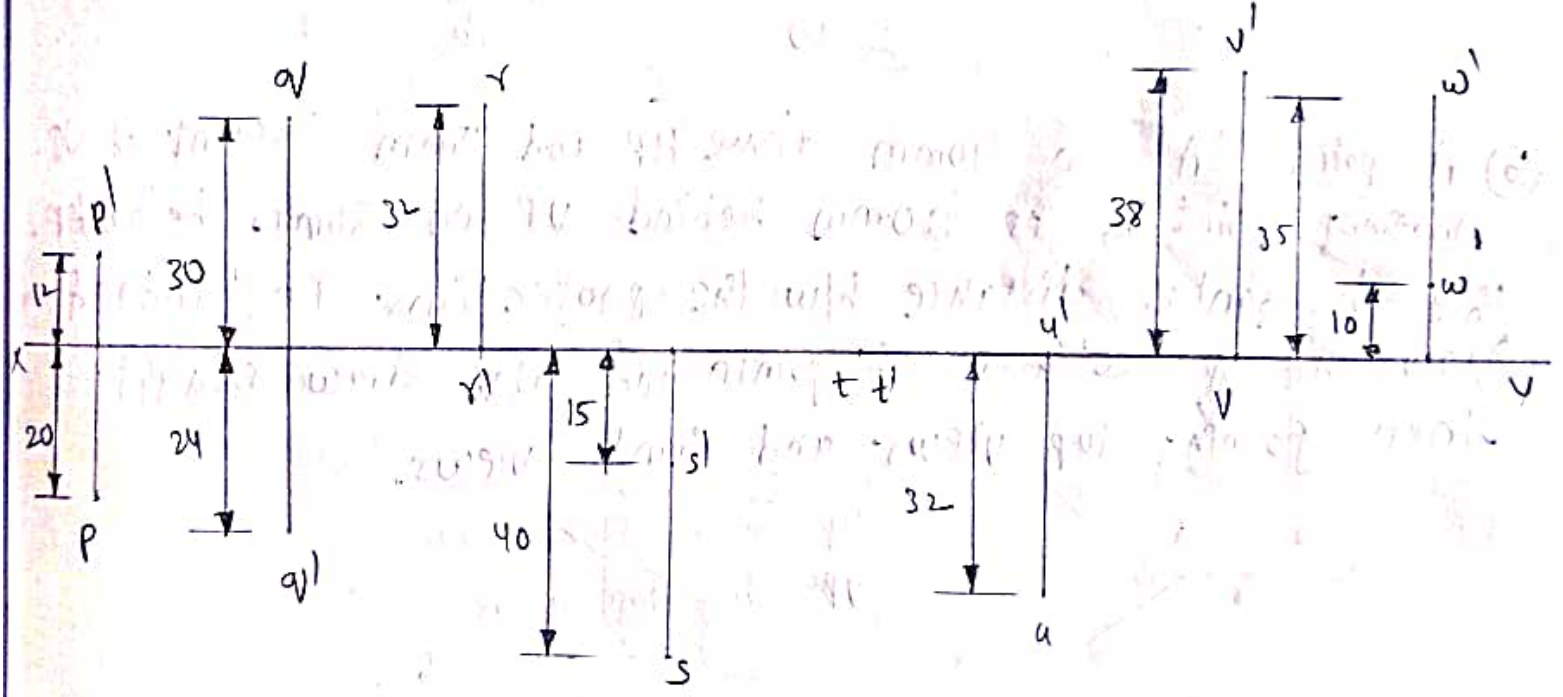
(ii) Point 'Q', 20mm infront of VP and 25mm below HP.

(iii) Point 'R', 20mm infront of VP and 10mm above HP.

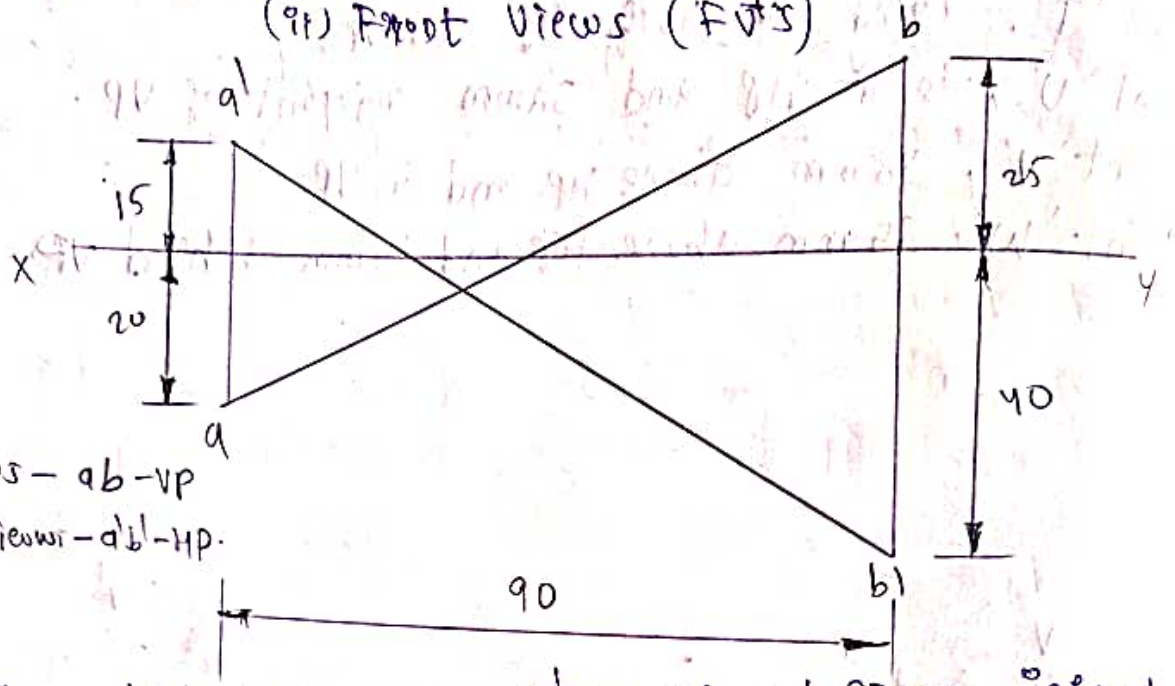
(iv) Point 'S', 25mm behind VP and 20mm above HP.



(8). Draw the projections of the following points
(i) Point 'P', 12mm above HP and 20mm infront of VP.
(ii) Point 'Q', 24mm below HP and 30mm behind VP.
(iii) Point 'R', is in HP and 32mm behind VP.
(iv) Point 'S', 15mm below HP and 40mm infront of VP.
(v) Point 'T', lying on both HP and VP.
(vi) Point 'U', is in HP and 32mm infront of VP.
(vii) Point 'V', 38mm above HP and in VP.
(viii) Point 'W', 35mm above HP and 10mm behind VP.



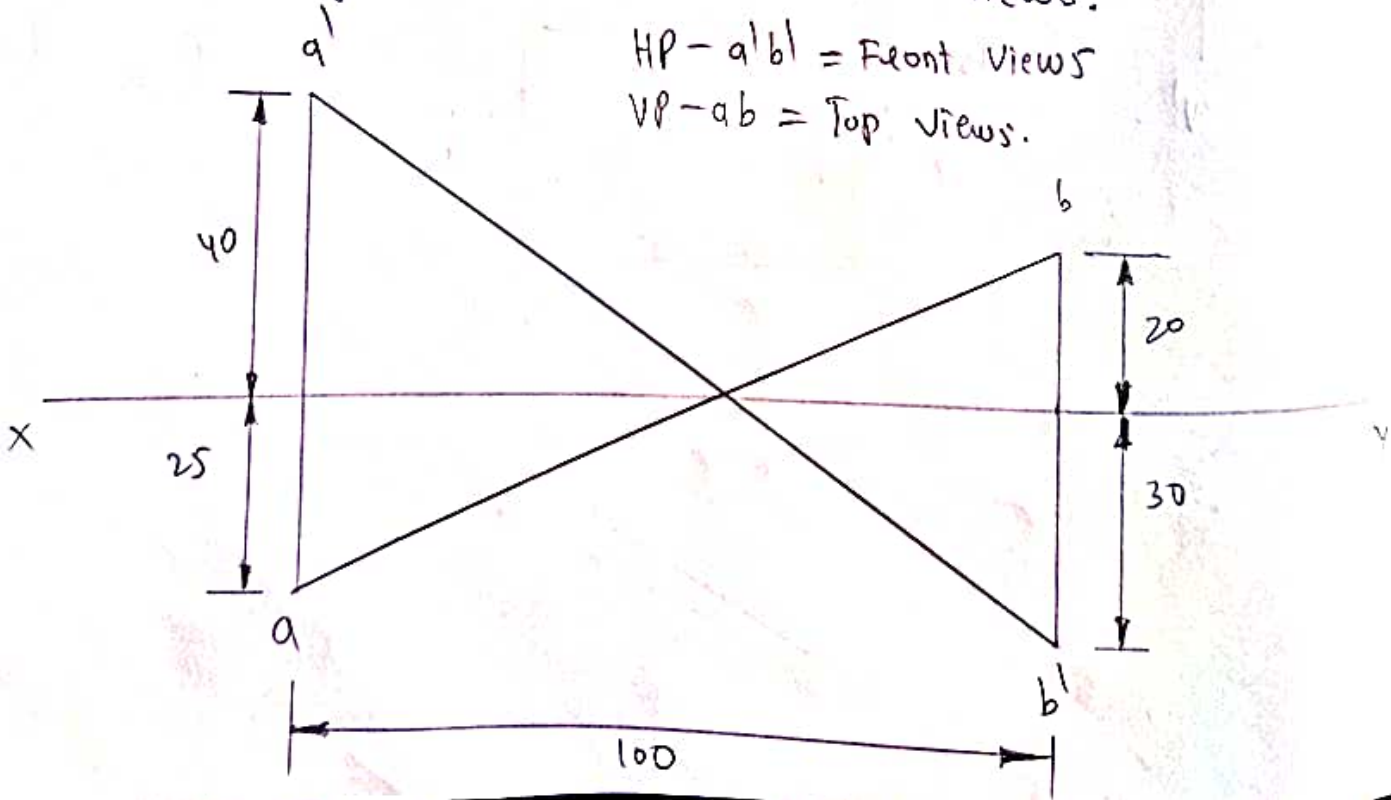
(9). A point 'A' is 15mm above HP and 20mm infront of VP. Another point 'B' is 25mm behind VP and 40mm below HP. Draw the projections of A and B, keeping the distance b/w the projections is equal to 90mm. Draw straight lines, joining. (i) Top views (Tv's) (ii) Front views (FV's)



Top Views – ab – VP
Front Views – a'b' – HP.

