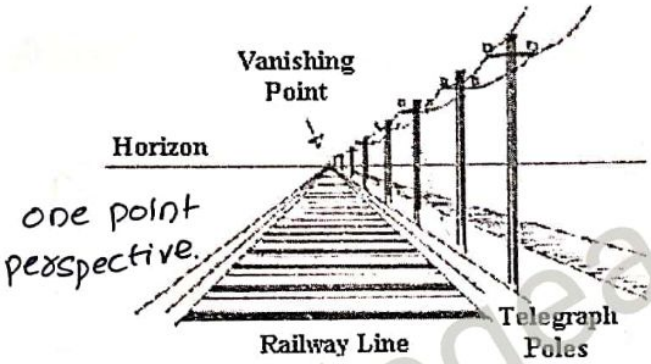
Chapter 2: Orthographic Projections

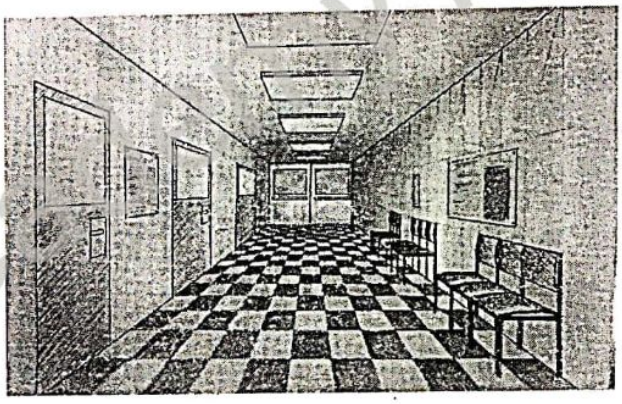
2.1 Types of Projections

Types of Projections

- Pictorial Projections
  - Perspective
    - → one point
    - → Two point
    - → Three point
  - Oblique
    - → cavalier
    - → cabinet
  - Axonometric
    - → Isometric
    - → Dimetric
    - → Trimetric.
- Orthographic Projections (multi view projections).

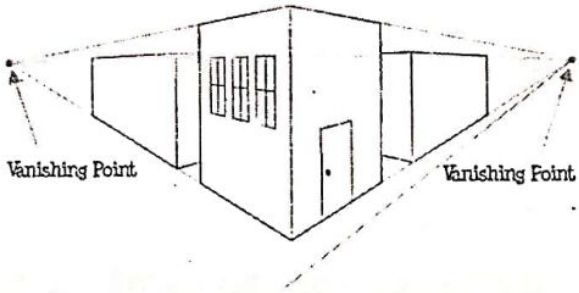


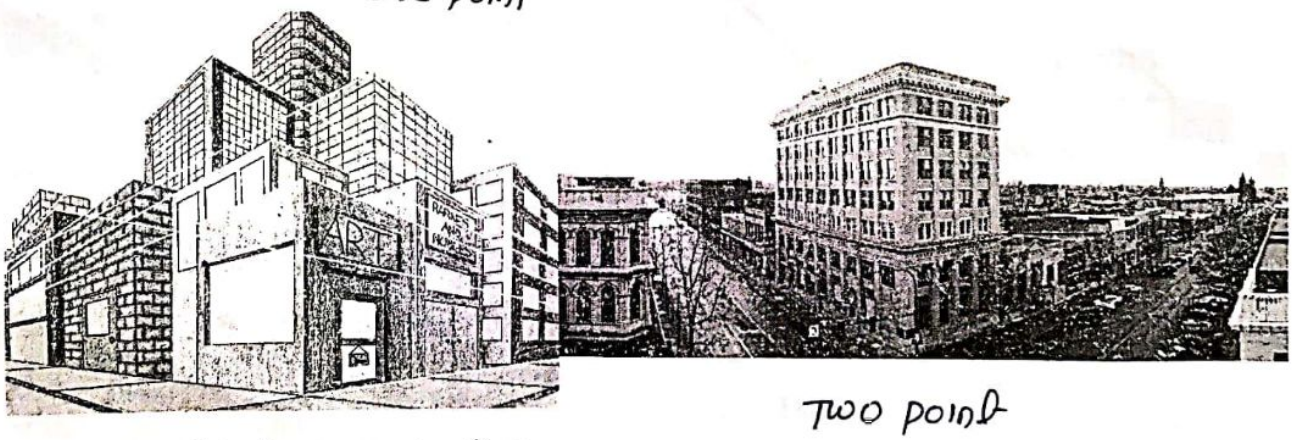
one point perspective.



