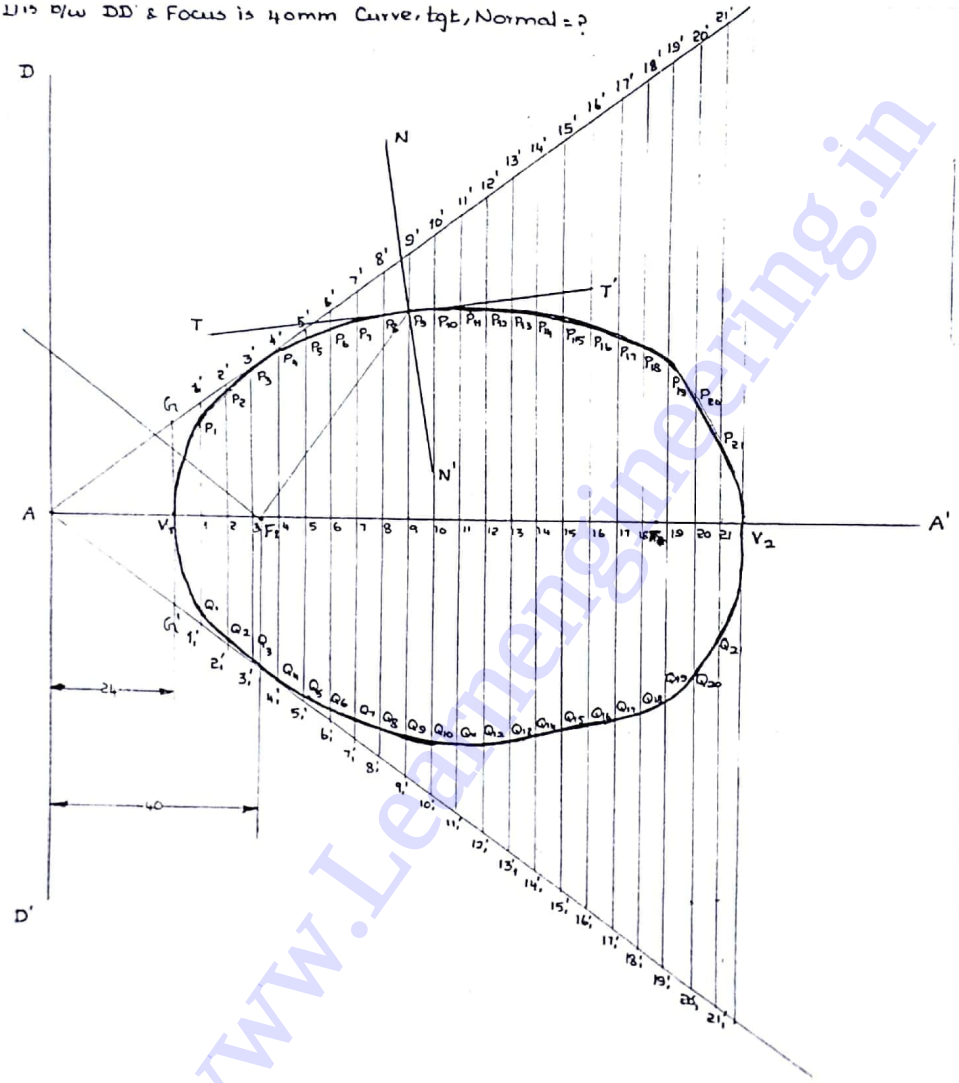
Unit-1Plane Curves and Free Hand Sketching

1. Construct **a curve** when the distance between directrix and focus is 40mm**.eccentricity** of the curve is **2/3. Name the curve**& also draw a tangent and normal at any point on the curve.
2. Construct a **parabola** when the distance between directrix and focus is 40mm. Also draw a tangent and normal **30mm below the axis line.**
3. The distance between a fixed point and fixed straight line is 40mm &**eccentricity of the curve is 3/2**. Draw the curve also draw a tangent and normal **70mm from the directrix line.**
4. A coin of 40mm diameter rolls over a **horizontal table without slipping.** A point on the circumference of the coin is in contact with the table surface in the beginning and after **one complete revolution.** Draw the path traced by the point. Also draw a tangent and normal at **any point** on the curve.
5. Draw **epicycloids** of rolling circle 40mm diameter, which rolls outside another circle of 150mm diameter for one revolution. Draw a tangent and normal to the curve at **any point** on it.
6. Draw a **hypocycloid** of rolling circle 40mm diameter, which rolls inside another circle of 200mm diameter for one revolution. Draw a tangent and normal to the curve at a distance of **80mm from the centre of the directing circle.**
7. Draw the **involutes of a square** of side 20mm. Draw a tangent and normal at any point on the curve.
8. A coir is unwound from a drum of 30mm diameter. Draw the locus of the free end of the coir for unwinding through an angle of **360°.** Draw also a normal and tangent at any point on the curve.
9. An inelastic string of **length 165 mm** is wound round a circle of 50 mm diameter. Draw the path traced by the end of the spring.

3. Dist b/w DD' & Focus is 40mm Curve, tgt, Normal = ?



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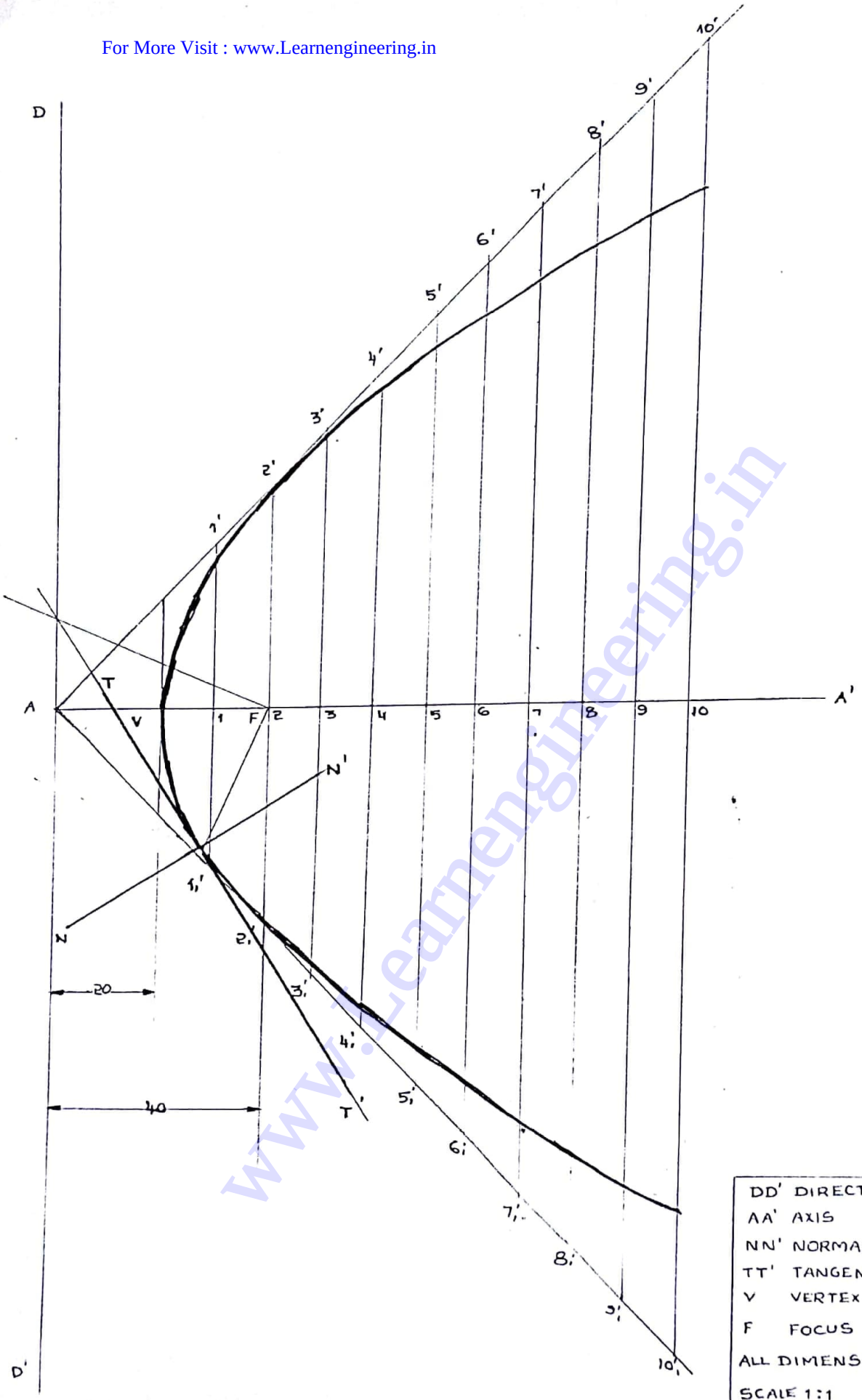
CURVE IS ELLIPSE

