

Kammavari Sangham (R) - 1952

K.S. GROUP OF INSTITUTIONS

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT



KSSEM
K.S. SCHOOL OF ENGINEERING AND MANAGEMENT

SKETCH BOOK

Subject Code : BCEBK203

Name : Tanahvi. S. T

Class : II SEM

USN :

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Academic Year 20 - 20

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Module 01: Orthographic projections of points

Point: A point can be defined as location characterized by given co-ordinate values, namely x-axis [abscissa], y-axis [ordinate], in two dimensional Geometry.

Point can also be defined as a location which describes the certain properties i.e. values of co-ordinates.

Quadrantic System

$I(x, y)(-, +)$ $\uparrow$ VP
 behind front
 $II(x, y)(+, +)$

$\leftarrow x$ Below Above $\rightarrow x'$ HP

$III(x, y)(-, -)$ $\downarrow$ $IV(x, y)(+, -)$
 y'

Date :

Scale : 1 Unit = 10mm

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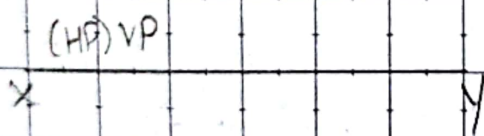
Sign Convention

- To draw projection of points with respect of I, II, III & IV quadrant. We should rotate horizontal plane exactly to 90° in the clockwise direction.
- The point of Intersection of horizontal plane [HP] & vertical plane [VP] is called as Reference line or axis which can be named as XY plane.

Projection of point in I Quadrant :-



Projection of point in II Quadrant



Projection of point in III quadrant



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Projection of point in IV Quadrant.

x VP (HP)

y

Problems:-

Types of lines:-

Type line	Description	General Applications
A	Continuous thick	A1 Visible outlines A2 Visible edges
B	Continuous thin (Straight or Curved)	B1 Imaginary lines of Intersection B2 Projection lines B3 Projection lines B4 Leader lines B5 Hatching lines B6 Outlines of revolved sections B7 Short center lines B8 In place of place
E	Dashed thick	E1 Hidden outlines E2 Hidden edges
G	Chain thin	G1 Center lines G2 Lines of symmetry G3 Trajectories

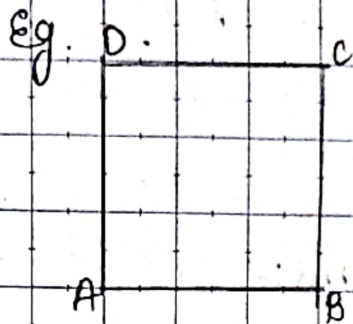
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Naming Conventions

- 1 Top view of an object - a
- 2 Front view of an object - a'
- 3 Side view of an object - a''
- 4 Only an object - A .



Top View Names:- a, b, c, d

Front View Names:- a', b', c', d'

Side View Names:- a'', b'', c'', d''

Problems:-

1. Draw the projections of the following points on the same xy line, keeping convenient distance between each projection. Name the quadrants in which they lie.

A:- 30mm Above HP & 35mm in front of VP.

B:- 35mm Above HP & 40mm Behind VP

C:- 10mm Above & ON VP

D:- 35mm Below HP & 30mm in front of VP.

FV $\rightarrow$ VP

TV $\rightarrow$ HP

Dist w.r.t HP $\rightarrow$ VP

Dist w.r.t VP $\rightarrow$ HP

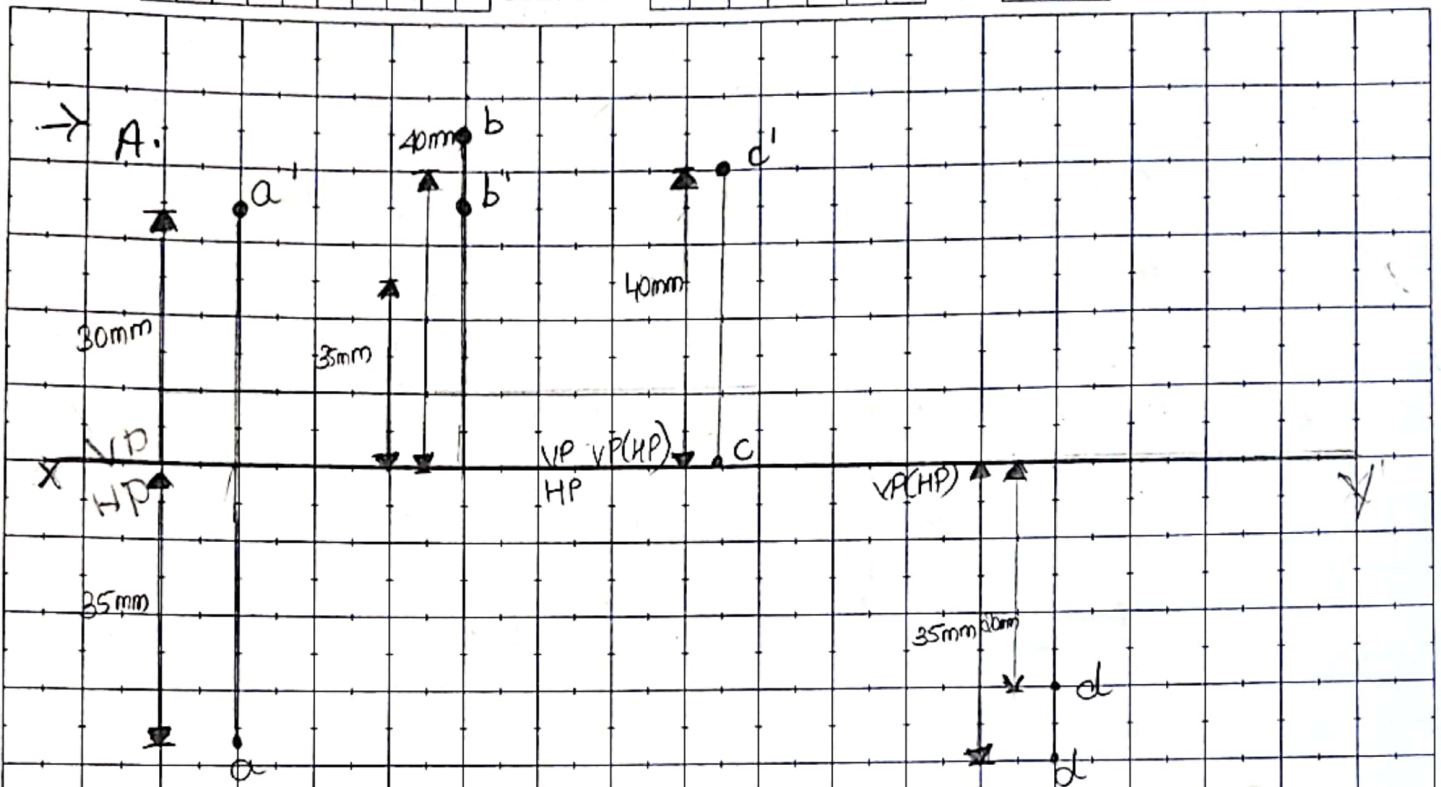
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EV $\rightarrow$ VP, TV $\rightarrow$ HP

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A $\rightarrow$ I Quadrant.

B $\rightarrow$ II Quadrant

C $\rightarrow$ I as well as II Quadrant.

2. Draw the Projection of the following points on the same XY LINE; Keeping convenient Distance between them.

Name the Quadrants in which they lie

E - 20MM Below HP & 25mm Behind VP

F - 35MM Below HP & 30MM Infront of VP

G - ON HP & 30MM Infront of VP

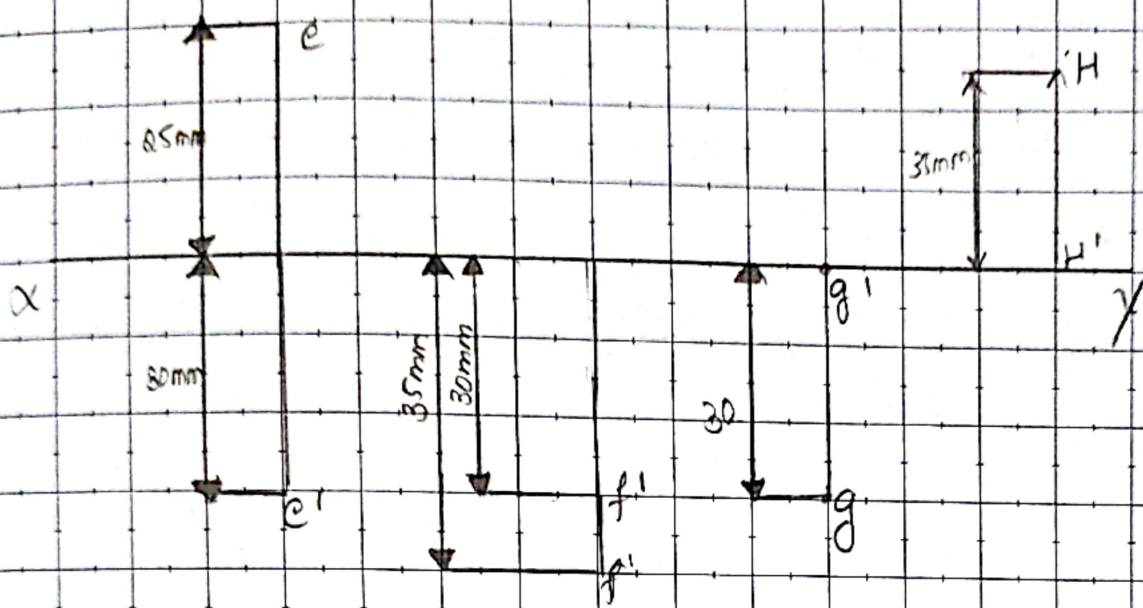
H - ON HP & 35 MM Behind VP

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Point A :- III Quadrant

Point F - IV Quadrant

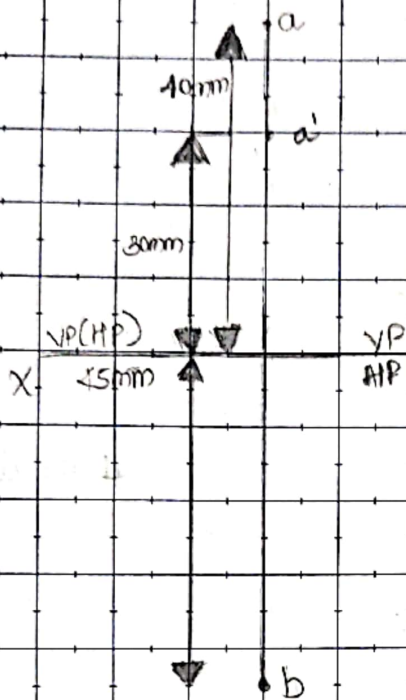
Point G - I As well as IV Quadrant

Point H - II As well as III Quadrant

3 A point 30mm above xy line is the front view of two points A and B. the top view of A is 40mm behind VP and the top view of B is 45mm in front of VP. The draw the projection of the points & state the quadrants in which the points are situated.

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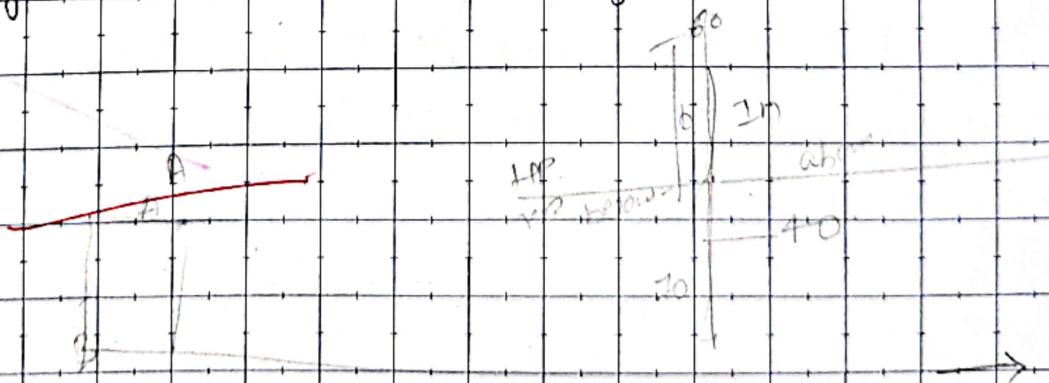
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point A $\rightarrow$ lies in II quadrant.

point B $\rightarrow$ lies in I quadrant.