one point

one point





2 point perspective

Two point

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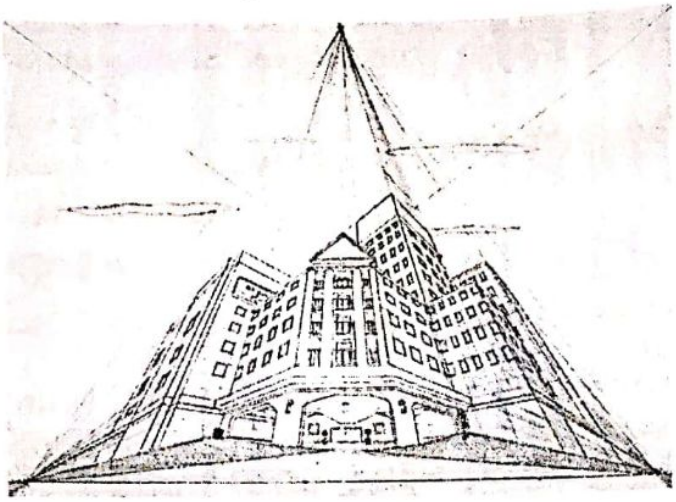
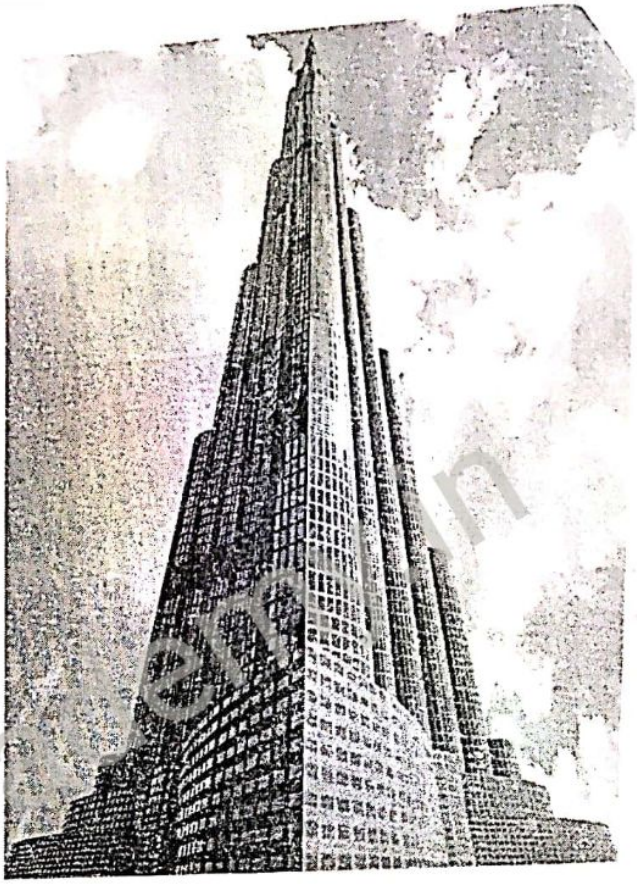
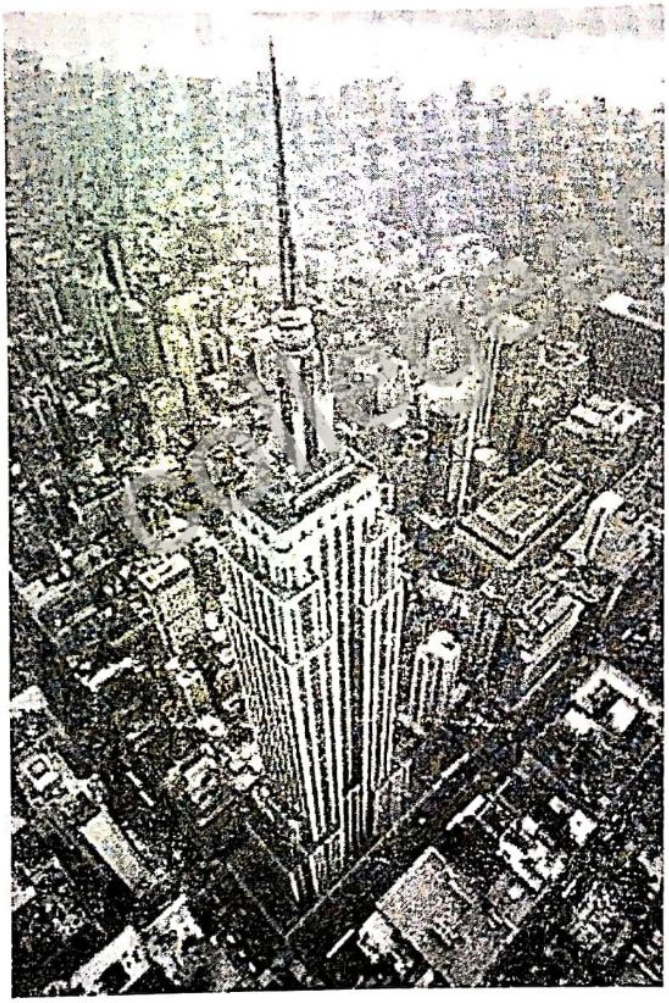
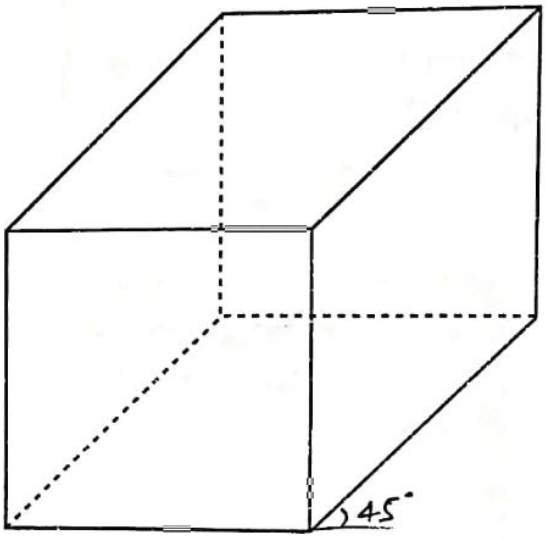
3 point perspective.

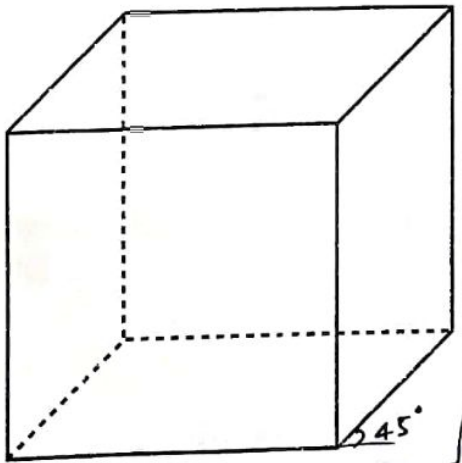








cavalier
All lines are at a scale of 1:1



cabinent porjection.

→ Horizontal and Vertical Lines → 1 : 1
Inclined Lines → 1 : 2

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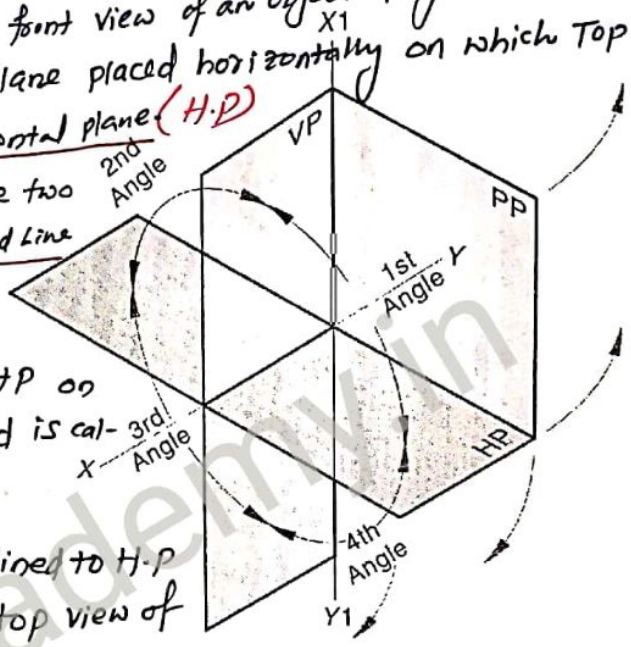
Orthographic Projections

It is a method of visualizing different phases of object on mutually orthogonal planes. The plane which is place vertically on which front view of an object projected is called as vertical plane (VP). The corresponding lee plane placed horizontally on which Top view of an objected is projected is called as Horizontal plane (H.P)

The Line which is at intersection of these two planes is called as Reference Lines (or) ground Line (or) XY Line.