DD'	DIRECTRIX
AA'	AXIS
V_1V_2	VERTEX
F_1F_2	FOCUS
TT'	TANGENT
NN'	NORMAL

ALL DIMENSIONS ARE IN 'mm'
SCALE 1:1

2. Parabola Dis b/w DD' & focus is 40mm. Draw tgt & normal 30mm below axis line.

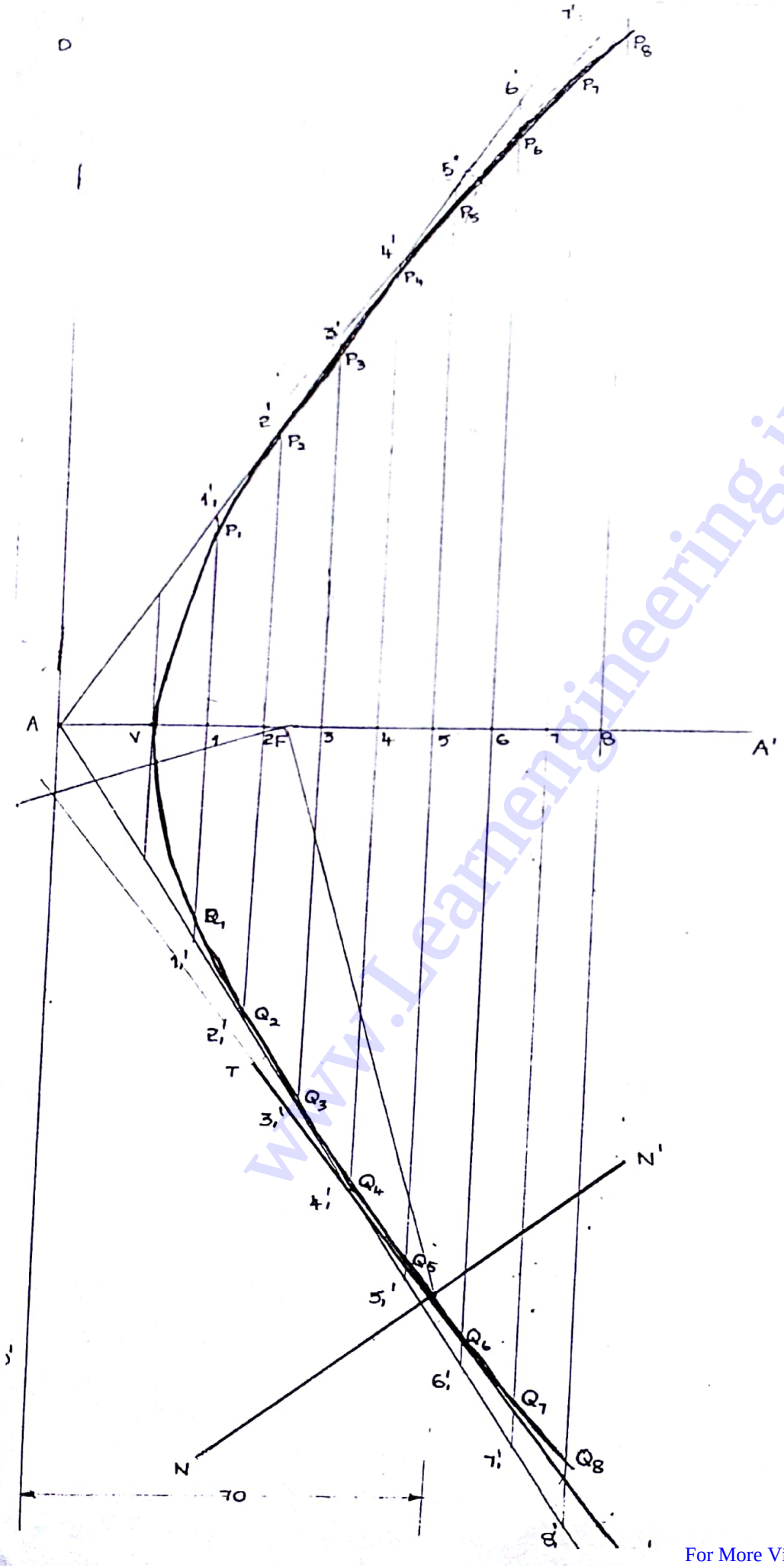


DD'	DIRECTRIX
AA'	AXIS
NN'	NORMAL
TT'	TANGENT
V	VERTEX
F	FOCUS

ALL DIMENSIONS ARE IN mm

SCALE 1:1

3. Dib blw fixed pt & fixed st. line 40mm & e = 3/2. Curve: Tgt, Normal 70mm from the directrix line.



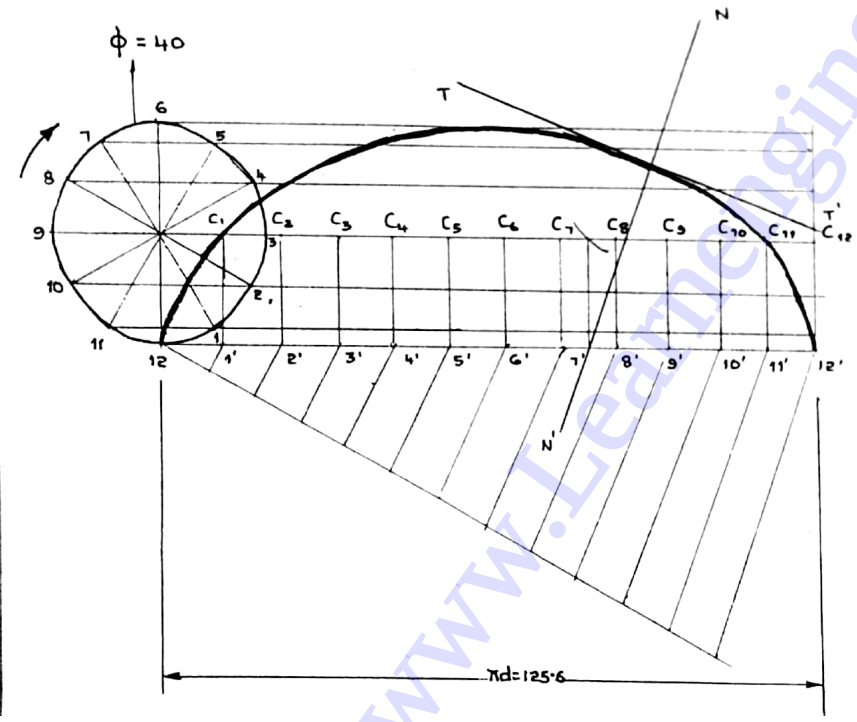
F	FOCUS
V	VERTEX
DD'	DIRECTRIX
AA'	AXIS
NN'	NORMAL
TT'	TANGENT

ALL DIMENSIONS ARE IN 'mm'
SCALE 1:1

4. Coin 40mm diameter rolls without slipping. Path traced by point = ?, Tgt, normal = ?

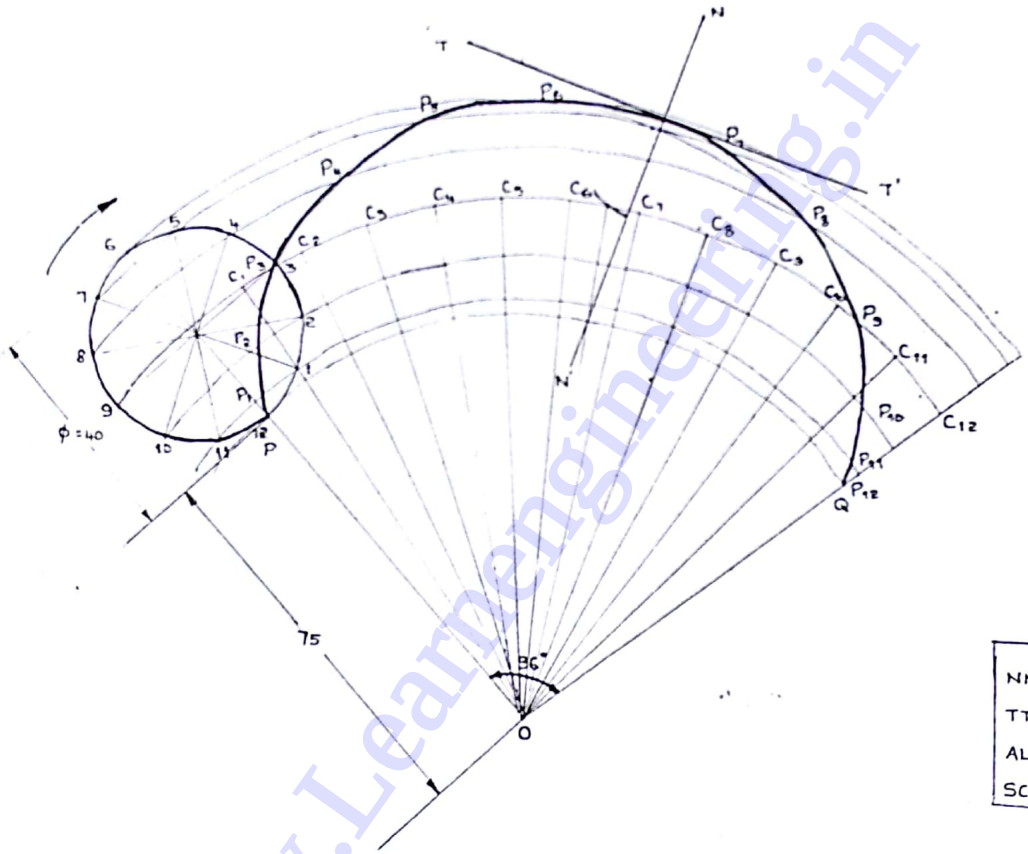
SOLUTION

THE CURVE IS CYCLOID

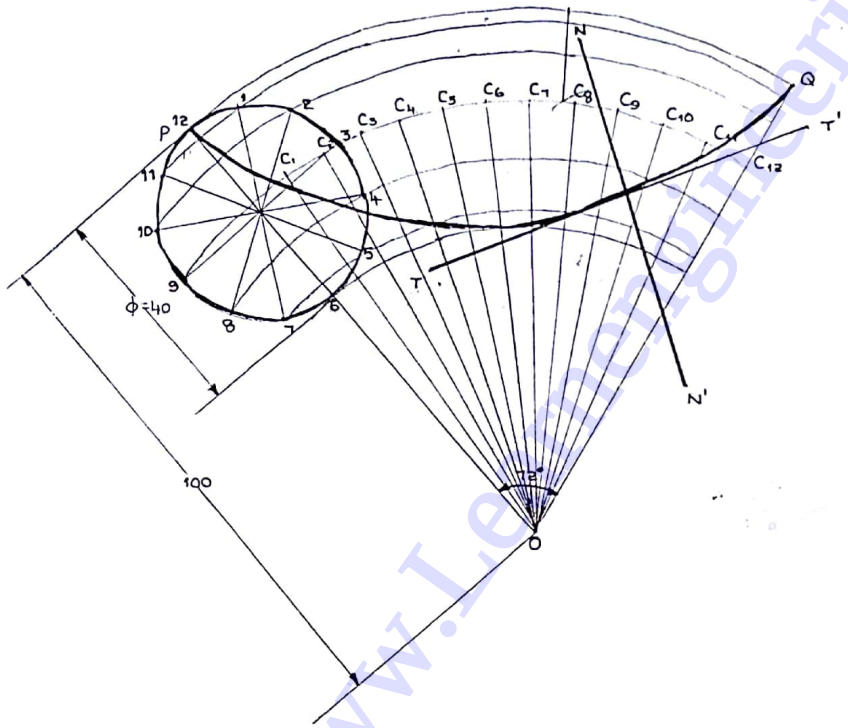


TT' TANGENT
NN' NORMAL
ALL DIMENSIONS ARE IN mm
SCALE 1:1

5 Epicycloid rolling circle 40mm diameter, rolls outside circle of 150mm diameter. tgt & normal = ?

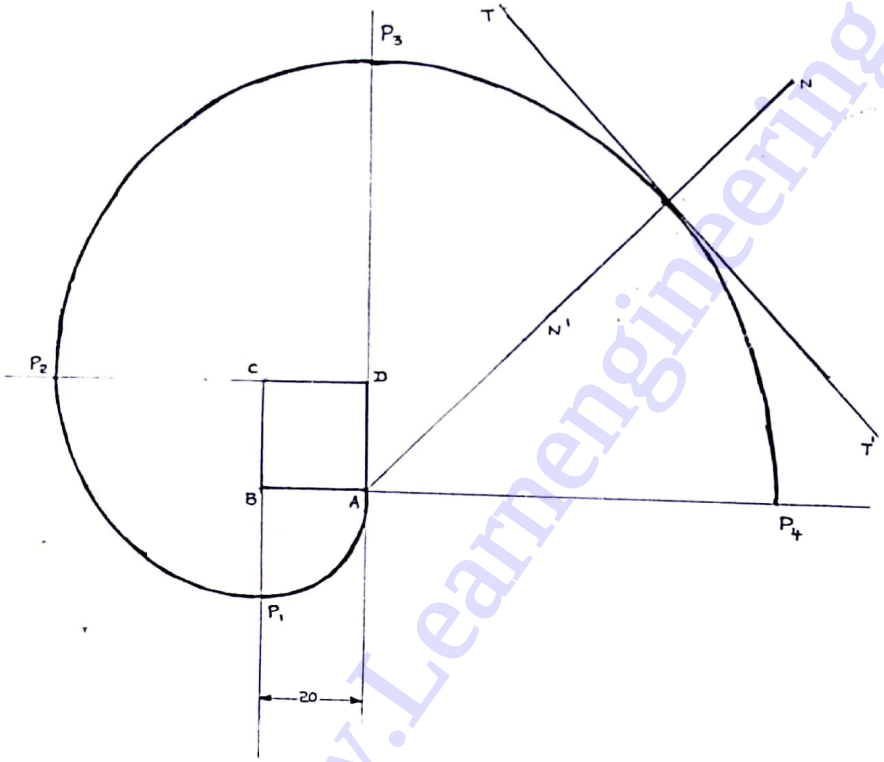


6. Hypocycloid rolling circle 40mm dia, inside circle 200m dia, tgt & normal 80mm from centre of directing circle.

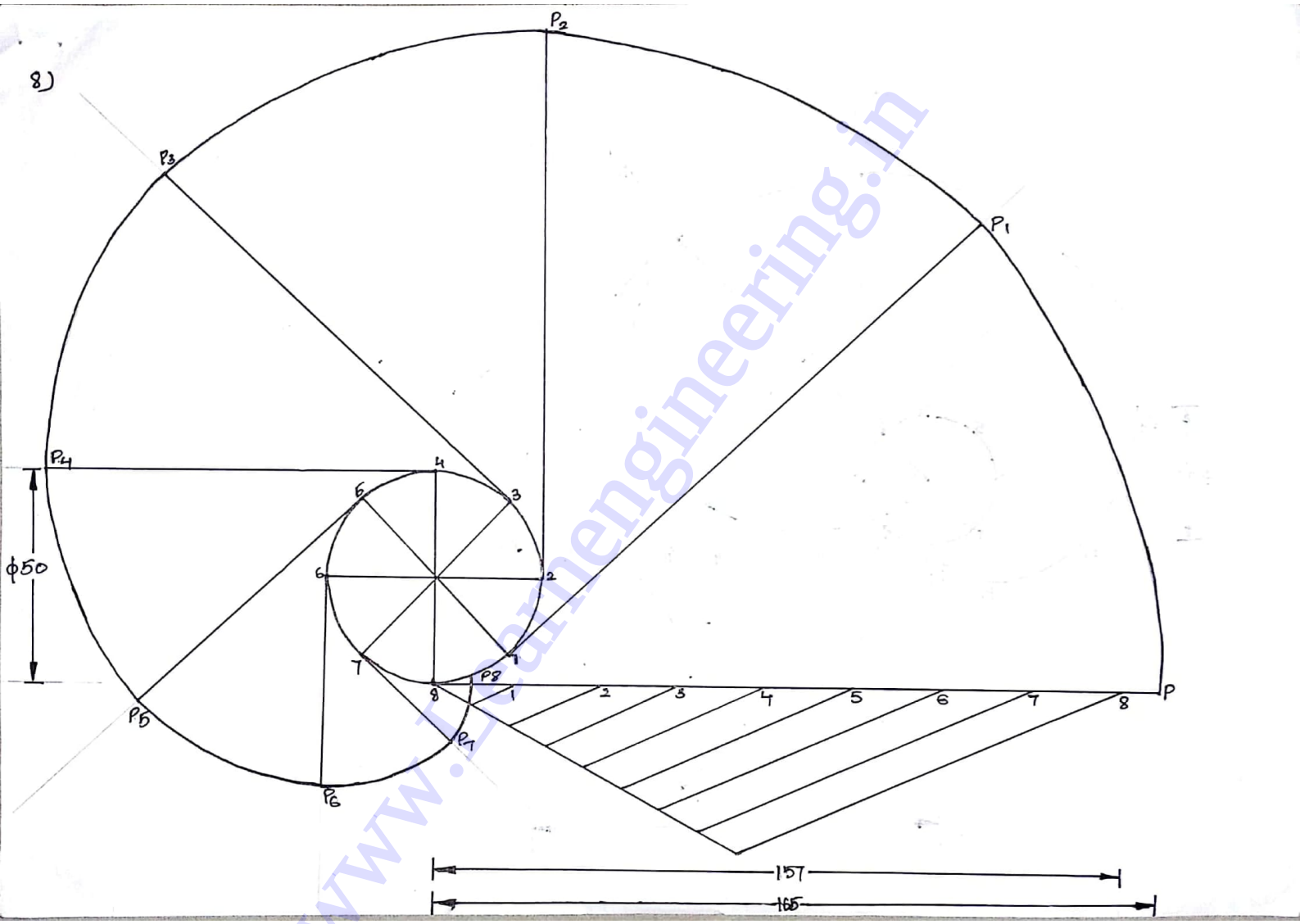


NN' NORMAL
TT' TANGENT
ALL DIMENSIONS ARE IN mm
SCALE 1:1

Invalue of square side 20mm. Tgt & normal = ?



NN' NORMAL
TT' TANGENT
ALL DIMENSIONS ARE IN 'mm'
SCALE 1:1



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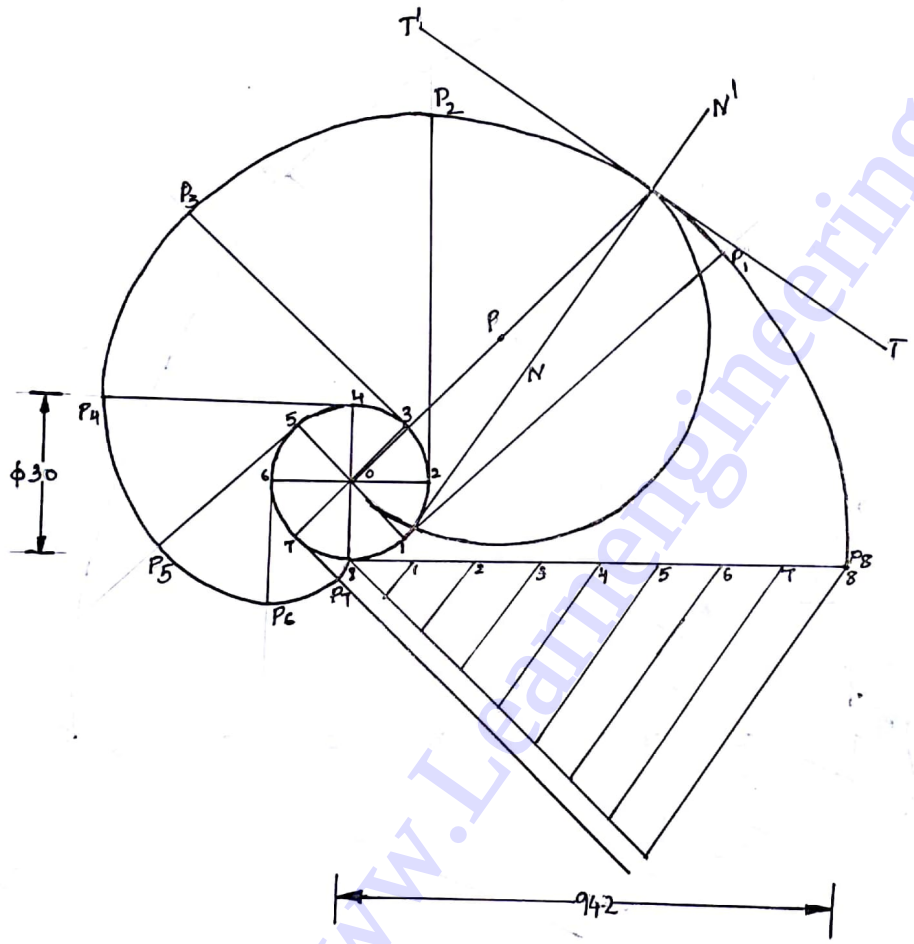

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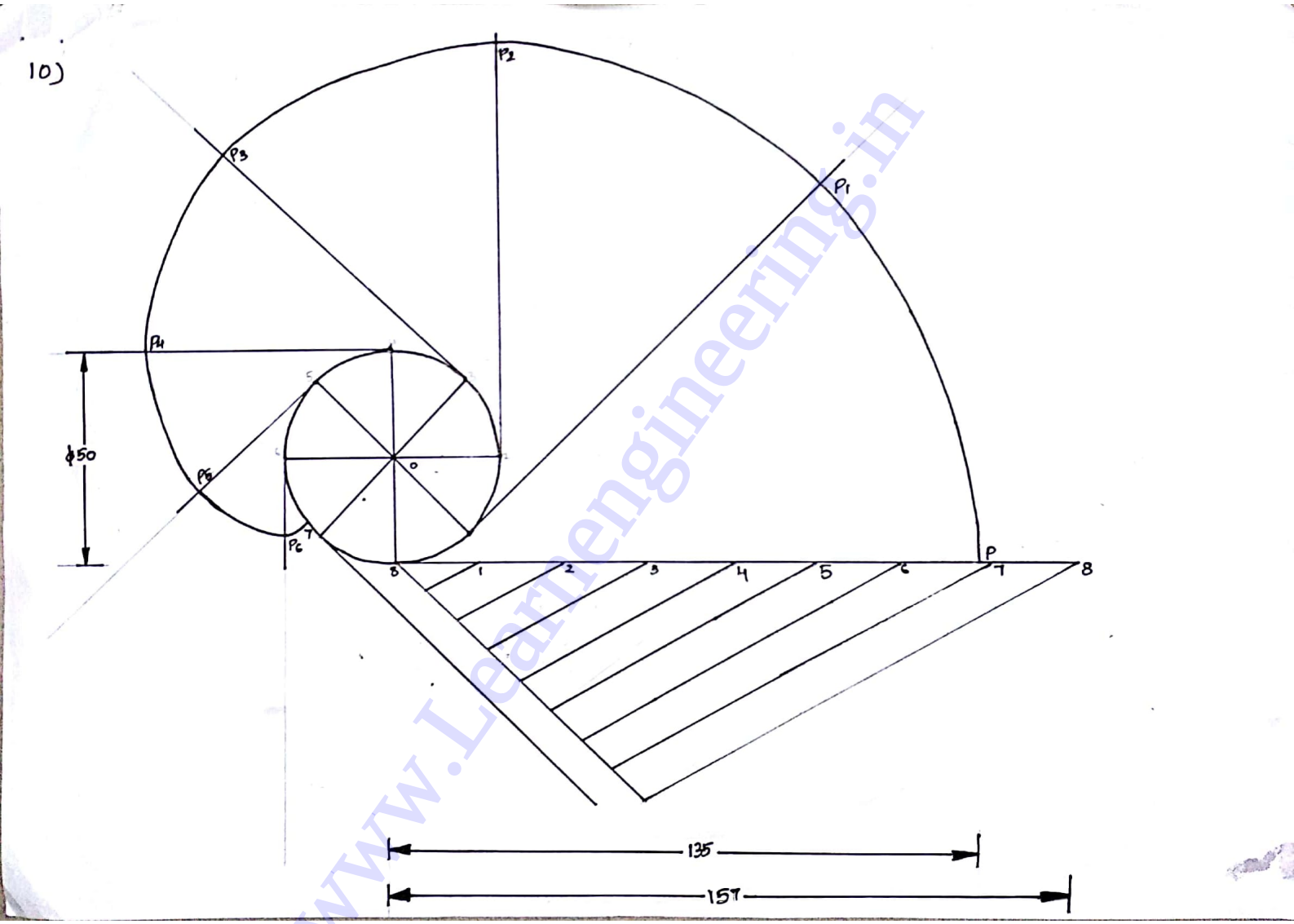

UNIT-I

PROCEDURE

1. **Ellipse.**

* Draw DD' - Directrix and AA' - Axis.
* Mark focus F_1 from DD' as distance given 40mm.
* Divide AF_1 into 5 divisions $\because e = \frac{2}{3}$
* Mark V_1 from F_1 as 2 div from F_1 & 3 div from A
* Measure V_1F_1 and cut an arc at V_1 above & below.
* Join the cutting arcs with 'A' line. & from V_1 take 0.5 or 1cm distance lines and name them as 1, 2, 3, 4 .... & join them with extension line from A & name them as 1', 2', 3' .... and $1_1'$, $2_1'$, $3_1'$ ....
* Measure 1 & 1' distance, from F_1 cut two arcs above & below of 1st line.
* Similarly cut many arcs to get many arcs & join them to get an ellipse. Now mark last point as V_2 & distance from F_2.
* Take any random point on ellipse & join with F_2 & with F_1 as centre take 90° to DD'.
* The point intersecting DD' & join that pt with F_1 is TT' Tangent and ⊥r to TT' is normal NN'

e = dis from moving pt / dis from fixed line

* $e < 1$ → Ellipse
* $e = 1$ → Parabola
* $e > 1$ → Hyperbola

$e = 4/3 = 1.33$; $\frac{3}{2} = 1.5$

$e = 3/4 = 0.75$; $\frac{2}{3} = 0.6$

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2. **Parabola.**

* Draw DD' and AA', mark focus F_1 from DD' as distance given 40mm
* Mark V_1 as exact midpoint of the line AF_1 $\because e = 1$
* Measure V_1F_1 and cut arcs at V_1 above & below & join these cutting arcs and from V_1 take 0.5 or 1cm distance lines and name them as 1, 2, 3, 4 .... & join them with extension lines from A & name them as 1', 2', 3' .... and $1_1'$, $2_1'$, $3_1'$ ....
* Now measure 1 & 1' distance, from F_1 cut two arcs above & below.
* Similarly cut many arcs, by joining them we get a parabola.
* Now with F_1 as centre take 30mm in compass cut an arc on the curve, parabola below the axis line. & join this with F_1.
* Take 90° from F_1 and the point which intersects DD' and join them with the point below axis line on parabola is Tangent
* ⊥r to Tangent is normal NN'

3. Hyperbola

* Draw directrix and axis line and mark F_1 as the distance given as 40mm from A. Now divide AF_1 into 5 divisions ∵ e = 5/3
* Mark V_1 as from F_1 3 divisions & from A 8 divisions. & measure V_1F_1 cut two arcs above and below of V_1 line. Now join these arcs with A and from V_1 take 0.5 or 1 cm distance lie
* Name them as 1, 2, 3.... and join with extended line from A and name as 1', 2'.... and $1_1'$, $2_1'$.....
* Measure 1 & 1' distance keep F_1 as centre cut two arcs of 1st line
* Similarly cut many arcs & join them to get a hyperbola.
* Take 10mm distance from the directrix line & the point that touches the curve is Point P & join it with F_1 and take 90° from it to DD'
* Join DD' point with P is the tangent & lr to this is normal - NN'.

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4. CYCLOID

* Draw circle of gn radius 20mm and divide it into 12 divisions and name them in anticlockwise direction.
* Mark rd distance from 12 by st. line & divide it into 12 division
* Now join 11 & 1 by a st. line and 111 by upto 6. Now extend the base point 1' to C_1' upto C_{12}'
* Take 20mm on compass. with C_1, C_2, C_3.... as centre cut arcs with corresponding line upto 11 line & join them we get a cycloid.
* Take random point on cycloid with 20mm in compass cut an arc in centre line & draw a line lr to base line & join it with random pt is the normal & lr to normal is tgt.
* Mark dimensions & direction of rotation.

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5. Epicycloid.

* Draw an arc of gn big radius 75mm take P at any point on arc and with O as centre mark 96° $\left[\frac{r}{R} \times 360°\right]$ is the point Q.
* Now divide that portion POQ into 12 divisions and take small radius 20mm outside the pt P. With P & that point as radi draw a circle & divide it into 12 divisions & name it anticlockwise
* Join 1 & 11 by an arc upto 6 & extend 1' to C_1' upto C_{12}'.
* Take small radius 20mm on compass and cut many arcs with C_1 as centre on 1st upto 11th line. & join them to get epicycloid.

*Take any random pt and cut an arc at centre line with 20mm distance. Join it with O & the point at which the base circle intersects, join it with random pt is normal.
*Ir to normal is tangent, mark direction of rotation.

6. Hypocycloid.

*Draw an arc of gn bigradius 100mm & mark P at any pt on curve
*Mark Q $\left(\frac{r}{R} \times 360^\circ\right)$ with O as centre and divide portion POQ into 12 divisions and now a circle with P as centre take 20mm inside P and draw a circle & name it clockwisely.
*Join 11 & 1 by arc upto 6 & take gn small radius 20mm cut with arcs from C_1 to corresponding line upto 11 line & join them we get a hypocycloid which is an image inverted of epicycloid.
*With O as centre take 80mm on the curve join them by cutting an arc of 20mm at centre line to base circle is & normal.
*Ir to normal is tangent, mark direction of rotation.

7. Involute of Square.

*Draw a square of given side 20mm and name as a, b, c, d.
*Extend a, b, c, d perpendicularly & from B measure AB cut an arc upto B & from C measure C to previous arc ending join upto C likewise upto A & Join them we get the involute of square.
*With A as centre take 45° on curve. Join it with A is normal
*Ir to normal is tangent.

8. Involute of Circle.

*Draw a circle of gn radius 15mm & divide it into 12 divisions.
*Name them in clockwise direction & mark πd distance by st.lin
*Divide this into 12 divisions & name as 1', 2', ... 12'. Extend 1st point to 12th point in circle by taking 90° one by one.
*Measure 12 to 1', with 1 as centre cut an arc at extended line
*IIIly upto 12th line & join them we get involute of Circle
Take random pt on the involute and join with centre C of circle.
Mark midpoint on line as O. Measure distance O and pt and with O as centre, draw an arc (semi circle)

UNIT 2 – PROJECTION OF POINTS , LINES & PLANES

1. Draw the projections for the following points take 30mm between each projector.
   a) Point 'A' is 20mm infront of VP & 25mm Above HP.
   b) Point 'B' is 20mm above HP &lies in VP.
   c) Point 'C' is 25mm infront of VP & lies in HP.
   d) Point 'D' is 25mm behind VP & 20mm above HP.
   e) Point 'E' is 25mm behind VP & lies in HP.
   f) Pont 'F' is 30mm below HP & 30 mm infront of VP.
   g) Point 'G' is 30mm below HP & 30mm infront of VP.
   h) Point 'H' lies in both the HP & VP.
2. Figure (a) shows the projections of different points. Determine the position of the points with reference to the projection of planes. The distances marked are in mm.

PROJECTION OF LINES

1. A Straight line AB is 70mm long one end of the line is 15mm above HP and 45mm infront of VP. The line is inclined at an angle of 40° to HP & 30° to VP. Draw its projections, Find the apparent inclinations, measure its front view & top view. Also locate the Traces.
2. A line AB 70mm long has its end A, 20mm above the HP and 15mminfront of the VP. The other end B is 50mm above the HP and 60mm infront of the VP. Draw the projections of the line and find its true inclinations with the HP and VP. Draw the projections of the line and find its true inclinations with the HP and VP.
3. A line LM 70mm long has its end L 10mm above HP and 15mm infront of VP. Its Top and front views measure 60mm & 40mm respectively. Draw its projections. Find its inclinations with HP & VP.
4. The top view of a line is 75mm long and inclined at 45° to XY line. The length of the front view is 65mm long. One end of the line A is 20mm above HP & 10mm infront of VP. Draw the projections. Find the inclinations & apparent inclinations with HP.
5. A line AB is 65mm long one end of the line 'A' touching HP & 15mm infront of VP. Line is inclined at 30° to HP & 40° to VP. Draw its projections & locate its traces.
6. The distance between the projections of the two points A & B 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 between A & B. Measure the true inclinations of the line AB with VP and HP using **ROTATING LINE METHOD.**
7. The Plan & Elevation of a line are inclined at 35°And 50° respectively to the XY. One end of the line is touching both HP & VP. The other end is 50mm above HP. Draw its projections , Find its true length, true inclinations & locate traces.
8. A line PF 65mm long has its end P, 15mm above the HP and 15mm infront of the VP. It is inclined at 55° to the HP and 35° to the VP. Draw its projections & locate its traces.

9. One end of the line A is 70mm above HP & 15mm infront of VP and other end is 10mm above HP & 60mm infront of VP. Distance between end projections is 50mm. Draw its projections & locate its traces.
10. The end P of a line PQ is in the HP and 40mm infront of VP. The end Q is in VP. The front view of the line makes an angle of 40° with XY and has a length of 85mm. Draw the projections. Find the true length ,θ, Ø and locate the traces .
11. One end of the line 'A' is 30mm above HP & 40mm infront of VP. The other end of the line 'B' is 90mm above HP and 110mm infront of VP. Both the ends of the line are in the same projector. Draw its projections, measure its FV, TV & true length. Also locate its traces.
12. The midpoint of a straight line AB is 60mm above HP and 50mm infront of VP. The line measures 80mm long and inclined at an angle of 30° to HP and 45° to VP. Draw its projections.
13. A straight line ST has its end S, 10mm infront of the VP & never to it. The midpoint 'm' of a line is 50mm infront of the VP and 40mm above HP. The elevation & plan measures 100mm & 120mm respectively. Draw the projection of the line. Also find its true length & true inclinations.

PROJECTION OF PLANES

1. A Hexagonal Plate Of side 35mm rest with one of its edge on HP and the resting side is perpendicular to the VP. Draw its projections when its surfaces is inclined at 50° to the HP. Also show its Traces.
2. A Pentagonal plate of side 35mm rest on the VP on one of its corner. Draw its projections when its surface is inclined at 50° to the VP & perpendicular to HP. Also show its traces.
3. A circular lamina of diameter 50mm rest with one of its point on HP with its surfaces inclined at an angle of 40° to HP &perpendicular to VP. Draw its projections & also show its traces.
4. A Hexagonal plate of side 25mm rest on the HP on one of its sides inclined at 45° to the VP. The surface of the plate makes an angle of 30° with HP. Draw the front & top views of the plate.
5. A rectangular plate 70mm X 40mm has one of its shortest edges in the VP inclined at 40° to the HP. Draw its top view , if its front view is a square of side 40mm.
6. A square lamina PQRS of side 40mm rests on the ground on its corner P in such a way that the diagonal PR is inclined at 45° to the HP and apparently inclined at 30° to the VP. Draw its projections.
7. A pentagon of side 30mm rests on the ground on one of its corners with the side containing the corner being equally inclined to the ground. The side opposite to the corner on which it rests is inclined at 30° to the VP and is parallel to the HP. The surfaces of the pentagon make 50° with the ground. Draw the plan & elevation of the pentagon.
8. A circular lamina of 60mm diameter rest on HP on a point 1 on the circumference. The lamina is inclined to HP such that the top view of it is an ellipse of minor axis 35mm. The top view of the diameter through the point '1' makes an angle of 45° with VP. (i) Draw its projections (ii) Determine the angle made by the lamina with the HP.

Projection of Lines.

PROCEDURE..