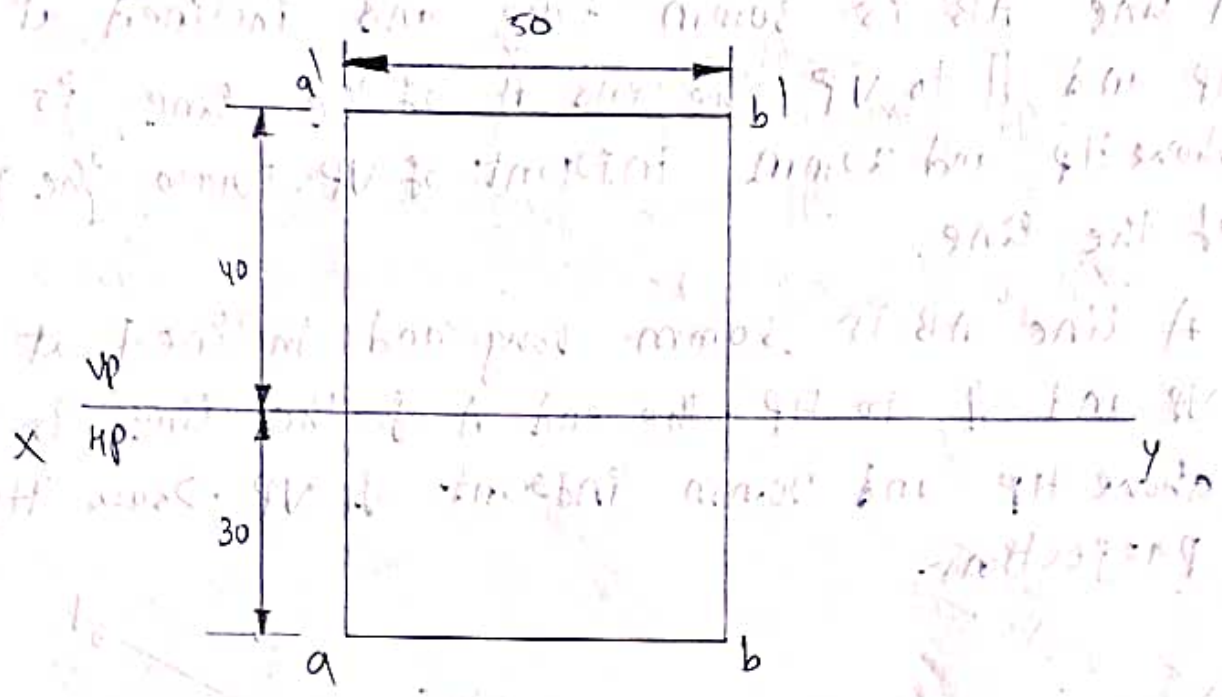
(10) A point 'A' is 40mm above HP and 25mm infront of VP. Another point 'B' is 20mm behind VP and 30mm below HP. the horizontal distance b/w the projections is hundred. Draw the projections of points and also draw straight lines joining top views and front views.

HP – a'b' = Front Views
VP – ab = Top Views.

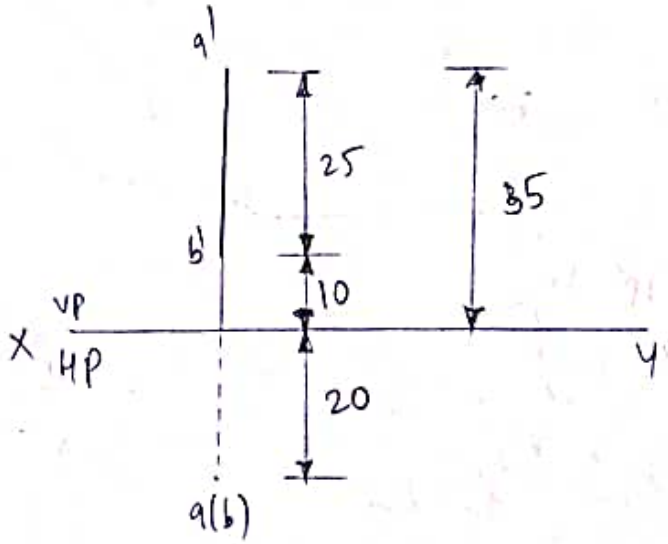


Projection of Lines

(a) A line AB of 50mm length is parallel to both HP and VP. The line is 40mm above HP and 30mm infront of VP. Draw the projections of the line.



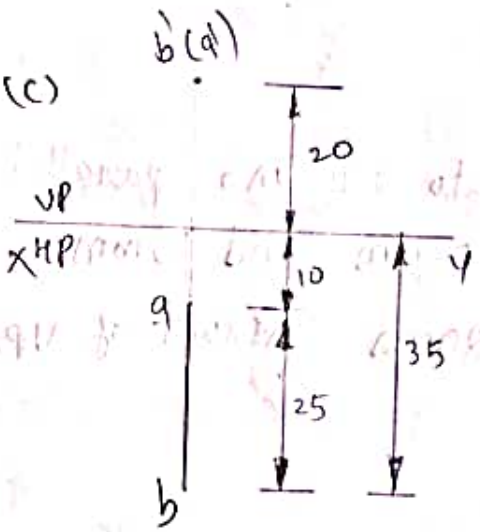
(b) A line AB of 25mm long is ⊥ to HP and parallel to VP. The end points A and B are 35mm and 10mm above HP respectively. The line is 20mm infront of VP. Draw the projections.

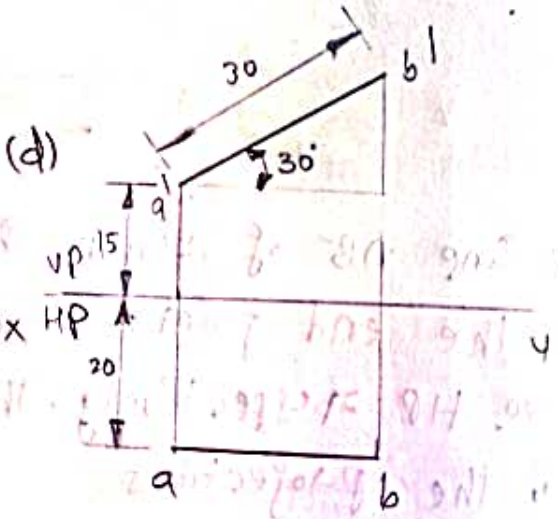


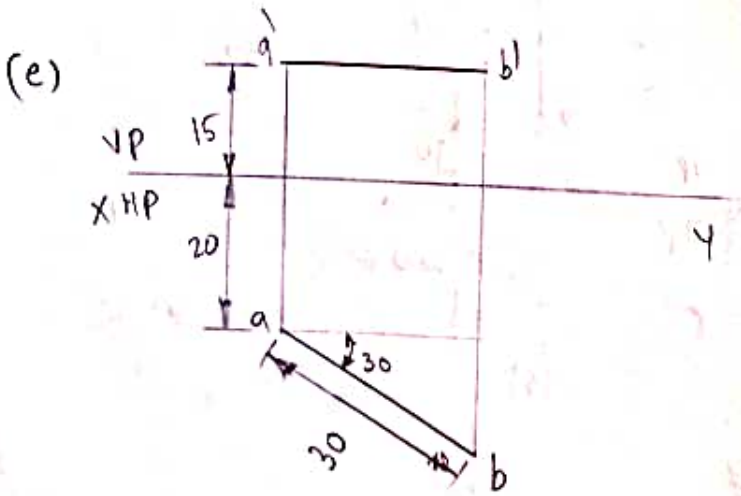
(c) A line AB of 25 mm long is ⊥ to VP and // to HP. The end points A and B of the line are 10mm and 35mm infront of VP respectively. The line is 20mm above HP. Draw its projections.

(d) A line AB is 30mm long and inclined at 30° to HP and // to VP. The end A of the line is 15mm above HP and 20mm infront of VP. Draw the projections of the line.

(e) A line AB is 30mm long and inclined at 30° to VP and // to HP. The end A of the line is 15mm above HP and 20mm infront of VP. Draw its projections.