Three principal planes

Profile plane:-
The plane which is lee to both HP, and HP on which sideview of the object is projected is called profile plane.

Auxilary Inclined plane :-
The plane which is lee to V.P and Inclined to H.P at a specific angle on which auxilary top view of the object is projected.

Auxilary vertical plane:-
The plane which is lee to HP and Inclined to V.P at a specific angle on which Auxilary front view of object is projected.

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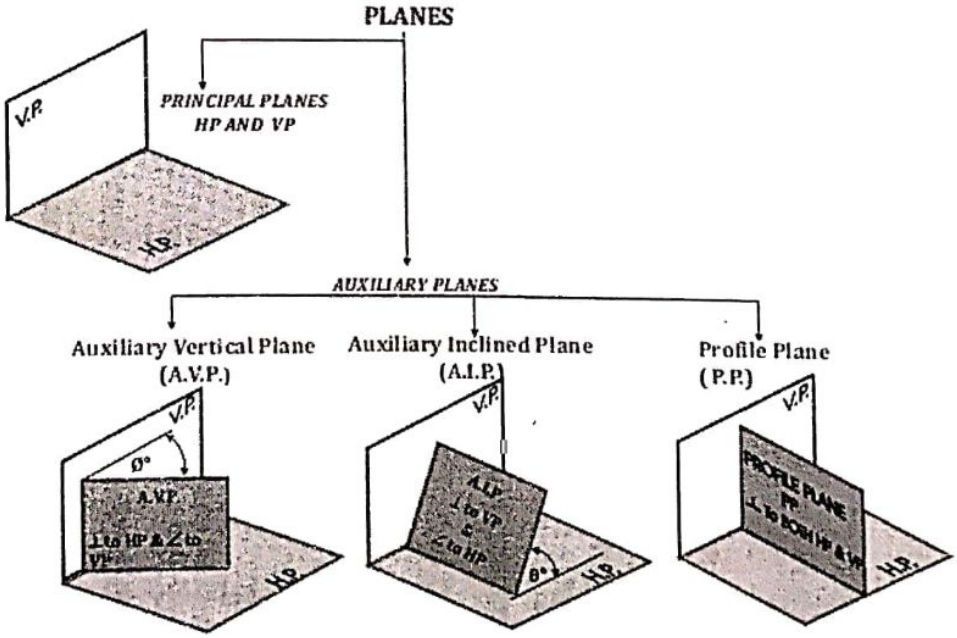

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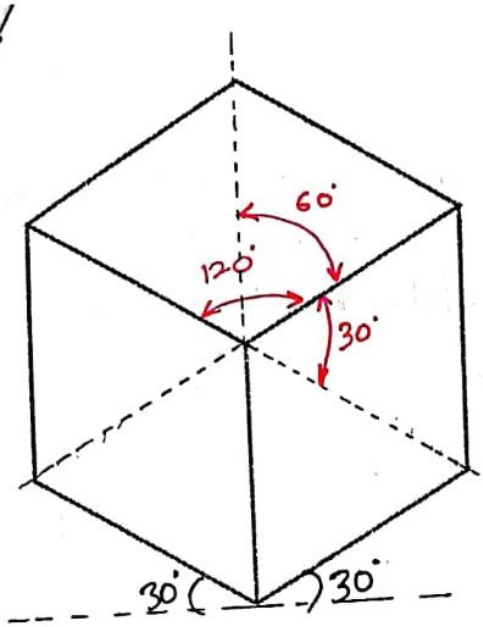
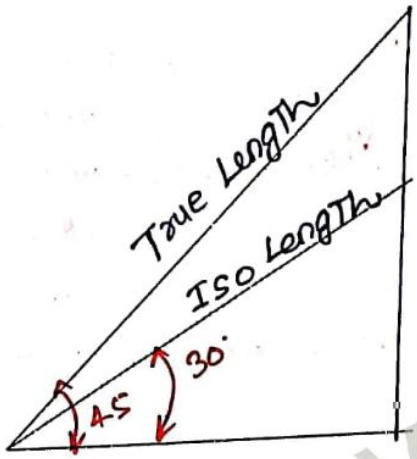




Axonometric projection

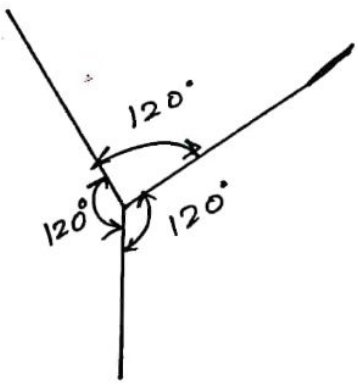
Isometric projection of cube.

$$\text{Isometric scale} = \frac{\text{Isometric Length}}{\text{True Length}}$$

$$\frac{\text{Iso Length}}{\text{True Length}} = \frac{a\,/\cos 30^\circ}{a/\cos 45^\circ}$$

$$\frac{\text{Iso Length}}{\text{True Length}} = \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{3}/2}$$

$$\simeq 0.816$$



Isometric Axis.