① *Draw the reference line XY, and mark VP, HP (↳ above XY, ↳ below XY)

*Take 15mm above VP [mark as a' (LOCUS OF b')] & 45mm below HP [mark as a (LOCUS OF a)]

* Keeping a' as centre, make 40° angle with length AB = 70mm

* Mark the length as b_1' (LOCUS OF b')

* Keeping a as centre, make 30° angle with length 70mm and mark as b_2 (LOCUS OF b).

* Extend b_1' upto Locus of a and extend b_2 upto locus of a'
  ↓ mark as b_1 ; ↓ mark as b_2'

* With a' as centre take the distance of $a'b_2'$, draw an arc at the locus of b' and mark as b' and they are called FRONT VIEW

* With a as centre take distance of ab_1, draw an arc at the locus of b and mark as b and they are called TOP VIEW.

* Mark the dimensions of front view, top view, true length, true inclinations, apparent inclinations.

For making Traces.

* Extend front view (a'b') upto XY reference line & mark as H'.

* Extend top view (a b) upto XY reference line & mark as V

* Now draw the perpendicular line to the top view from H' and mark as HT.

* Draw perpendicular line from V to the front view, mark as VT.

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② *Draw the reference line XY and mark VP & HP

* Take 20mm above VP [mark as a' (LOCUS OF a')] & 15mm below HP [mark as a (LOCUS of a)]

* Take 50mm above HP mark as b_1' with length 70mm from a' LOCUS of b

* Take 60mm below HP mark as b_2 with length 70mm from a LOCUS OF b

* Extend b_1' upto locus of a and extend b_2 upto locus of a'
  ↓ mark as b_1 ; ↓ mark as b_2'

* With a' as centre take distance of $a'b_2'$, draw an arc at locus of b' and mark as b' and they are called FRONT VIEW.

* With a as centre take distance of ab_1, draw an arc at locus of b and mark as b and they are called TOP VIEW.

* Mark the dimensions of front view, top view, true length, true inclination apparent inclinations

③ * Draw the reference line XY and mark VP and HP.
* Take 10mm above VP and 15mm above/below HP. and mark 'l' and 'l as well as LOCUS OF L' and LOCUS of L.
* With l'as centre draw an arc with distance 40mm upto locus of l' and mark as m_2', extend m_2' upto the extreme end (infinity).
* With l as centre draw an arc with 60mm upto locus of l and mark as m_1, extend m_1 upto the extreme point (infinity).
* Now take 70mm (true length) on the compass, with l' as centre cut an arc on extension line m_1 and mark as m_1', LOCUS OF m'
* With l as centre cut an arc on extension line m_2', mark as m_2 locus of m
* Now join the front view (m') and top view (m) to l' and l (arc touching locuses).
* Mark the dimensions, measure the inclinations.

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④ * Draw reference line XY and label VP and HP.
* Take 20mm above VP and 10mm below HP, label as a' and a as well as LOCUS OF a' and LOCUS of a.
* With a as centre, take the TOP VIEW inclination 45° with the length 75mm and label as b as well as label as locus of b.
* Draw an imaginary line from b to the extreme end (infinity) [∵ FRONT VIEW & TOP VIEW FALLS ON SAME LINE]
* With a' as centre take 65mm on the compass cut an arc at the imaginary line mark as b' as well as LOCUS OF b'
* With a and a' as centre extend the top view and front view by an arc. (mark as b_2' & b_1).
* Now extend the two arcs upto the extreme locus and label as b_2 & b_1
* Join a and b_2, a' and b_1', we get the true length of line AB.
* Mark the dimensions, measure the true & apparent inclinations.

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⑤ * Draw reference line XY and label as VP & HP
* Take 15mm below HP (mark as a) and a' touching the XY line.
* Now draw the inclinations with a' as centre make 30° upto the true length 65mm mark as b_1' as well as LOCUS OF b'
* With a as centre mark 40° upto the true length 65mm mark as b_2 and locus of b

* Extend b_1' upto locus of a (mark as b_1) and extend b_2 upto locus of a' (mark as b_2')
* With a' as centre take $a'b_2'$ distance, draw an arc at the locus of b' and mark as b' and called as FRONT VIEW. Join them
* With a as centre take ab_1 distance, draw an arc at the locus of b and mark as b and called as TOP VIEW. Join them
* Mark the dimensions, inclinations and true length.

Traces.

* Mark a' as H' ∵ a' is in XY line so front view touches XY line
* Extend top view (a b) upto XY and mark as V.
* Now draw perpendicular line to the top view from H' and mark as HT.
* Draw perpendicular line from V to the front view, mark as VT.

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⑥ * Draw reference line XY and label as VP and HP.
* Take 10mm above VP and 15mm below HP & mark as a' & a [LOCUS OF a' & LOCUS OF a]
* Take 50mm above VP, mark as LOCUS OF b' and 40mm ~~below~~ HP mark as LOCUS OF b.
* With a' and a as centre cut an arc at the locus of b' and locus of b with true length distance 70 mm (mark as b_1' & b_2)
* Extend b_1' upto locus of a (mark as b_1) and extend b_2 upto locus of a' (mark as b_2').
* With a' as centre take $a'b_2'$ distance, draw an arc at the locus of b' and mark as b' and called as FRONT VIEW. Join them
* With a as centre take ab_1 distance, draw an arc at the locus of b and mark as b and called as TOP VIEW. Join them.
* Mark the dimensions, inclinations and true length.

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⑦ * Draw XY reference line and label as VP and HP.
* The one end of line AB falls on XY line (mark as a' & a ; LOCUS OF a' LOCUS OF a)
* The other end is 50mm above HP (mark as LOCUS of b')
* With a' as centre draw the elevation (Front view) angle upto the LOCUS of b' and mark as b'

* Draw an imaginary line from b' upto the extreme end (infinity).
* With a as centre, take plan (TOP VIEW) angle 35°, the point at which the imaginary line and the inclination met is the point b and locus of b. (TOP VIEW).
* Draw an arc from b' and b upto locus of a' and locus of a
* Extend these arcs upto the extreme locus (mark as b_1' and b_2)
* Join a' and b_1', a and b_2 is the true length.
* Mark the dimensions, find the true length, true and apparent inclinations.

Traces.

* Mark a' and a as H' and V respectively [∵ Front and Top view meets the XY line at a' and a].
* Mark VT and HT on the same XY reference line.

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(9)
* Draw reference line XY and label as VP and HP.
* Mark 70mm above VP [mark as a' / locus of a'] and 15mm below HP [mark as a / locus of a]
* Mark 10mm above VP (mark as locus of b') and 60mm below HP (locus of b)
* With a as centre take 50mm cut arc on locus of b mark as b it is the TOP VIEW & extend it to the locus of a and mark as b_1.
* Extend b_1 to locus of b' and mark as b_1'. Join a' and b_1' and it is the true length.
* Now draw an imaginary line from b upto the locus of b'
* Join a'b' and it is the FRONT VIEW. Take true length a'b_1' and with a as centre cut an arc on locus of b mark as b_2. Join a & b_2

Traces.

* Extend a'b' to XY mark as H' and ab to XY mark as V
* Join H' to TOP VIEW extension ↓ [mark as HT] and join V to FRONT VIEW extension ↓ [mark as VT]

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(10)
* Draw the reference line XY and label as VP and HP.
* Mark p' in the XY line (LOCUS OF p') and p just below the HP which is of distance 40mm (LOCUS OF P)
* Mark the locus of q in XY line.
* With p' as centre, make the front view angle 40° for the length 85mm and mark as q' which is the LOCUS OF q'.

*Draw the imaginary line from q' upto XY because q is in XY [∵ Front & top view are in same line] and join p & q which is TOP VIEW.

*With p' and p as centre draw an arc from q' and q to the nearest locus.

*Extend them to the extreme locus (LOCUS OF q') and join $p'q_1'$ which is true length.

*Join p and q_2 → True length (No extension of line is needed here).

*Mark the dimensions, true length, angles.

Traces.

*Mark p' as H' [∵ Front view touches XY line] & mark q as V [∵ Top view touches XY line]

*Extend H' to the point p (TOP VIEW) by ℓr line and V to the point q' (FRONT VIEW) which are HT and VT respectively.

---

(11) *Draw XY reference line and label as VP and HP.

*Take 30mm above VP (mark as a' label as locus of a') and 40mm below HP (mark as a locus of a.

*Take 90mm above VP (locus of b') and 110mm below HP (locus of b)

*∵ Both ends are in same projector, front & top view are of 90°

*Thus mark b' and b in such a way just very straight above a' and below a respectively which is FRONT VIEW and TOP VIEW.

*Extend the b' and b by an arc to the nearest locus from a' & a

*Mark these extension arcs as b_2' and b_1

*Extend b_2' and b_1 to the extreme locus (mark as b_1' and b_2)

*Join a' and b_1' and a and b_2 which is true length

*Mark the dimensions, true length, inclinations, front & top view lengths.

Traces.

*Extend a' to XY (mark as H') and a to XY (mark as V) ∵ Front view a'b' meets at a' & top view ab meets at a in the same line.

*Extend H' to Top view (mark as HT) and V' to Front view (mark as VT).

---

(12) * Draw reference line XY and label as VP & HP.

* Take 60mm above VP [mark as m' / locus of m'] and 50mm below HP [mark as m / locus of m]

* With m' as centre, draw an angle of 30° with the distance of 40mm and mark as b_1' (locus of b') Extend $m'b_1'$ to a_1' such that $m'a_1' = 40mm$

* (locus of a') such that $a_1'b_1' = 80mm$.

* With m as centre, make angle 45° with the distance of 40mm and mark as b_2 (locus of b) Extend mb_2 to a_2 such that $a_2'm = 40mm$ (locus of a) such that $a_2b_2 = 80mm$.

* Extend a_1' & b_1' to the opposite midpoint locus [locus of m] and extend [mark as a_1 & b_1] a_2b_2 to opposite midpoint locus [locus of m' / mark as a_2' & b_2']

* With m' as centre draw an arc at locus of b' by taking $m'b_2'$ as distance (mark as b') and draw another arc at locus of a' by taking $m'a_2'$ as distance (mark as a') Join a'b' through m', which is front view.

* With m as centre draw two arcs by taking a_1m & mb_1 as distances at corresponding locus & mark a & b. Join ab through m (TOP VIEW).

* Mark dimensions, angles, true length.

---

(13) * Draw reference line XY and label as HP and VP.

* Make m' and locus of m' 40mm above VP & m and locus of m 50mm below HP.

* Take 10mm below HP and mark as S & locus of S and take any convenient distance from above VP mark as S' & locus of S'.

* The front view distance is 100mm and then s'm' = 50 mm such that extend them to 50mm, mark as T', locus of T'.

* The top view measures 120mm then sm = 60mm such that extend them to 60mm, mark as T, locus of T.

* From m' cut an arc upto locus of m' by taking distance of m'T' and mark as T_2' extend this to extreme locus mark as T_2 Join S_2T_2 through m

* From m cut an arc upto locus of m by taking distance of mT and mark as T_1 extend this to extreme locus mark as T_1' Join $T_1'S_1'$ through m'.

* Mark the dimensions, inclinations, true length.

---

(8) * Draw XY reference line and label as HP & VP.

* Mark p' and locus of p' 15mm above VP & p and locus of p 15mm below HP.

* With p' as centre draw an angle of 55° with its length 65mm mark as f_1' and locus of f'

* With p as centre make an angle 35° with 65mm distance (mark as f_2 locus of F)
* Extend f_1' and f_2 to the opposite locus and mark as f_1 and f_2'.
* Draw an arc from $p'f_2'$ cutting locus of F' and mark as f', it is the FRONT VIEW.
* Draw an arc from pf_1 cutting locus of F and mark as f, it is the TOP VIEW.
* Mark dimensions, inclinations, true lengths.

Traces.

* Extend $p'f'$ to XY & mark as H' & extend pf to XY & mark as V.
* Extend H' to top view by a ⊥r line, it is HT and extend V to front view by a ⊥r line, it is the VT.

PROJECTION OF PLANES.

① The hexagon edge rest on HP, so draw a hexagon of side 35mm below HP. by drawing XY reference line & label VP and HP.

* Take 60° on the 2 sides and complete the hexagon and give the names. By seeing from the bottom of hexagon, the sides which are not able to see should be enclosed in bracket by extending the side lines. which is FRONT VIEW.
* Incline the front view by 50° and mark the exact distance as in the previous diagram.
* Now extend these markings from top to the below XY line and extend the 1st TOP VIEW and mark the points which intersect with the top extension and draw the complete hexagon, which is the 2nd TOP VIEW.
* Mark the dimensions and inclinations.

② * Draw XY reference line and label as VP and HP.

* Pentagon corner rest on VP, so draw pentagon of side 35mm above VP by taking 72° angle on the five sides & mark the sides.
* By seeing from top of hexagon, extend the corner to XY line and mark them by giving appropriate names which is TOP VIEW.
* Tilt the TOP VIEW by 50° and mark the exact distance as in the previous TOP VIEW, now it is the 2nd TOP VIEW.

* Now extend their markings from 2nd TOP VIEW and 1st FRONT VIEW and mark the corresponding points intersecting the extension lines and now we draw a pentagon.
* It is our 2nd FRONT VIEW & mark the dimensions.

---

③ * Draw a reference line XY and label as VP and HP.
* Draw a circle of dia 50mm below HP [∵ its point rest on HP]
* Divide the circle into 8 divisions and name them and extend their names (lines) to XY line and it is the 1st FRONT VIEW.
* Now tilt this front view 40° with exact distances between each point and name them by different names [1₁' 2₁'(8₁') 3₁'(7₁') 4₁'(6₁') 5₁']
* Now extend this markings from 2nd FRONT VIEW and 1st TOP VIEW to the below HP & mark the corresponding points intersecting the extension lines and join these points we get a circular lamina which is the 2nd TOP VIEW. & mark the dimensions.

---

④ * Draw a reference line XY and label as VP and HP.
* Hexagon side rest on HP hence draw a hexagon of side 25mm by taking 60° angle. and mark the names which is 1st TOP VIEW.
* Extend the lines to XY line and it is 1st FRONT VIEW with the names. Now tilt this front view to the surface inclination 30° with exact distances between each point.
* Now extend this markings from 2nd FRONT VIEW & 1st TOP VIEW to below HP & mark corresponding points intersecting extension lines & join them to get 2nd FRONT VIEW (hexagon).
* Now tilt this hexagon to 45° by drawing a line of 45° with HP. Place the hexagon side 1, and 2, in the 45° angle line and draw a hexagon which is 3rd FRONT VIEW
* Now extend this markings to the above VP and also extend the markings of 2nd TOP VIEW and join the corresponding points we get a hexagon which is 3rd TOP VIEW.
* Mark the dimensions

⑤ * Draw XY reference line and label as HP & VP.
* The short edge of rectangle rest on VP, draw a rectangle of 70x40 above VP and name them. Extend the naming lines to XY and it is the 1st TOP FRONT VIEW.
* Now 2nd FRONT VIEW is a square and draw a square of 40mm and name them and extend them to below HP and it is the 2nd TOP VIEW.
* Now 40° is inclined to HP, then draw it in above VP and tilt the square side $1_1'$ and $2_1'$ to the inclined angle. and name them
* It is the 3rd FRONT VIEW and extend them to the below HP and also extend 2nd TOP VIEW and mark the intersection points
* Join them and then we get a rectangle which is 3rd TOP VIEW.
* Mark the dimensions.

⑥ * Draw XY reference line and label as HP & VP.
* The corner of square rest on HP, draw a square of side 40mm and name them, now extend them to XY line to get 1st FRONT VIEW & name it
* Its diagonal PR (1st FRONT VIEW) is inclined to 45° in an exact distance to the previous diagram. and name them it is 2nd FRONT VIEW.
* Extend them and 1st TOP VIEW to get 2nd TOP VIEW by pointing the intersections and joining.
* Now tilt the diagonal PR in 2nd TOP VIEW to 30° by placing PR in the inclined line and name them. it is 3rd TOP VIEW.
* Extend them and 2nd FRONT VIEW to get 3rd FRONT VIEW by joining the intersection points.
* Mark the dimensions.

⑦ * Draw XY reference line and label as HP & VP.
* Corner of pentagon rests on ground (HP), draw a pentagon of side 30mm and angle 72° & name them & extend to XY to get 1st FRONT VIEW & name it.
* Now tilt 1st FRONT VIEW to 30° in an exact distance between points as in the previous view, it is 2nd FRONT VIEW.
* Extend them and 1st TOP VIEW to get 2nd TOP VIEW by joining the intersection points.
* Now tilt the side opposite to corner to 30° by placing 4_2 and 5_2 in the inclined line & draw a pentagon, it is the

* Extend them and 2nd FRONT VIEW to get 3rd FRONT VIEW by joining the intersection points, we get a Pentagon.
* Mark the dimensions.

---

(8). * Draw XY reference line and label as VP & HP.
* Draw a circle of dia 60mm and divide into 8 divisions & name them.
* Now extend them to XY line to get 1st FRONT VIEW
* Now draw an ellipse with minor axis of 35mm on HP. Take 35mm distance and extend to above VP and draw 2nd FRONT VIEW.
* Now extend them & 1st TOP VIEW to get 2nd TOP VIEW by joining the intersection points.
* Now tilt the point 1 to 45° by placing point 1 in the inclined line and draw the 3rd TOP VIEW & name it.
* Extend them and 2nd FRONT VIEW to get 3rd FRONT VIEW by joining the intersection points, we get a circular lamina.
* Mark the dimensions.

---

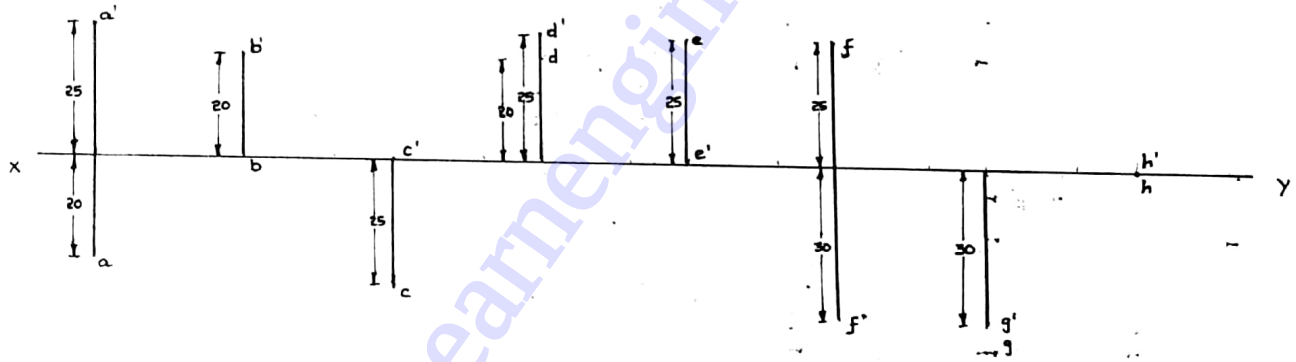
(9). * Draw XY reference line and label as VP & HP.
* Draw a circle of dia 60mm 40mm above VP and divide into 8 divisions and name them.
* Now extend them to 30mm below HP to get 1st TOP VIEW.
* Now tilt the 1st TOP VIEW to 45° and mark the exact distance and name them to get 2nd TOP VIEW.
* Extend them and 1st FRONT VIEW to get 2nd FRONT VIEW by joining the intersection points, we get a circular lamina.
* Mark the dimensions

1 Draw projections of points take 30mm between each projector

a) 'A' is 20 I VP & 25 ↑ HP b) 'B' is 20 ↑ HP & lies in VP c) 'C' is 25 I VP & lies in HP

d) 'D' is 25 behind VP & 20 ↑ HP e) 'E' is 25 behind VP & lies in HP f) 'F' is 30 ↓ below HP & 25 behind VP

g) 'G' is 30 ↓ HP & 30 I VP h) 'H' is lies in both HP & VP.

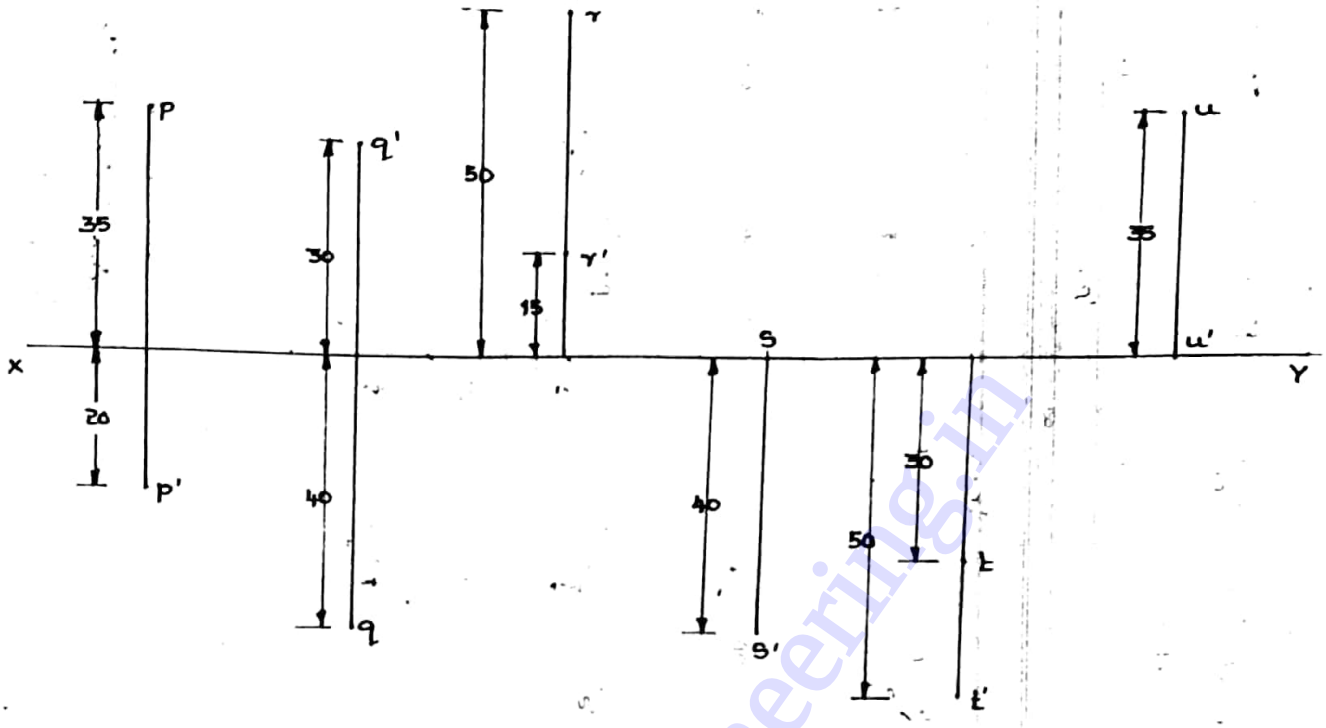


XY REFERENCE LINE.