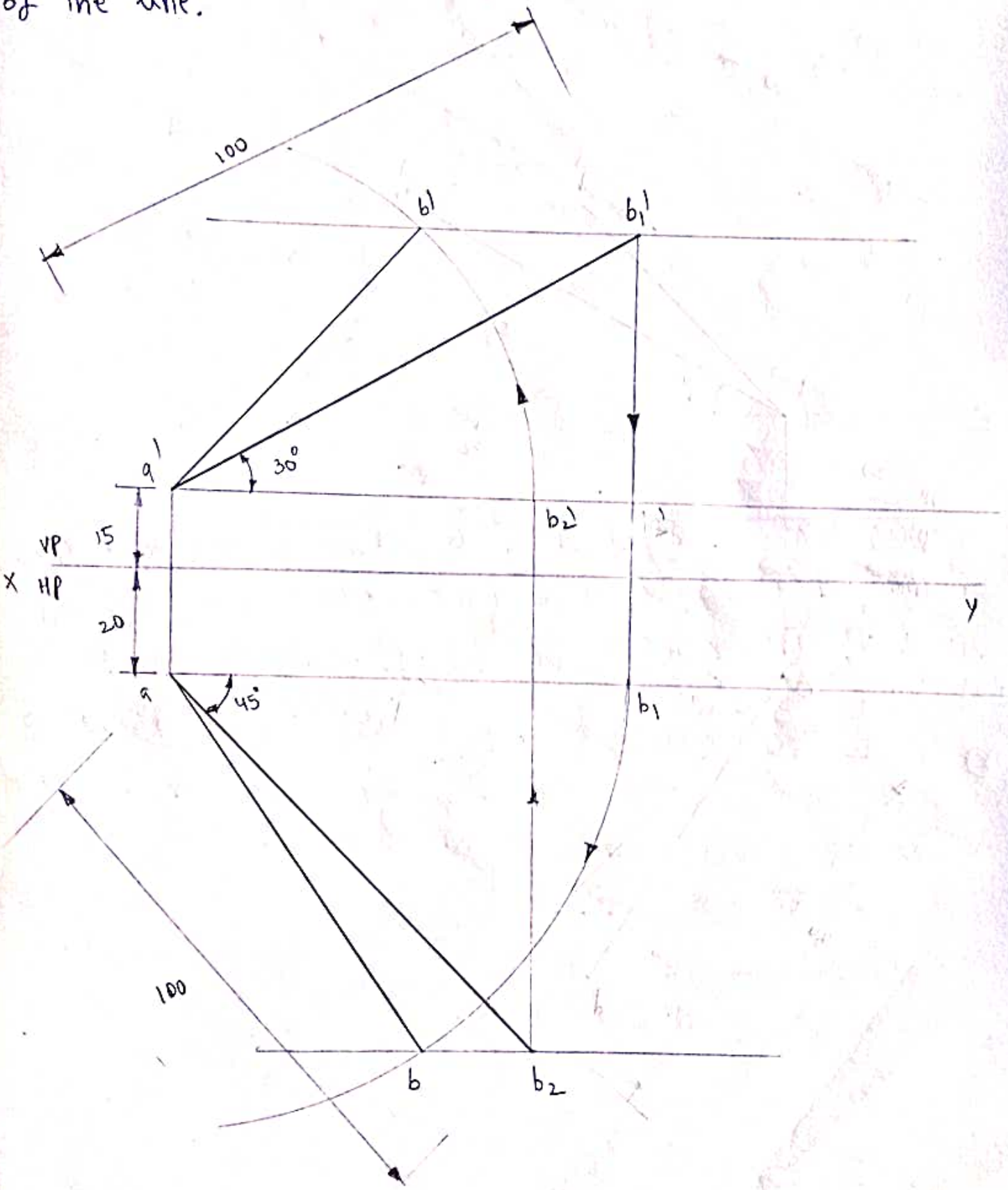




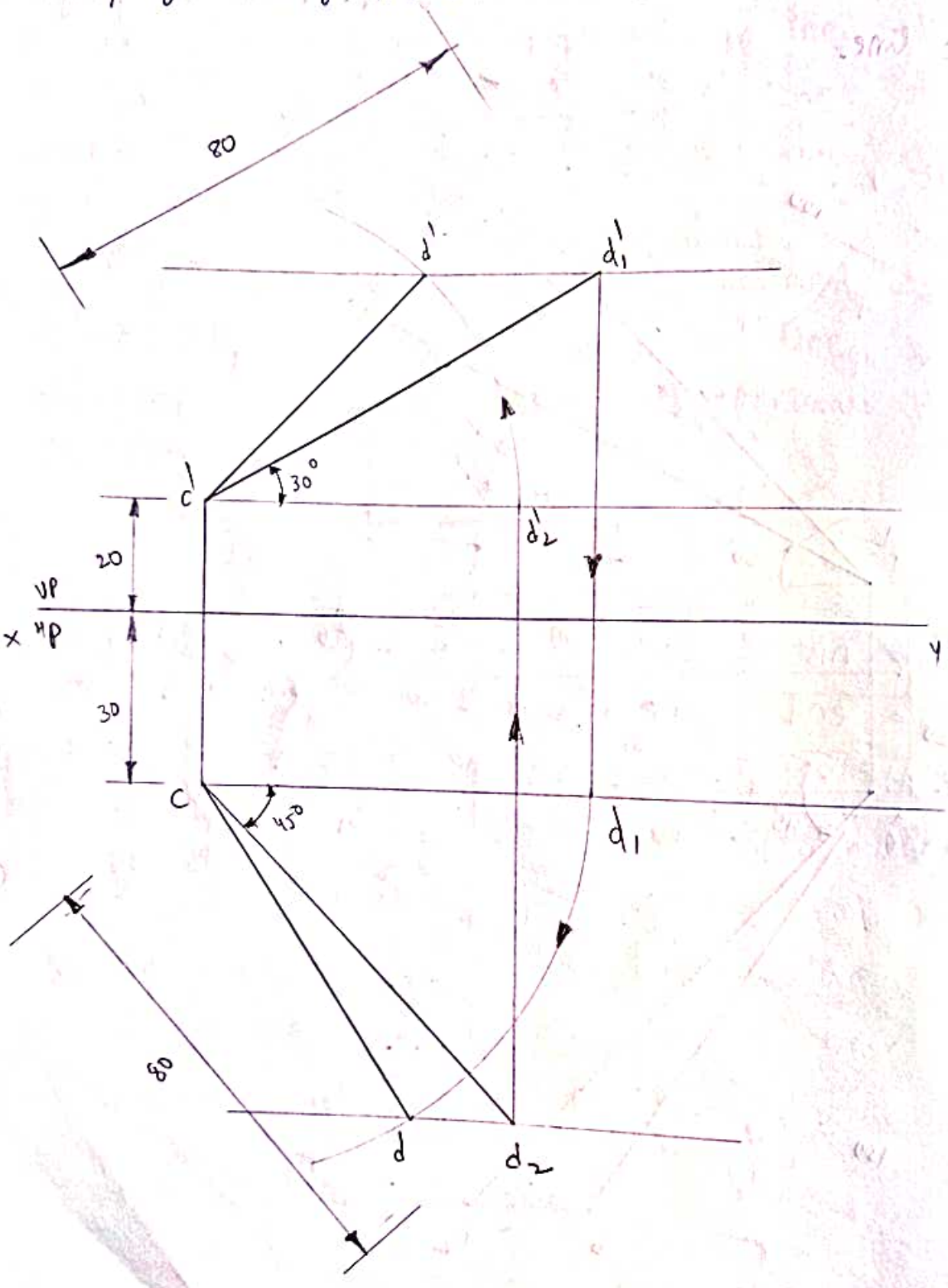


General Method:-

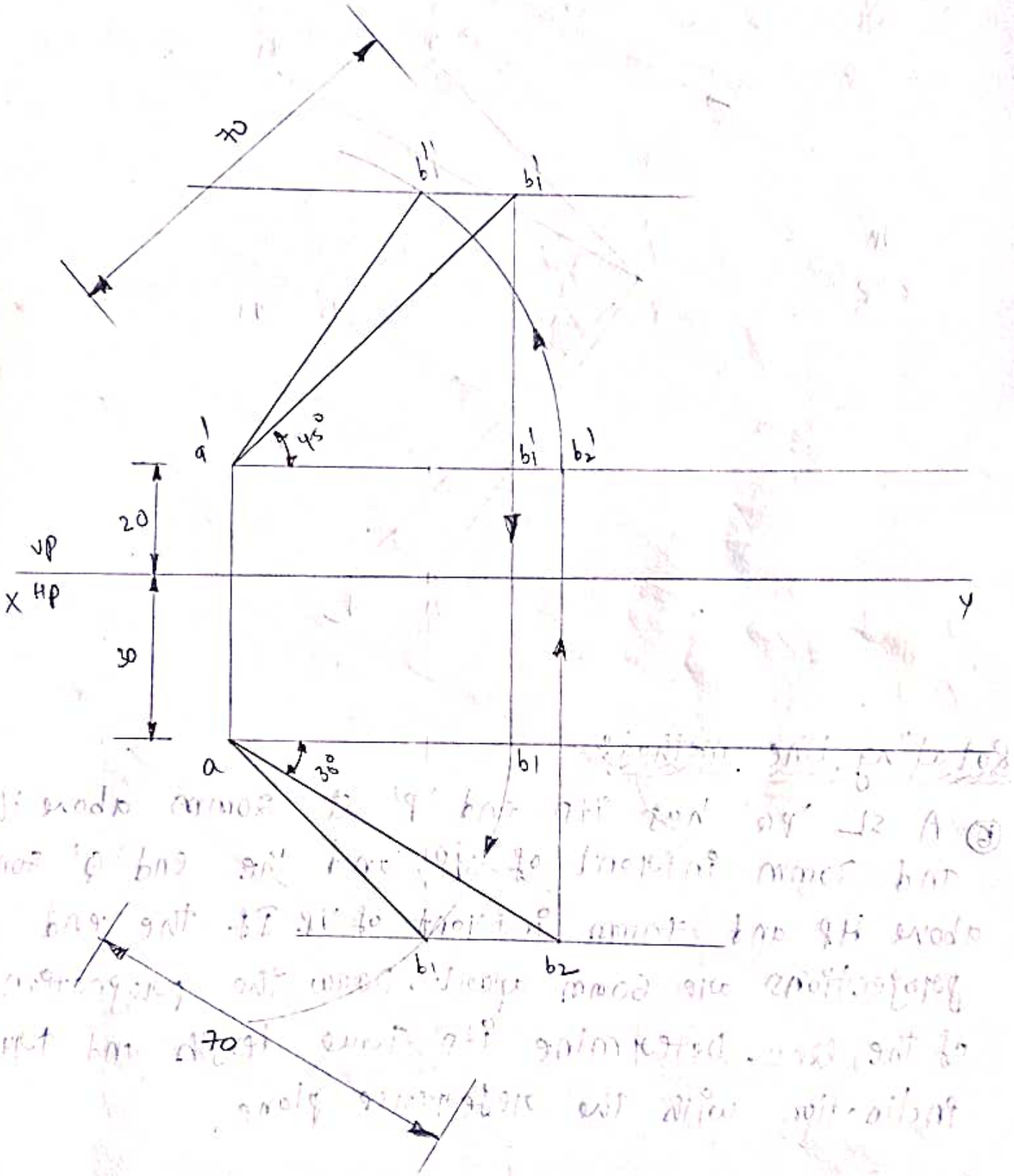
(2) A line AB of 100mm length is inclined at an angle of 30° to HP and 45° to VP. The point A is 15mm above HP and 20mm infront of VP. Draw the projections of the line.



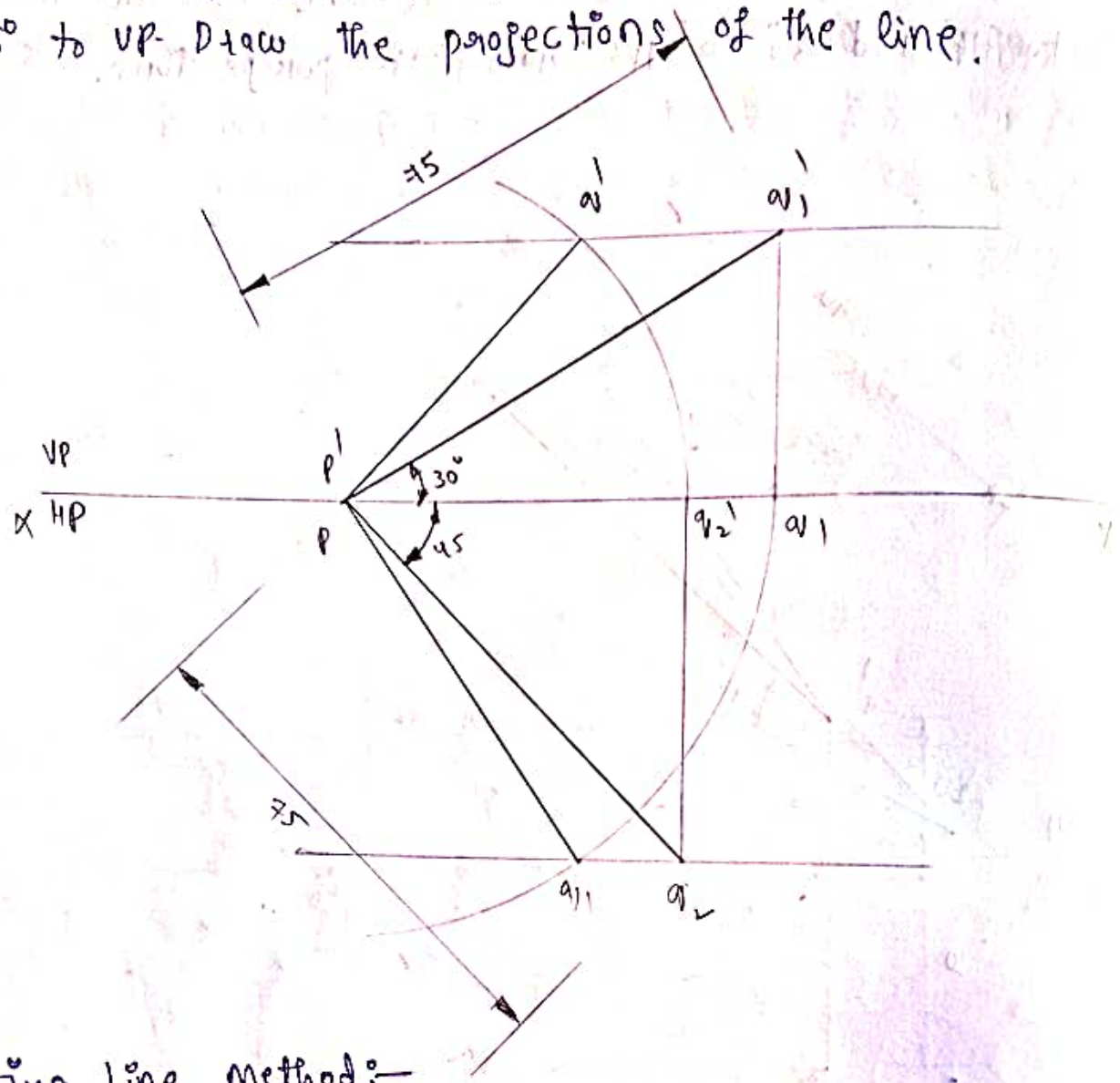
(3). A line CD is measuring 80mm length is inclined at an angle of 30° to HP and 45° to VP. The point 'c' is 20mm above HP. and 30 mm infront of VP. Draw the projection of the S.L.



④ A 70mm long line AB has end A at 20mm above HP and 30mm infront of VP the line is inclined at 45° to HP and 30° to VP. Draw its projections.