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Quadrant Number / Projection Method	Position of Object	Position of FV/TV wrt xy line
First quadrant / First angle projection.	Above HP, Infront of V.P	FV / TV
~~Second quadrant / second angle projection method.~~	Above HP, Behind VP	FV, TV
Third quadrant / TAPM	Below H.P, Behind V.P.	TV / FV
~~Fourth quadrant / FAPM.~~	Below hP, infront of vp.	FV, TV

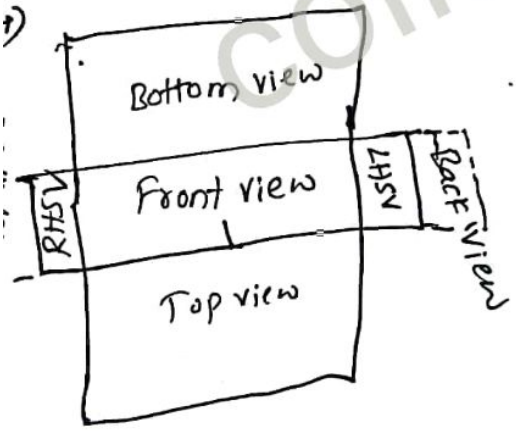
FAPM

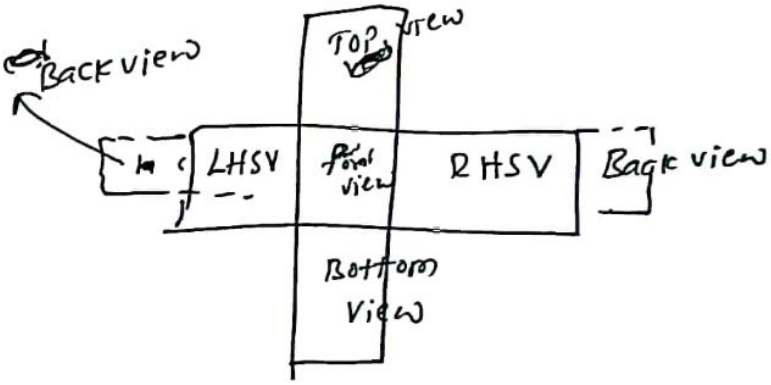
1) Projection planes are non Transferent
2) object Lies b/w observer and plane of projection.
3) Used in India, Britain and other countries.

TAPM.

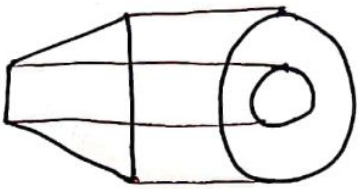
1) Projection planes are transferent.
2) Plane of projection is placed b/w object and observer.
3) used in USA and other European countries Except Britain.

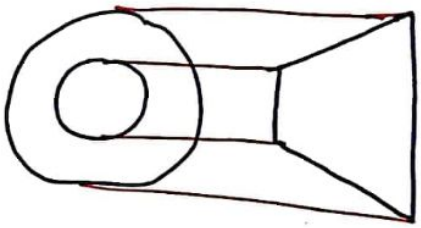
4)





5).





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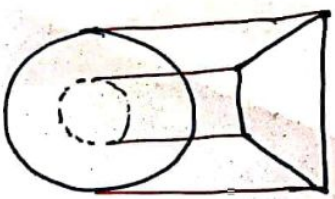

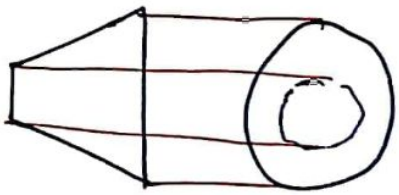

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Important points :-

① In orthographic projections projectors are ||el to each other and ⊥ar to the plane of projection.

② In oblique projection projectors are ||ell to each other. but they are not ⊥ar to plane of projection.

③ In perspective projection projections are neither ||ell to each other. Nor they are ⊥ar to the plane of projection.

→ In Axinometric projection projectors are ||ell to each other and also ⊥ar to plane of projections.

→ The difference from orthographic projection is in the orientation of the object.

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chapter - 2

* Orthographic Projection *

Isometric Lines :-

Lines which are parallel to isometric axis.

Non Isometric Lines :-

Lines which are not parallel to isometric axes.

Isometric View :-

It is the isometric drawing in which true Lengths of the object used.

Isometric projection :-

It is the isometric drawing in which isometric Lengths of object are used.

NOTE :-

1. Angbl b/w isometric axes is 120°
2. Angle b/w isometric Lines can be 120° (or) 60°

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Chapter-3

Projection of points

Representation :-

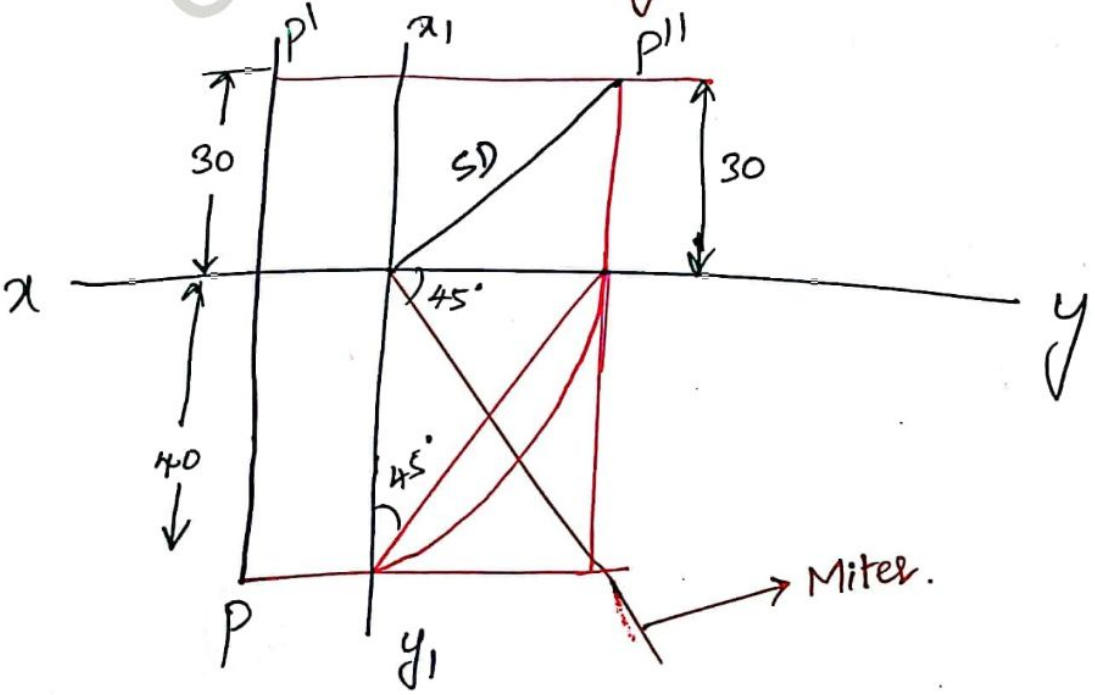
Object – P (capital Letter)

Front view – 'p' (small Letter with dash).
(elevation)

Top view – p (small Letter)
(plan)

Side view – p'' (small Letter with double dash).
(profile view)

Q :- A point 'p' is placed 30mm above hp and 40mm infront of vp. draw its projections.