ALL DIMENSIONS ARE IN 'mm

SCALE 1:1

2. Determine the positions of points with ref. to projection of planes. The distances marked are in mm.



Point 'P' is 35 mm behind VP and 20 mm below HP

Point 'Q' is 30 mm above HP and 40 mm Infront of VP

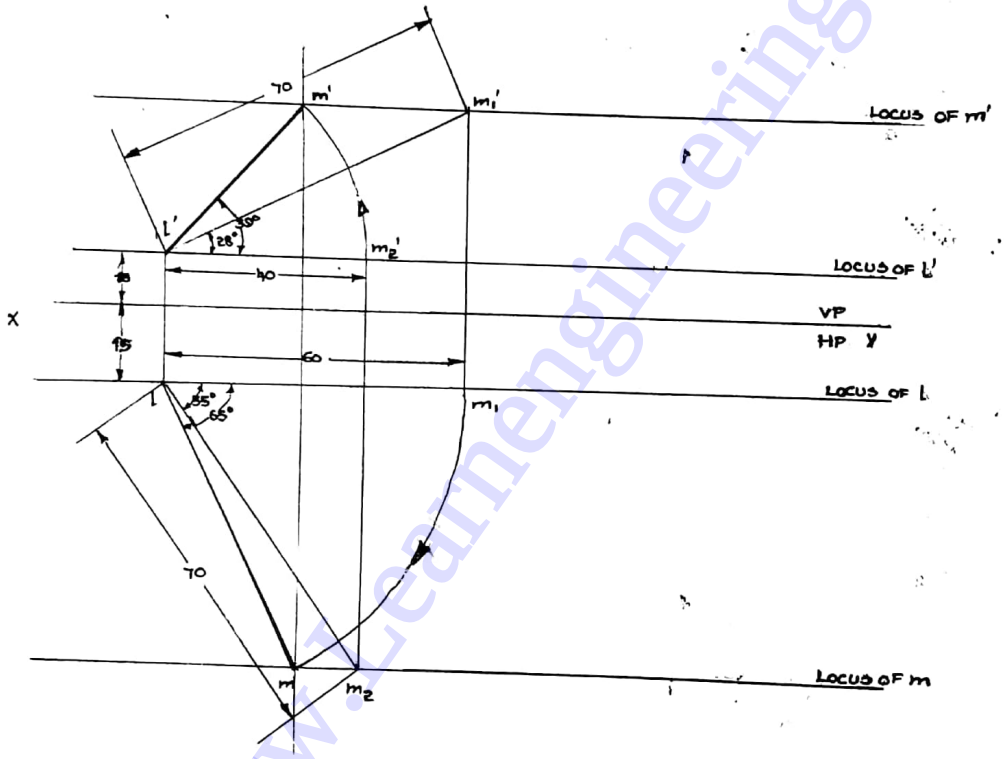
Point 'R' is 50 mm behind VP and 15 mm above HP

Point 'S' is lies on VP and 40 mm below HP

Point 'T' is 50 mm below HP and 30 mm Infront of VP.

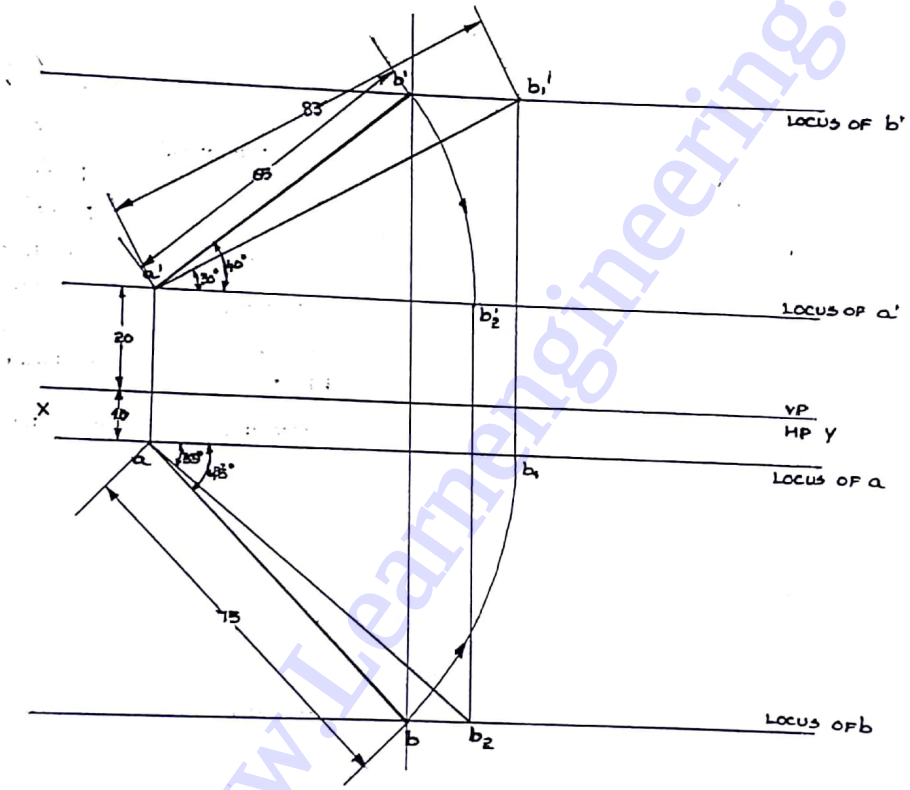
Point 'U' is 35 mm behind VP and Lies on HP.

3. Given Data: LM = 70mm L = 10mm ↑ HP 15 mm I VP Top view = 60mm Front view = 40mm inclinations = ?



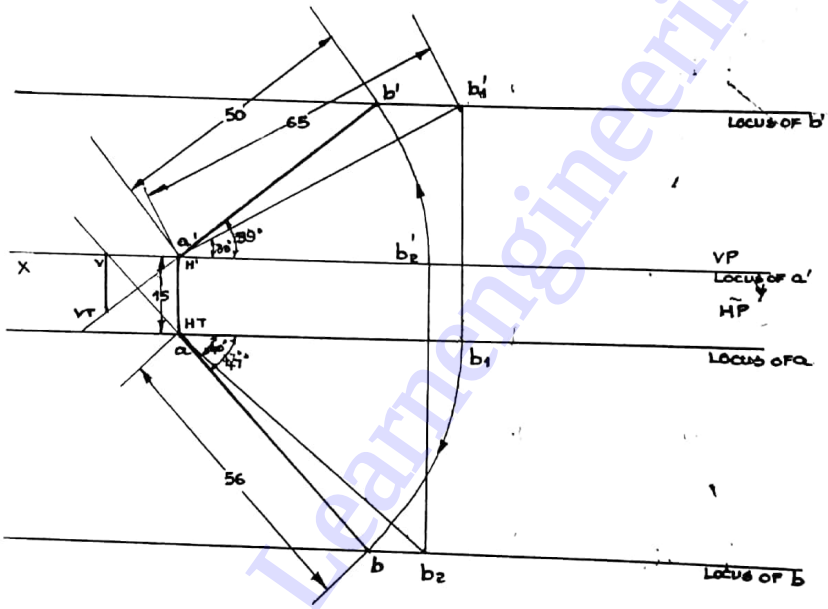
θ = 28°
α = 39°
ϕ = 55°
β = 65°
l'm' = FRONT VIEW = 40
lm = TOP VIEW = 60
l'm1' = lm2 = TRUE LENGTH = 70
ALL DIMENSIONS ARE IN 'mm'
SCALE 1:1

4. Top View = 75 mm
45° inclined to XY line
Front View → 65mm
A is 20 ↑ HP
10 I VP
θ, ϕ, α, β = ?



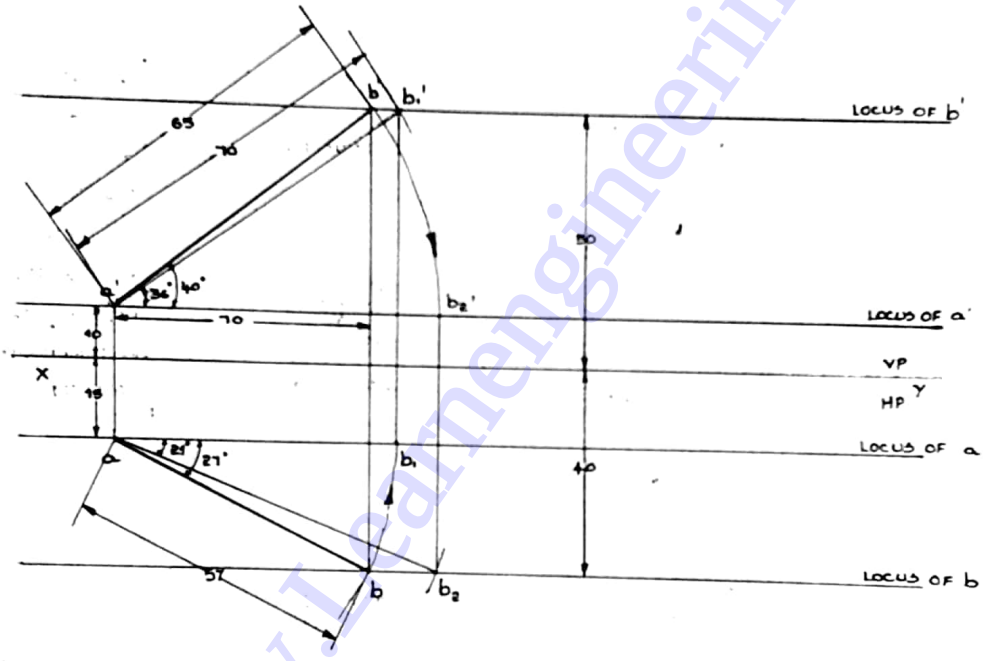
θ = 30°
α = 40°
ϕ = 39°
β = 45°
a'b' FRONT VIEW = 65
ab = TOP VIEW = 75
$a'b_1' = ab_2$ = TRUE LENGTH = 83
ALL DIMENSIONS ARE IN 'mm'
SCALE 1:1

5 AB → 65mm long A → touching HP & 15mm I VP 30° to HP & 40° to VP. Traces = ?



θ = 30°
α = 39°
ϕ = 40°
β = 47°
a'b' FRONT VIEW = 50
ab TOP VIEW = 56
a'b'1 = ab2 = TRUE LENGTH = 65
ALL DIMENSIONS ARE IN 'mm'
SCALE: 1:1

6. Distance between projections is 70mm A → 10mm ↑ HP, 15mm I VP B → 50mm ↑ HP, 40mm I VP θ, ϕ = ? Shortest distance = ?

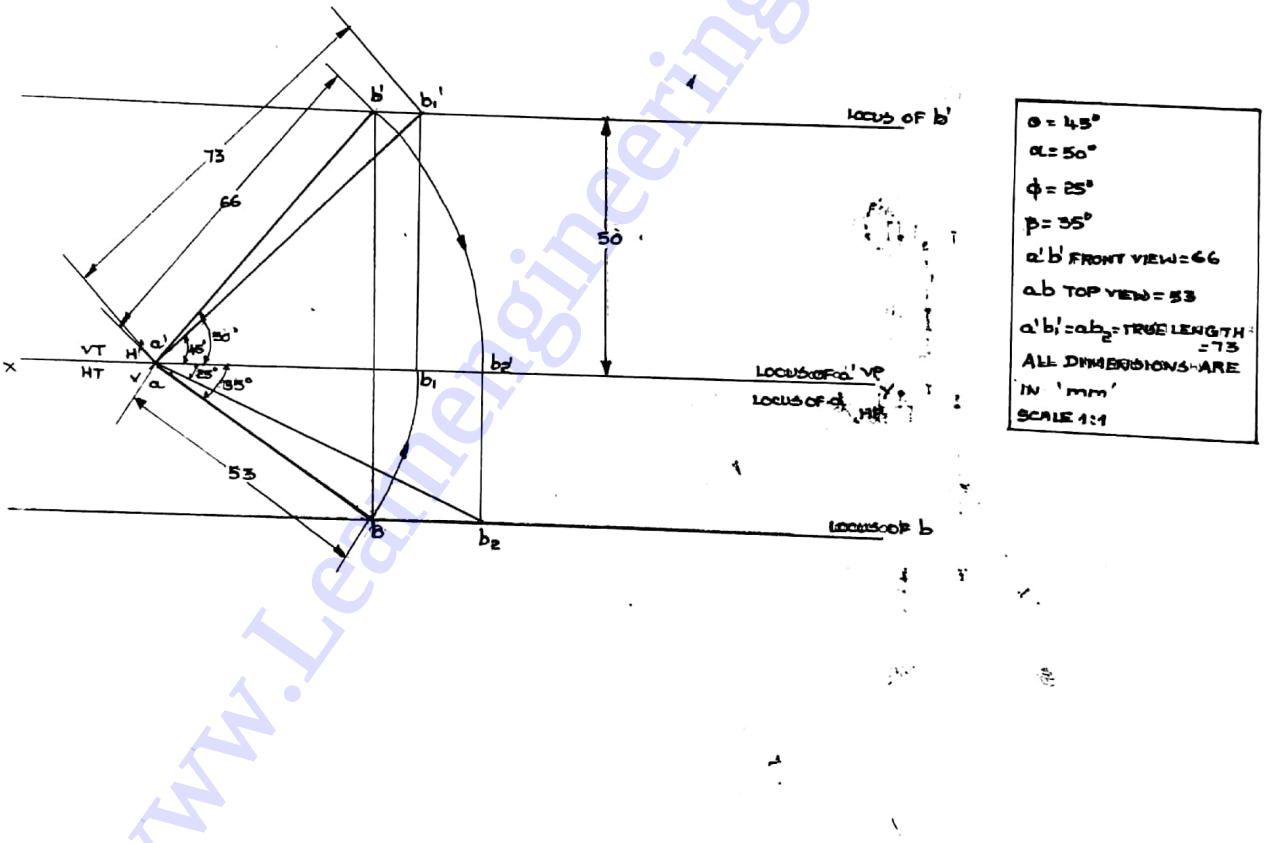


θ = 36°
α = 40°
ϕ = 21°
β = 27°
a'b' FRONT VIEW = 65
ab TOP VIEW = 57
a'b' = ab2 = TRUE LENGTH = 70
ALL DIMENSIONS ARE IN 'mm'
SCALE 1 : 1

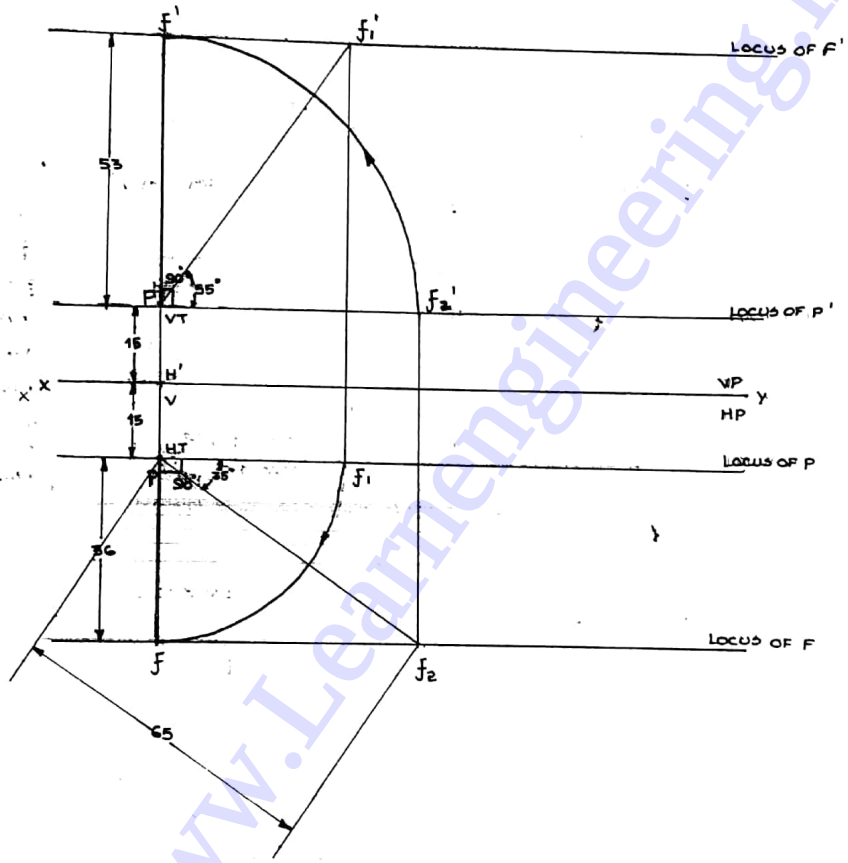
7. plan (TV) → 35°
Elevation(FV) → 50°

One end → touching both VP & HP
Other end → 50mm ↑ HP

True length; True inclinations, traces = ?

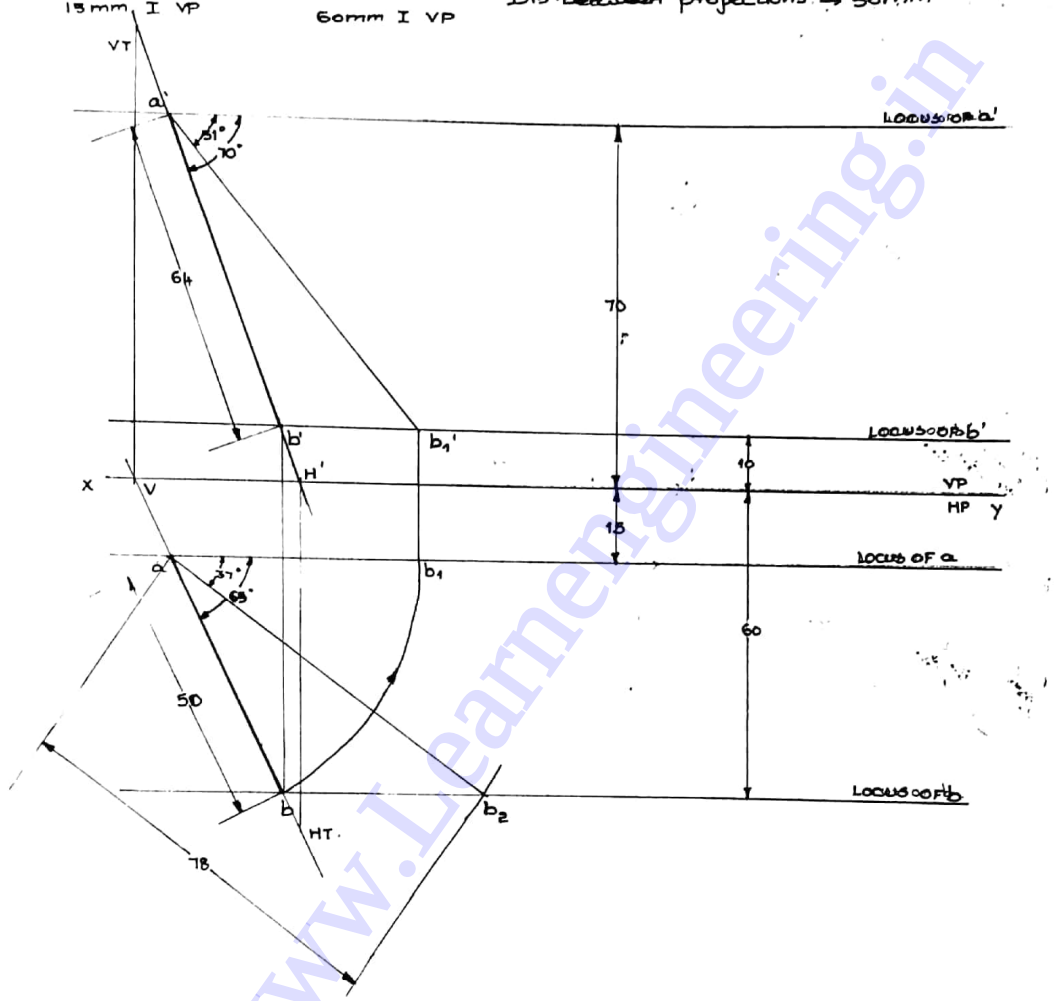


8. PF = 65mm P → 15 mm ↑ HP 55° to HP Traces = ?
15mm I VP 35° to VP



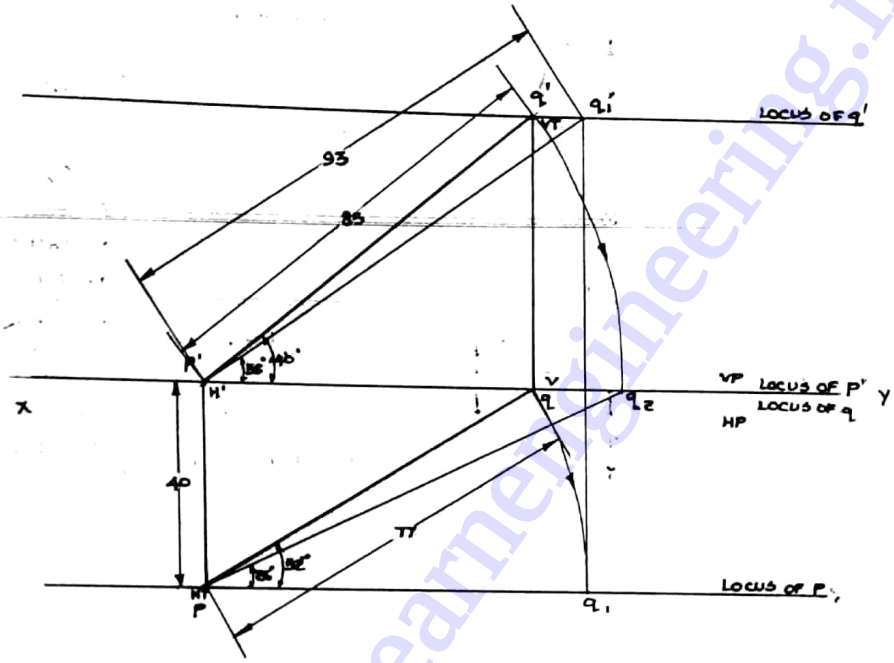
θ = 55°
α = 90°
ϕ = 35°
β = 90°
P'f' FRONT VIEW = 53
Pf TOP VIEW = 36
P'f1' = Pf2 = TRUE LENGTH = 65
ALL DIMENSIONS ARE IN 'mm'
SCALE 1:1