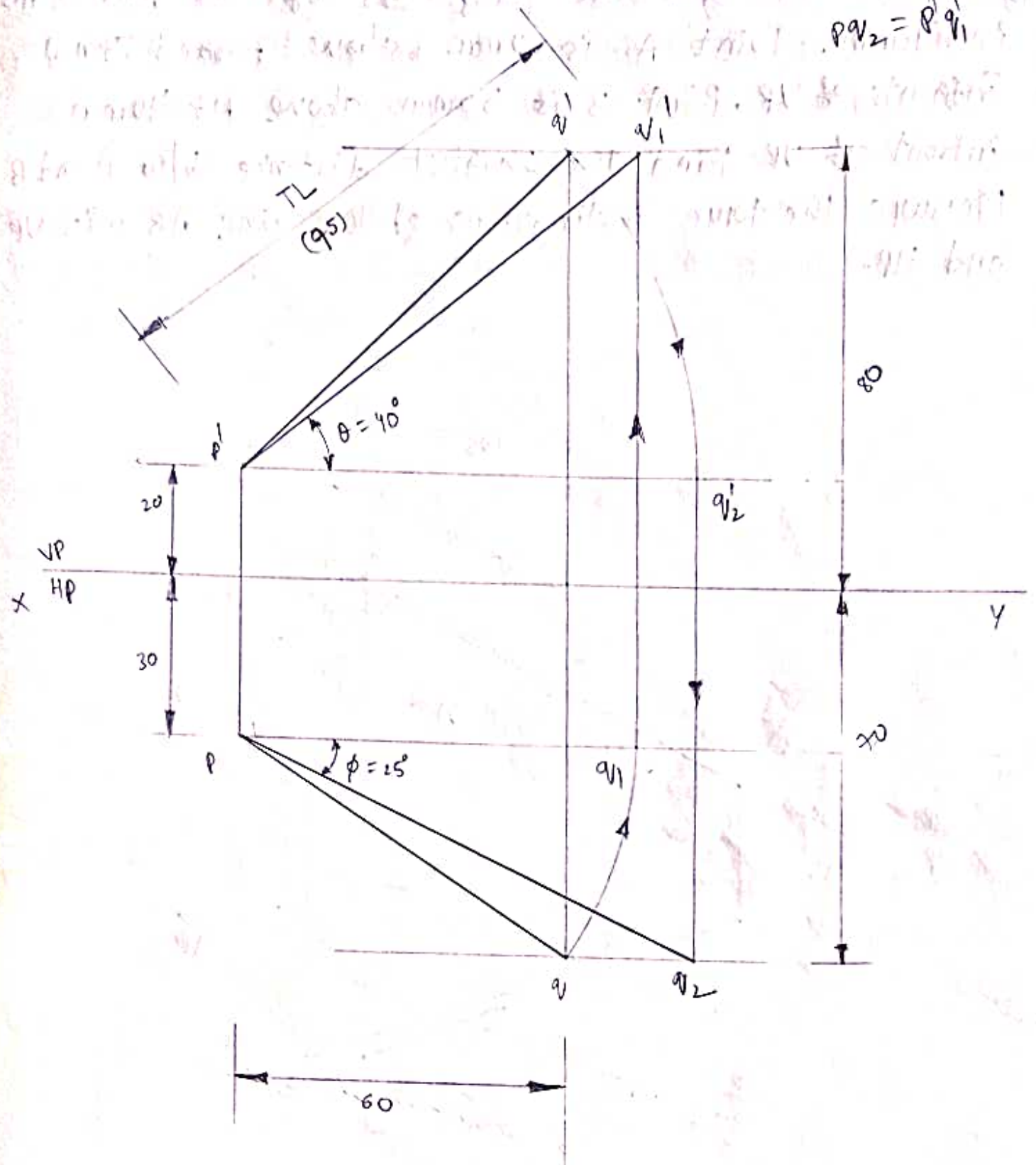


(5) A line PQ 75mm long has its end 'P' in both HP and VP. It is inclined at an angle of 30° to HP and 45° to VP. Draw the projections of the line.



Rotating Line Method:-

(6) A SL 'PQ' has its end 'P' at 20mm above HP and 30mm infront of VP, and the end 'Q' 80mm above HP and 70mm infront of VP. If the end projections are 60mm apart. Draw the projections of the line. Determine its True length and true inclination with the reference plane.



True lengths

$pq_2 = 95$

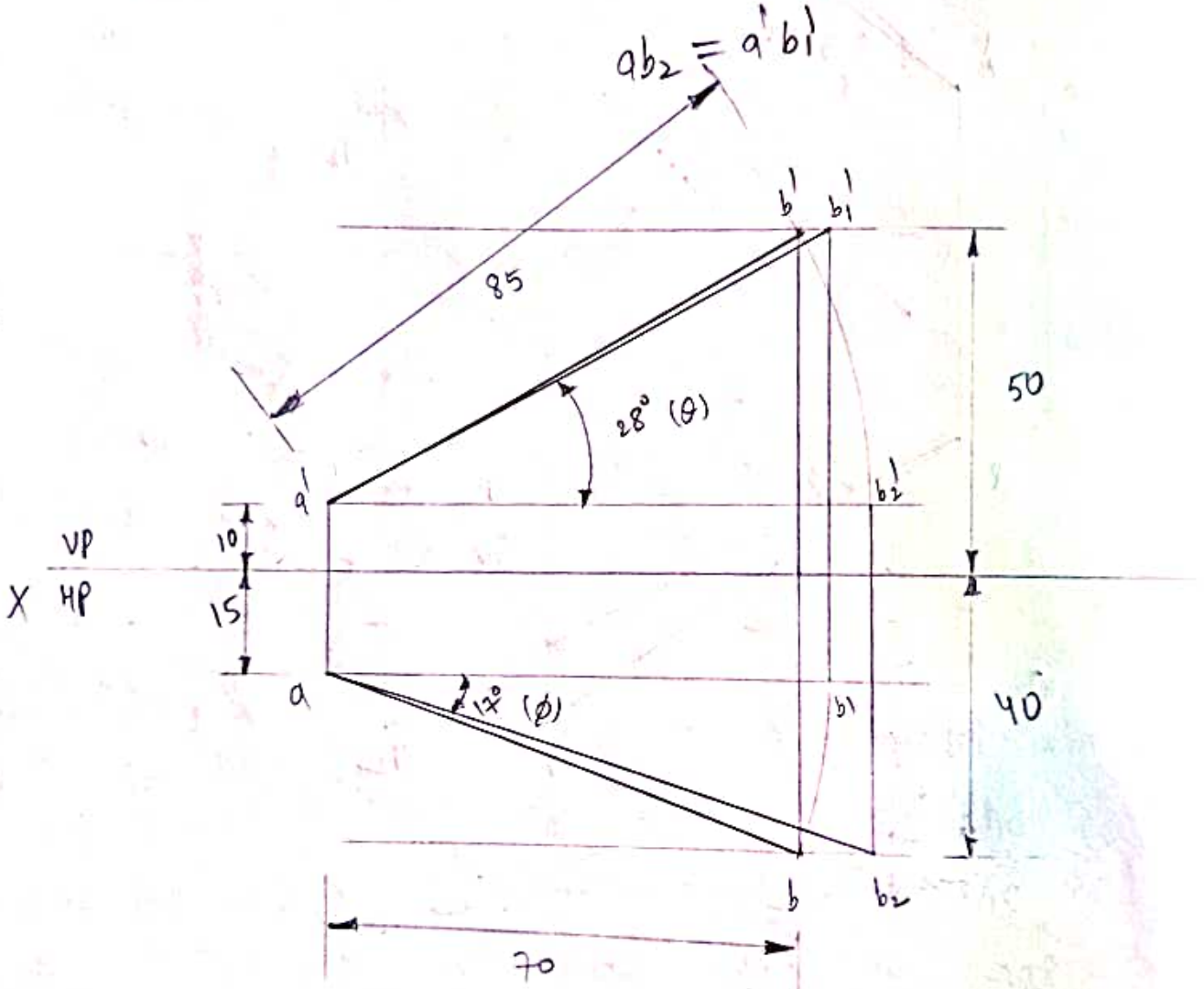
$p'q_1' = 95$

True Inclinations

$\theta = 40°$ (Inclined to HP)

$\phi = 25°$ (Inclined to VP)

(7) The distance b/w the projectors of two points AB is 70mm. Point A is 10mm above HP and 15mm infront of VP. Point B is 50mm above HP 40mm infront of VP. Find the shortest distance b/w A and B Measure the true inclinations of the line AB with VP and HP.



True Lengths

$ab_2 = 85$

$a'b_1' = 85$

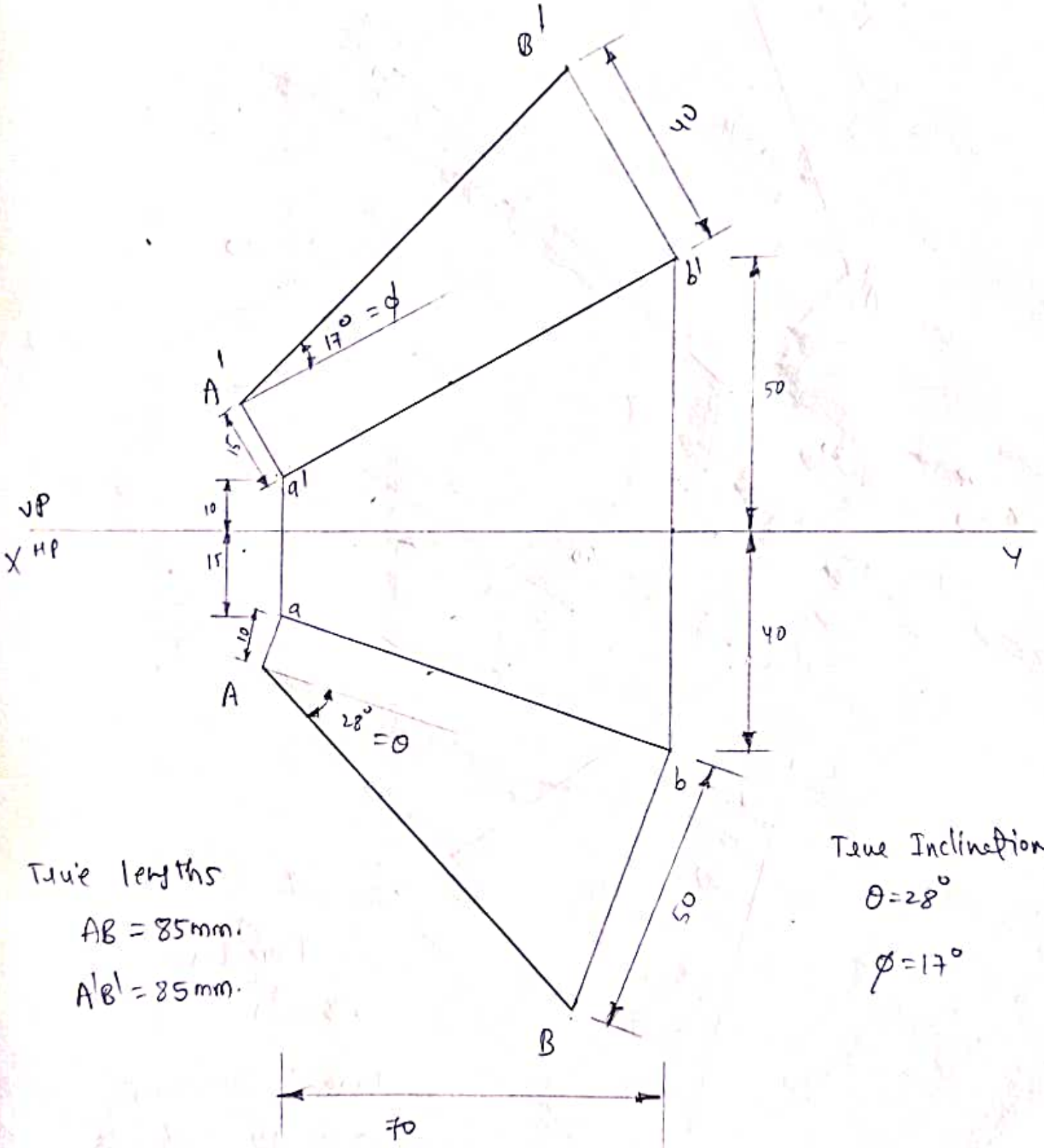
True Inclinations

$\theta = 28^\circ$

$\phi = 17^\circ$

Trapezoidal Plane Method:-

⑧ The distance b/w the projectors of two points AB is 70mm. Point A is 10mm above HP and 15mm infront of VP. Point B is 50mm above HP and 40mm infront of VP. Find the shortest distance b/w A and B. Measure the true inclinations of the line AB with HP and VP by using trapezoidal plane method.



True lengths

AB = 85mm.