Shortest distance (SD) of point from xy Line

$= \sqrt{30^2 + 40^2}$

$= 50mm$

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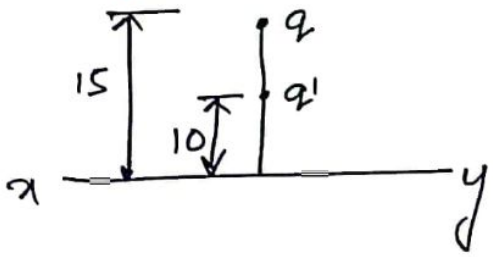
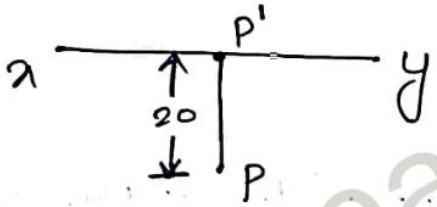
(4) A point Q lies 10mm above hp and 75mm behind VP draw Its projections.



$$SD = \sqrt{10^2 + 15^2}$$

(5). A point 'P' is resting on HP and is 20mm infront of V.P. draw Its projections.



$$SD = \sqrt{0^2 + 20^2}$$

$$\boxed{SD = 20}$$

(6). If The Top view of a point Lies about The reference Line Then The possible Quadrents in cohich The point may Lie are

a) I (or) III

b) II (or) III

c) III (or) IV

d) IV (or) I.

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Chapter - 4

Projection of Lines

Line is shortest distance b/w two points.

True Length :-

It is the physical length of the line measured in space along the lines own direction.

Apparent Length :-

It is the length (or) projection of line on the projection planes.

> True Length $\geq$ Apparent Length.

True Inclination :-

It is the physical inclination of the line measured in space w.r.to H.P (or) V.P.

Apparent Inclination :-

It is the inclination of projection of lines in front (or) Top view w.r.to Reference Line.

Apparent inclination is always greaterthan (or) equal to True inclination.

True inclination w.r.to HP = θ

True inclination w.r.to V.P = ϕ

Apparent inclination in F.V = α

Apparent inclination in T.V = β.

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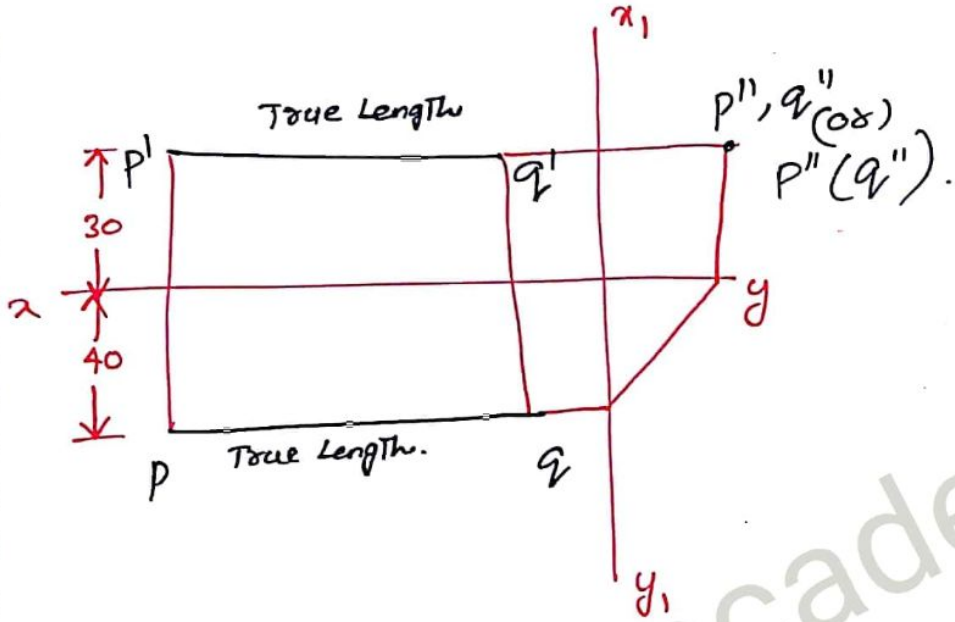
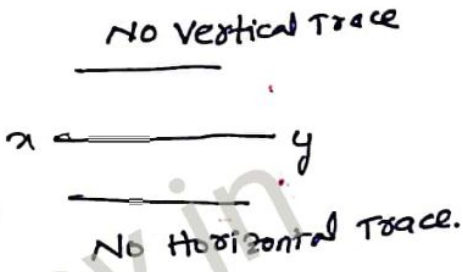
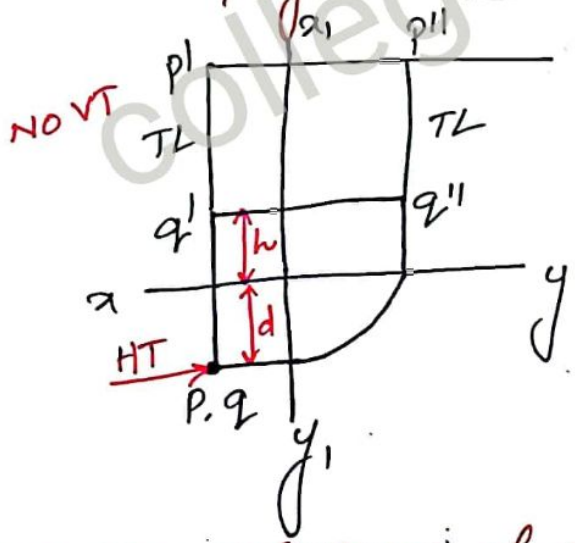
④ A Line PQ of Length 100mm is ||ell to both H.P & V.P. Its distance from HP is 30mm and That from V.P is 40mm.