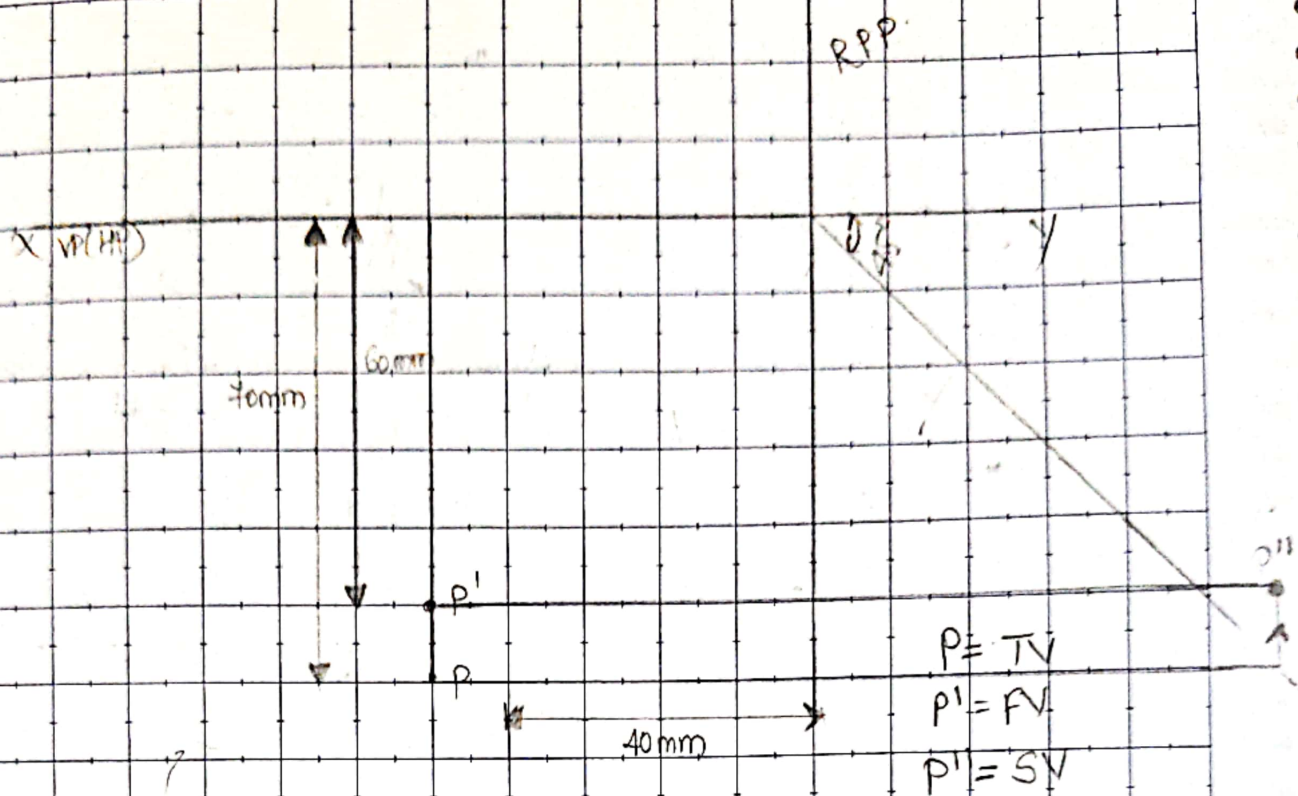
4. Draw all the 3 views of a point P lying 60mm below HP 70mm in front of VP and 40mm from the RPP. [Right Profile Plane] Also state the Quadrant in which it lies.



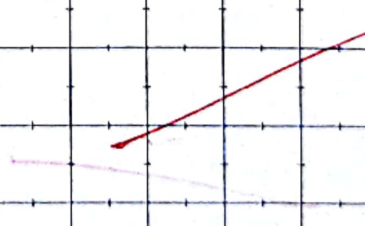
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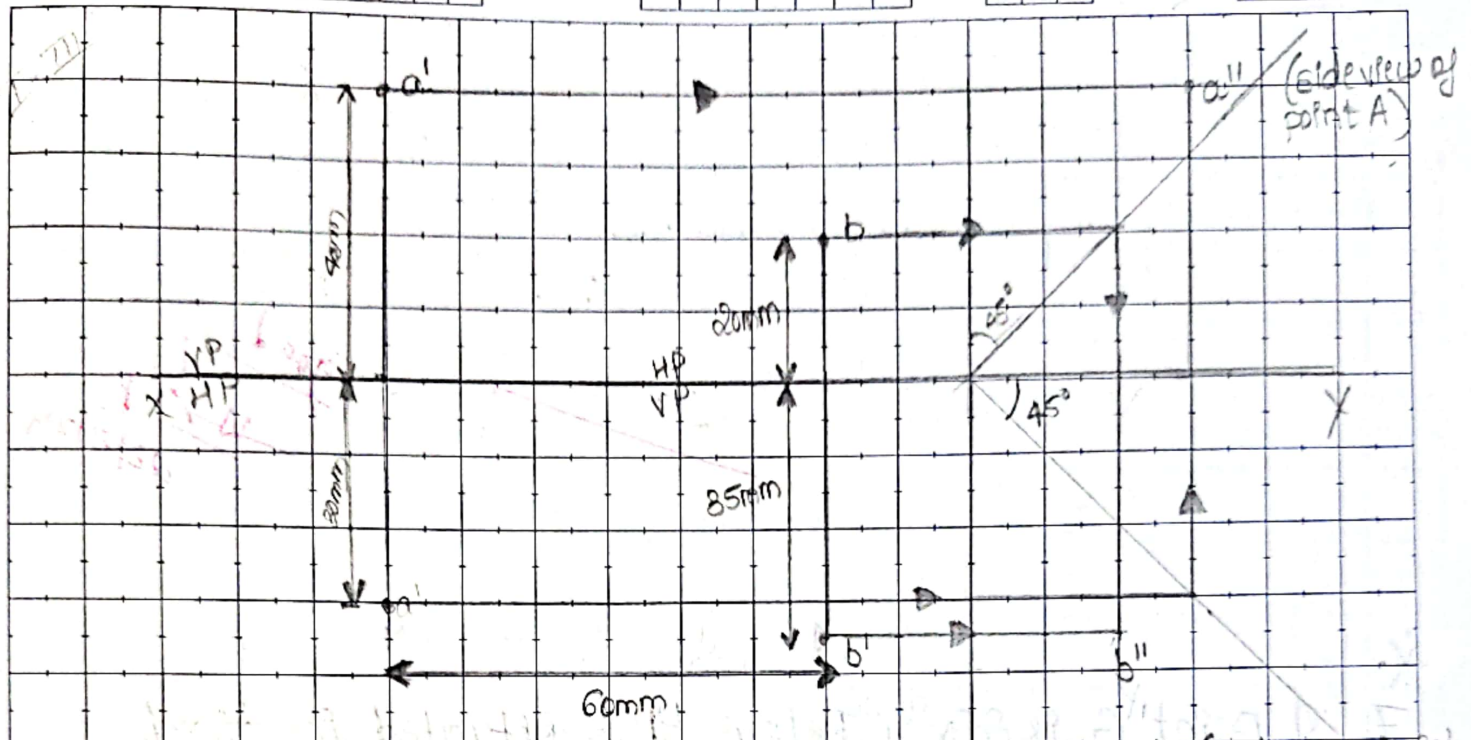
5. A point A is 30mm in front of VP & 40mm above HP. Another point B is 20mm behind VP and 35mm below HP. The horizontal distance b/w the points measured parallel to XY line is 60mm. Draw the 3 projections of the points. Join their front & top views.



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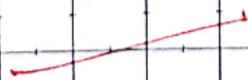
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A $\rightarrow$ I Quadrant

B $\rightarrow$ III Quadrant

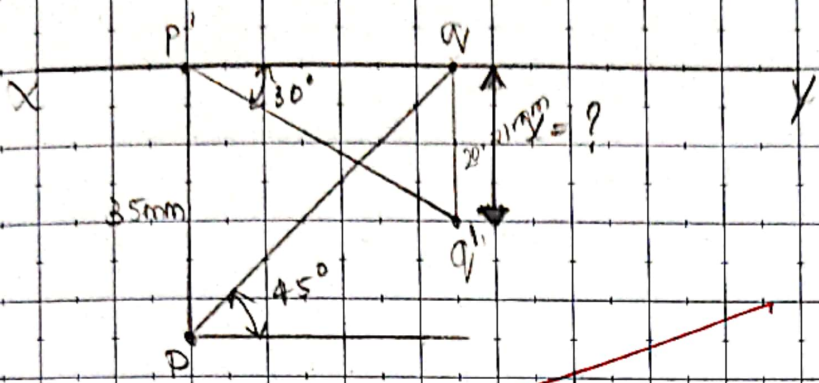
6. A point P on HP and 35mm in front of VP. Another point Q is on VP and below HP. The line joining their front views makes an angle of 30° to X-Y line. While the line joining their top views makes an angle of 45° with X-Y line. Find the distance of the point Q from HP.



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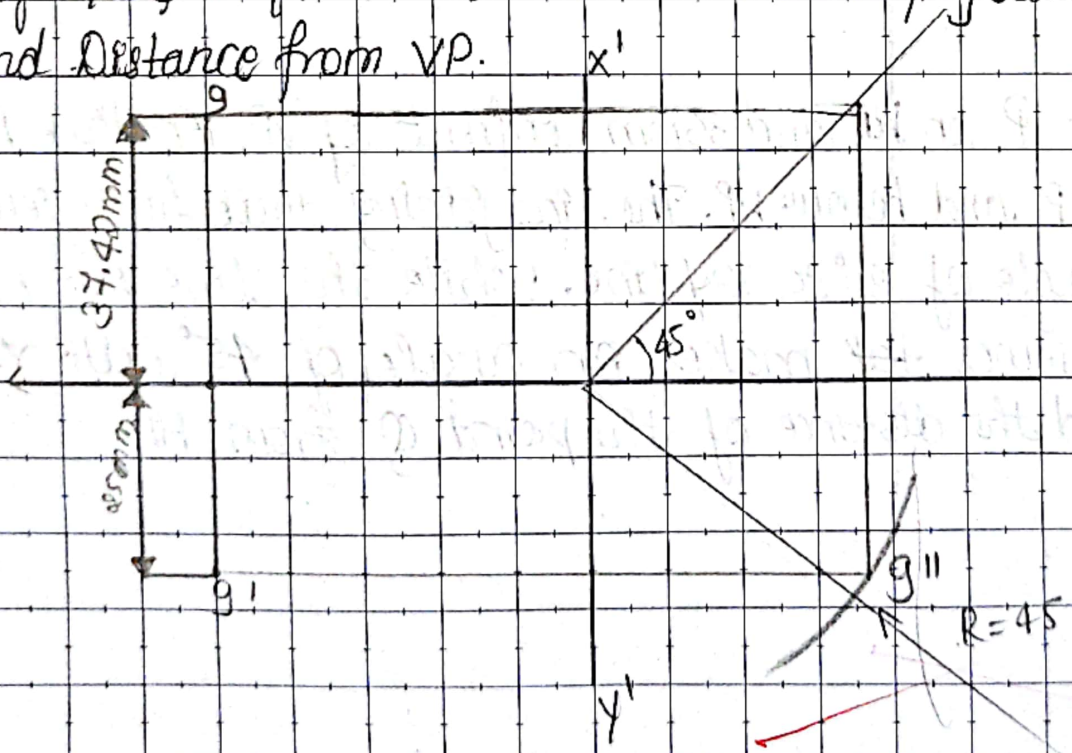


The distance of the point Q from HP = 20mm

900 1
14 7 8
2813024

✱

7. A point G is 25mm below HP & situated in third quadrant. Its shortest distance from the intersection of XY & X₁Y₁ is 45mm. Draw the projection & find distance from VP.



point G is 37.42 mm bh VP

Location and Relative Positions of Points in Four Quadrants

S.No	Location of point	Relative position of views	Quadrant in which the point lies
1	Above HP In front of VP	Front view Above the XY line Top view Below the XY line	FIRST
2	Above HP Behind VP	Front view Above the XY line Top view Above the XY line	SECOND
3	Below HP Behind VP	Front view Below the XY line Top view Above the XY line	THIRD
4	Below HP In front of VP	Front view Below the XY line Top view Below the XY line	FOURTH
5	Above HP on VP	Front view Above the XY line Top view on the XY line	FIRST OR SECOND
6	Below HP on VP	Front view Below the XY line Top view on the XY line	THIRD OR FOURTH
7	on HP In front of VP	Front view on the XY line Top view Below the XY line	FIRST OR THIRD

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8. On HP/Behind VP

Front View on the XY Line
Top View Above the XY Line

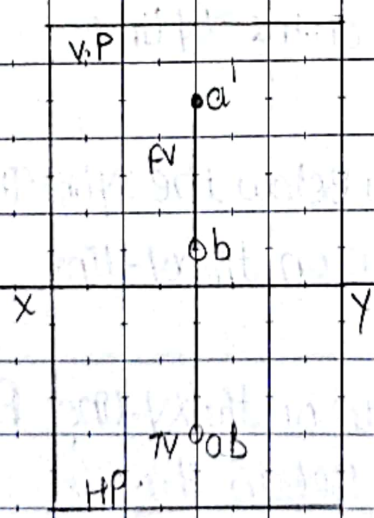
SECOND OR THIRD

Line:- A line can be defined as the shortest distance between the two points or can be defined as locus of 2 points measured linearly.

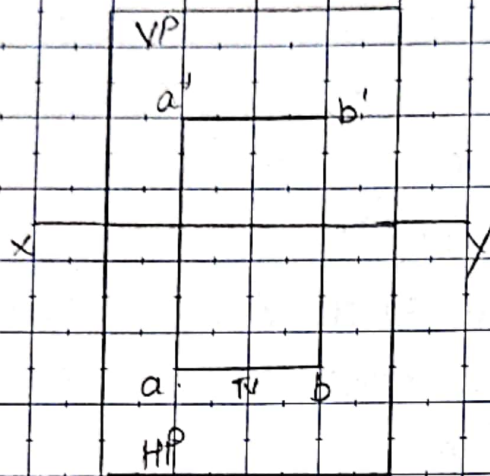
The Orthographic projection of lines can be performed with respect to first quadrant using the following cases.