9 A → 70mm ↑ HP, 15mm I VP B → 10mm ↑ HP, 60mm I VP Dis between projections → 50mm



θ = 51°
α = 70°
ϕ = 37°
β = 65°
a'b' FRONT VIEW = 64
ab TOP VIEW = 51
$a'b_1' = ab_2$ = TRUE LENGTH = 78
ALL DIMENSIONS ARE IN 'mm'
SCALE 1 : 1

10. P → is in HP Q → is in VP FV = 40° True length, θ, ϕ, Traces = ?
40 I VP length = 85 mm



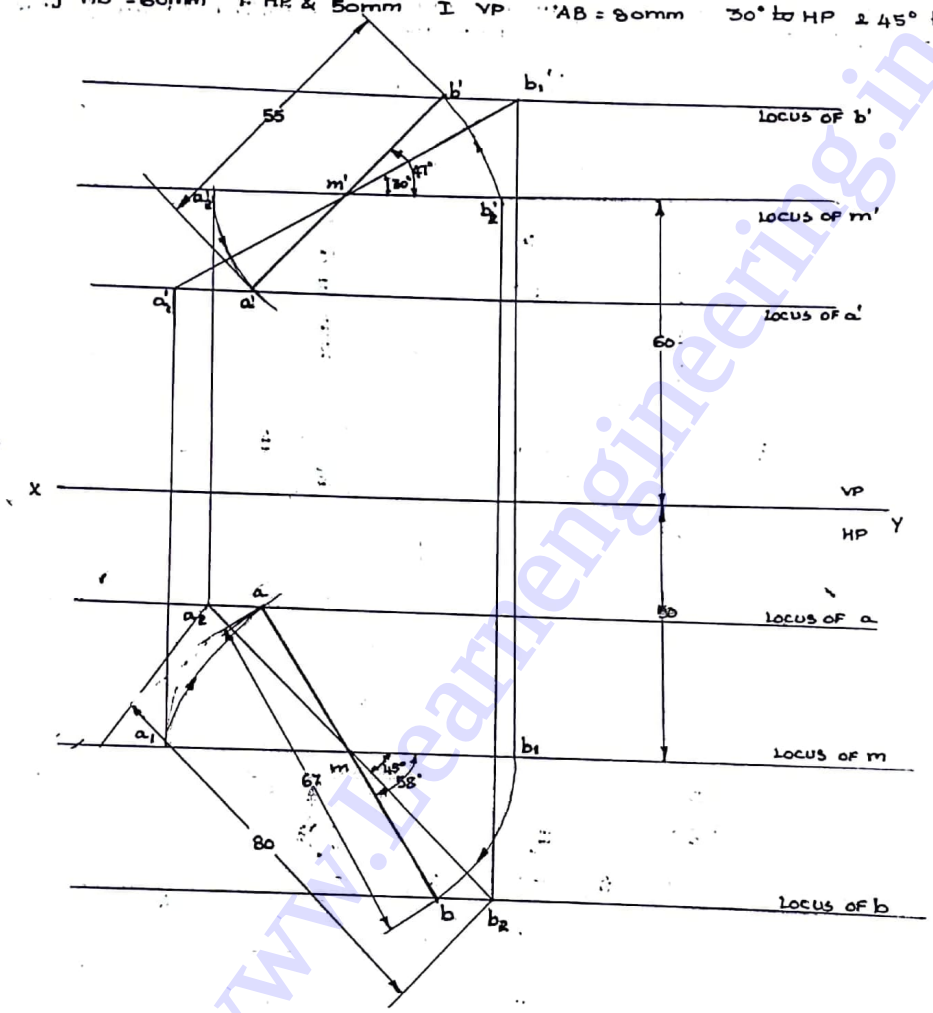
θ = 36°
α = 40°
ϕ = 26°
β = 32°
p'q' FRONT VIEW = 85
pq TOP VIEW = 77
P'q1' = Pq2 = TRUE LENGTH = 93
ALL DIMENSIONS ARE IN 'mm'
SCALE 1:1

11. A → 30mm ↑ HP
40mm ↓ VP
B → 90 ↑ HP
110 ↓ VP
Both ends of line are in same projector
Find TV, True length, Inclination

θ = 41°
α = 90°
ϕ = 49°
β = 90°
a'b' FRONTVIEW = 60
ab TOP VIEW = 70
$a'b_1' = ab_2$ = TRUE LENGTH = 94
ALL DIMENSIONS ARE IN 'mm'
SCALE 1:1

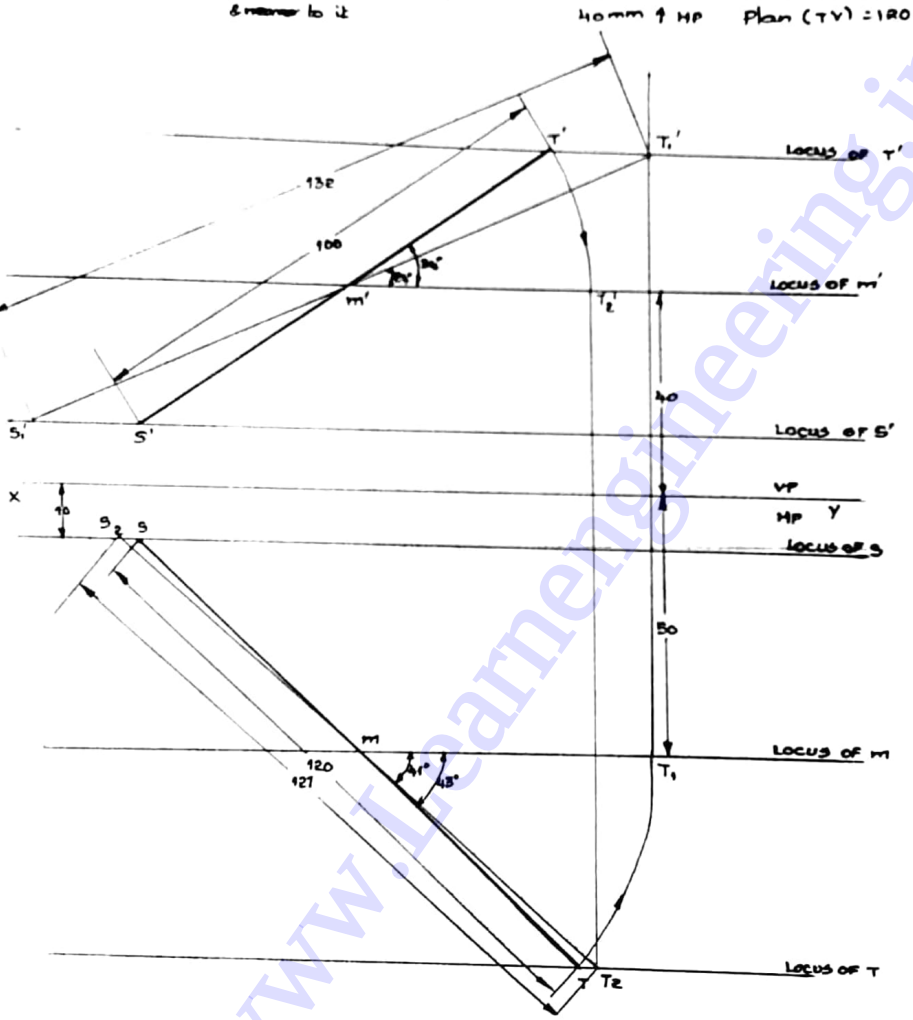
94
b'
b_1'
LOCUS OF b'
60
90
90°
41°
a'
VT
b_2'
LOCUS OF a'
30
H'
VP
HP
X
Y
V
40
HT
a
49°
b_1
LOCUS OF a
110
70
b
b_2
LOCUS OF b_2

12. midpoint of AB = 60mm ↑ HP & 50mm I VP. AB = 80mm 30° to HP & 45° to VP.



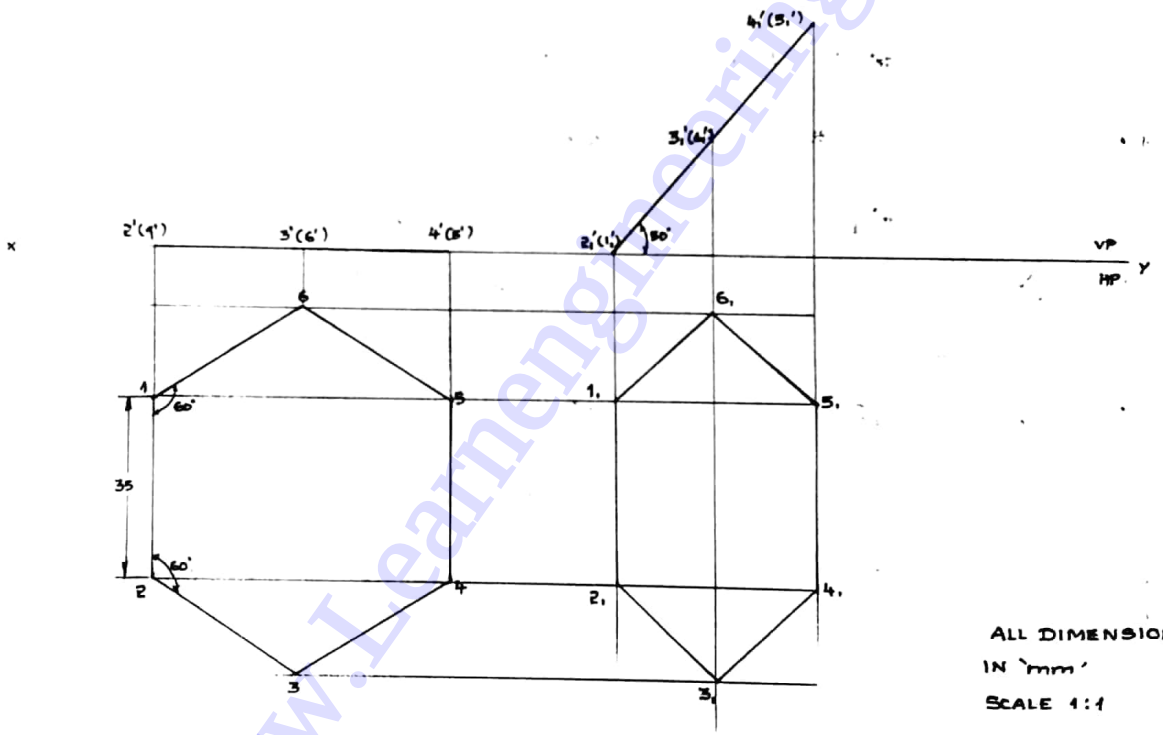
$\theta = 30°$
$\alpha = 47°$
$\phi = 45°$
$\beta = 58°$
a'b' FRONT VIEW = 55
ab TOP VIEW = 67
$a_1'b_1' = a_2b_2$ = TRUE LENGTH = 80
ALL DIMENSIONS ARE IN 'mm'
SCALE 1:1

15 ST is a st line S→10mm I VP midpoint 'm' → 50mm I VP Elevation (FV) : 100 mm True length, θ, ϕ = ?
& inclined to it 40mm ↑ HP Plan (TV) : 120 mm



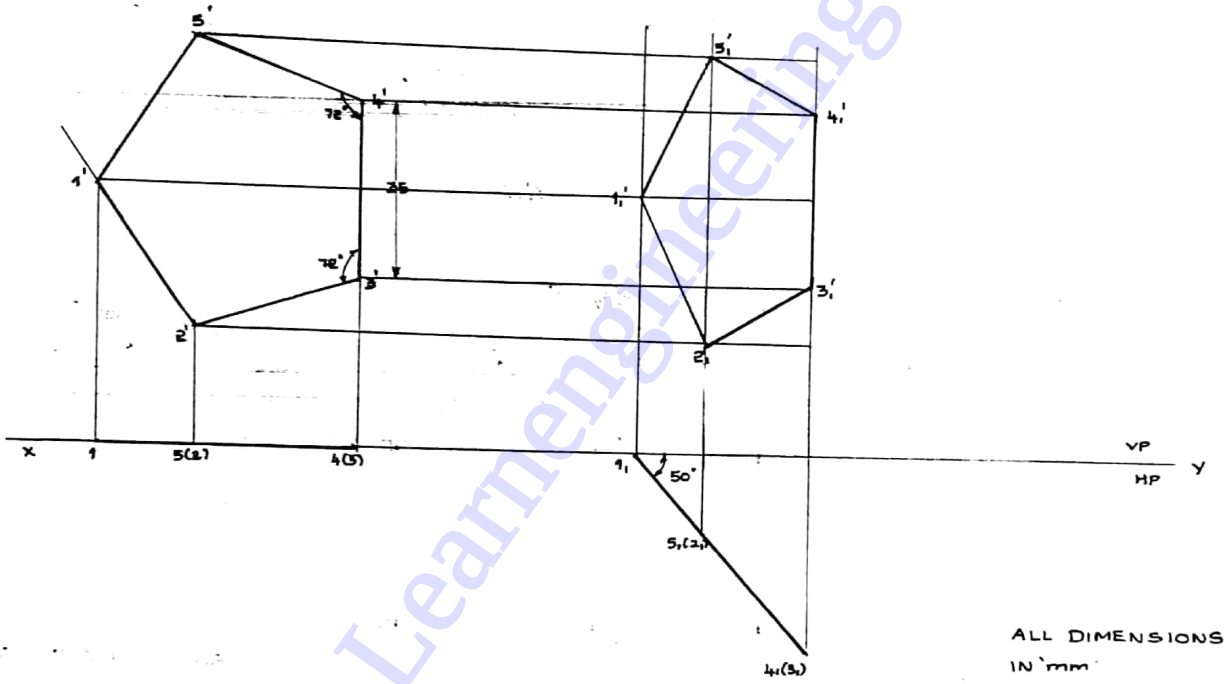
θ = 24°
α = 34°
ϕ = 41°
β = 43°
S'T' FRONTVIEW = 100
ST TOP VIEW = 120
$S_1'T_1'$ = 132 TRUE LENGTH
S_2T_2 = 127 TRUE LENGTH
ALL DIMENSIONS ARE IN 'mm'
SCALE 1:1

1. Hexagon side = 35mm Edge rest on HP, 50° inclined to HP.



ALL DIMENSIONS ARE IN 'mm'
SCALE 1:1

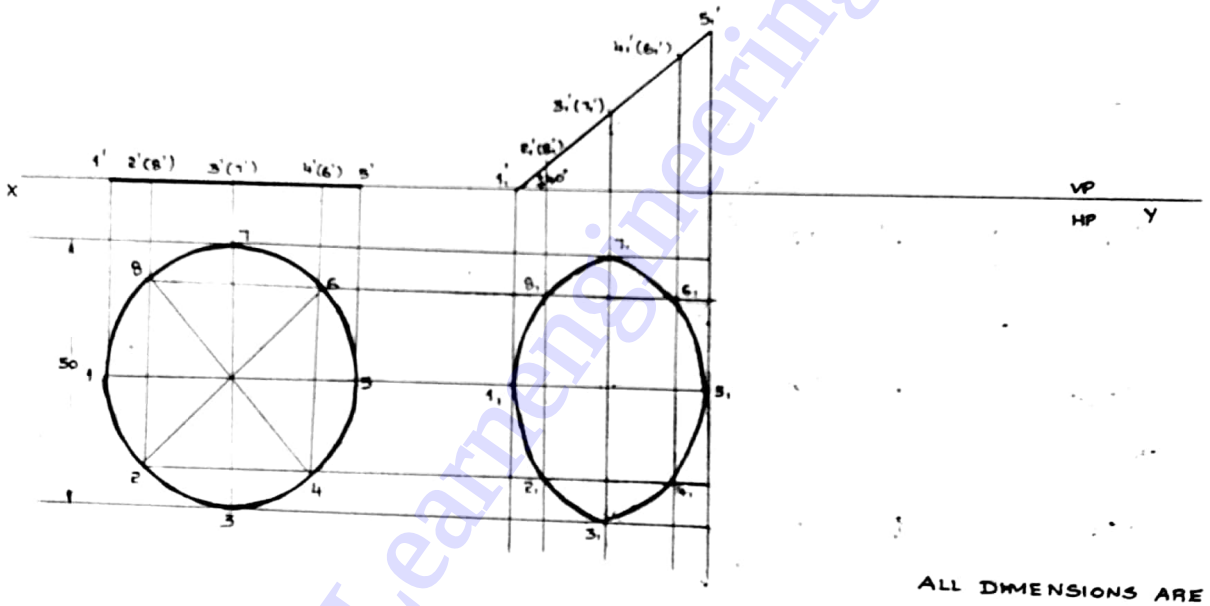
2. Pentagon side 35mm, rest on VP on corner, 50° to VP



ALL DIMENSIONS ARE IN mm

SCALE 1:1

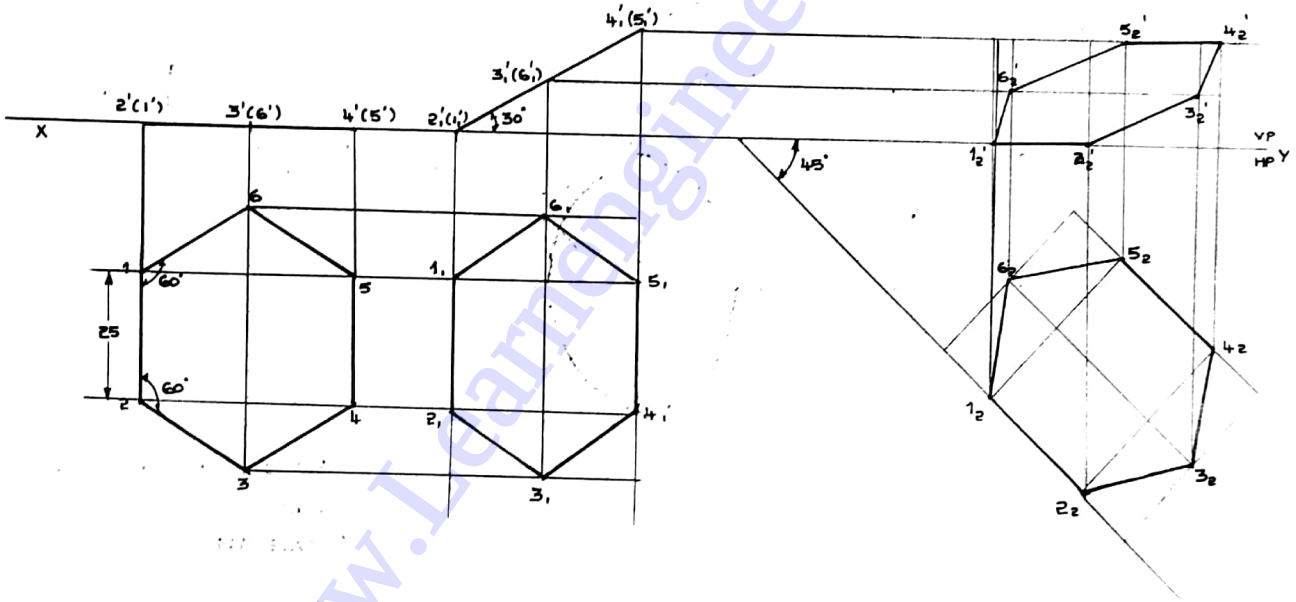
3 Circular lamina → dia 50mm rest its point on HP surfaces inclined at 40° to HP



ALL DIMENSIONS ARE IN 'mm'

SCALE 1:1

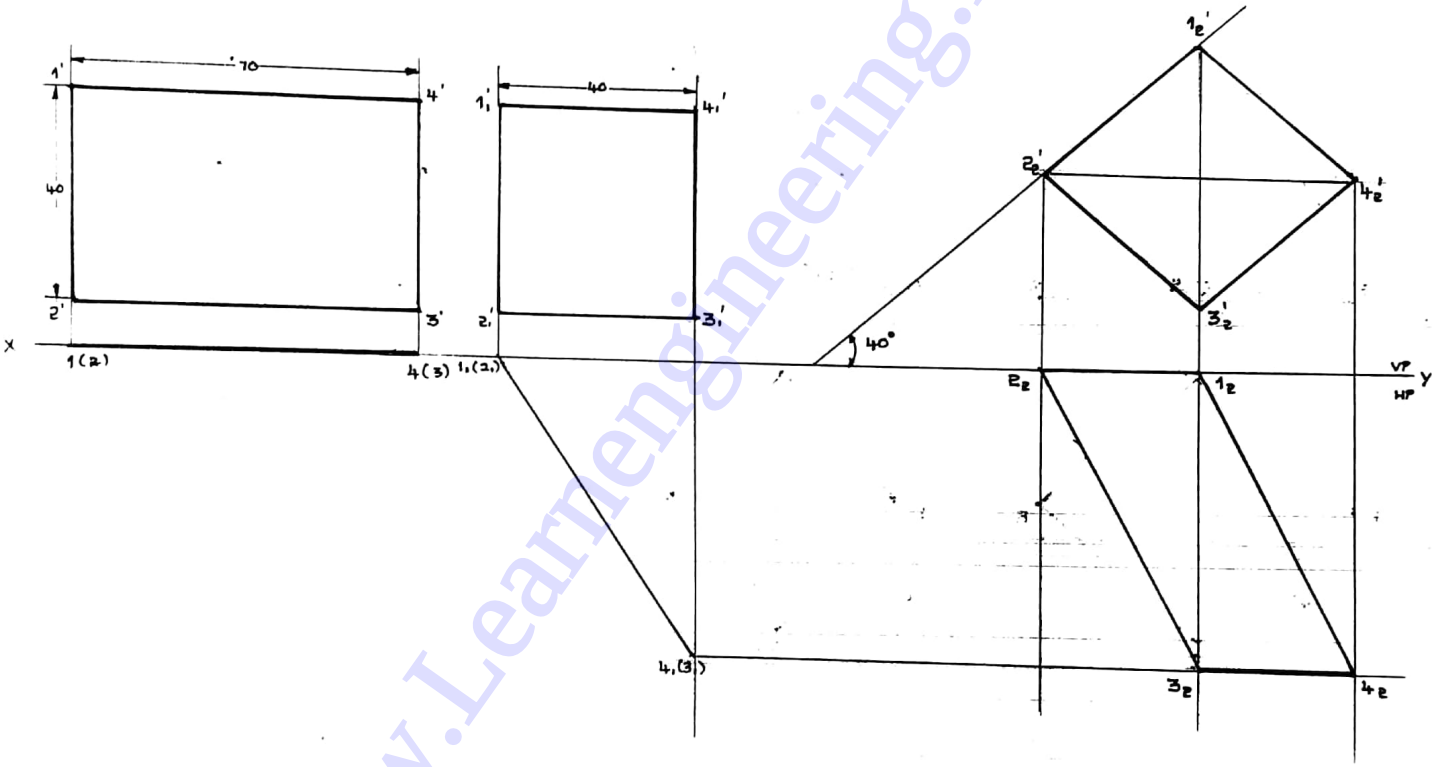
4) Hexagonal side → 25mm, rest on HP on its side, inclined at 45° to VP. The surface plate → 30° with HP