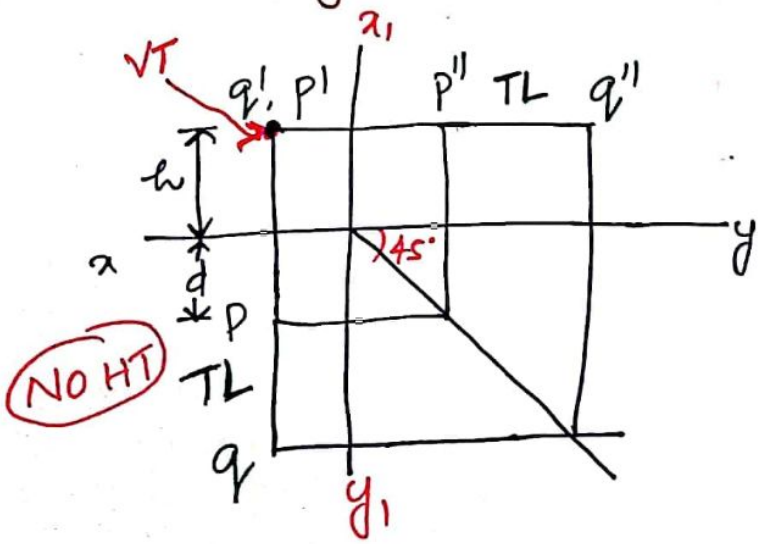




⑤ draw the poojection of the Line that is Ler H.P.



⑥ Draw the projections of a Line Ler to V.P.



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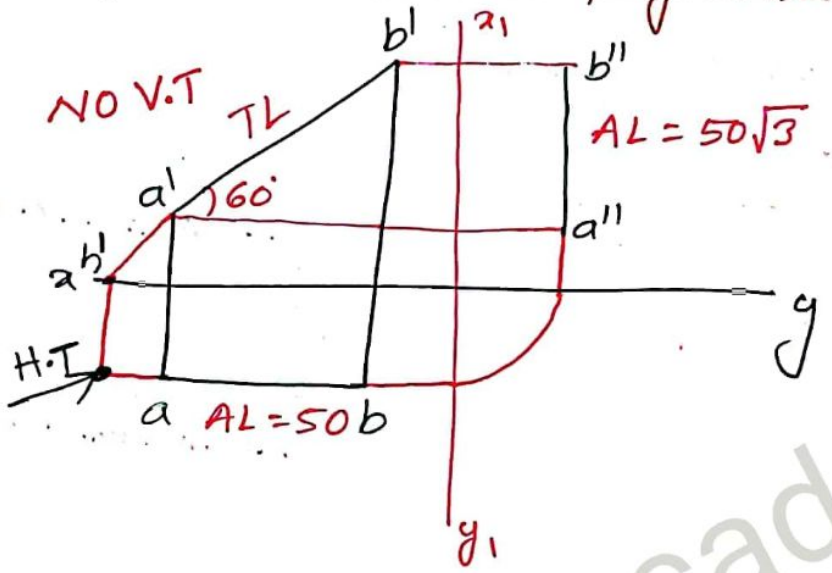
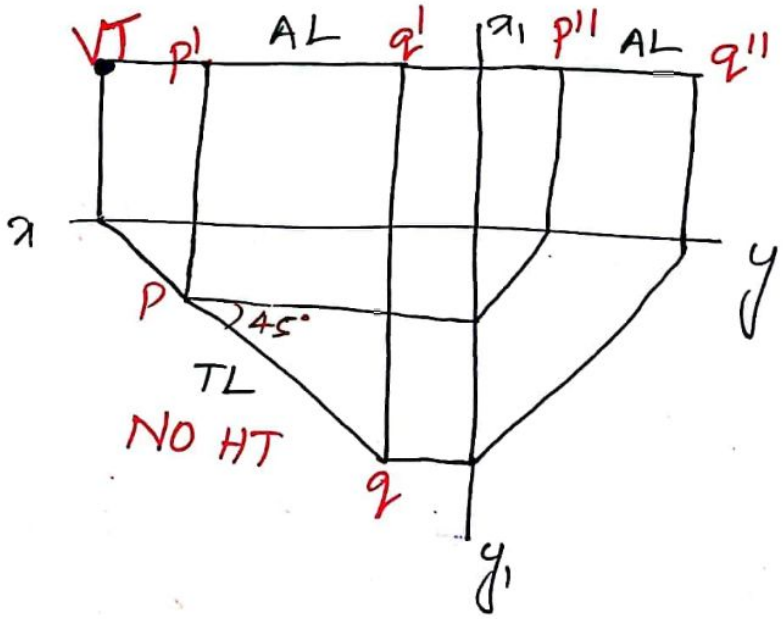
(9) A Line AB of Length 100mm is parallell to V.P and inclined to H.P at 60°. draw Its projections.



Trace :-

The point of intersection at which the Line if extended, meets HP (or) VP is called as Trace.

(9) :- Draw the projection of Line 100mm Long i.e llel to H.P and inclined at 45° to V.P.



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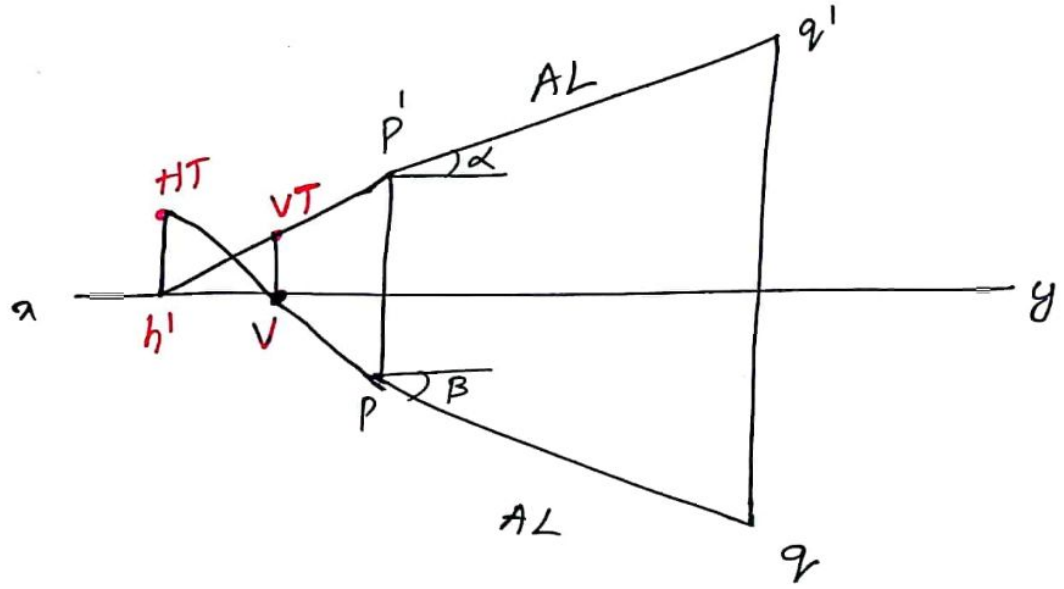

(9) for a Line placed in first quadrant, which of the following conditions is Not possible ?