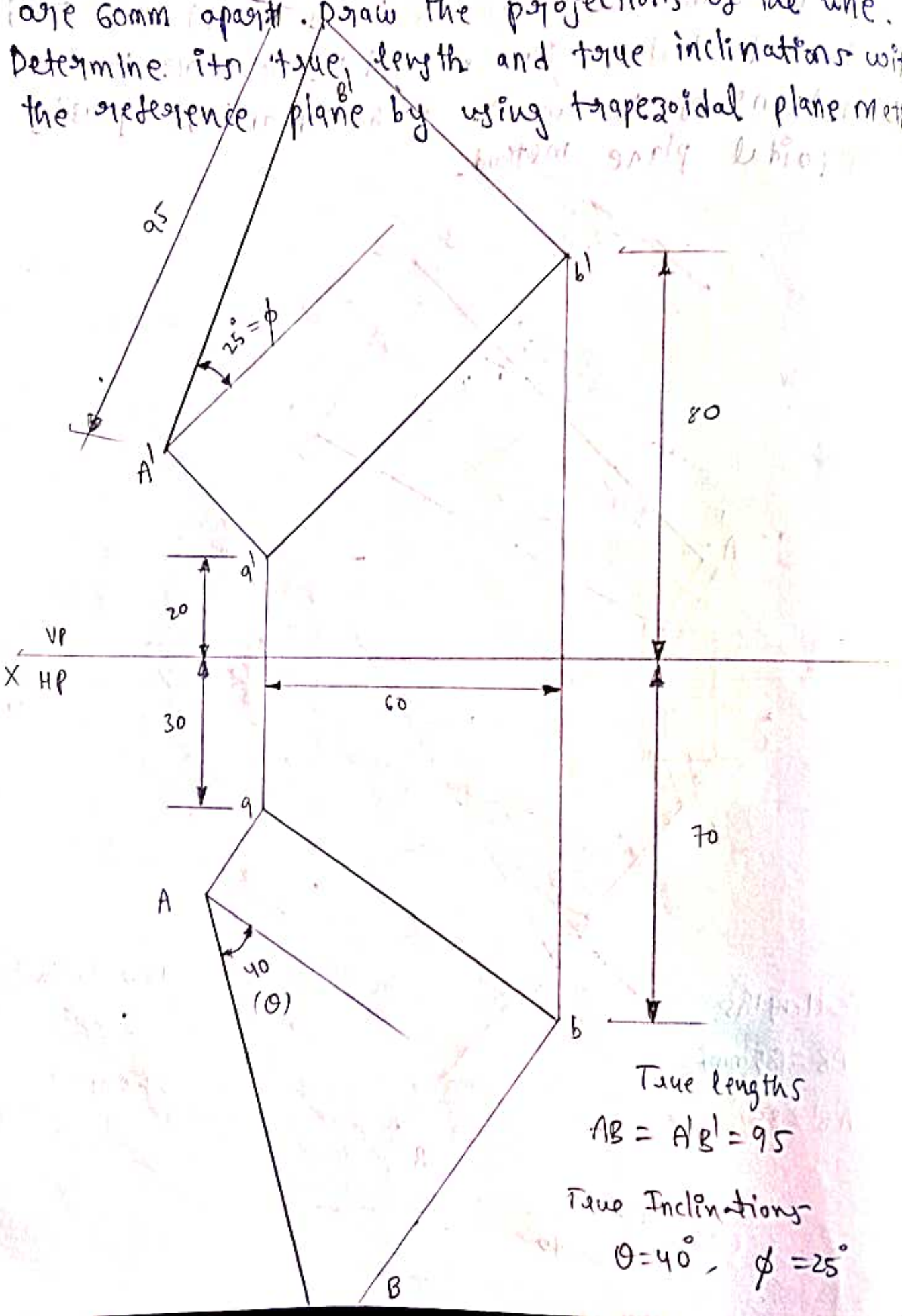
A'B' = 85mm.

True Inclinations

θ = 28°

ϕ = 17°

⑨ A SL 'PQ' has end 'P' at 20mm above HP and 30mm in front of VP, and the end Q is 80 mm above HP and 10mm in front of VP. If the end projectors are 60mm apart. Draw the projections of the line. Determine its true length and true inclinations with the reference plane by using trapezoidal plane method.



True lengths

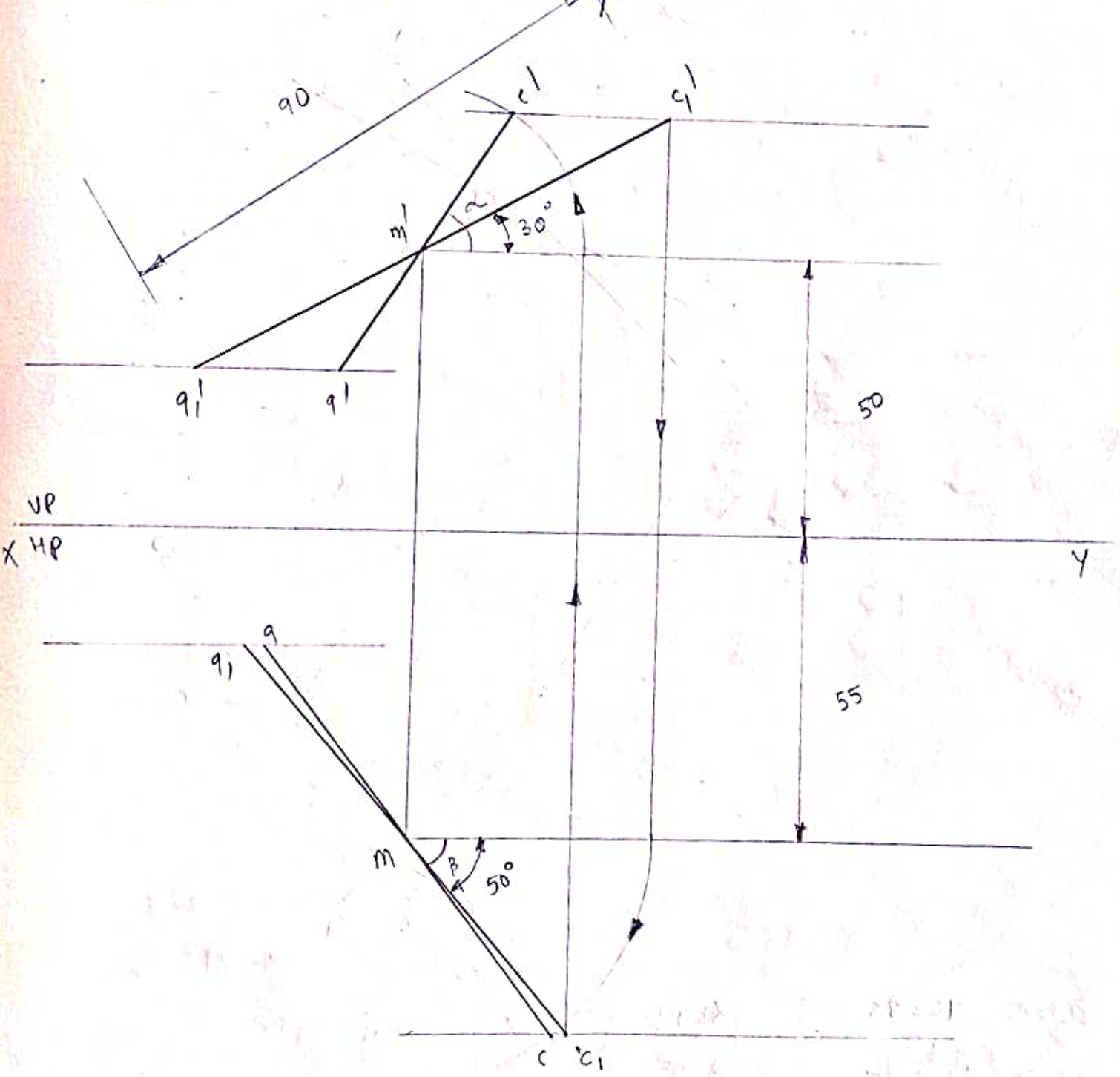
$AB = A'B' = 95$

True Inclinations

$\theta = 40°$, $\phi = 25°$

Mid point Method:—

① A line AC 90mm long makes 30° with HP and 50° with VP. such that its mid point M lies 50mm above HP and 55mm infront of VP. Draw the projections, If the end A is neared to HP. while the end C is neared to VP. Also find the lengths AC and a'c' and the upper end angle α and β.

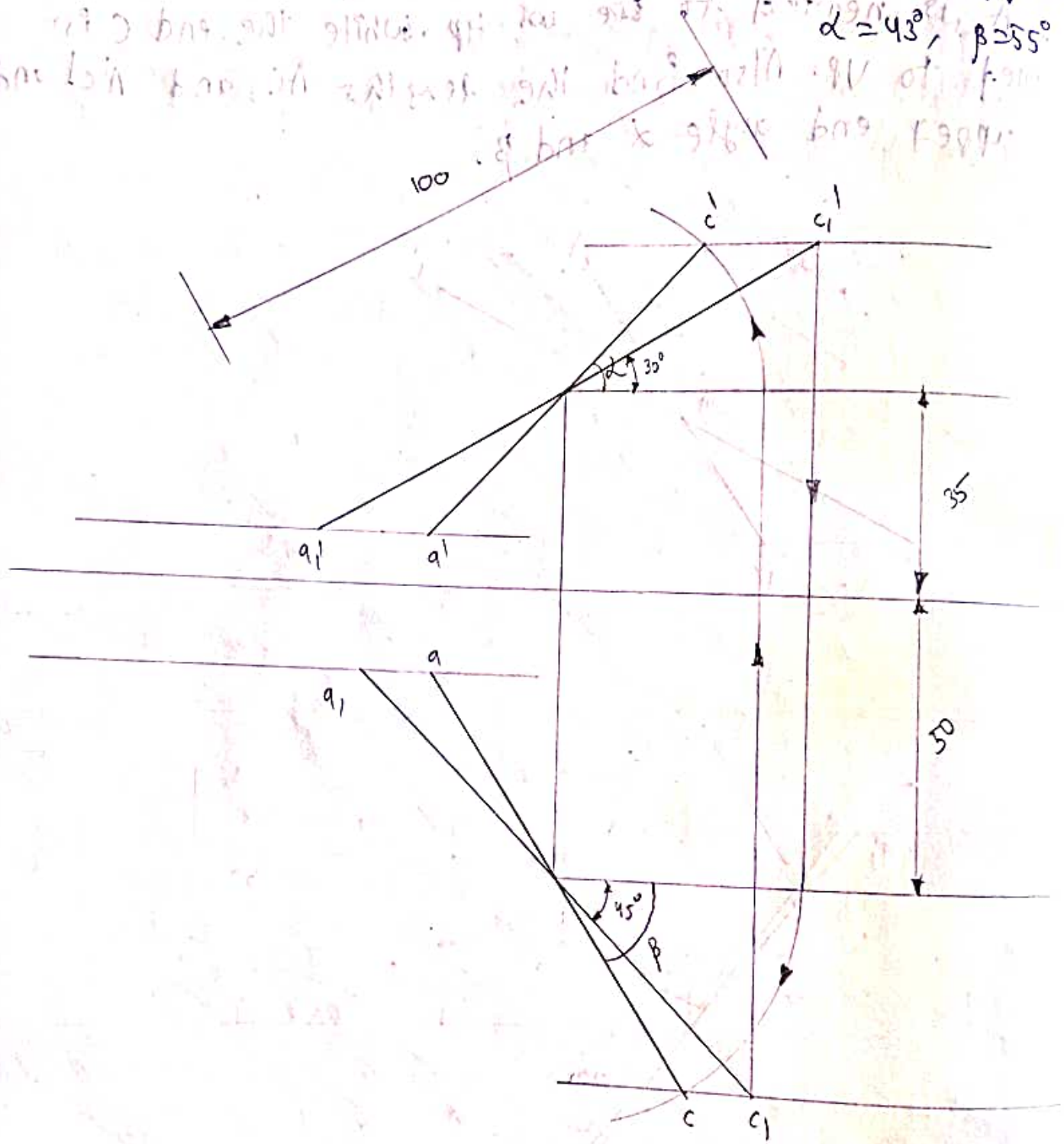


ac=87	ac = 80	$\alpha = 47°$
a'c'=55	a'c' = 62	$\beta = 60°$

(11) A 100 mm long line PQ is inclined at 30° to HP and 45° to VP. It's mid point is 35mm above HP and 50mm infront of VP. Draw its projections.