ALL DIMENSIONS ARE IN mm

SCALE 1:1

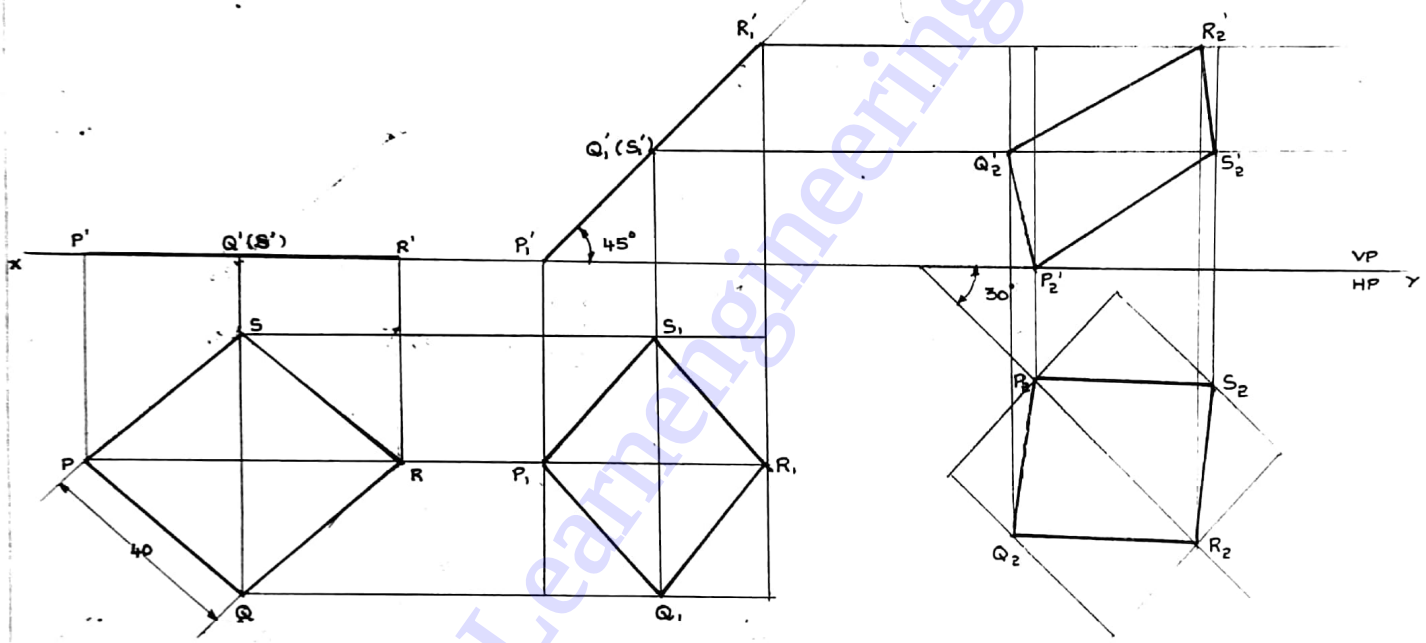
5 Rectangular plate 70×40. One short edge in VP, inclined 40° to HP, its FV is a square of side 40mm.



ALL DIMENSIONS ARE IN 'mm'

SCALE 1:1

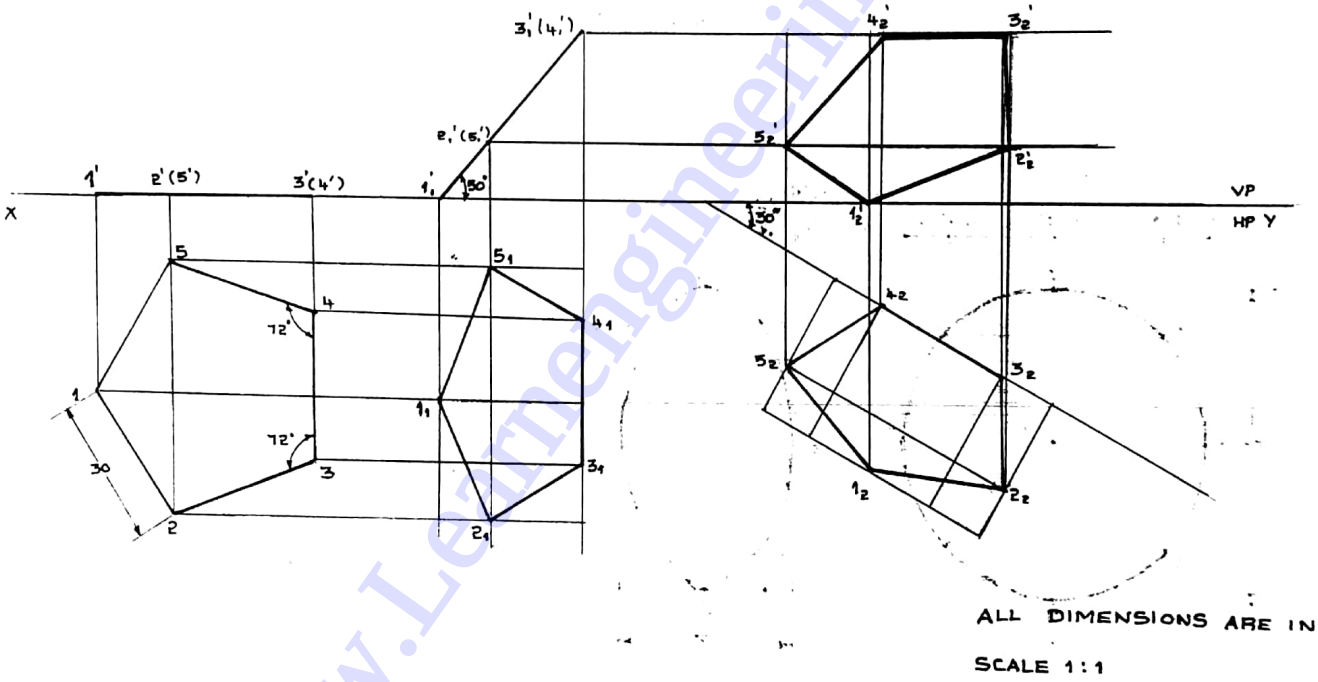
6. PQRS (Square lamina) side → 40mm rest on ground on corner P. Diagonal PR inclined at 45° to HP & apparently inclined at 30° to VP.



ALL DIMENSIONS ARE IN mm

SCALE 1:1

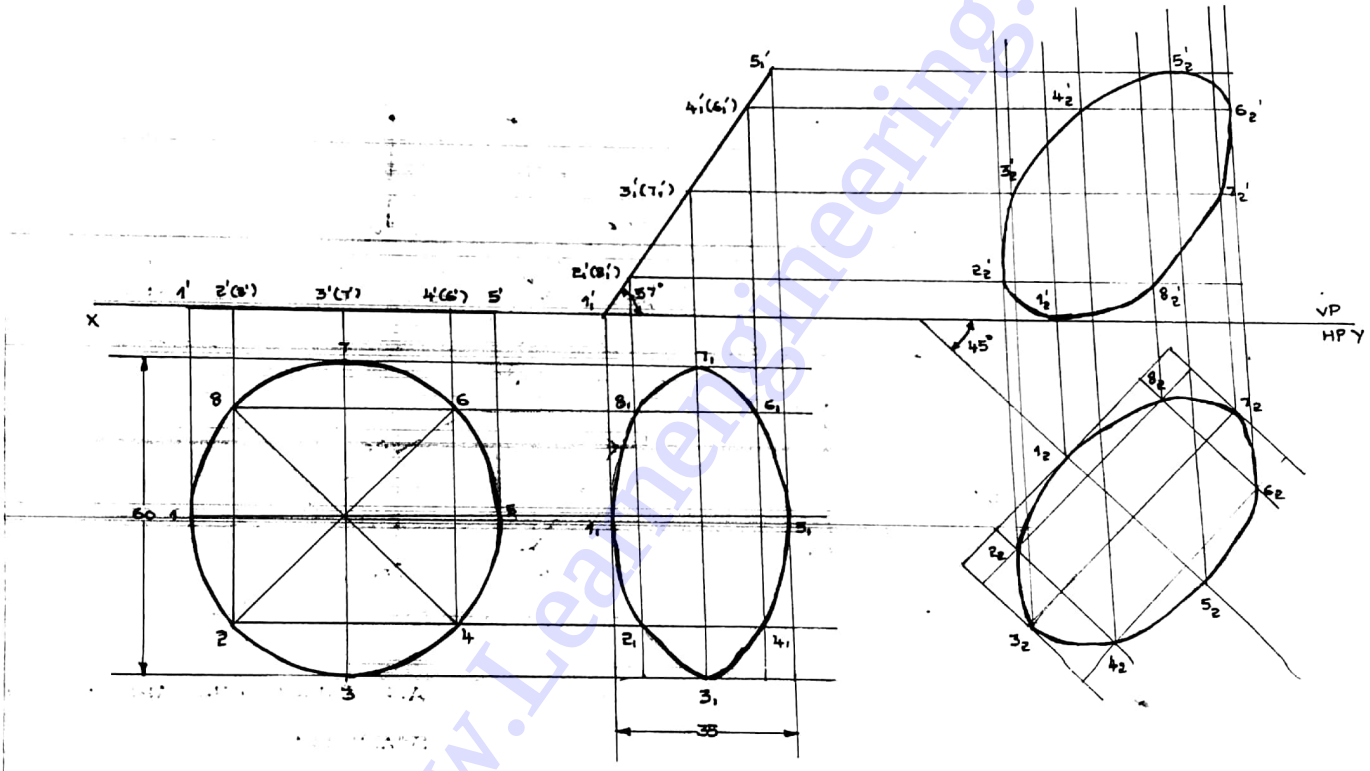
1 Hexagon - 30mm rests on ground. one of its corner rests on ground. Side opposite to corner inclined to 30° VP, 50° with ground.



ALL DIMENSIONS ARE IN 'mm'

SCALE 1:1

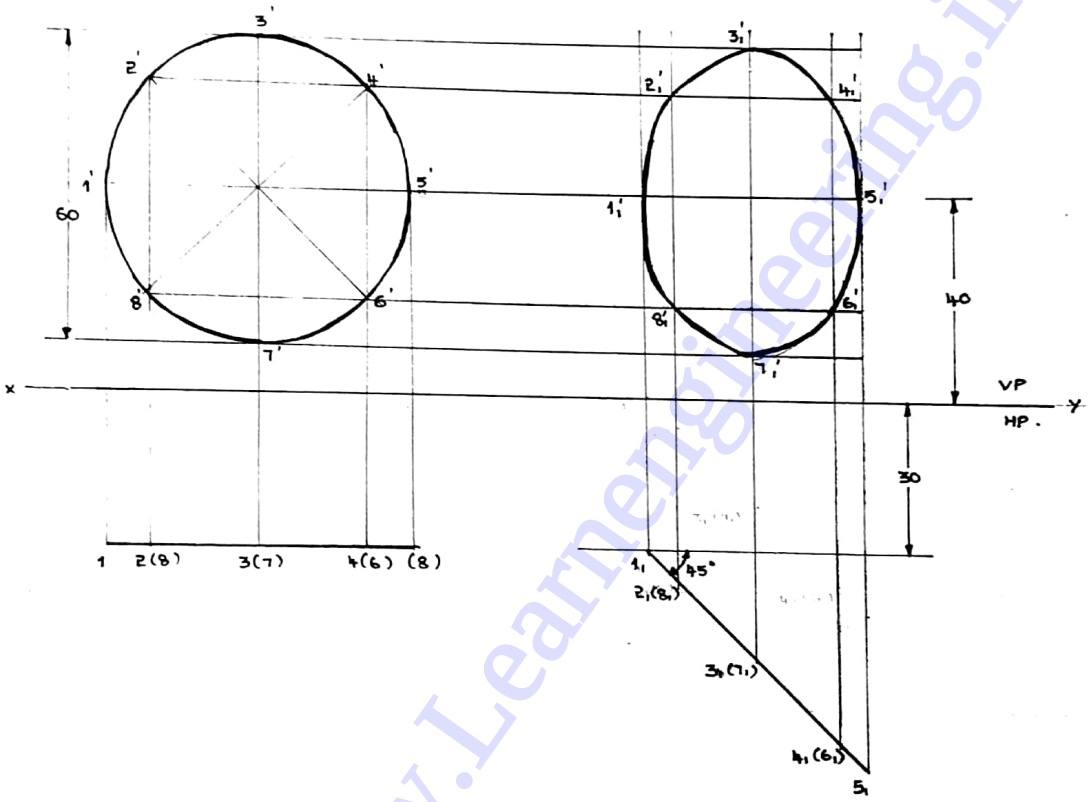
8. Circular lamina ⌀60mm minor axis 35mm on HP ; TV of diameter thro point 1 makes 45° with VP.



ALL DIMENSIONS ARE IN 'mm'

SCALE 1:1

7. Centre of Circle 40mm ↑HP & 30mm I VP Circle dia 60mm one point on VP surface inclined 45° to VP.

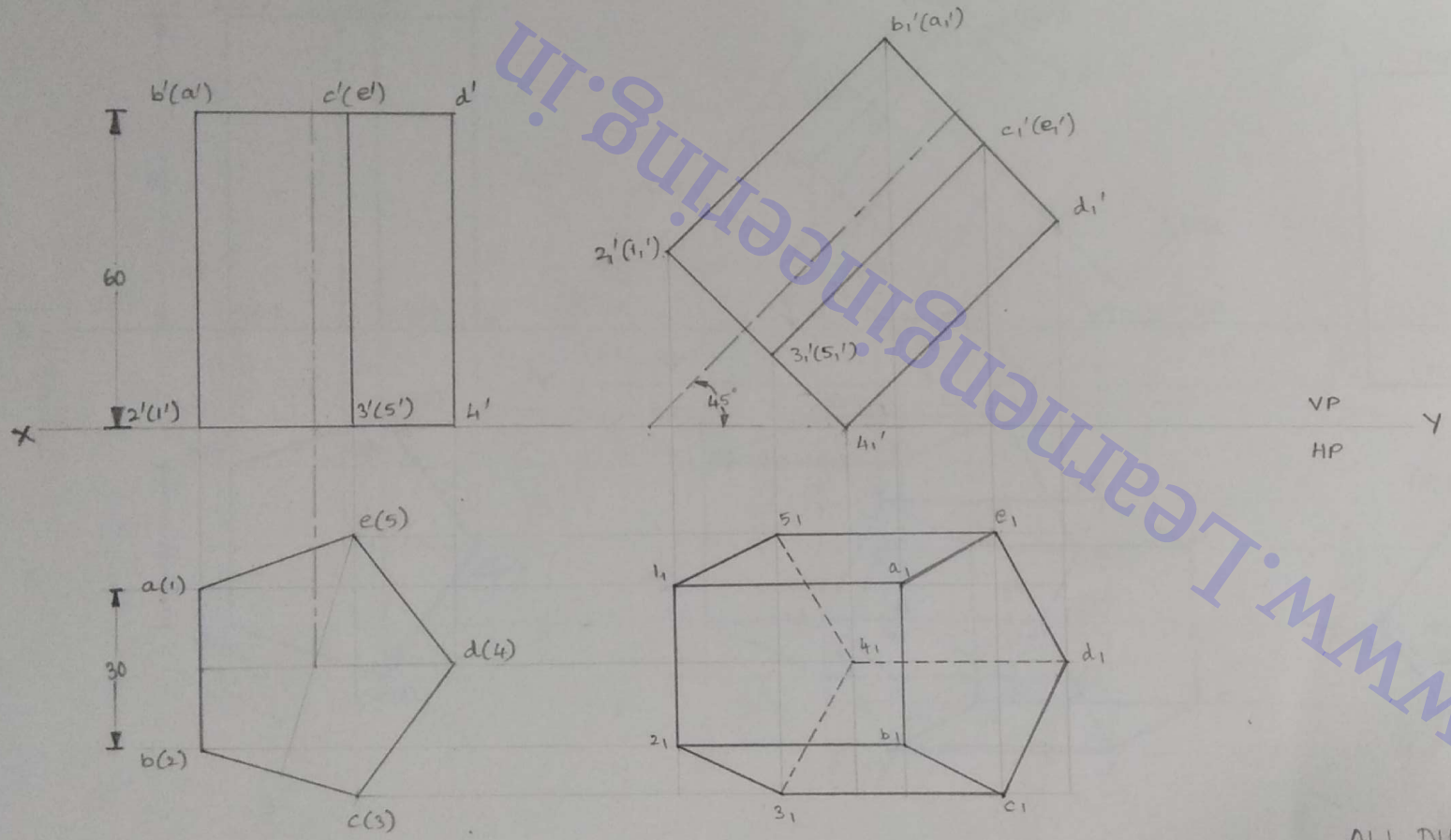


ALL DIMENSIONS ARE IN 'mm'

SCALE 1:1

1. A Pentagonal prism of side of base 30mm and height 60mm rest with one of its base corner on HP and its [(a) Axis is inclined at 45^0 to HP & parallel to VP (b) Longer edge is inclined at 45^0 to HP & axis is parallel to VP. (c) Base surface is inclined 35^0 to HP]. Draw its projections. {*Change of position method

PROJECTION OF A PENTAGONAL PRISM

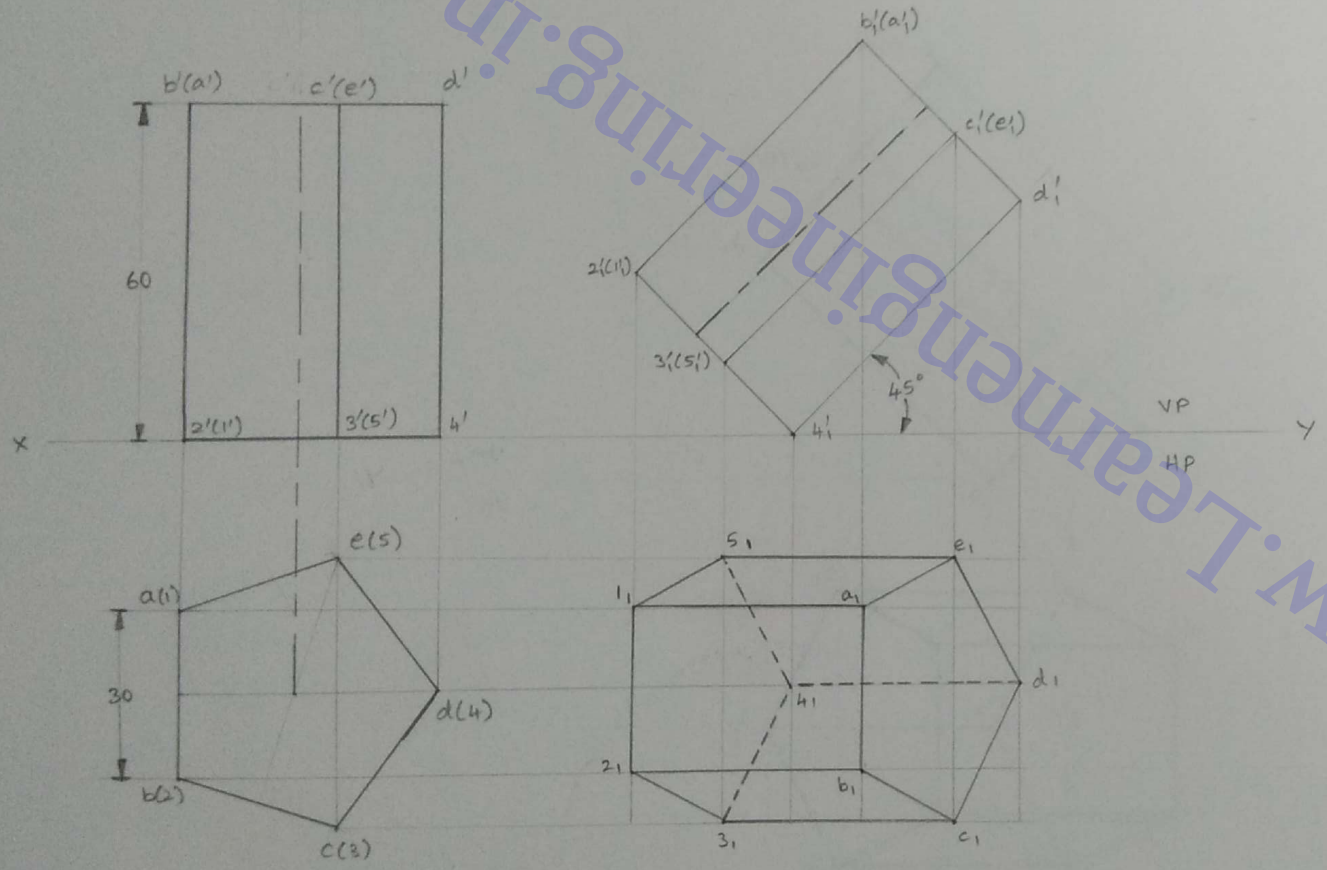


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

1.(b)