(a) x ——— HT, VT ——— y (b) x ——— HT, VT ——— y (c) x ——— HT / VT ——— y (d) x ——— VT / HT ——— y

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23|9

(9) if the front of a Line is llel to Reference Line Then the True Length of the Line will be seeing in the projection on ?

a) HP b) VP c) Both d) PP.

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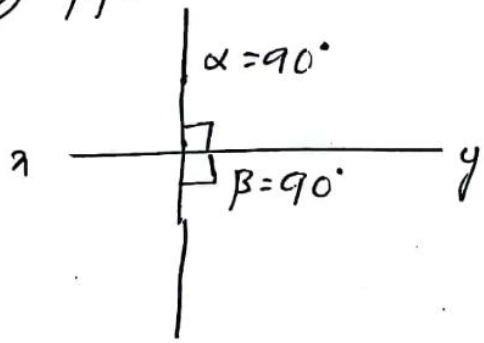
(10) if the Line is llel to hP and inclined to V.P and Then which of the following statements is correct.

a) TL = PL (Plan Length). b) TL = EL c) TL < PL (d) VT Lies above xy Line.

(9). if $\theta + \alpha = 90°$ Then the true Length of the Line will be seen in the projection on

a) HP b) VP c) Both d) PP.



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Chapter - 5

Projection of planes

Types of planes

- Iel planes
  - Iel to both HP and V.P
  - Iel to one and Ilel to other
  - Iel to one and inclined to other.
- oblique planes
  - inclined to both HP and V.P.

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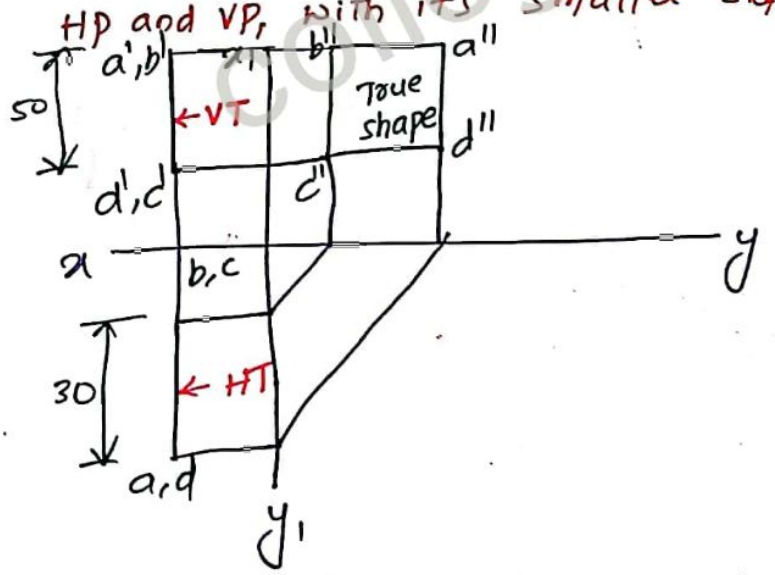
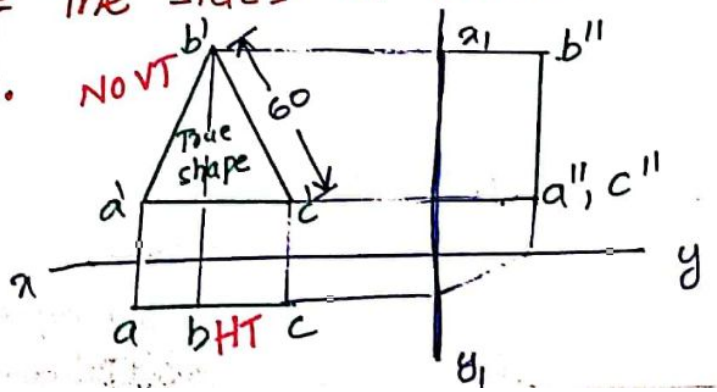
(9) A Rectangular plate 50mm x 30mm is kept Iel to BOTH HP and VP, with its smaller side Ilel to HP. Draw its projections



(9) An equilateral Δ^{le} of side 60mm has its surface Ilel to V.P one of the sides at bottom is Ilel to hP draw its projections.



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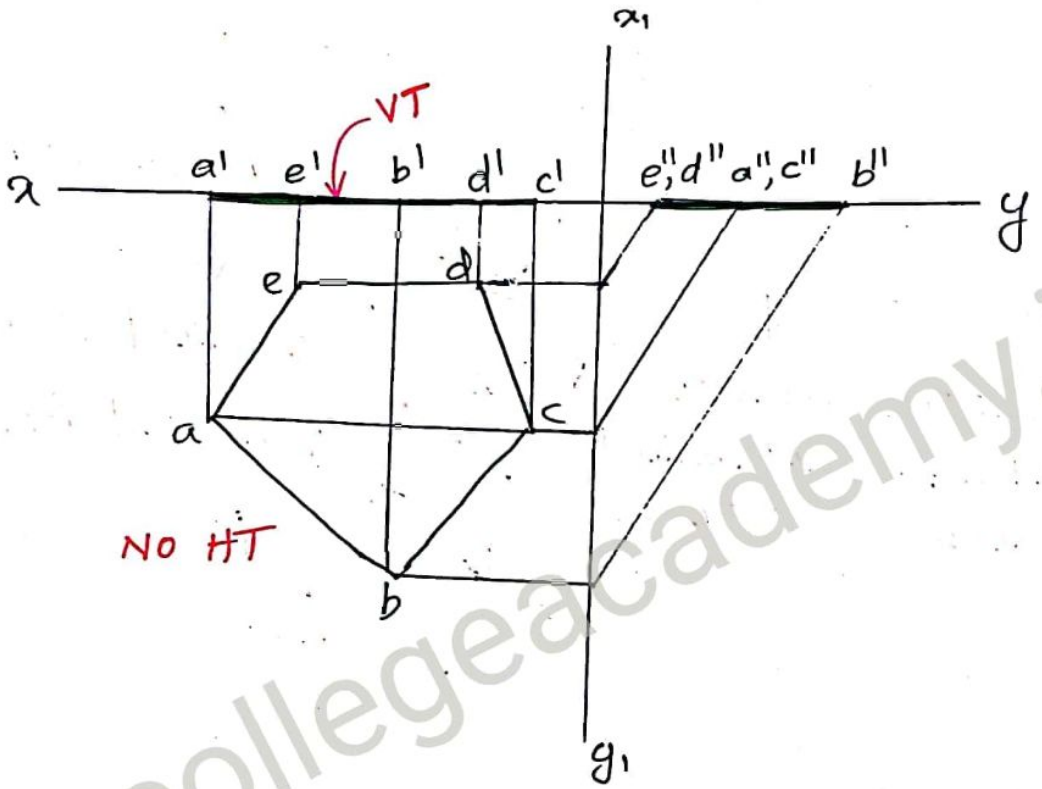
⑥. A Rectangular pentagon of side 25mm has its surface resting on HP one of the sides near to V.P is ||ell to it. Draw it projections.