1. A Vertical line (line perpendicular to HP & || to VP)
2. Line Parallel to both HP & VP
3. Line Inclined to HP & Parallel to VP
4. Line Inclined to VP & Parallel to HP
5. Line Inclined to Both HP & VP.

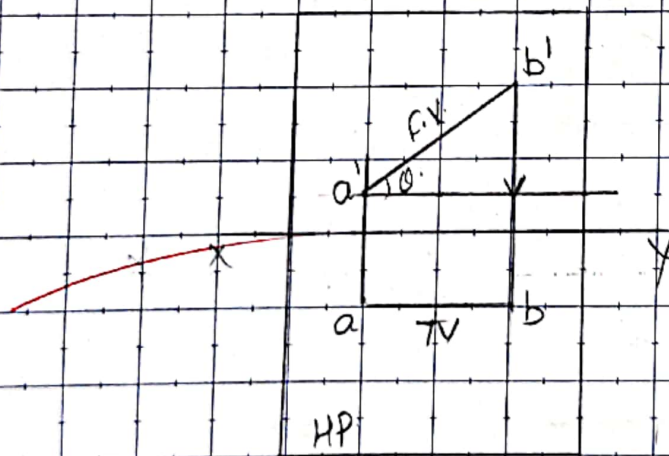
1. Line Perpendicular to HP and Parallel to VP



2 A line parallel to HP & VP.



3 A line inclined to HP and Parallel to VP.

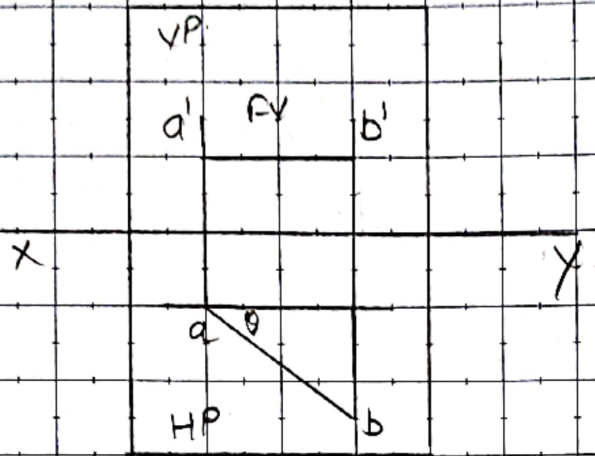


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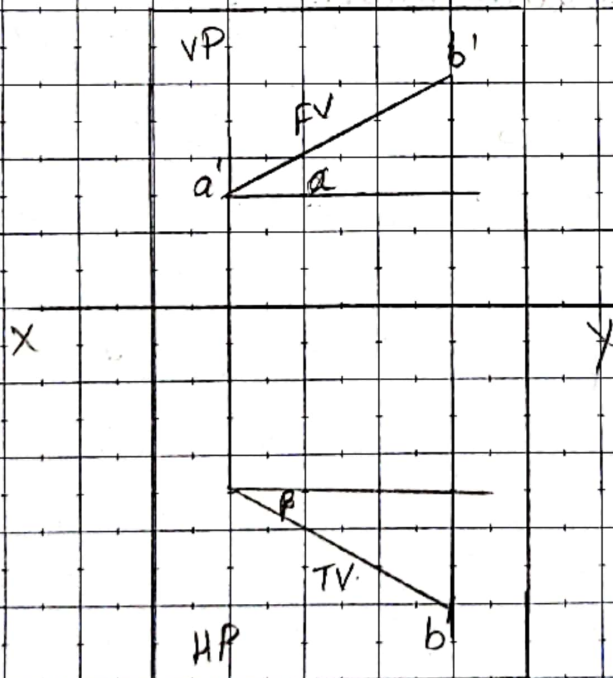
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4. A line inclined to VP and parallel to HP



5. A line inclined to both HP & VP.



Date

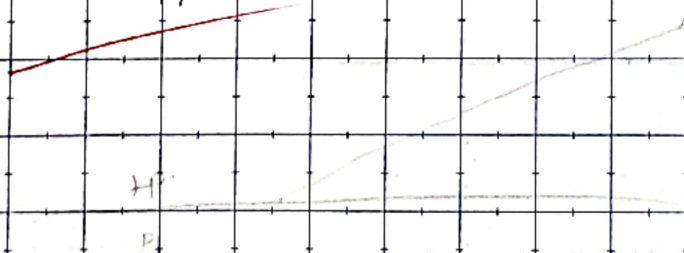
Scale : 1 Unit = 10mm

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- 1 Angle of TL with HP = θ
- 2 Angle of TL with VP = ϕ
- 3 Angle of FV with XY = α
- 4 Angle of TV with XY = β

θ & ϕ are called as True angle of line
 α & β are called as Apparent Angles.

- 8 A line AB 80mm long, has its end A 20mm above the HP and 30mm in front of VP. It is inclined at 30° to horizontal plane (HP) & 45° to vertical plane (VP). Draw the projections of the line and find apparent length and apparent inclination.

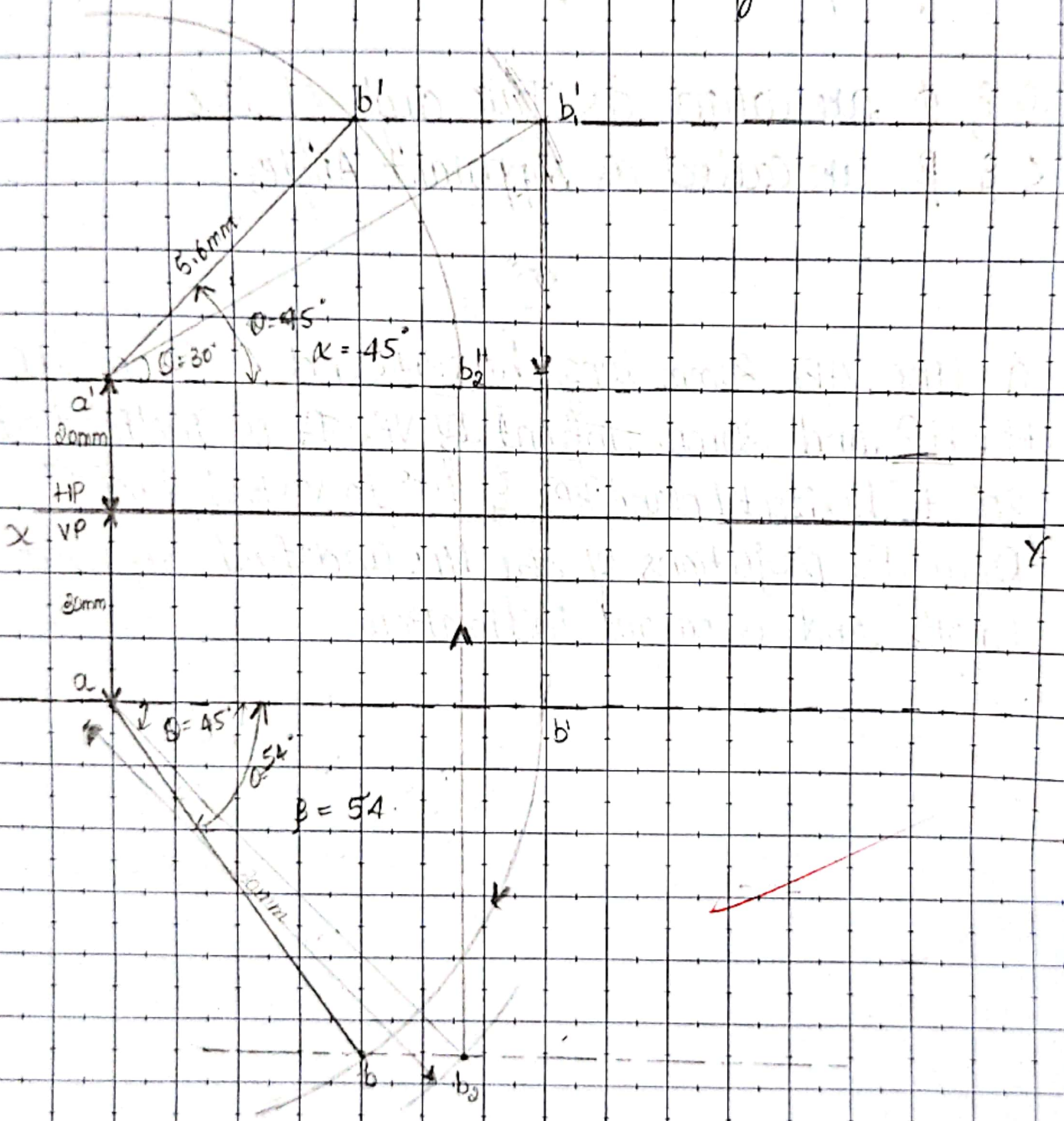


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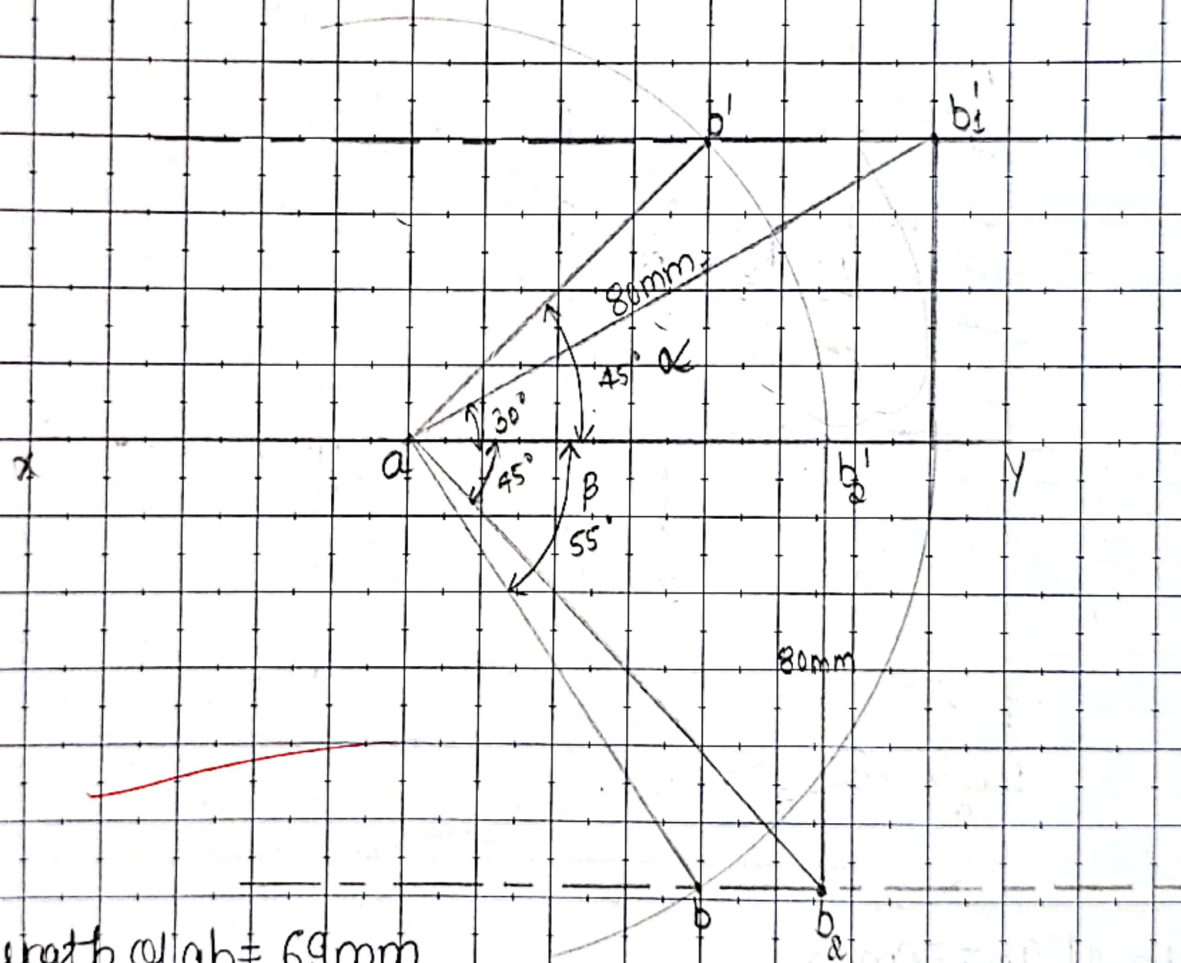
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length of $ab = 70\text{mm}$
 Angle $\beta = 54^\circ \text{ or } 55^\circ$
 length of $a'b' = 5.6\text{mm}$
 Angle $\alpha = 45^\circ \pm 1^\circ$