PROJECTION OF A PENTAGONAL PRISM

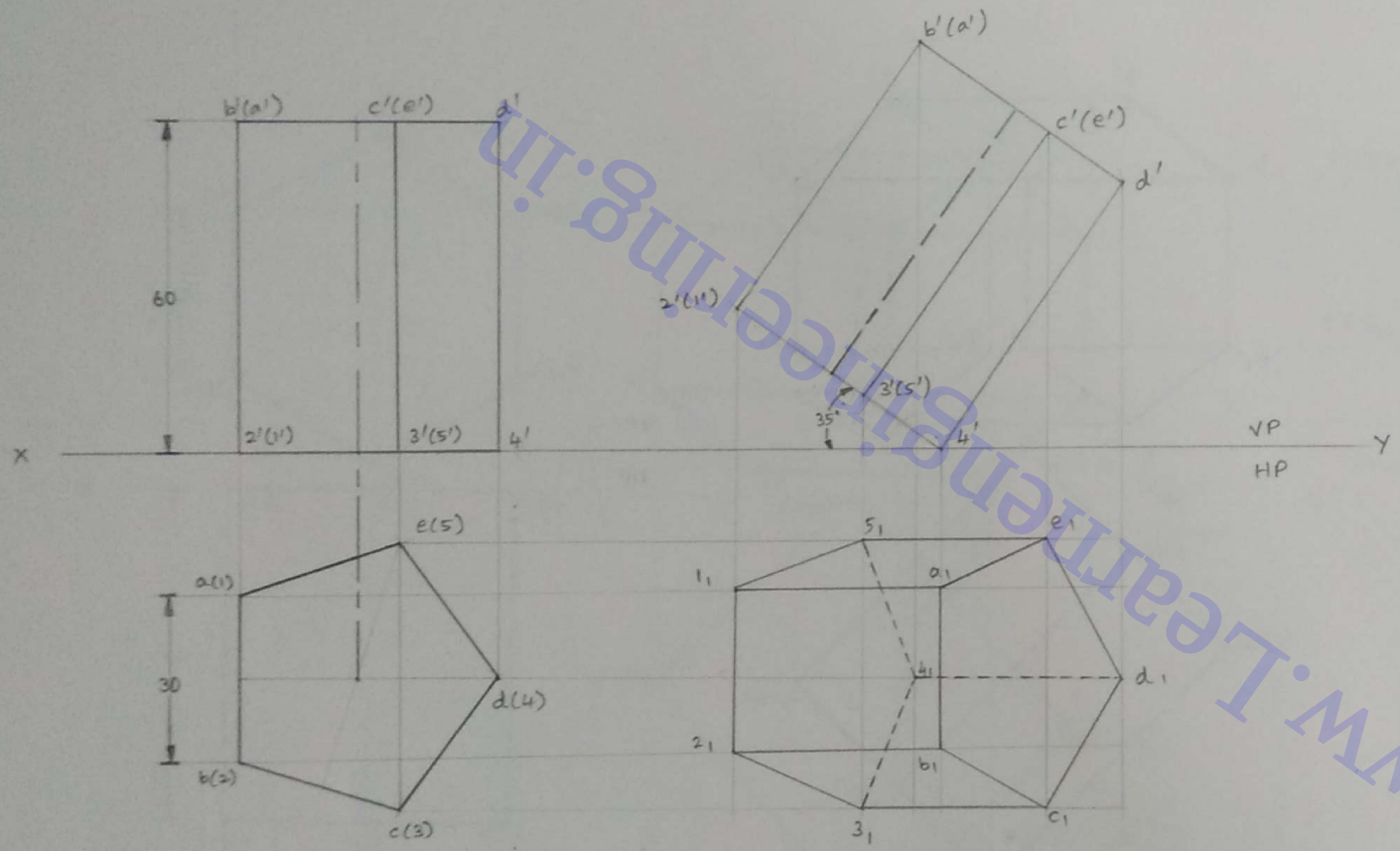


ALL DIMENSIONS ARE IN "MM"

SCALE 1:1

1. (c)

PROJECTION OF A PENTAGONAL PRISM

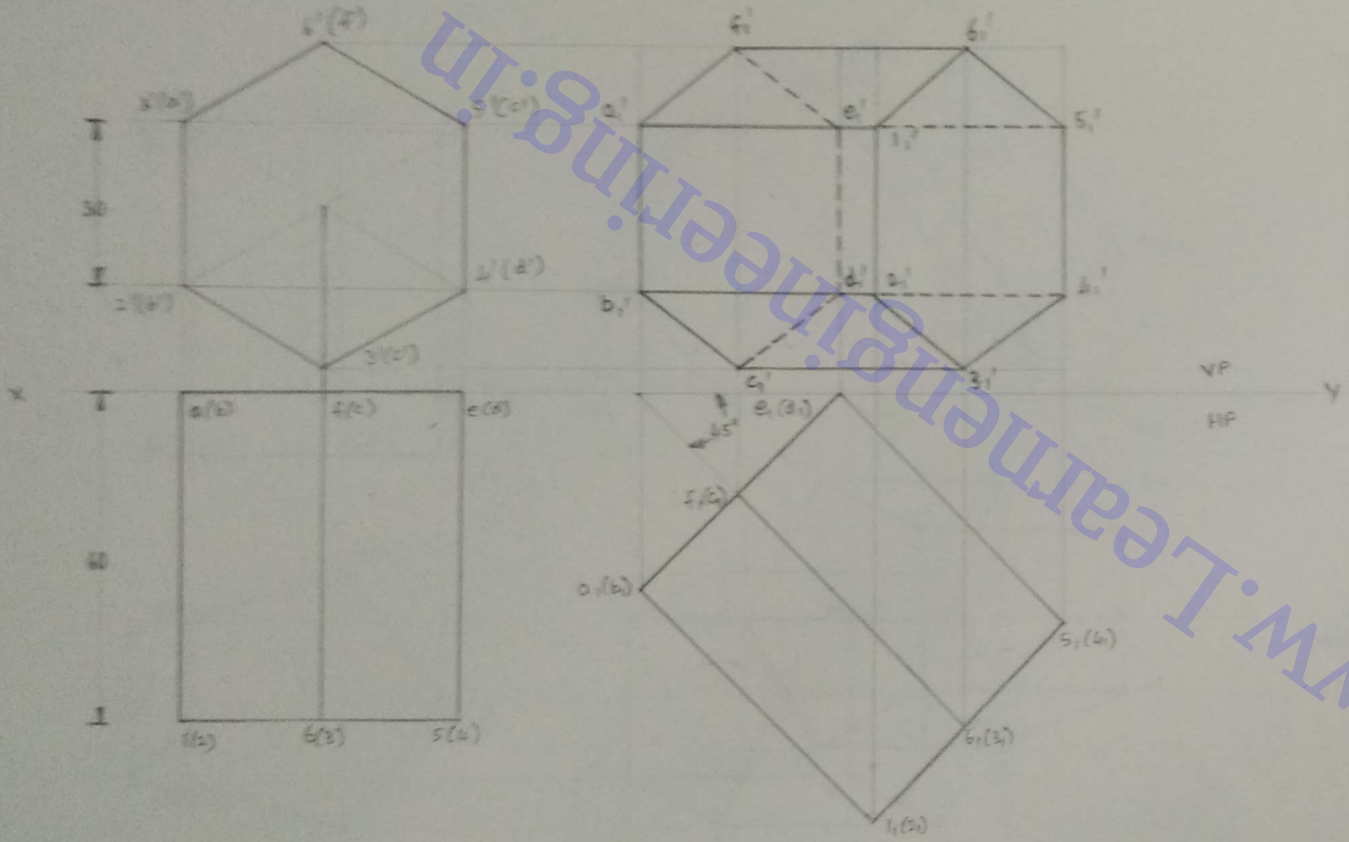


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

2. A hexagonal prism of side of base 30mm and height 60mm rest with one of its base edge on VP and its (a) Axis is inclined at 45° to VP & parallel to HP. (b) Rectangular face is inclined at 45° to VP & axis is parallel to HP. (c) Base surface is inclined 35° to VP). Draw its projections. [*Change of position method

PROJECTION OF A HEXAGONAL PRISM

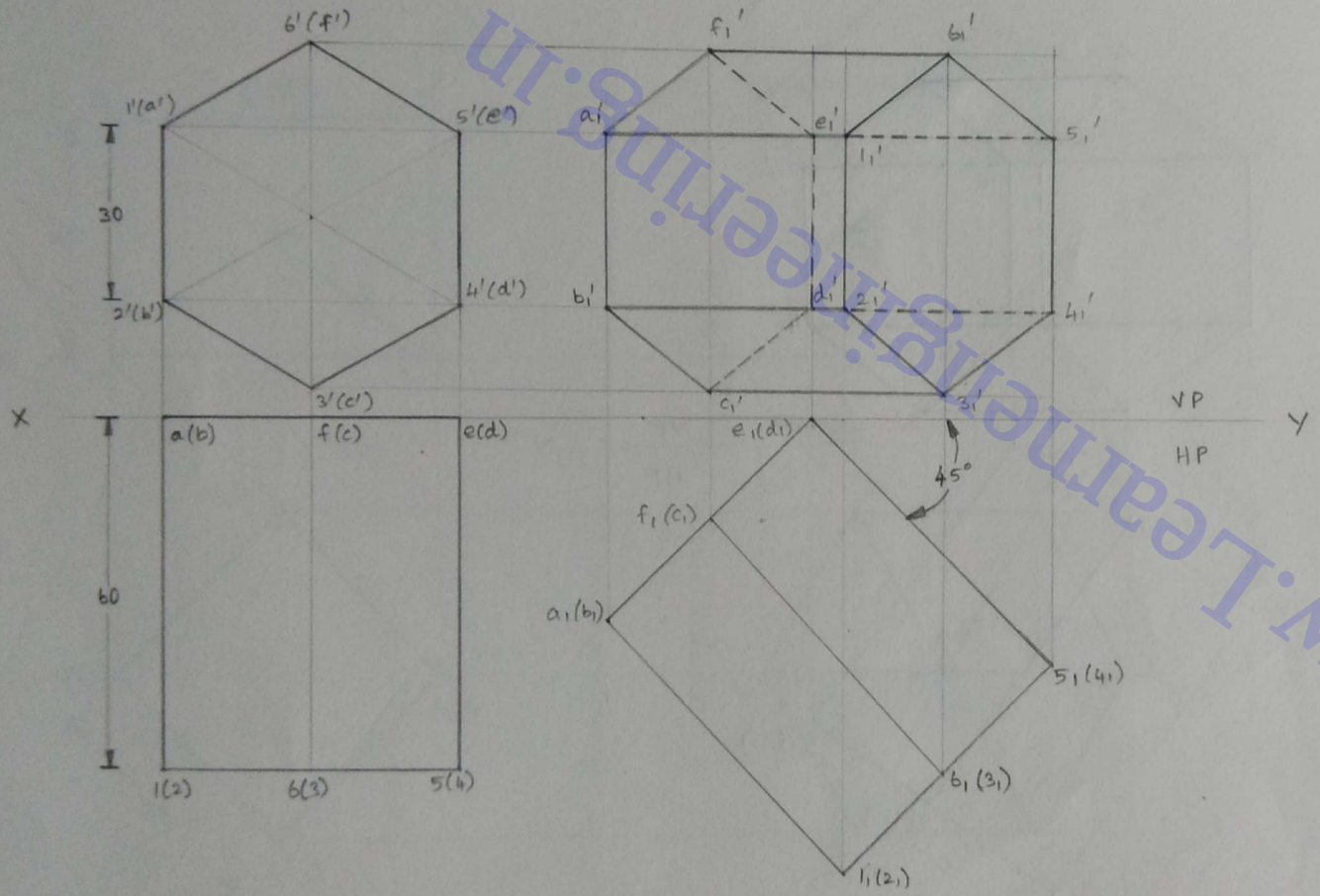


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

2. (b)

PROJECTION OF A HEXAGONAL PRISM

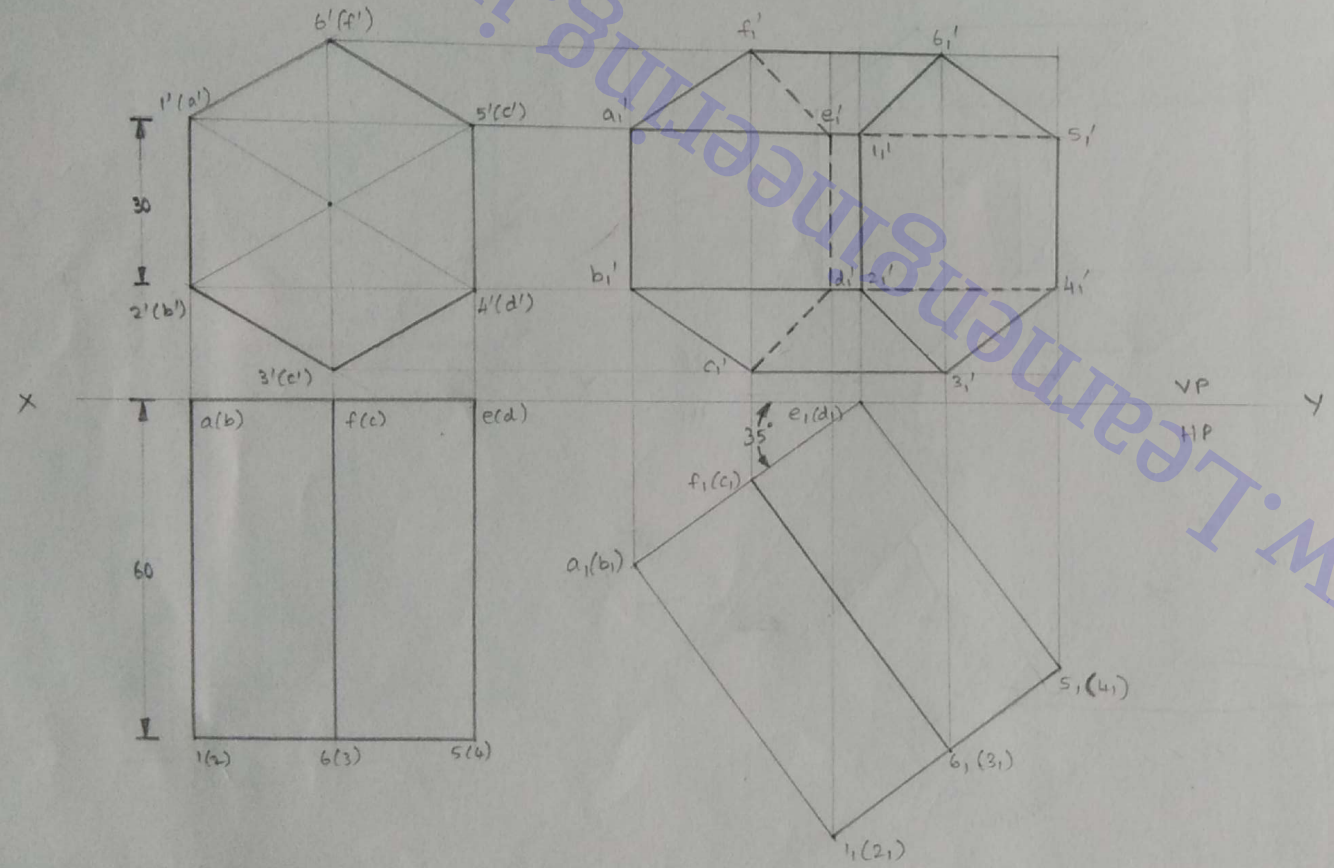


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

2(c).

PROJECTION OF A HEXAGONAL PRISM

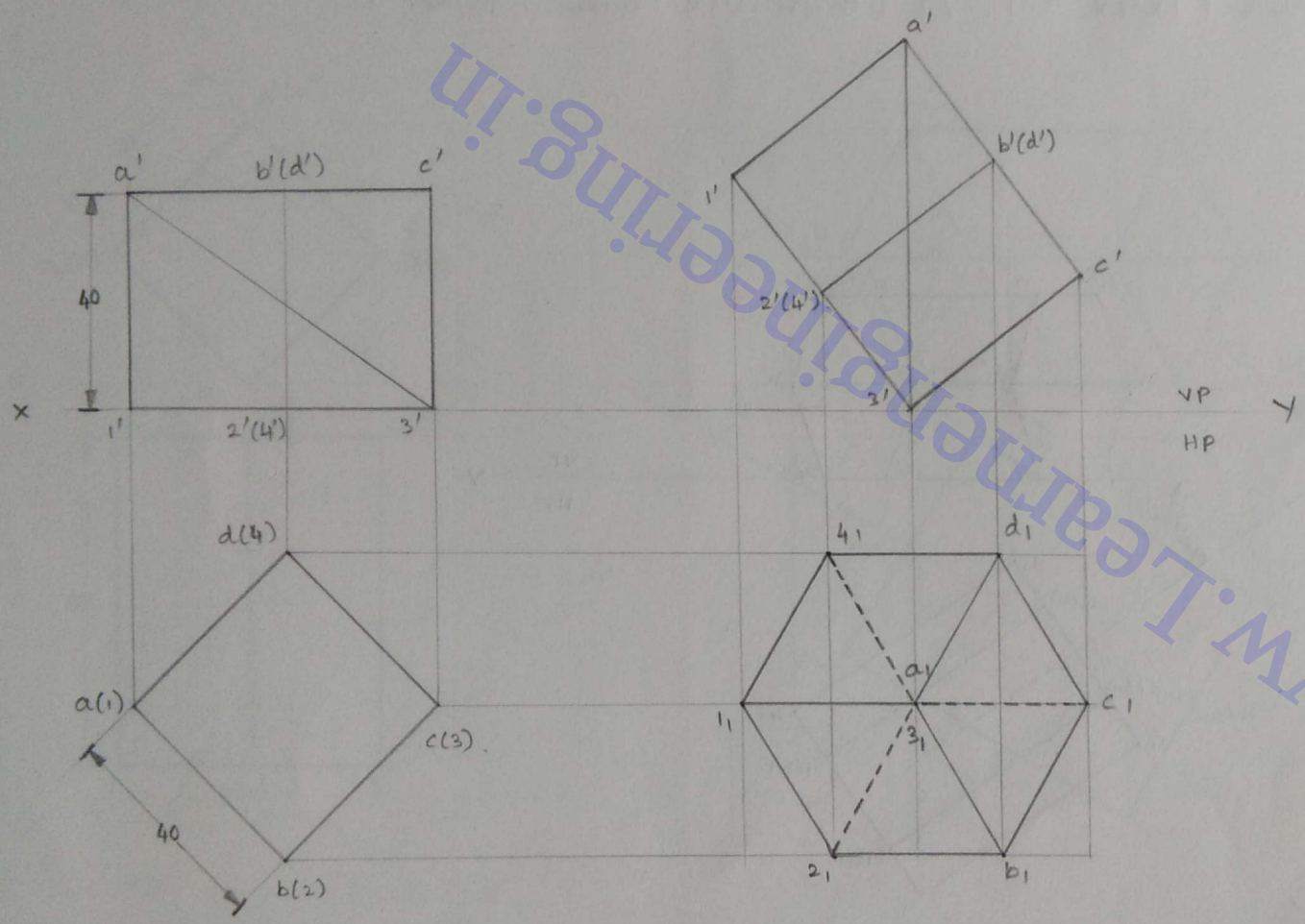


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

3. Draw the projections of a cube of side 40mm when it rests on one of its corner with a diagonal of the solid vertical.

PROJECTION OF A CUBE

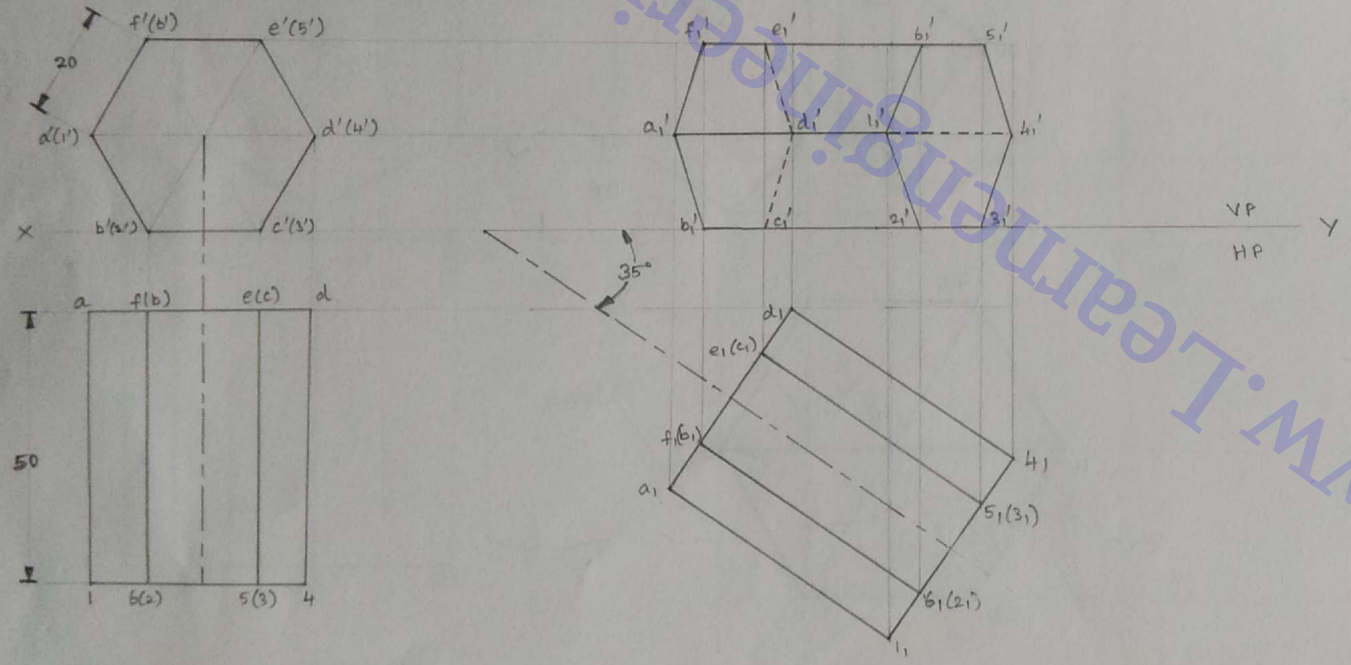


ALL DIMENSIONS ARE IN "MM"

SCALE 1:1

4. Draw the projections of hexagonal prism of base side 20mm and axis length 50mm when it is lying on the ground on one of its rectangular faces and the axis is inclined at 35^0 to the VP.{*Change of position