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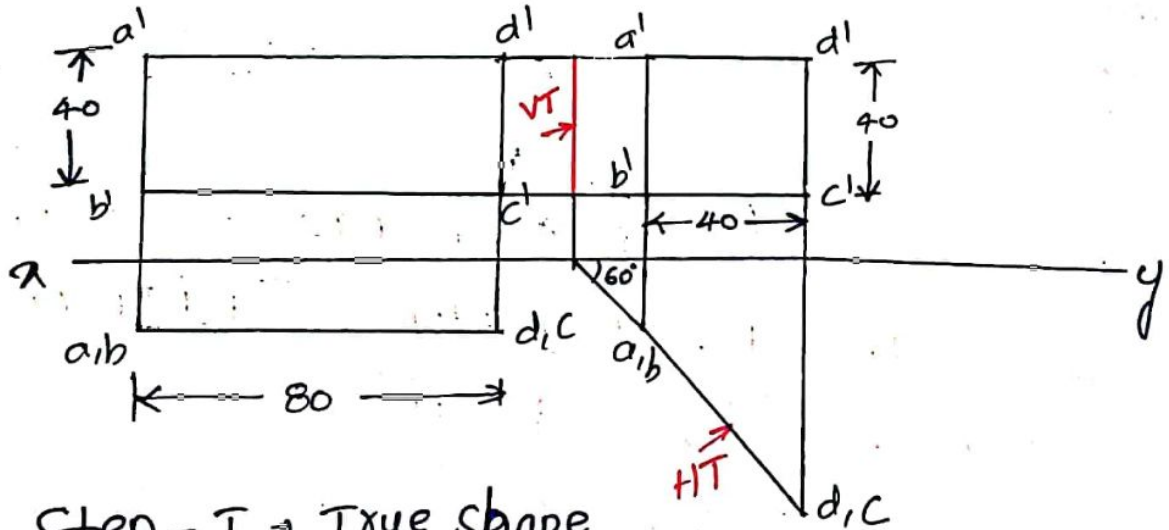
⑦. A Rectangular plate of dimensions 40mm × 80mm is ~~lea~~ to HP and its surface is inclined at 60° to V.P. The shorter side is ||ell to VP. Draw its projections.



Step - I ⇒ True shape

step - 2

Reduced shape.

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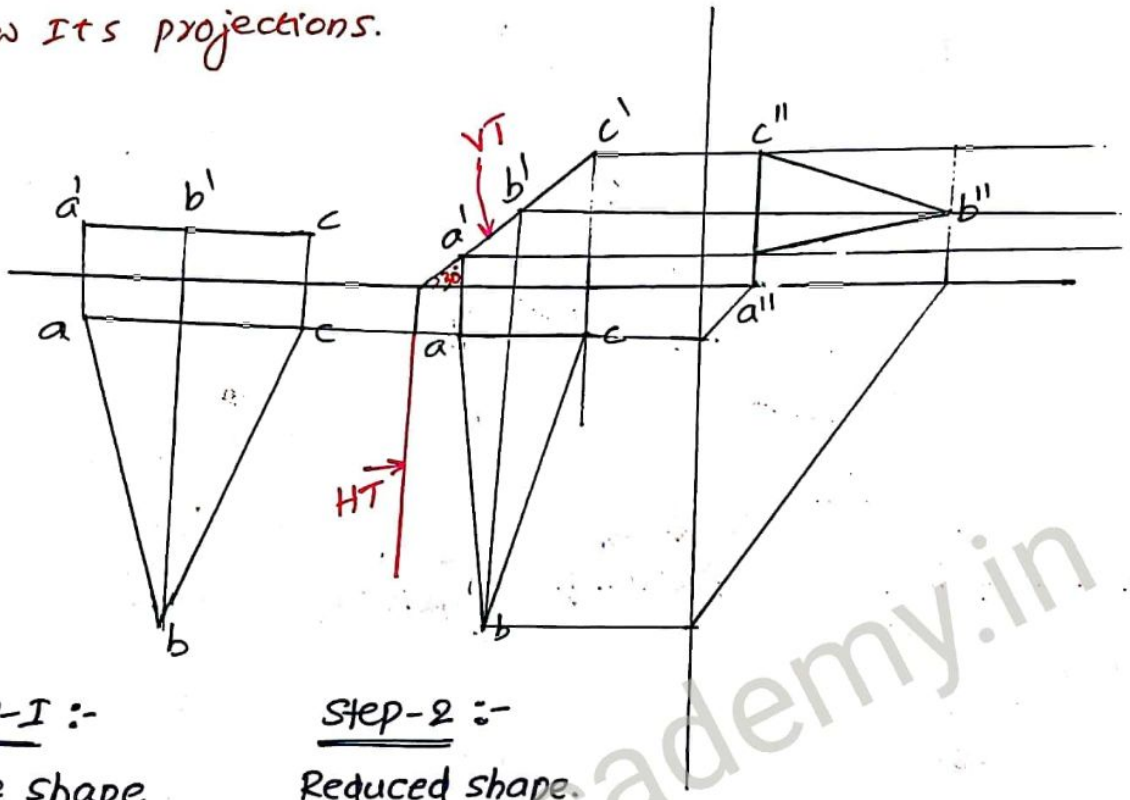
(9) An equilateral Δle of 40mm has its surface ⊥r to V.P and inclined to H.P at 30° one of the sides Near to V.P is ||ell to H.P. Draw Its projections.



Step-I :-

True shape

Step-2 :-

Reduced shape.

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