9. A line AB 80mm long is inclined to HP at 30° and inclined to VP at 45° . Draw the ~~proj.~~ front & Top views of the line and determine their length. Also measure the perpendicular distance of end B from both HP & VP. Compare your answers with the previous problem.



length of $ab = 69\text{mm}$

Angle $\beta = 55^\circ$

length of $a'b' = 57$

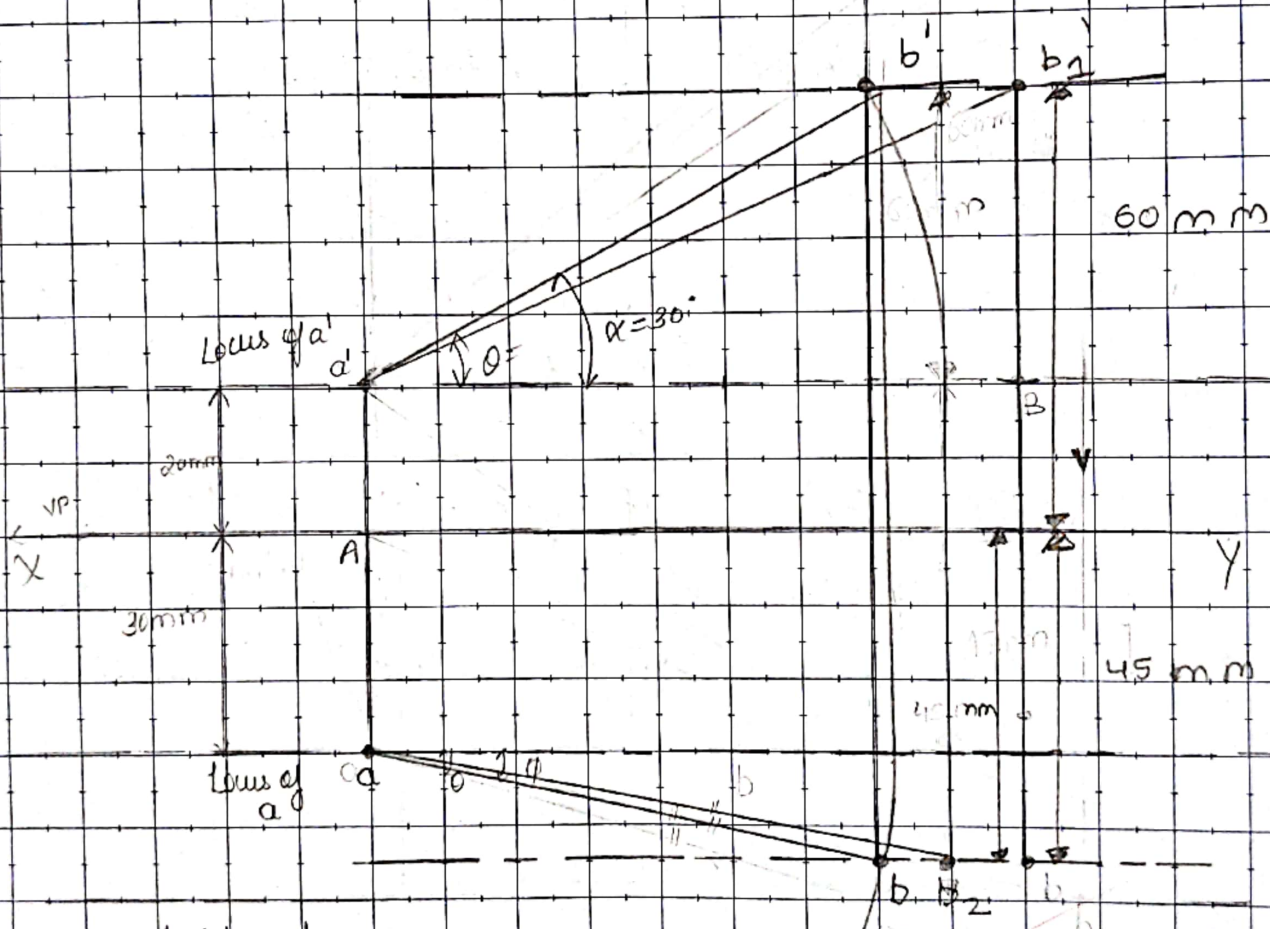
Angle $\alpha = 45^\circ$

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10. A line AB has its end A 20mm above the HP and 30mm in front the VP. The other end B is 60mm above the HP and 45mm in front of the VP. the distance b/w end projectors is 70mm. Draw its projections also determine a true length and apparent inclination.



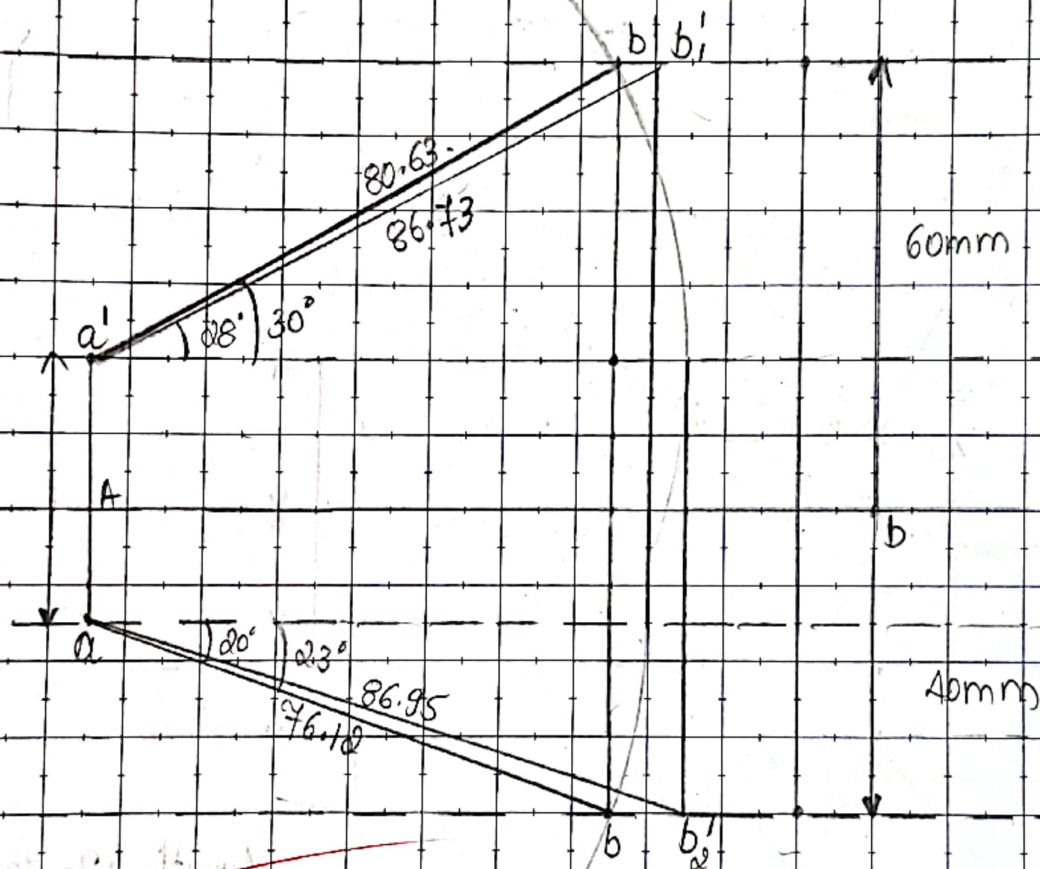
Length of $ab = 70\text{mm}$
 Angle $\theta = 54 \text{ or } 55^\circ$
 Length of $a'b' = 56\text{mm}$
 Angle $\alpha = 45^\circ$

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11. A line AB has its end A 20mm ^{above} the HP, and 15mm in front of VP. The distance b/w end projections is 70mm. Draw the projection & determine the apparent parameters

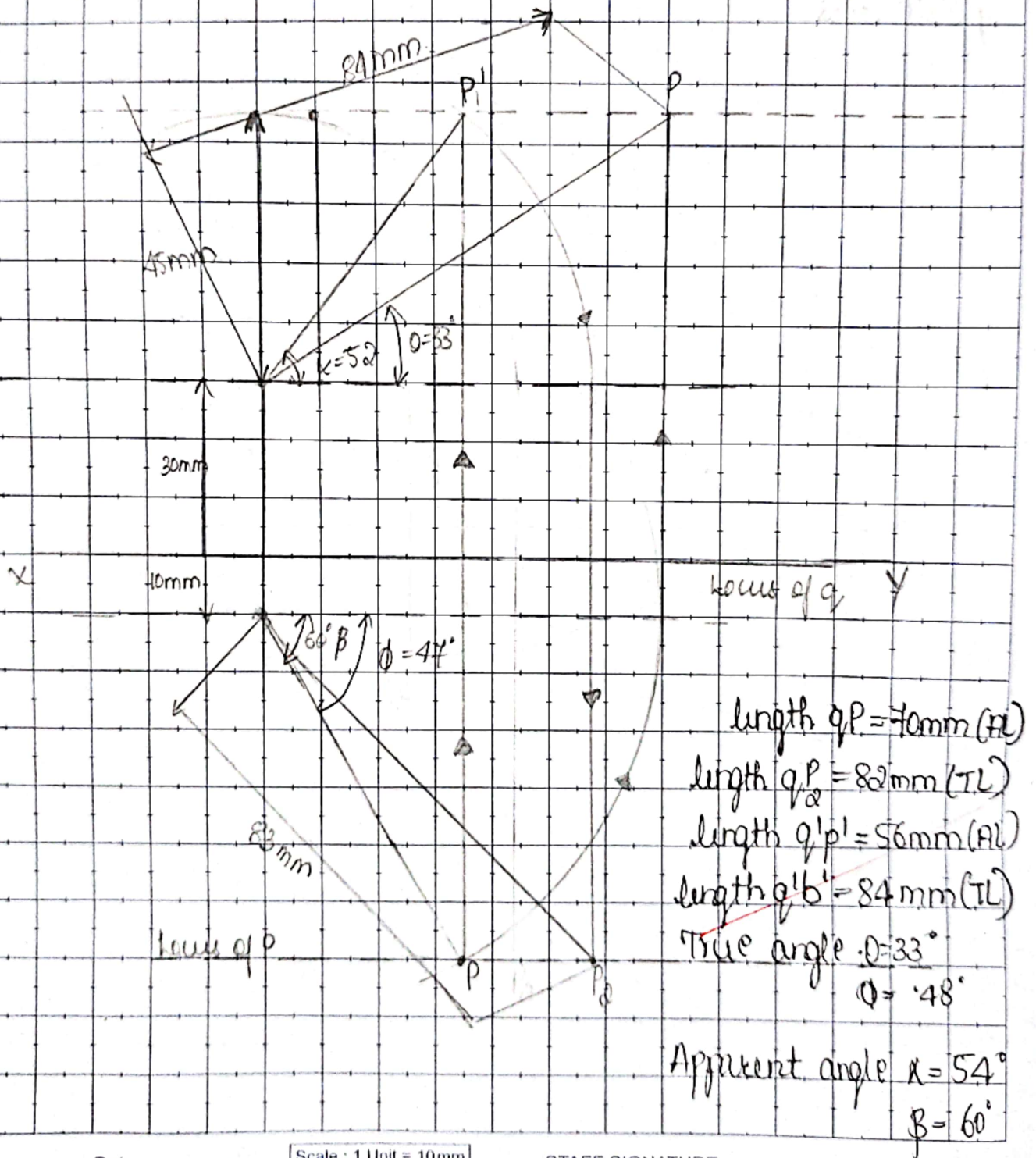


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Q12 The top view 'P' of a straight line in 70mm makes an angle of 60° with X-Y line. The end 'Q' is 10mm in front of VP & 30mm above the HP. The difference b/w the distances of P & Q above the HP is 45mm. Draw the Projection & determine the true length & true inclination with HP & VP