$p'q' = 72mm$, $PQ = 85mm$

$\alpha = 43°$, $\beta = 55°$

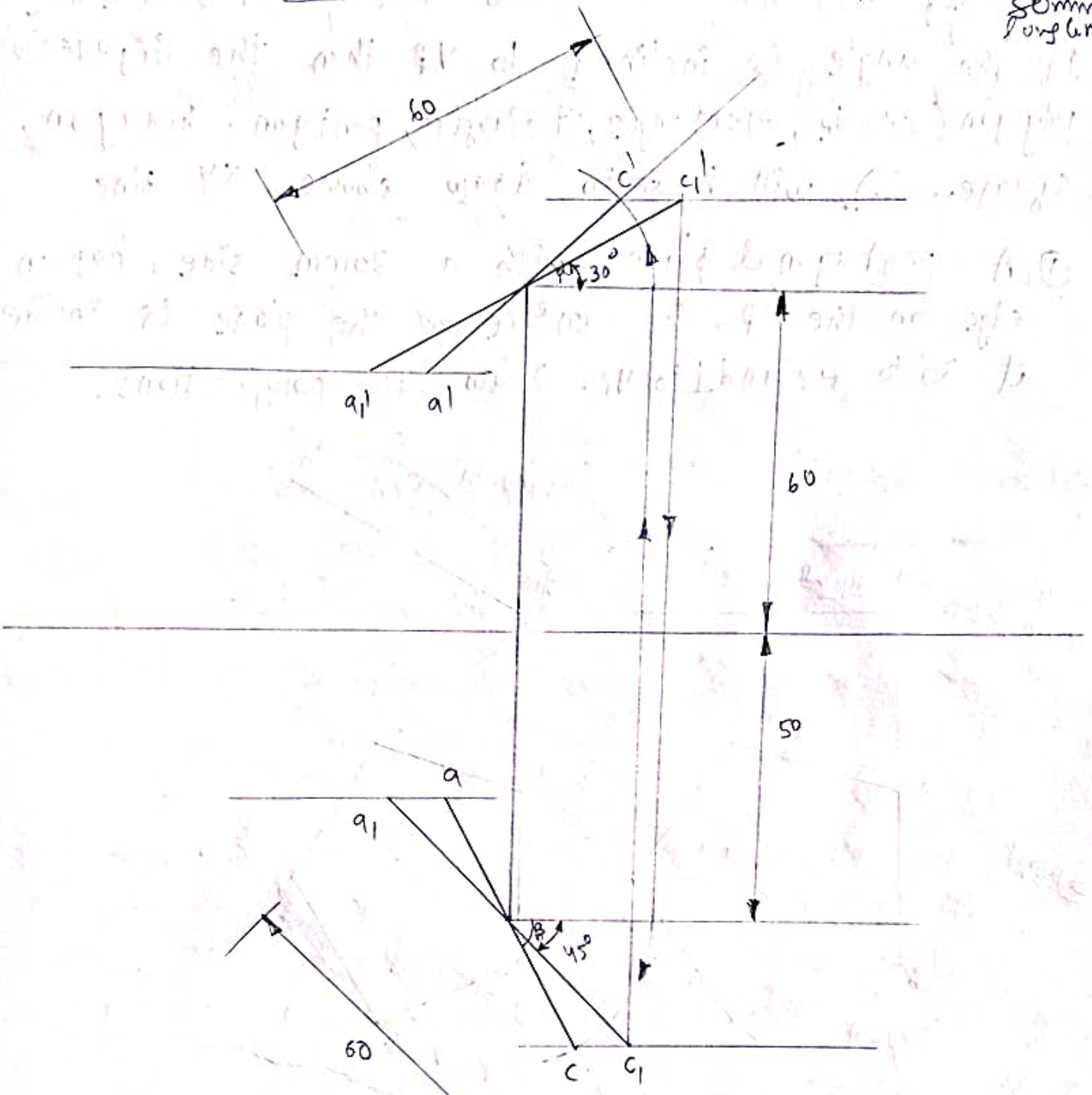


qc=85 | qc=85 | $\alpha = 43$

a'c'=70 | a'c'=72 | $\beta = 55$

(2) The midpoint of a SL AB is 60mm above HP and 50mm infront of VP. The line measures 65mm long and inclined at an angle of 30° to HP and 45° to VP. Draw its projections.

$a'b' = 51mm$, $ab = 74mm$, $\alpha = 50°$, $\beta = 50°$ ← for 50mm long line



$ac = 49$ $\alpha = 43°$

$a'c' = 45$ $\beta = 62°$

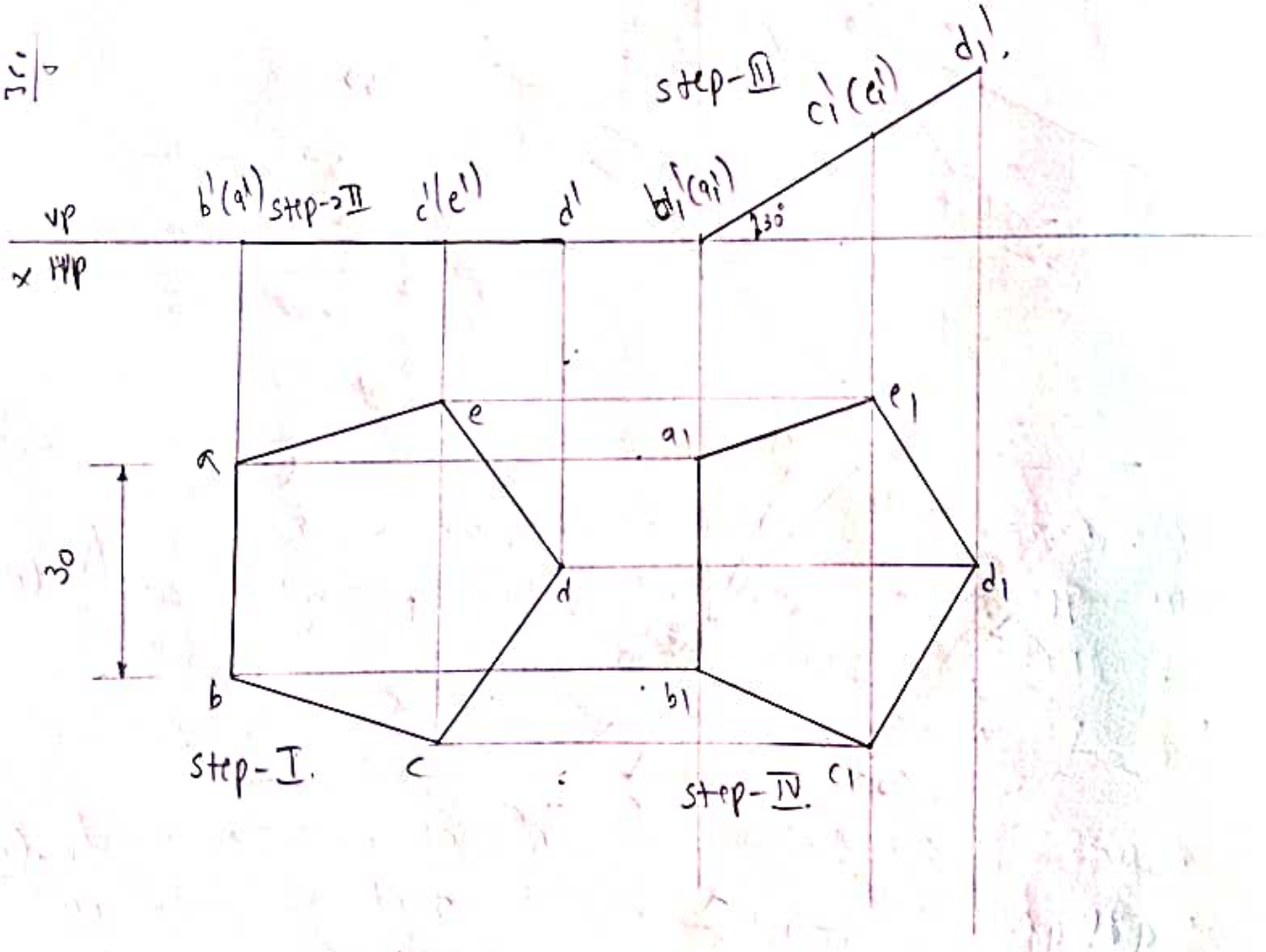
for 60mm long line

Projection of planes:-

If the angle is inclined to HP then the figure (polygon (circle, rectangle, triangle, pentagon, hexagon, square..) will have to draw below XY line.

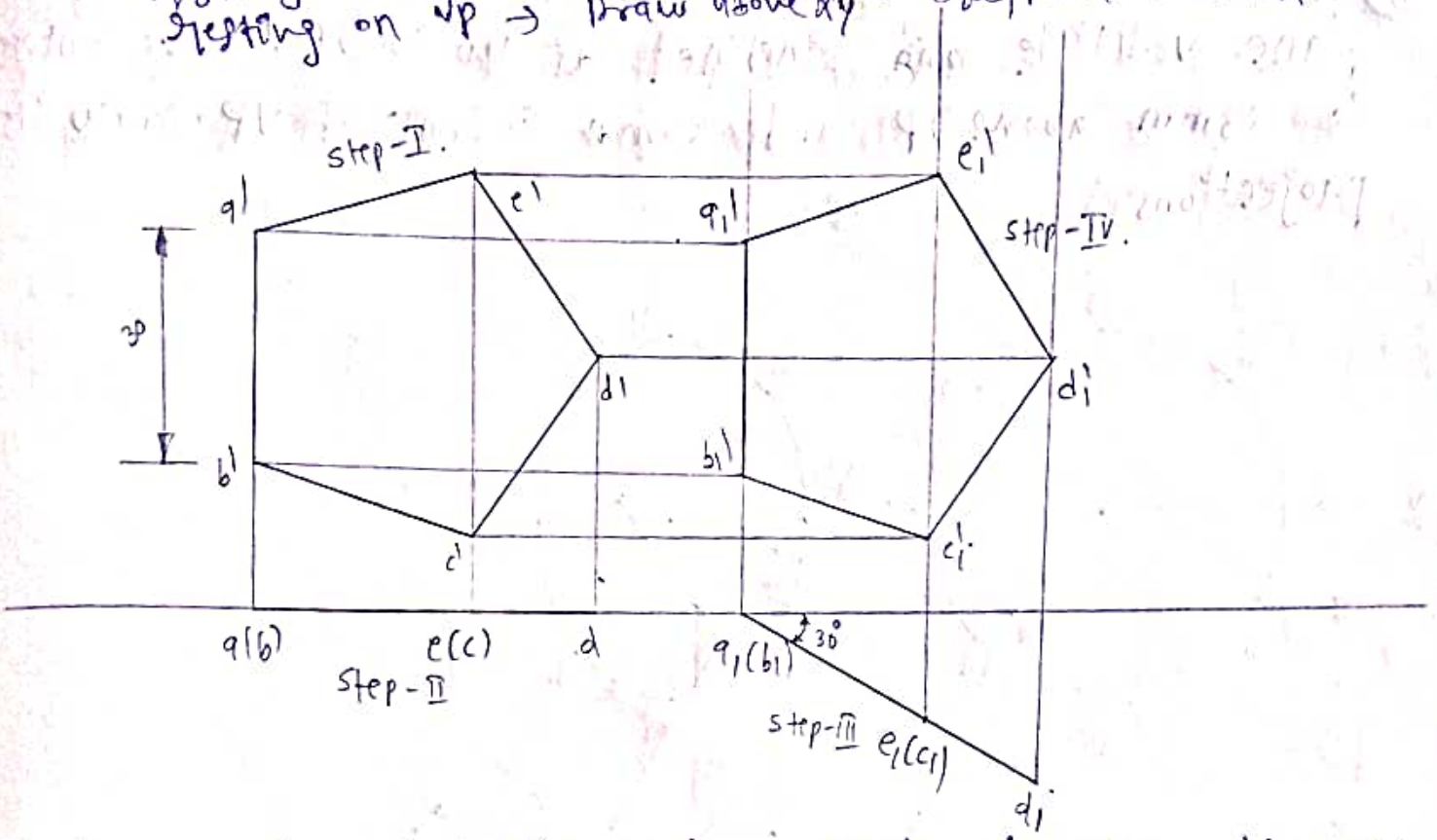
If the angle is inclined to VP then the figure (polygon (circle, rectangle, triangle, pentgon, hexagon, square----) will have to draw above XY line

① A pentagonal plane with a 30mm side, has an edge on the HP, the surface of the plane is inclined at 30° to HP and ⊥ to VP. Draw its projections.