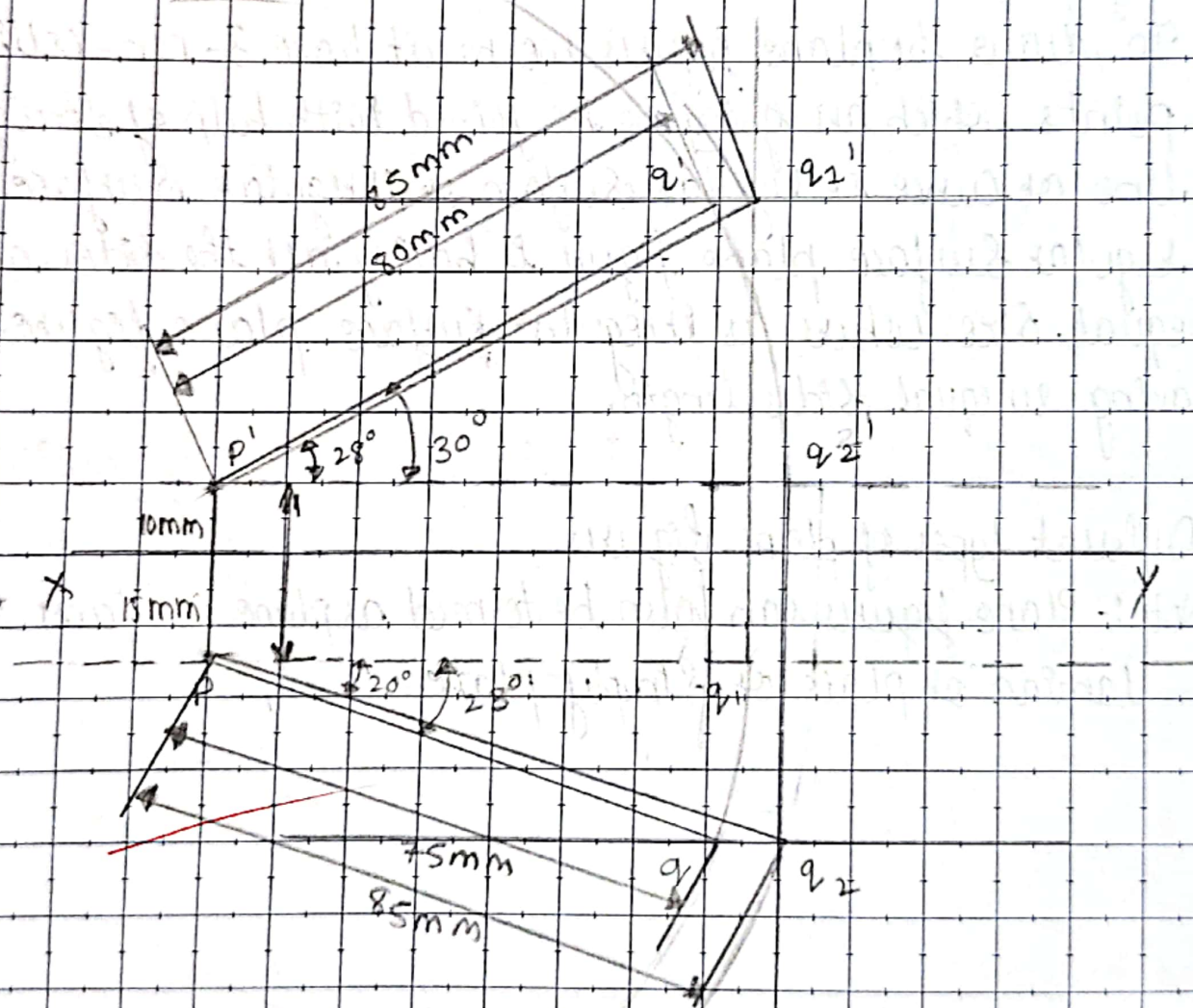


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- Q. A line PQ 85mm long as its end P 10mm along the HP and 15mm in front of the VP. The top and front view from PQ are 75mm & 80mm respectively. Draw its projections also determine the true & apparent inclinations of the line.



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Orthographic Projections of Plane Surfaces

Plane Surfaces:-

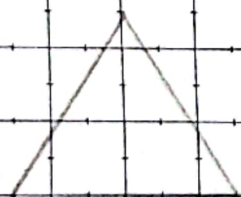
A plane surface can be defined as an object or image having 2-dimensions namely length and breadth with negligible thickness.

To draw the plane figures we must have 3-non-collinear points which are going to be joined with help of straight line or curve or regular surface or irregular surface.

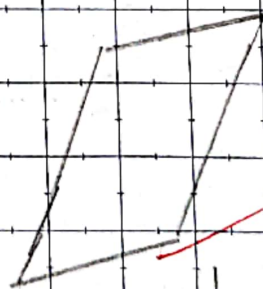
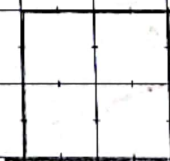
A regular surface plane figure is having all the sides are equal size where as irregular surface plane figure having unequal sides length.

* Different types of plane figures

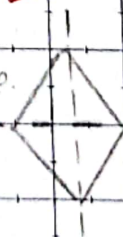
Note:- Plane figures can also be termed as plane surfaces or lamina or plate or simply plate.



3-Sided
Polygon



4-Sided polygon



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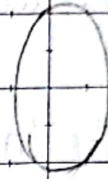
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5-Side polygon

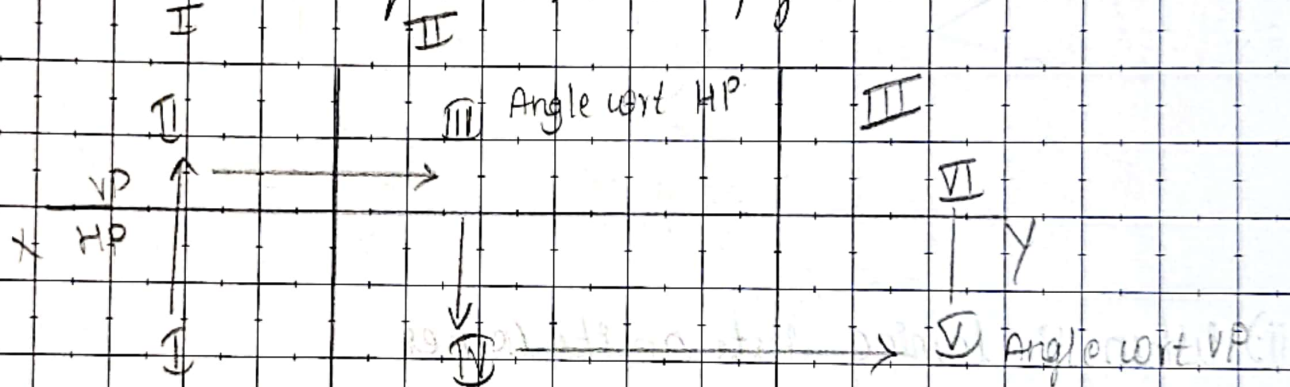


6-Side polygon

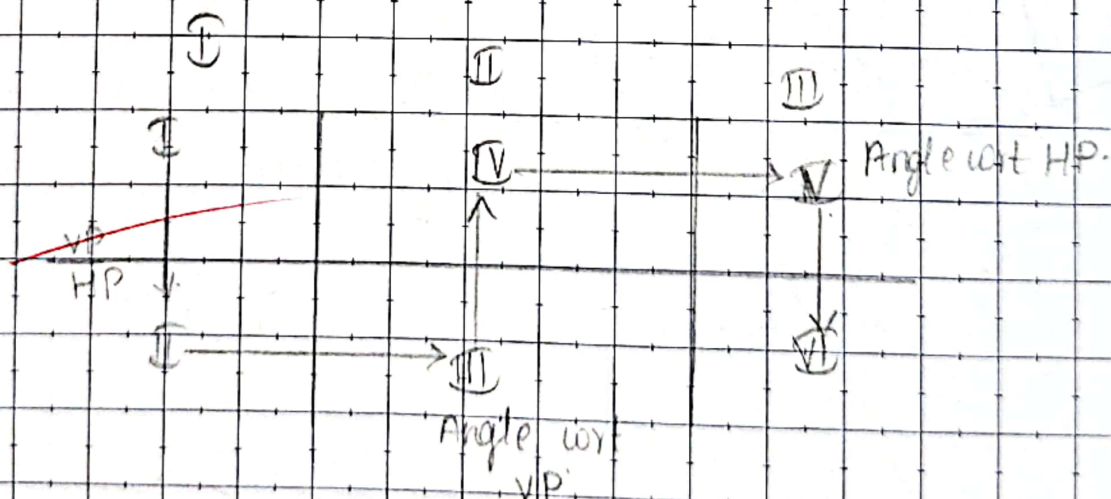


Circular lamina

Constructional Sequence i) Plane-figure test on HP-



ii) Plane figure test on VP-



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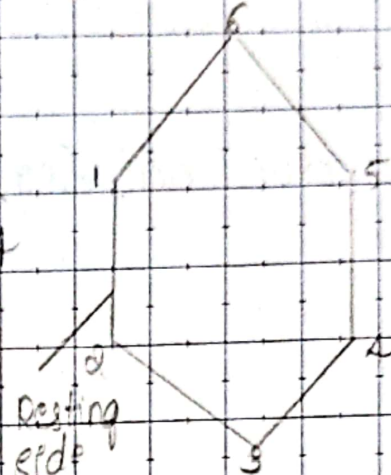
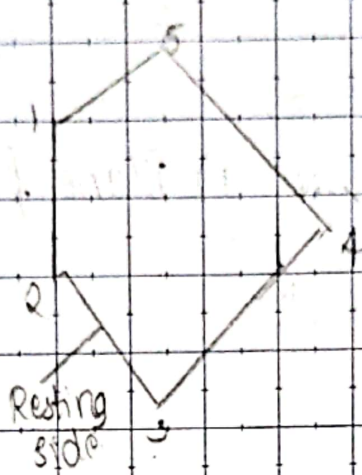
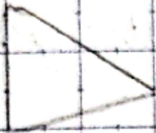
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* Resting conditions of plane figures.

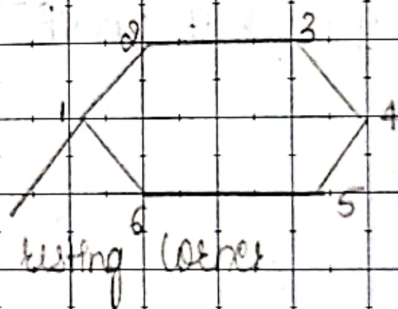
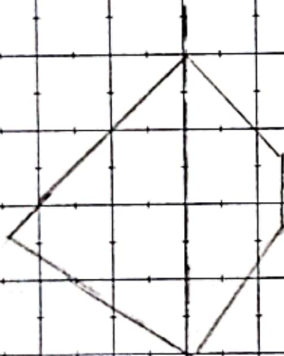
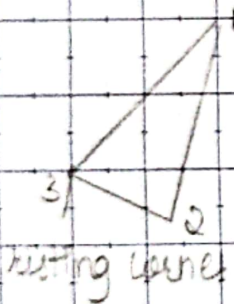
i) When the lamina rests on its side / edge -

eg.

Resting
side/edge



ii) When the lamina rests on its corner



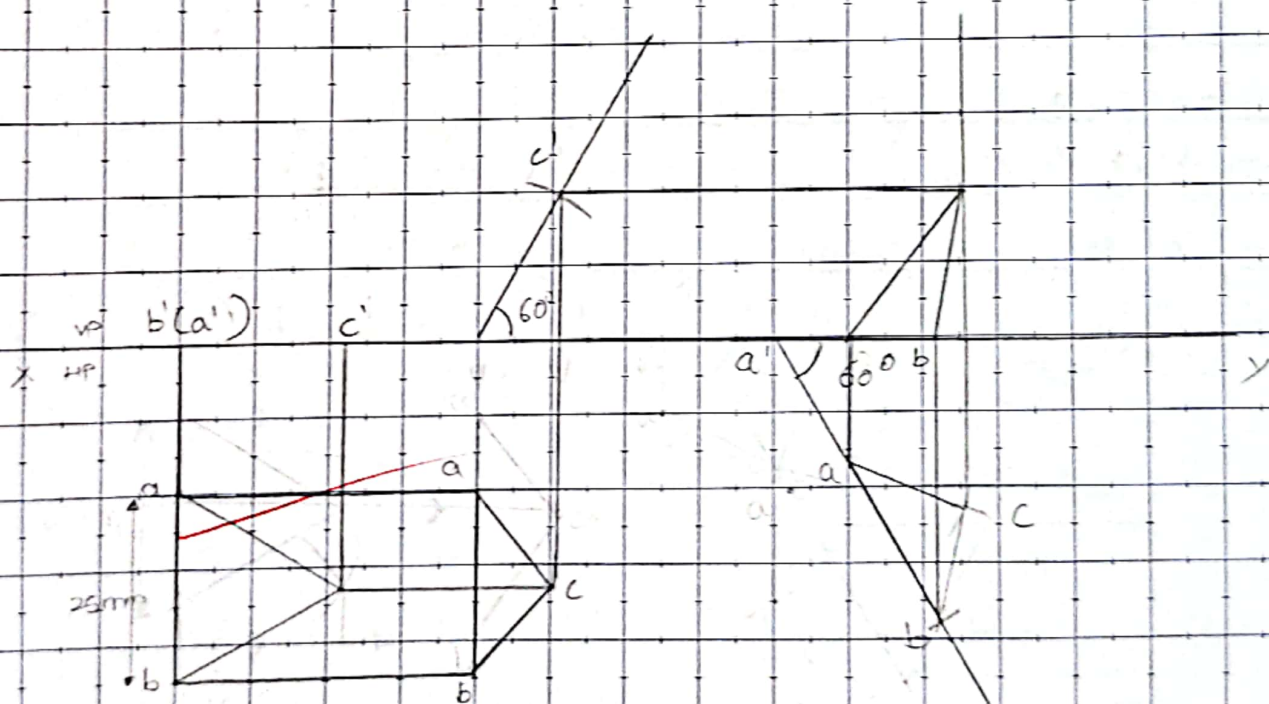
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Problems :-

1. An equilateral triangular lamina of 25mm side lies with one of its edges HP such that the surface of the lamina is inclined to HP at 60° . The edge on which it rests is inclined to VP at 60° . Draw the projections of the lamina.



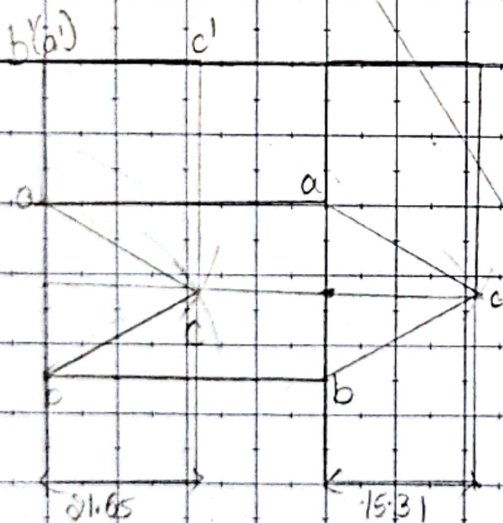
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2 An Equivalent Laminar of 25mm Sld. Res with one of its Sldu on HP.

The lamina makes 45° with HP and one of its median is inclined at 40° to VP. Draw its projection.



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Notes:-

Triangle:- Median

Median appeared to be (Not β angle Problem)

For Triangular lamina:

- * If the median of the triangle inclined to VP then the given problem is β angle problem
- * If the median of the triangle appears to be inclined to VP then it is not β -angle problem.

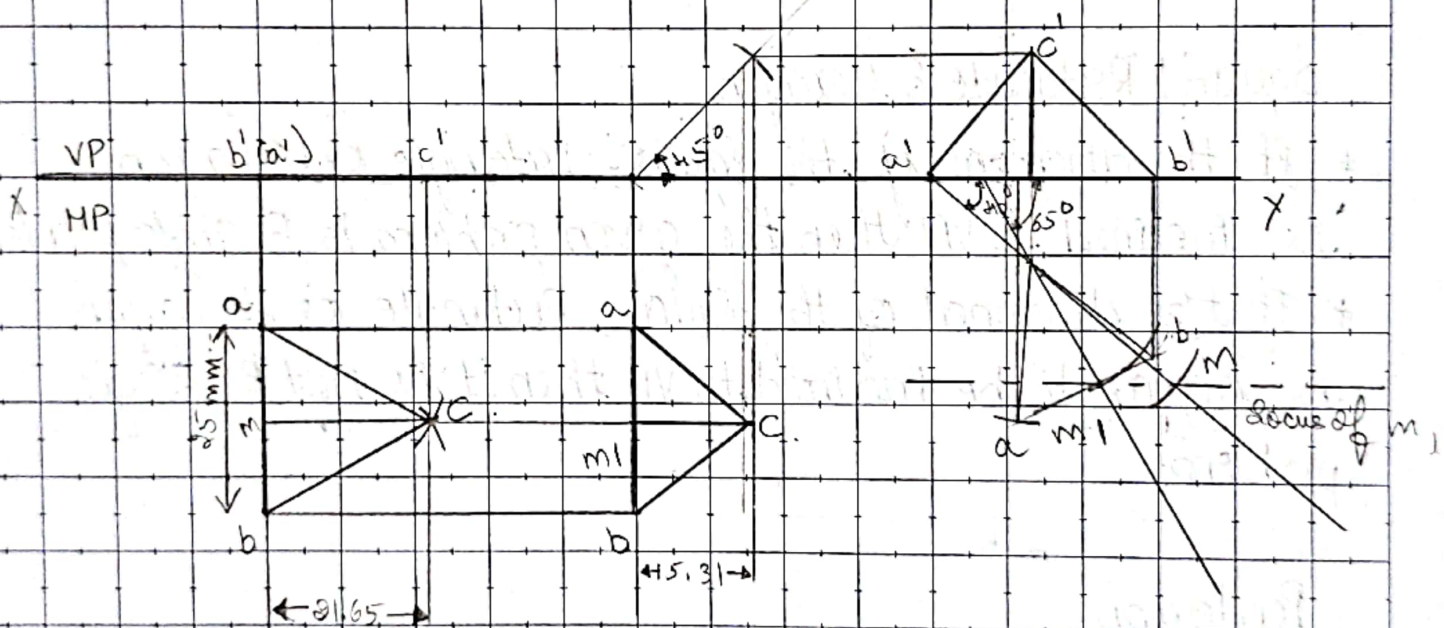
Square, Rectangle & Hexagon

- * If the diagonal of the square, Rectangle or Hexagon is inclined to VP then the given problem is β angle problem
- * If the diagonal of the square, Rectangle or Hexagon appears to be inclined to VP then it is not β -angle problem.

Pentagon

- * If the perpendicular bisector of the pentagon is inclined to VP then the given problem is β angle problem
- * If the perpendicular bisector of pentagon appears to be inclined to VP then it is not β -angle problem

2] An equilateral triangular lamina of 85 mm side lies on one of its sides on HP. The lamina makes 45° with HP & one of its medians inclined at 40° to VP.



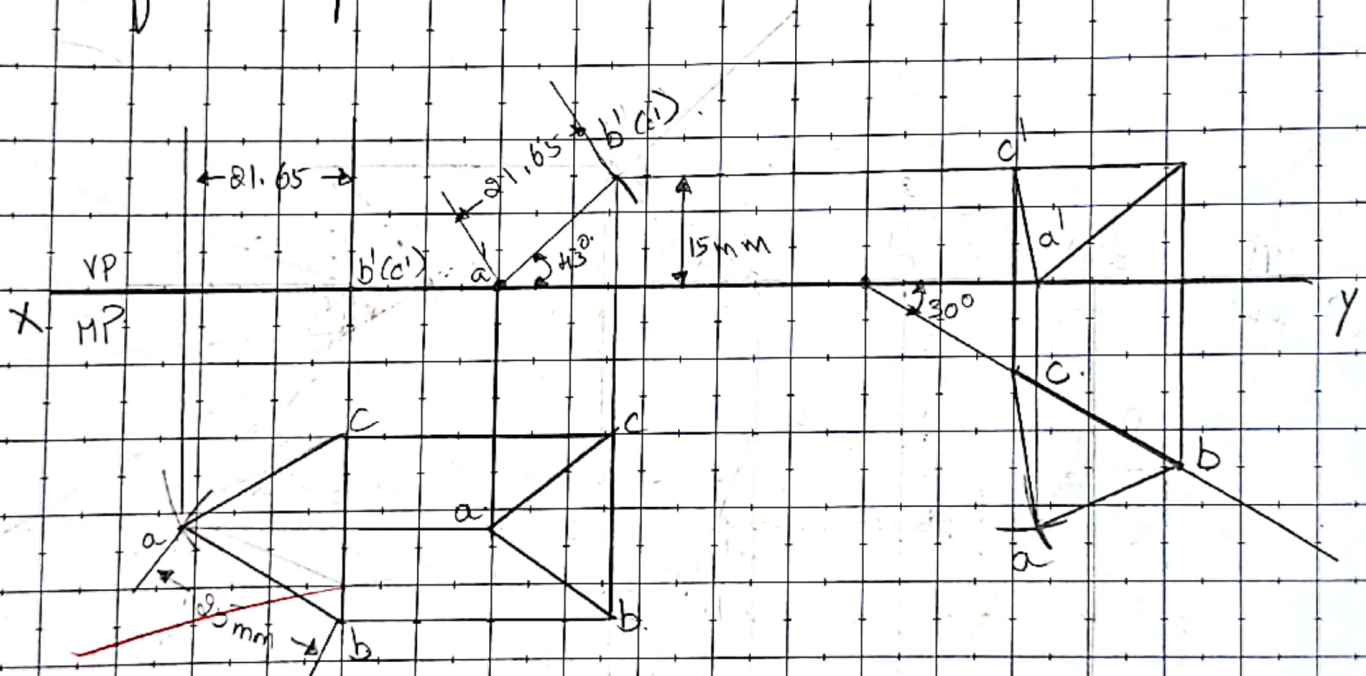
~~Real~~ angle = 65°

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- 3] A triangular plane lamina of side 85 mm is resting on HP with one of its corners touching it, such that the side opposite to the corner on which it rests is 15 mm above HP & makes an angle of 30° with VP. Draw the top & front views in this position. Also determine the inclination of the lamina to the reference plane.

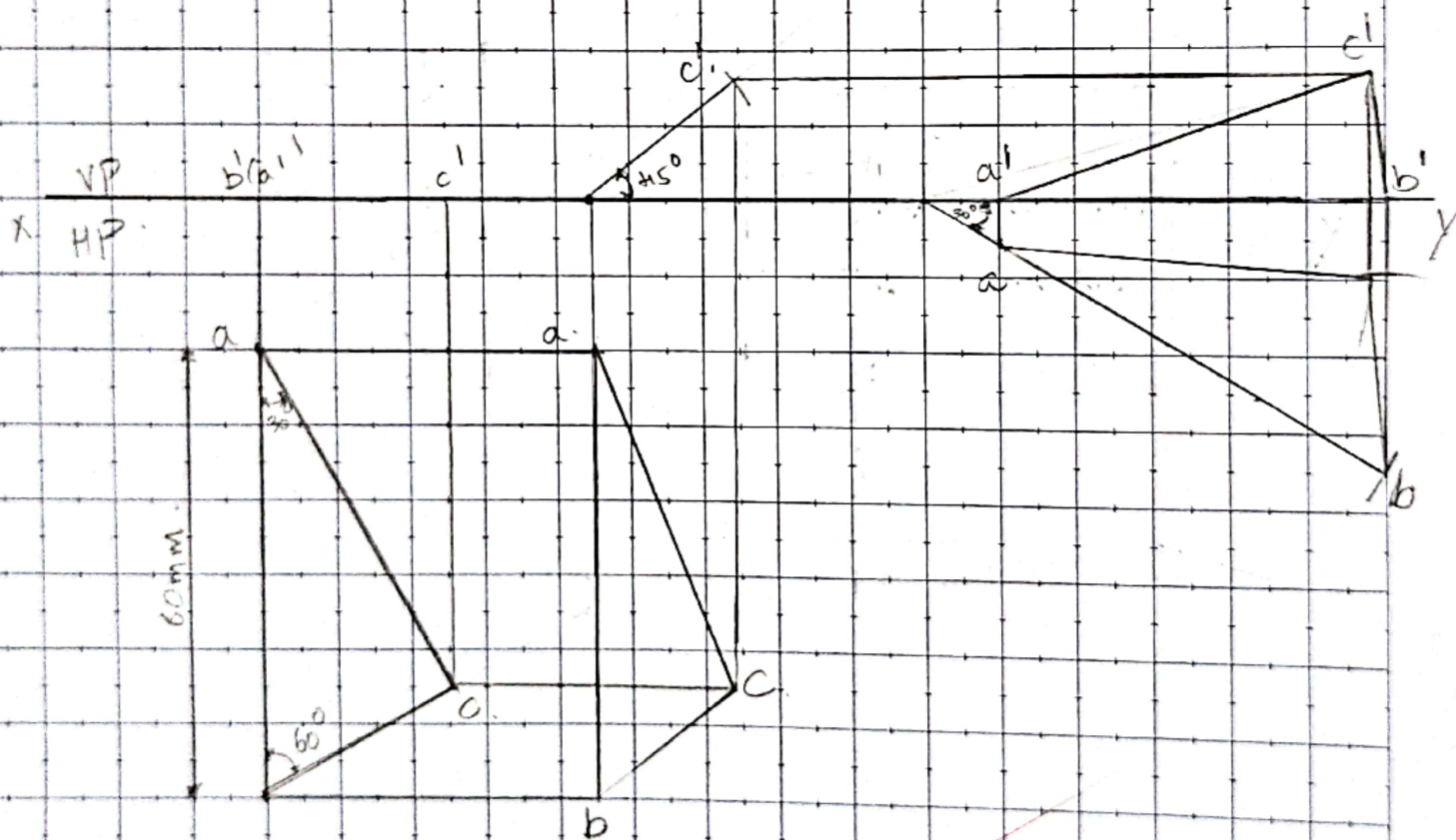


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Q] A 30-60 degree set square of 60 mm longer side is kept such that the longest side is in HP, making an angle of 30° with VP. The set square itself is inclined at 45° to HP. Draw the Projections of the set square.