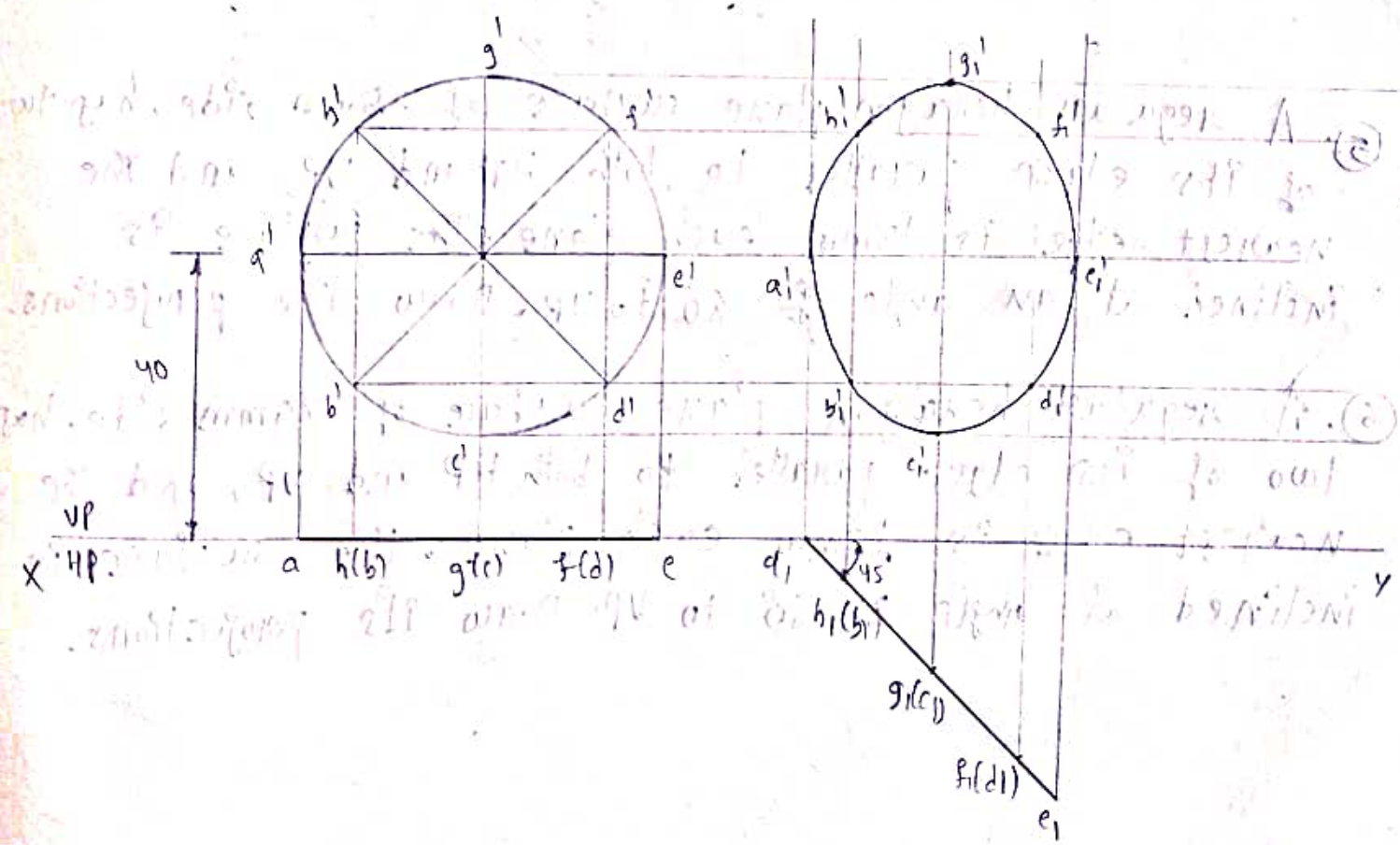


② A pentagonal plane with a 30mm side has an edge on the VP. The surface of the plane is inclined at 30° to the VP and ⊥ to HP.

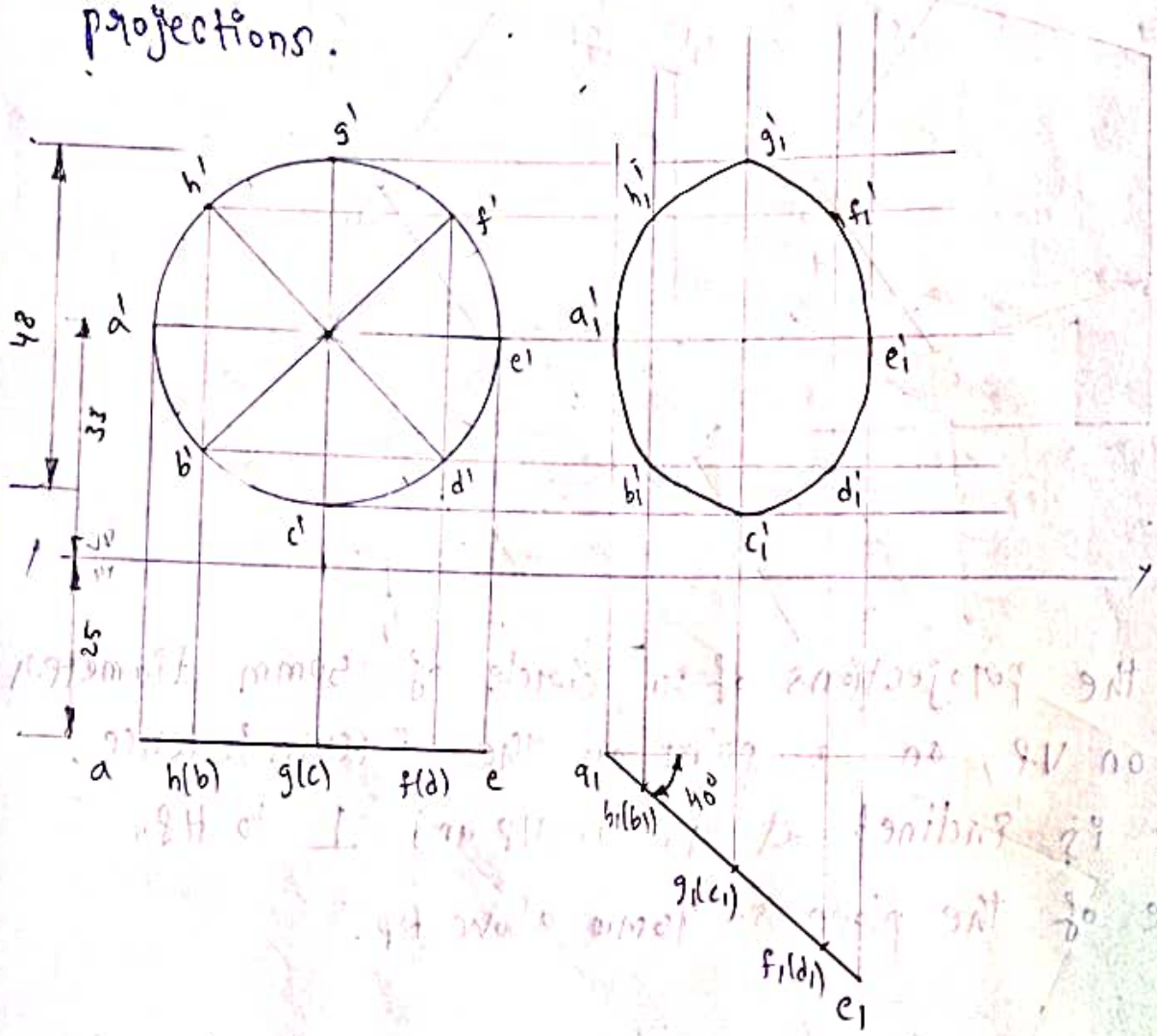
resting on HP → Draw below XY — Square, pentagon, circle etc.
resting on VP → Draw above XY — Square, pentagon, circle etc.



③. Draw the projections of a circle of 50mm diameter resting on VP, on a point on the circumference. The plane is inclined at 45° to VP and ⊥ to HP. The centre of the plane is 40mm above HP.



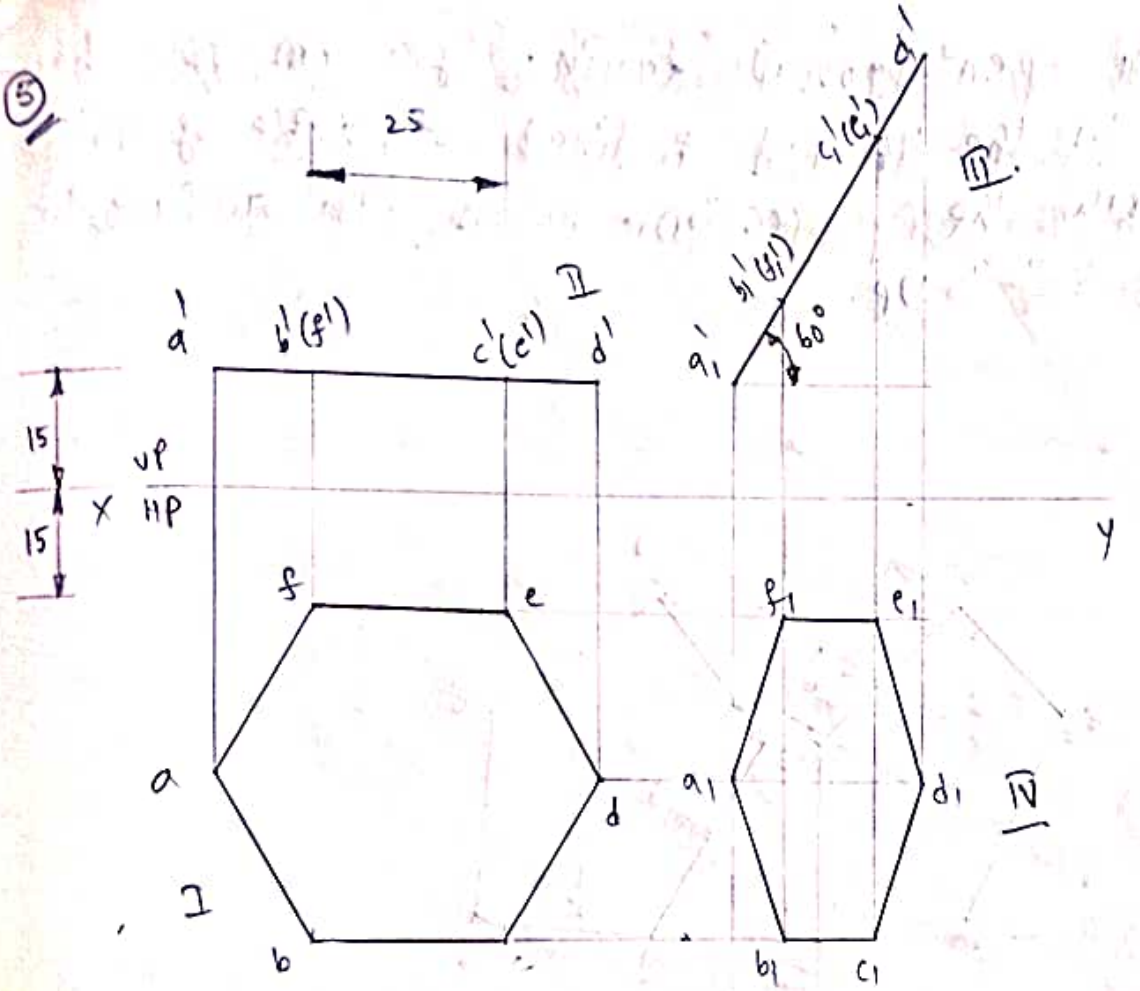
④. A thin circular plate of 48mm diameter having its plane vertical and inclined at 40° to VP. Its centre is 33mm above HP and 25mm infront of VP. Draw its projections.