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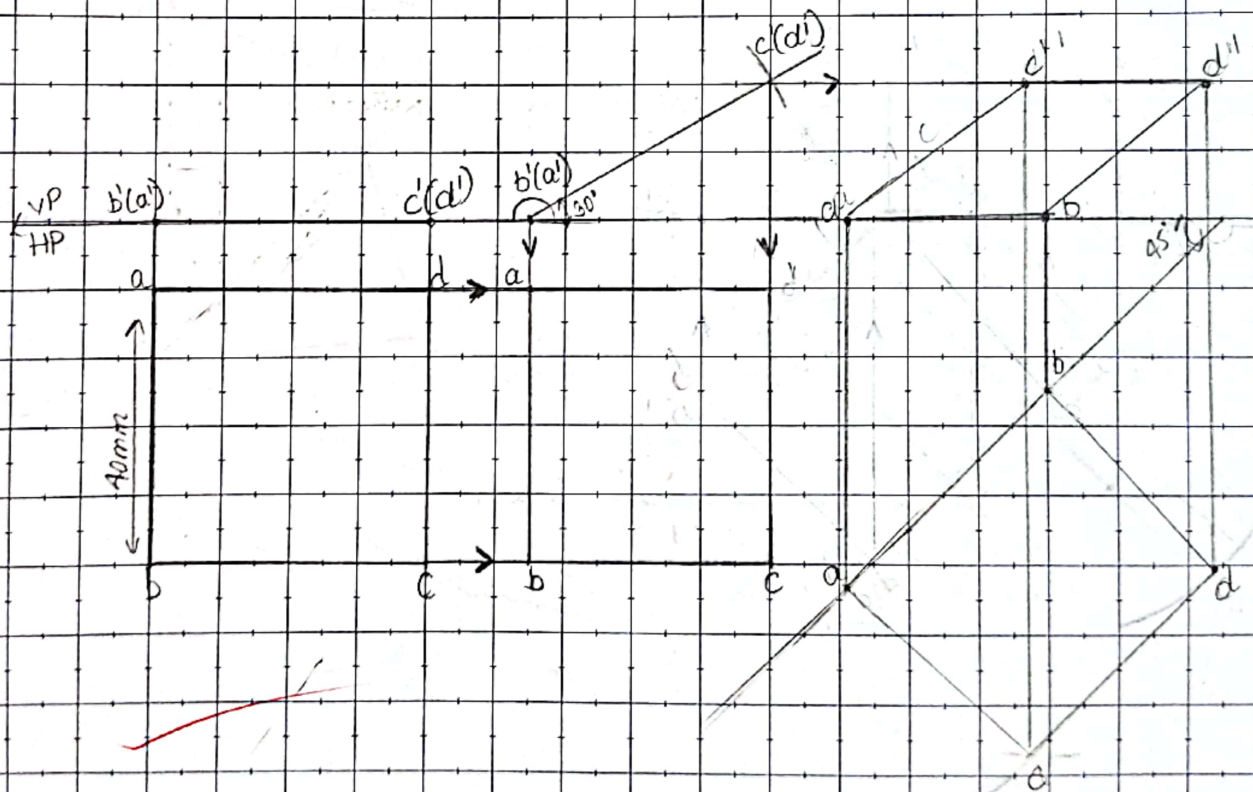
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5 A square lamina of 40mm side rests on one of its sides on HP. The lamina makes 30° to HP and the sides on which it rests makes 45° to VP. Draw its projections

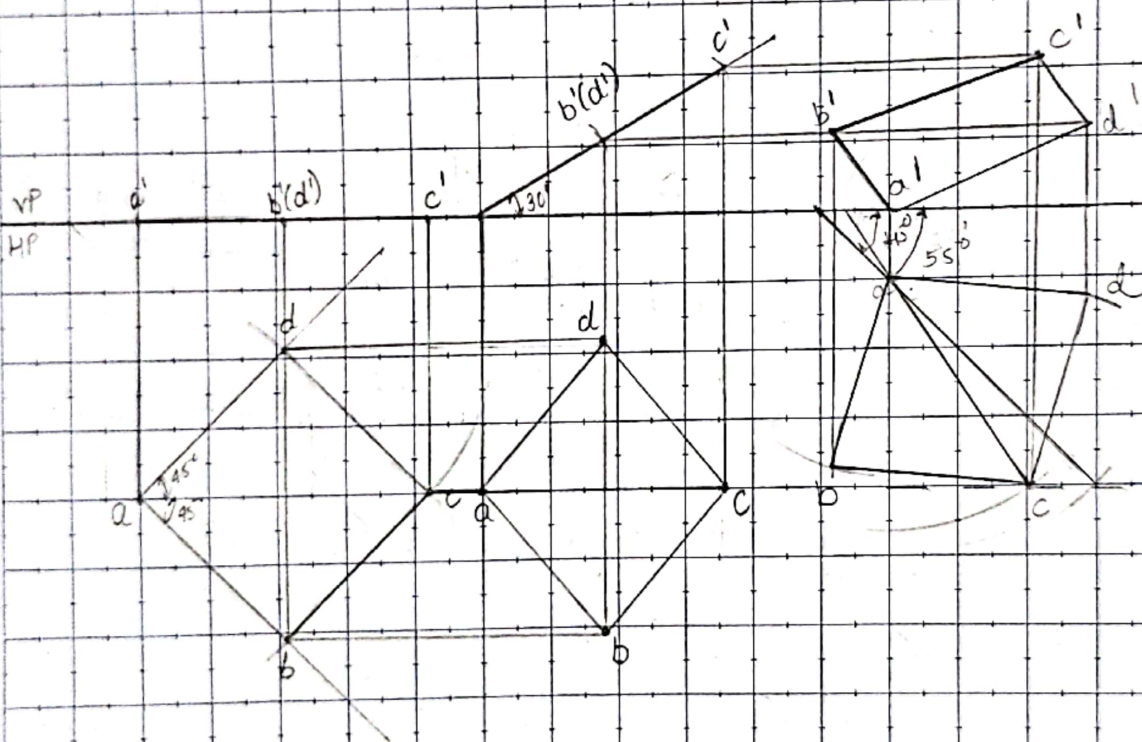


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6. A Square plate of side 80mm is resting on HP with one of its corner point. The diagonal of square plate is inclined to HP at 30° & 45° to VP. Draw its projections.

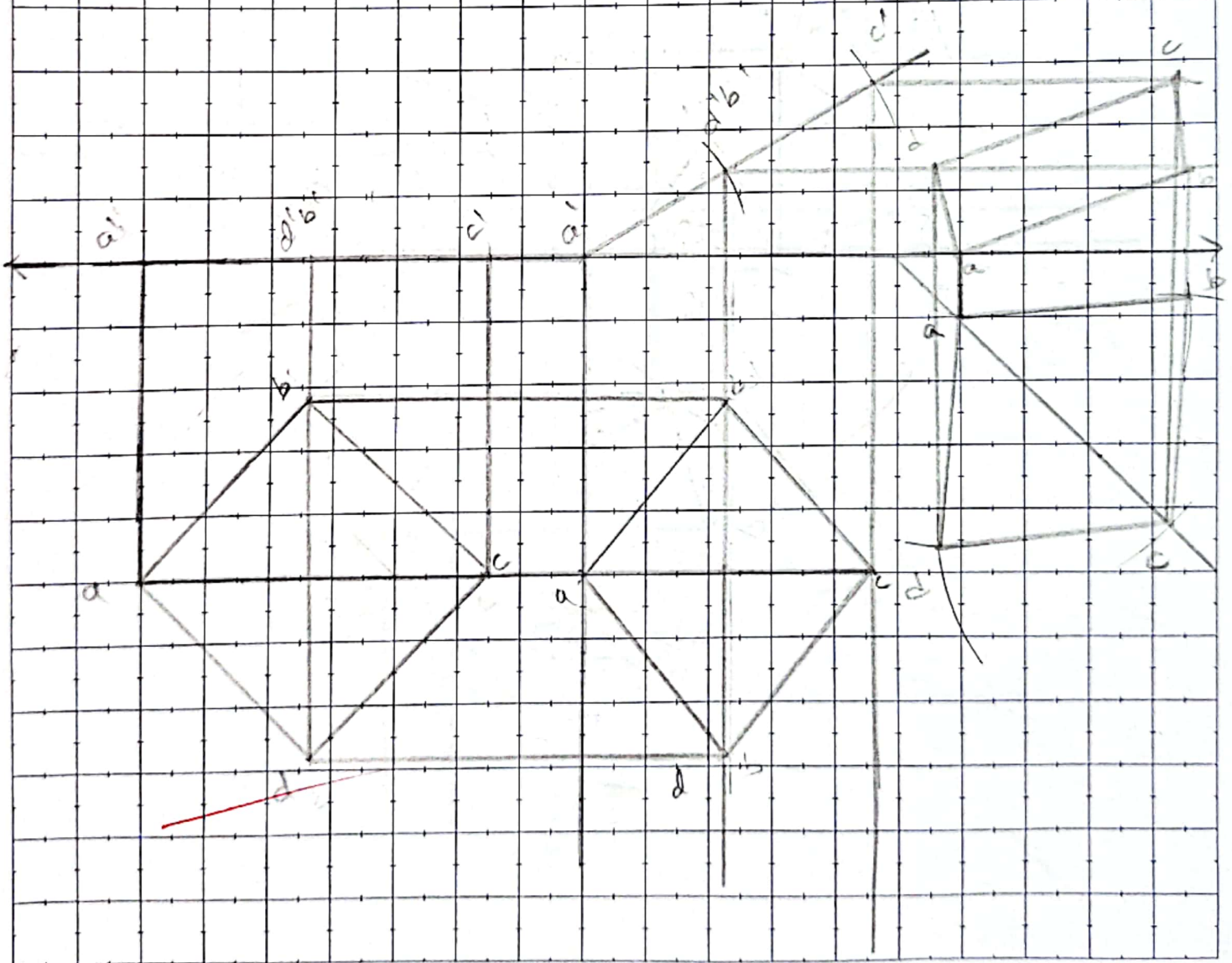


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7. A Square lamina ABCD of 40mm side Rest on corner such that diagonal appears to be 45° to VP. The two side sides of the lamina containing resting corner makes equal inclination to HP. Draw the projection of the lamina makes 30° with HP.

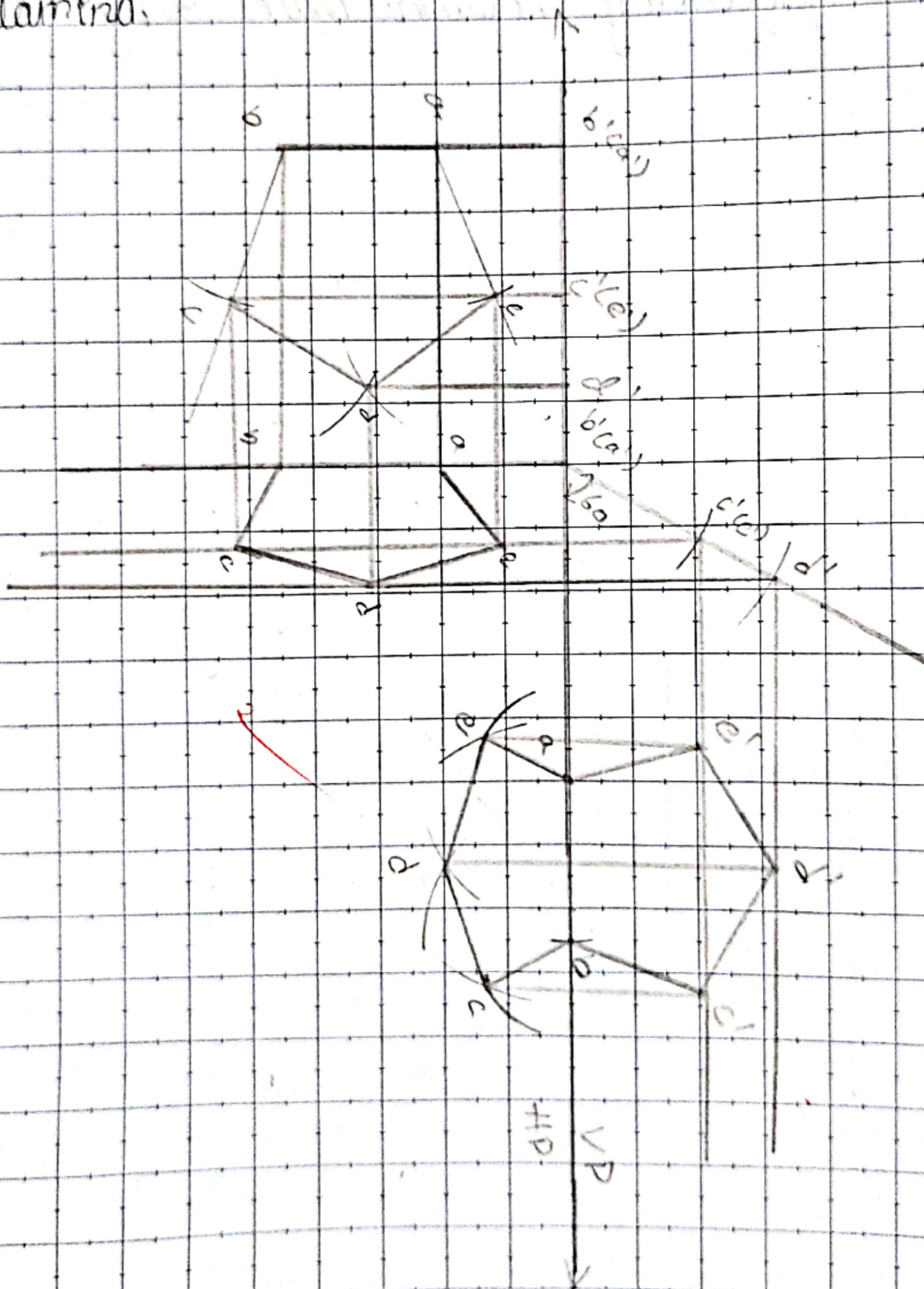


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Q8 A pentagonal lamina of side 85mm is having a side both on HP & VP. The surface of the lamina is inclined at an angle of 60° with HP. Draw the Top & front views of the lamina.

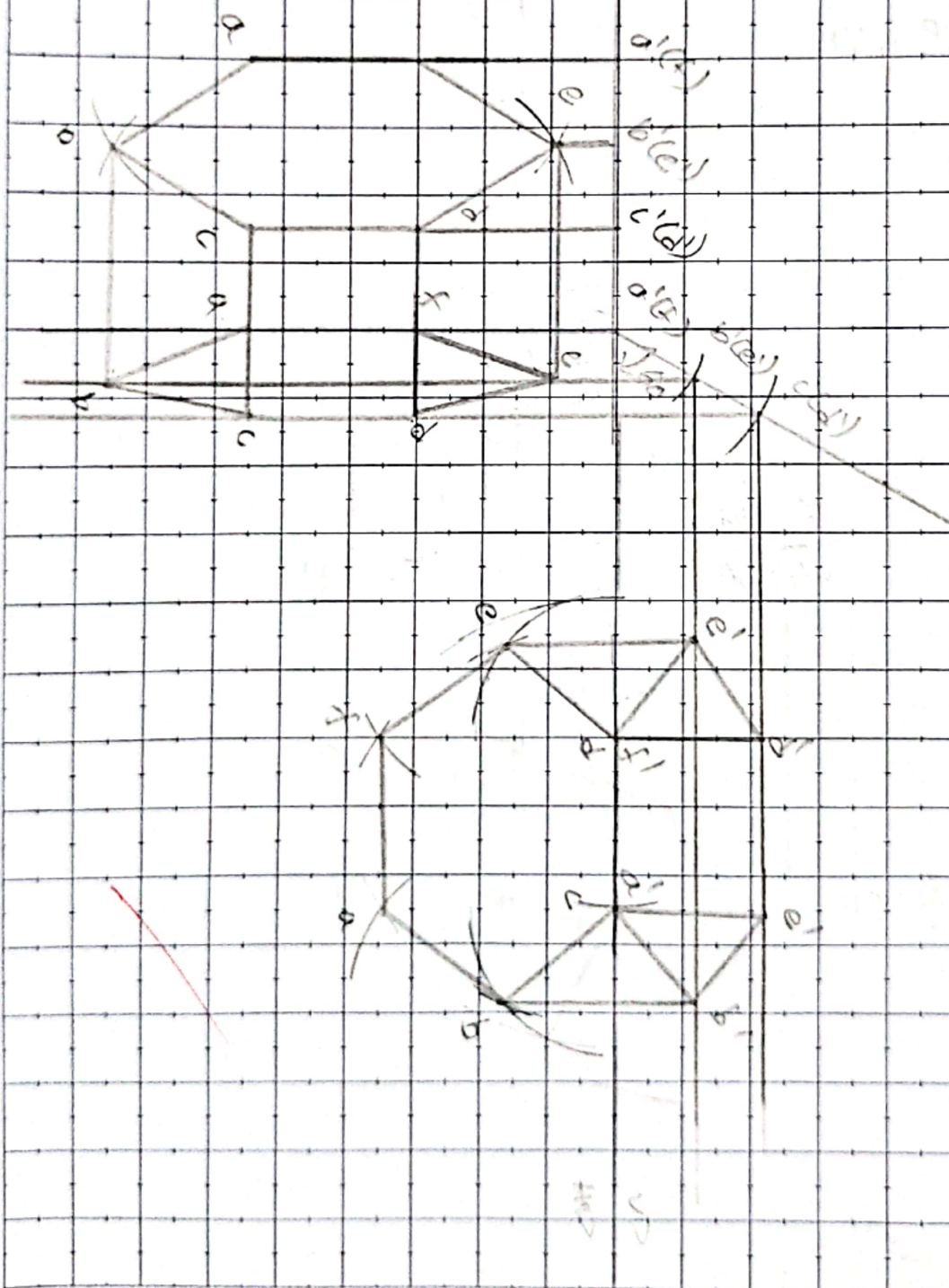


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9. A regular hexagonal lamina of sides 25mm is lying in such a way that one of its side on HP. While the side opposite to the side on which it rest is on VP. If the lamina makes an angle of 60° to HP. Draw the projections.

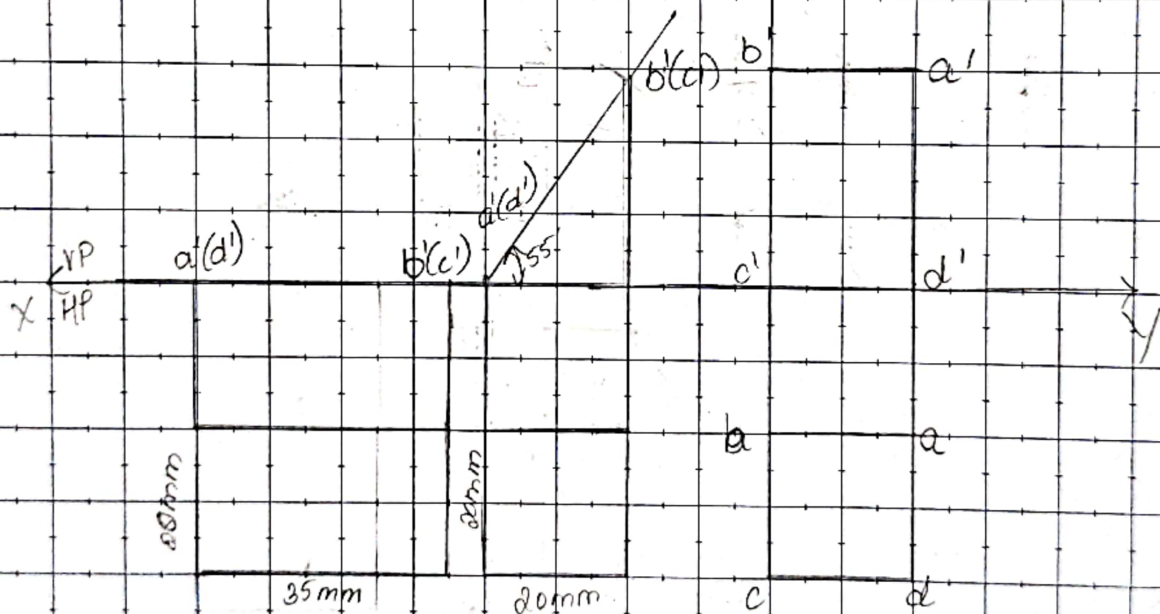


Date :

Scale : 1 Unit = 10mm

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10. A rectangular lamina of $35\text{mm} \times 20\text{mm}$ rests on HP on one of its shorter edges. The lamina is rotated about the edge on which it rests till it appears as a square in the top view. The edge on which the lamina rests being parallel in both HP & VP. Draw its projection & find its inclination to HP & VP.

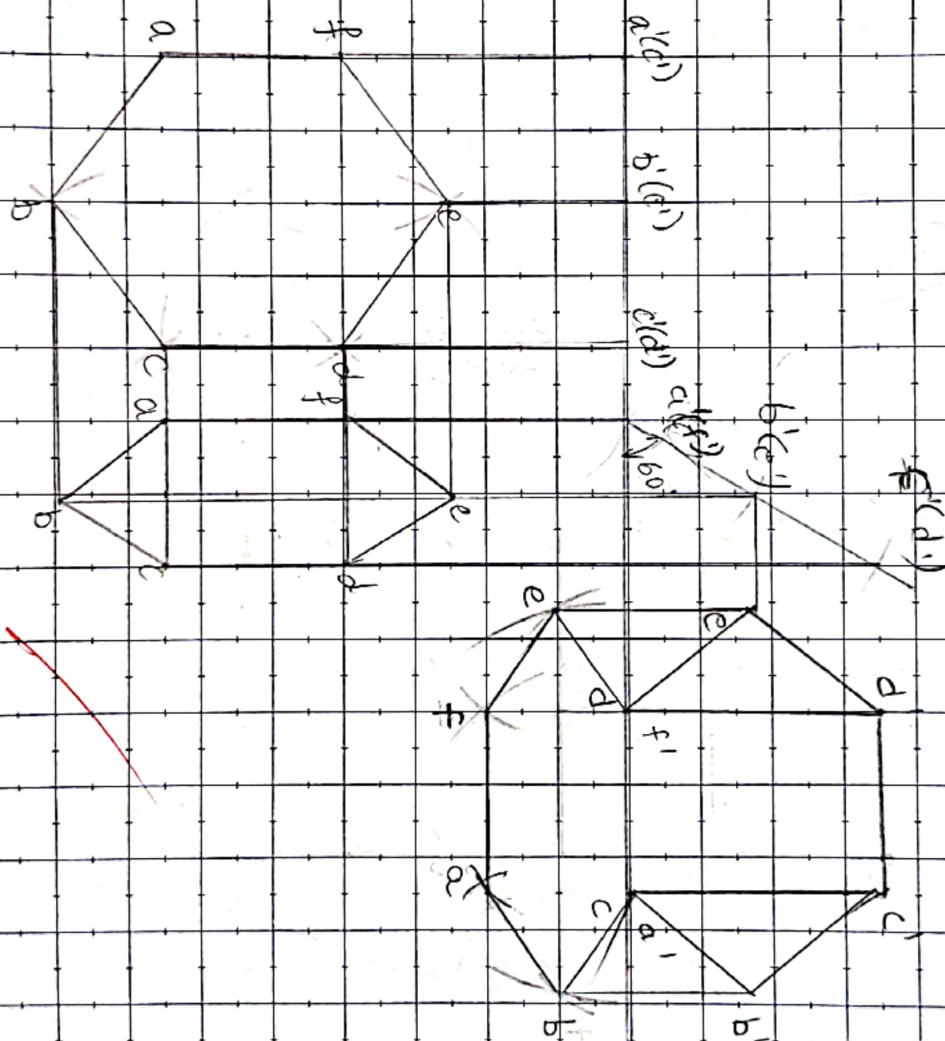


Date :

Scale : 1 Unit = 10mm

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11. A regular hexagonal lamina of its side 25mm is lying in such a way that one of its side on HP while the side opposite to the side on which its rests in on VP. If the lamina makes an angle of 60° to HP. Draw the projections.

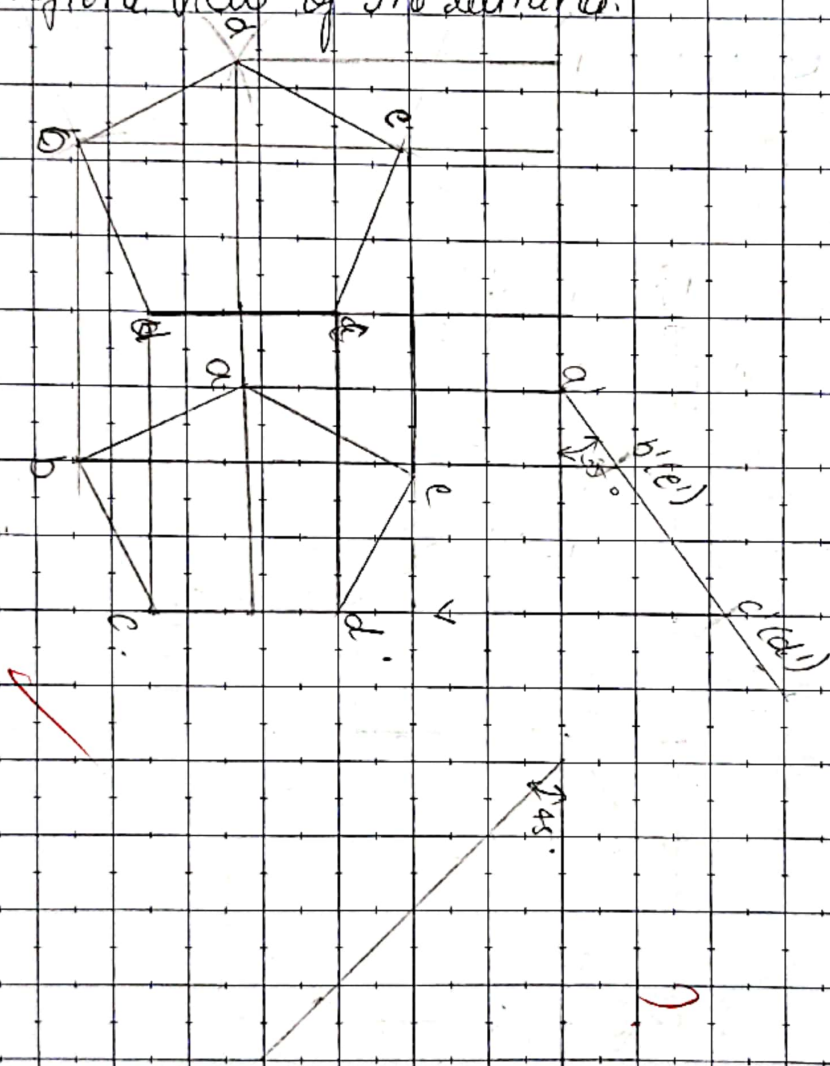


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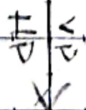
12. A pentagonal lamina having edges 25mm is placed on one of its corners on HP. Such that the $\perp^{\text{th}}$ bisector of the edge passing through the corner on which the lamina rests is inclined at 30° to HP & VP at 45° . Draw the top & the front view of the lamina.



Date :

Scale : 1 Unit = 10mm

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Scale : 1 Unit = 10mm

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