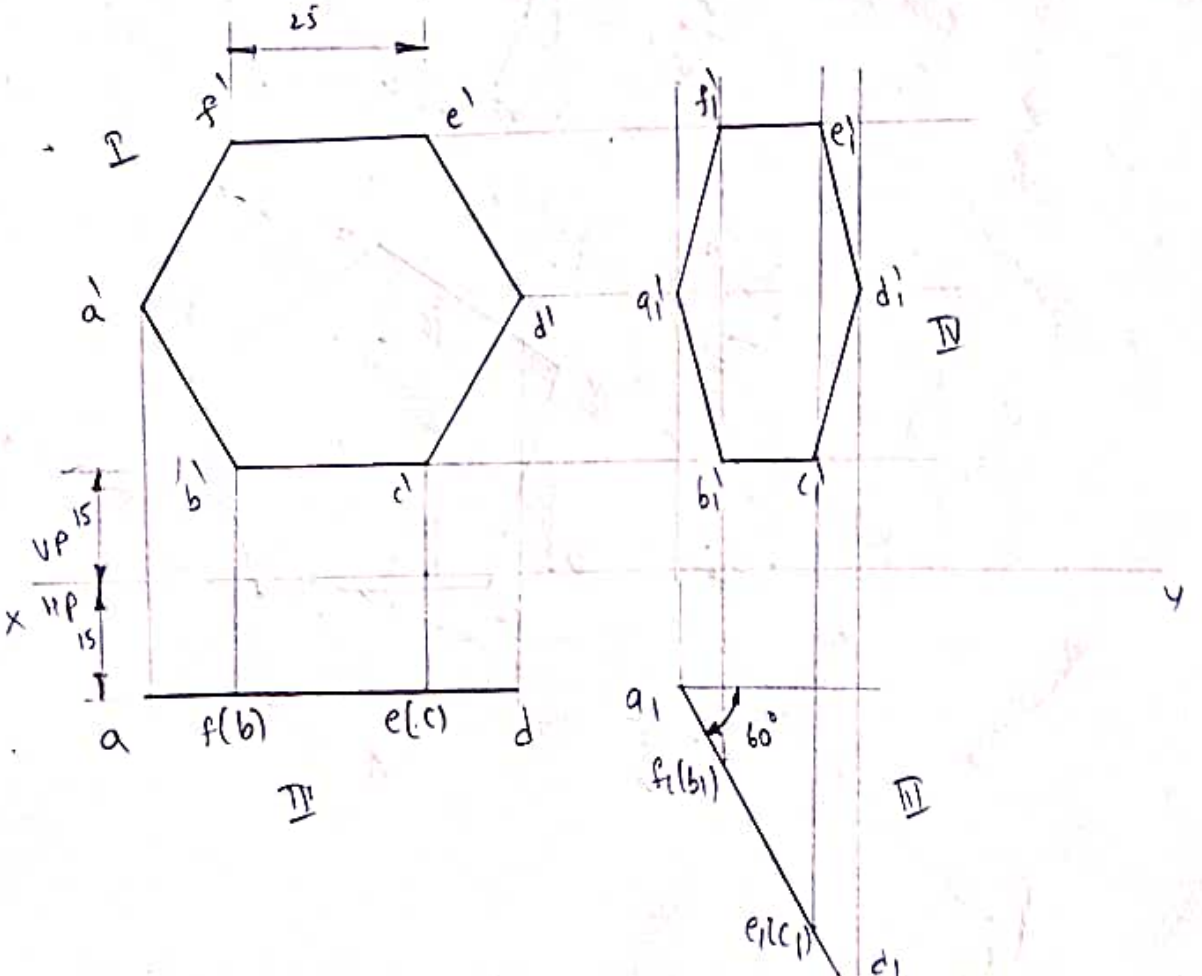
⑤. A regular hexagon plane surface of 25mm side, has two of its edges parallel to both HP and VP and the nearest edge is 15mm each plane. The surface is inclined at an angle of 60° to HP. Draw its projections.

⑥. A regular hexagon plane surface of 25mm side, has two of its edges parallel to both HP and VP, and the nearest edge is 15mm each plane. The surface is inclined at angle of 60° to VP. Draw its projections.

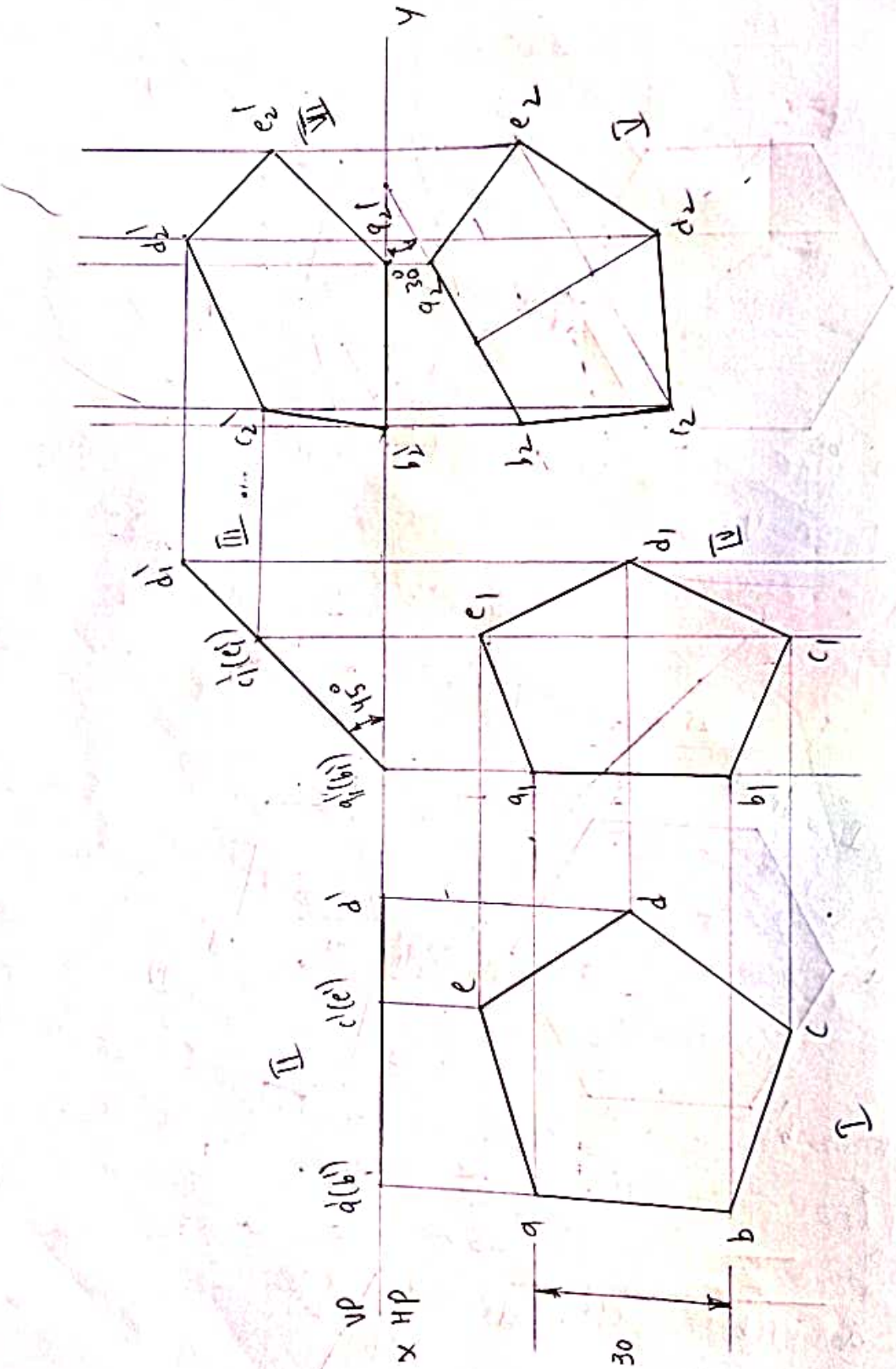
(5)


25
a'
b'(f')
c'(e')
d'
II
III
$c_1'(d_1')$
$b_1'(f_1')$
a_1'
60°
15
VP
X
HP
15
Y
f
e
f_1
e_1
a
d
a_1
d_1
IV
I
b
b_1
c_1

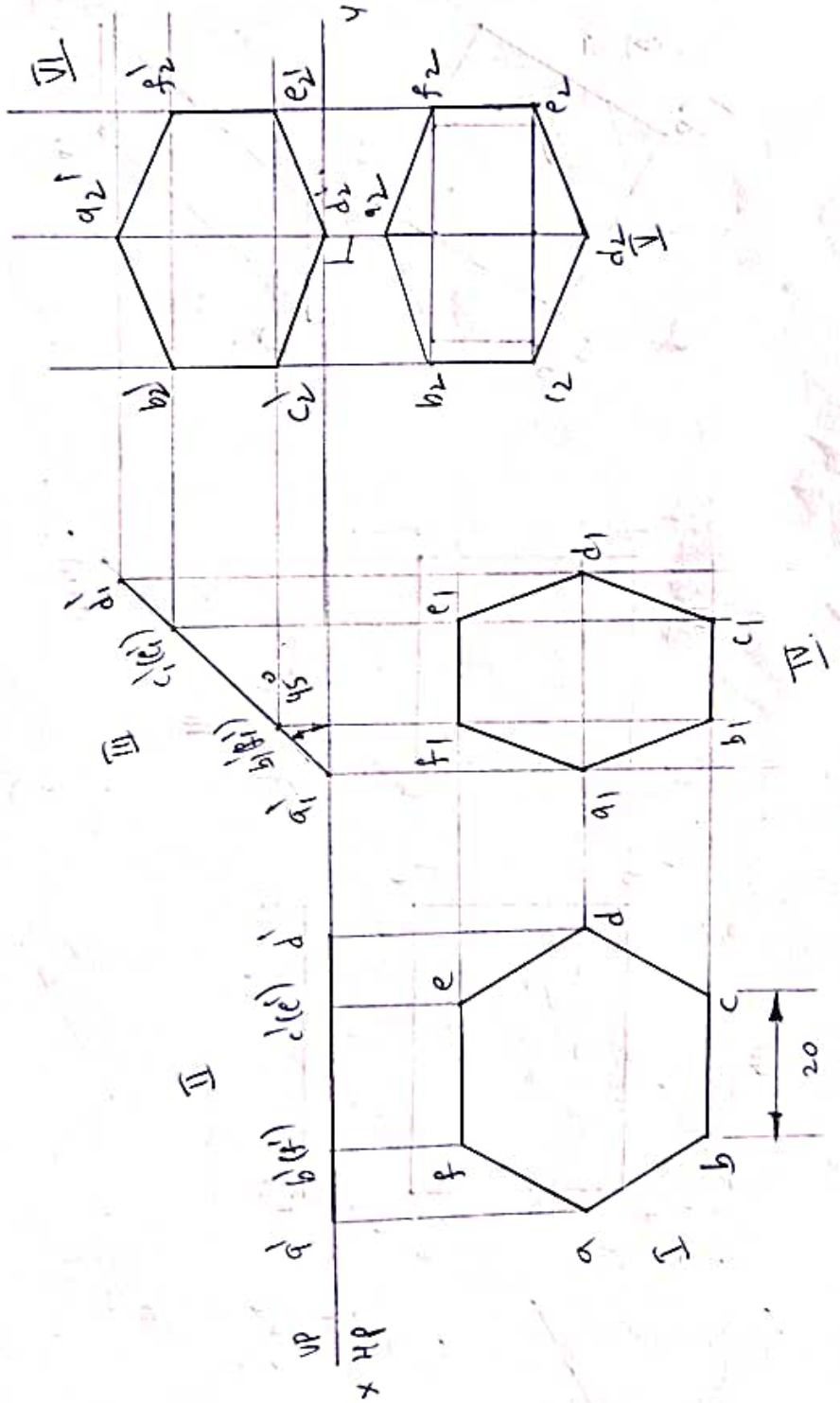
(6)


25
f_1'
e_1'
I
a_1'
d_1'
IV
b'
c'
VP
15
X
HP
15
Y
a
f(b)
e(c)
d
II
a_1
60°
$f_1(b_1)$
III
$e_1(c_1)$
d_1

(4). A regular pentagonal lamina of 30mm side has one edge in the HP and inclined at angle of 45° to the HP. Draw the projections when its surface is inclined to 30° to VP.



(8) A hexagonal lamina of 20mm side rest on one of its corners on the HP. The diagonal passing through this corner is inclined at 45° to HP. The lamina is then rotated through 90° such that the top view of this diagonal is ⊥ to VP and the surface is still inclined at 45° to HP. Draw the projections of the lamina.



(9) A rectangular plate of size 40mm x 30mm has its shorter side in the VP and the surface is inclined at 45° with the VP. The longer side of the plane is inclined at 30° to the HP. Draw its projections.