PROJECTION OF A HEXAGONAL PRISM

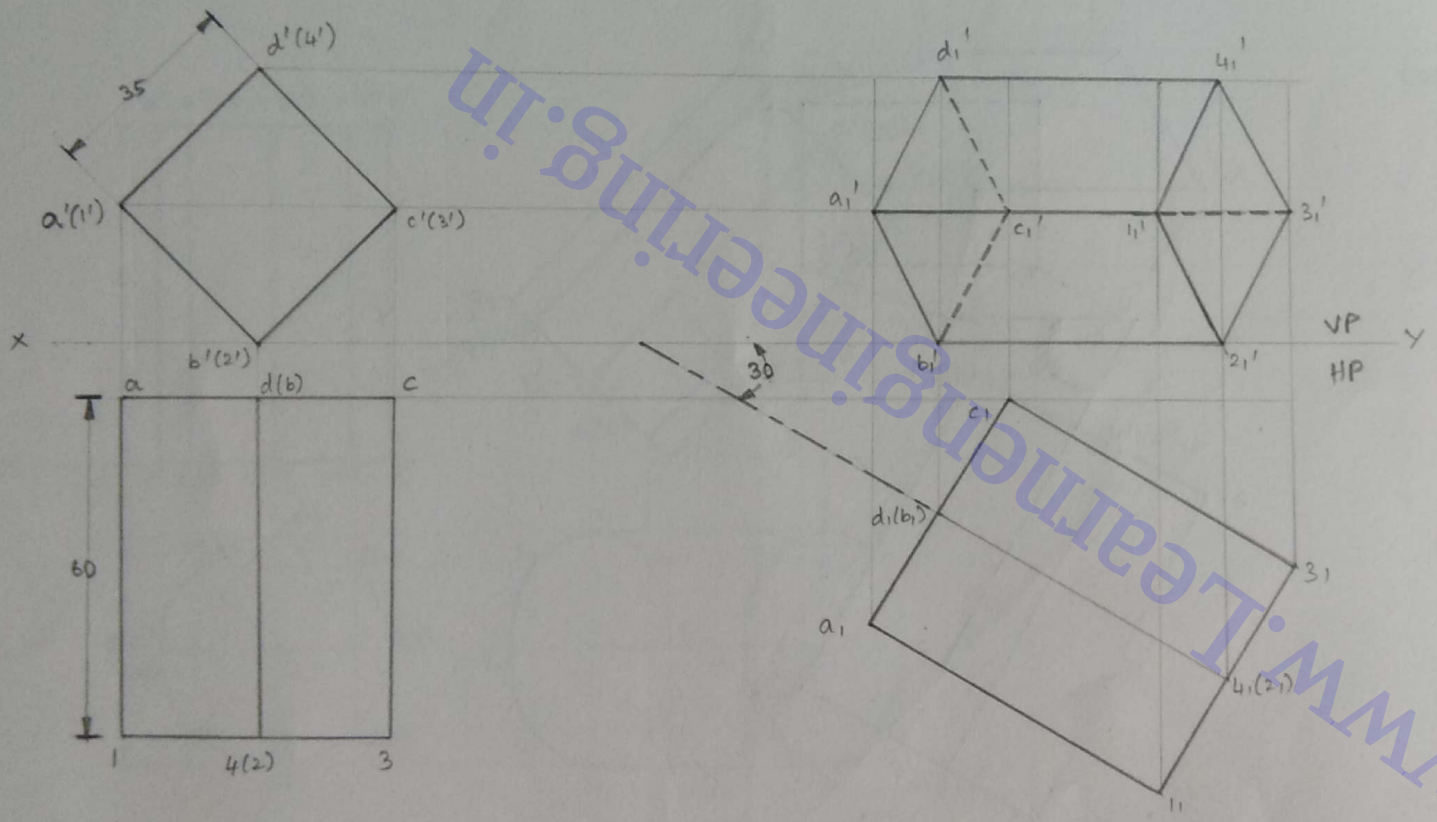


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

5. A square prism of base side 35mm and axis length 60mm lies on the HP on one of its longer edges with its faces equally inclined to the HP. Draw its projections when its axis is inclined at 30^0 to the VP.

PROJECTION OF A SQUARE PRISM

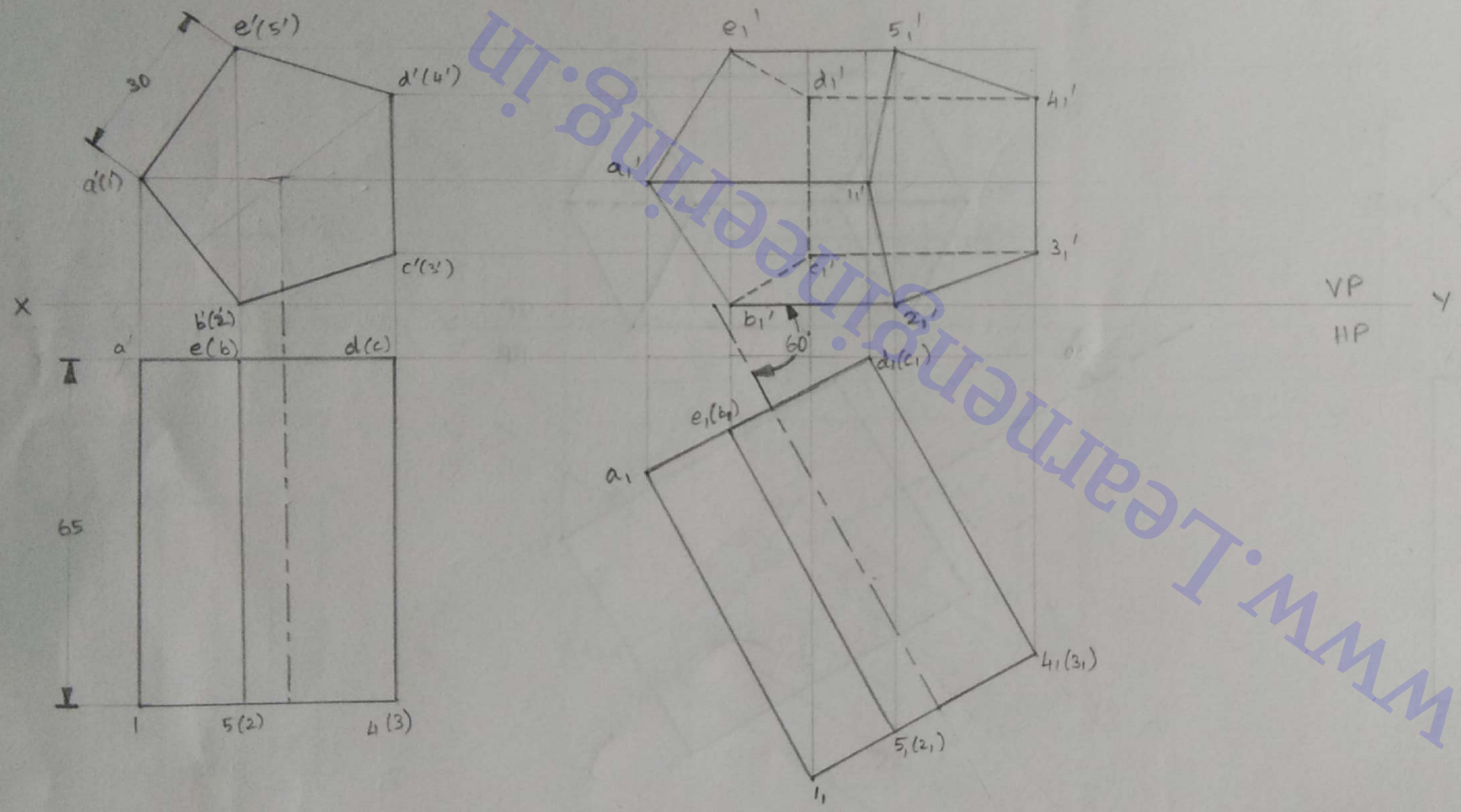


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

6. Draw the projections of a pentagonal prism of 30mm side of base and 65mm long lying on one of its longer edges on the HP with one rectangular face perpendicular to the HP such that the axis makes 60^0 with VP.

PROJECTION OF A PENTAGONAL PRISM

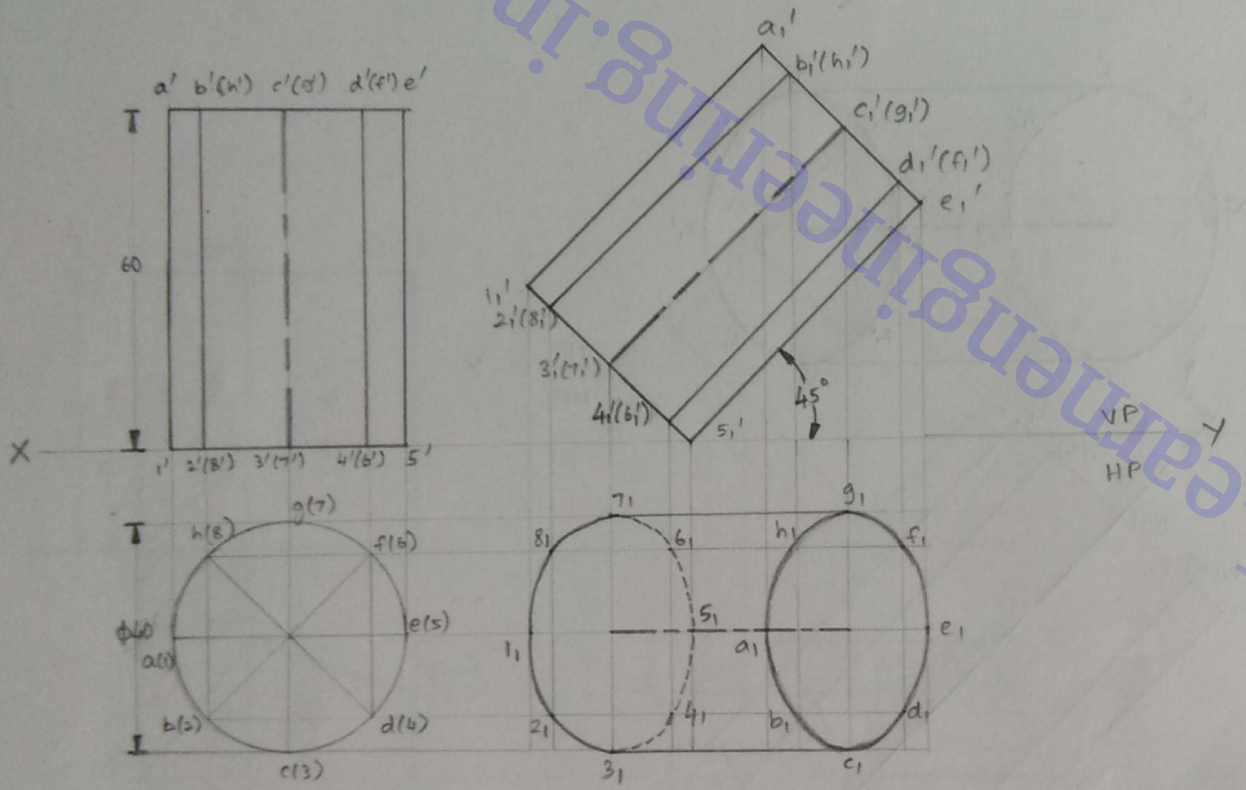


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

7. A cylinder of base diameter 40mm and altitude 60mm rest with one of its base point on HP. One of the generator lines is inclined at 45^0 to HP and parallel to VP. Draw its projections.

PROJECTION OF A CYLINDER

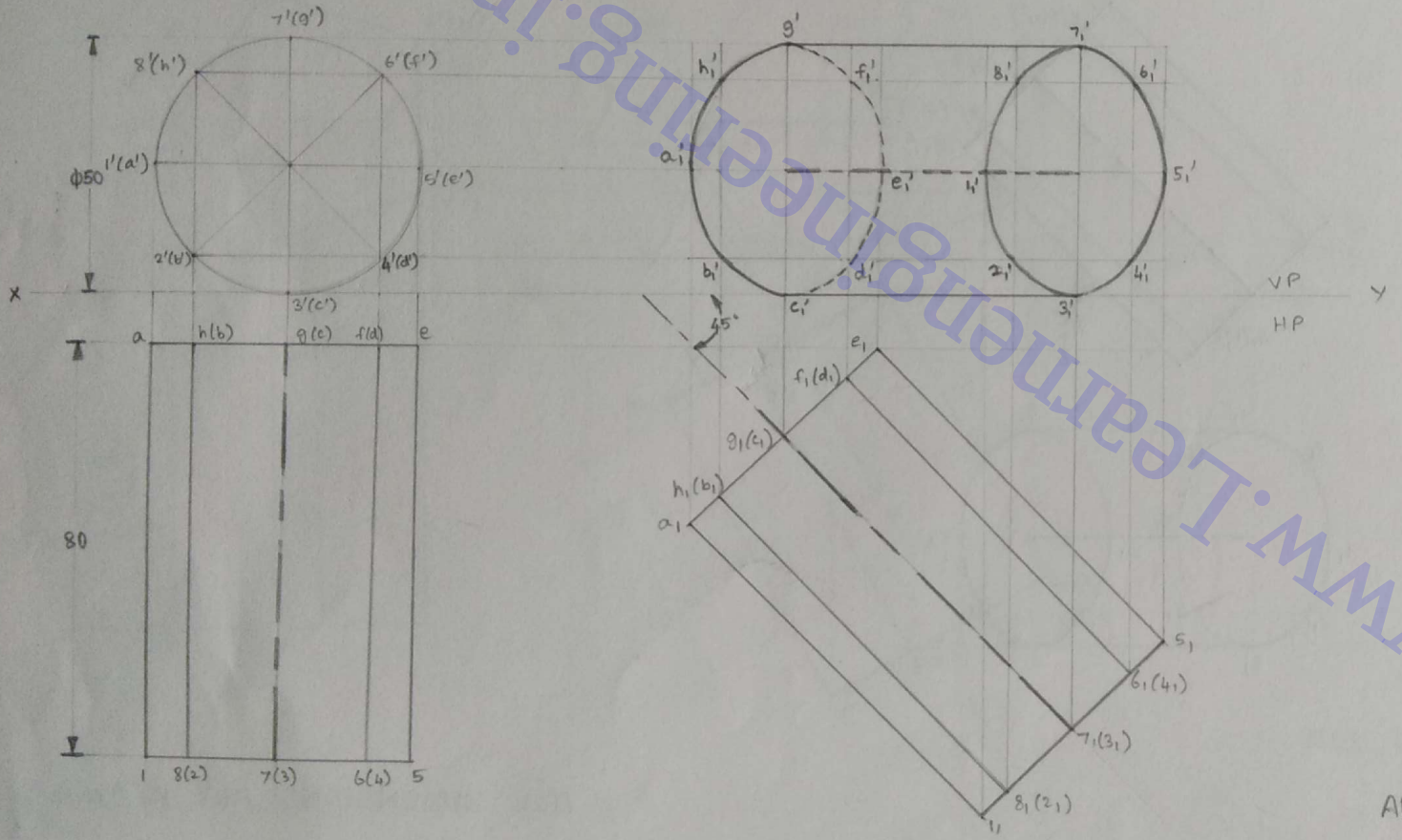


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

8. Draw the projections of a cylinder of diameter 50mm and axis length 80mm when it's lying on the ground with its axis inclined at 45^0 to the VP and parallel to the ground.[*Change of position method

PROJECTION OF A CYLINDER

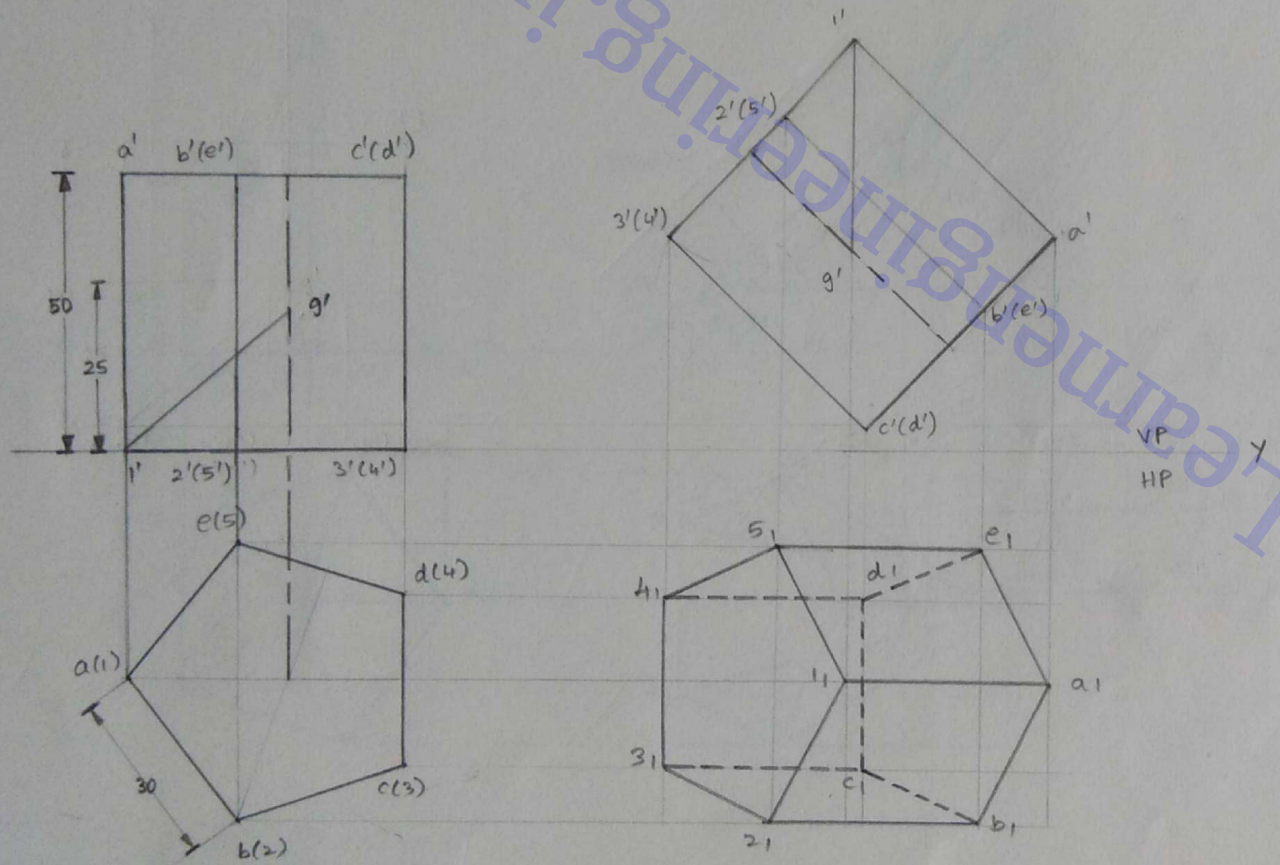


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

9. A pentagonal prism of base side 30mm and axis length 50mm is freely suspended by means of a string from one of its base corners with its axis parallel to VP. Draw its projections.

PROJECTION OF A PENTAGONAL PRISM

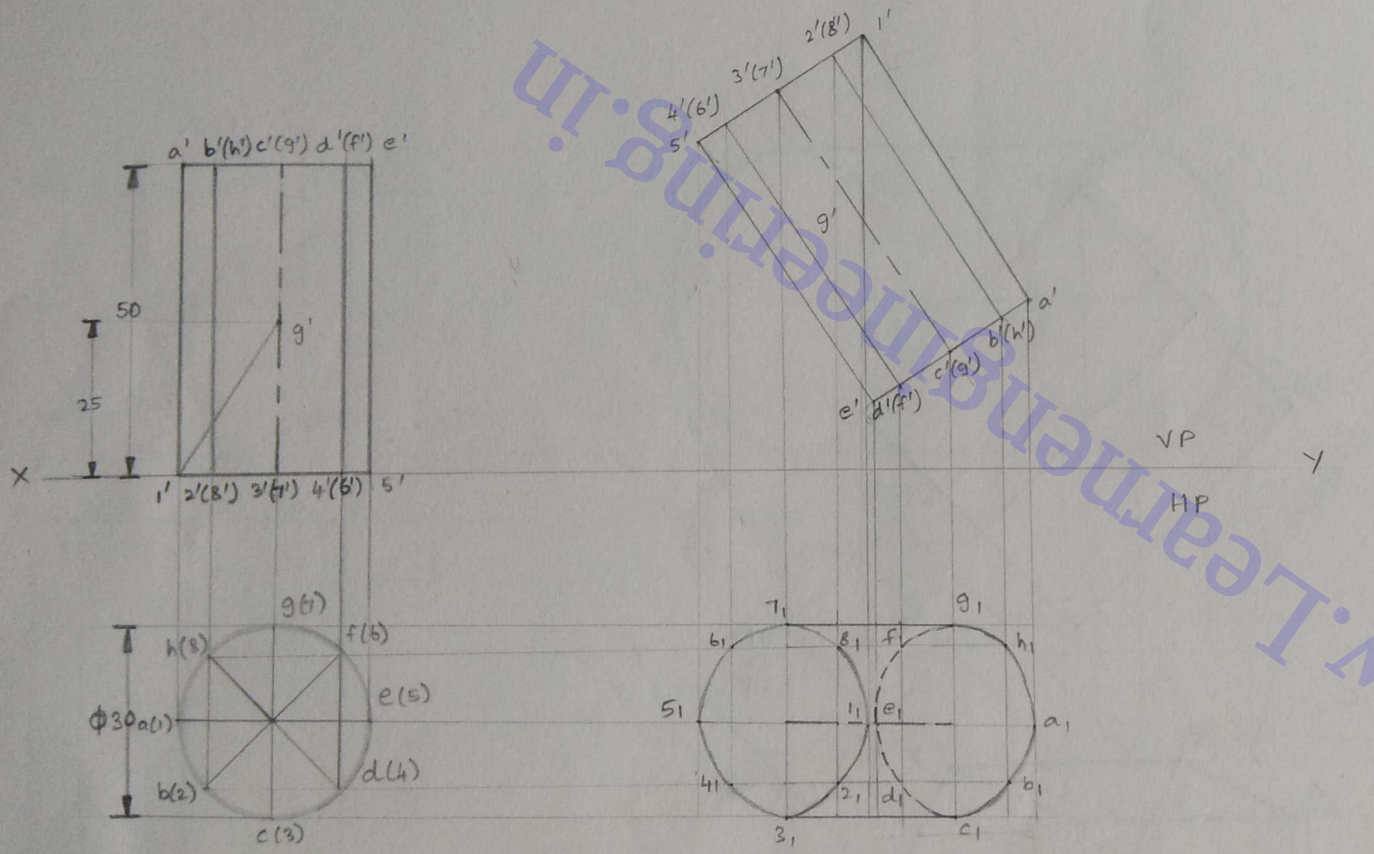


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

10. A cylinder of diameter 30mm and axis length 50mm is freely suspended by means of a string from one of its base point with its axis parallel to VP. Draw its projections.

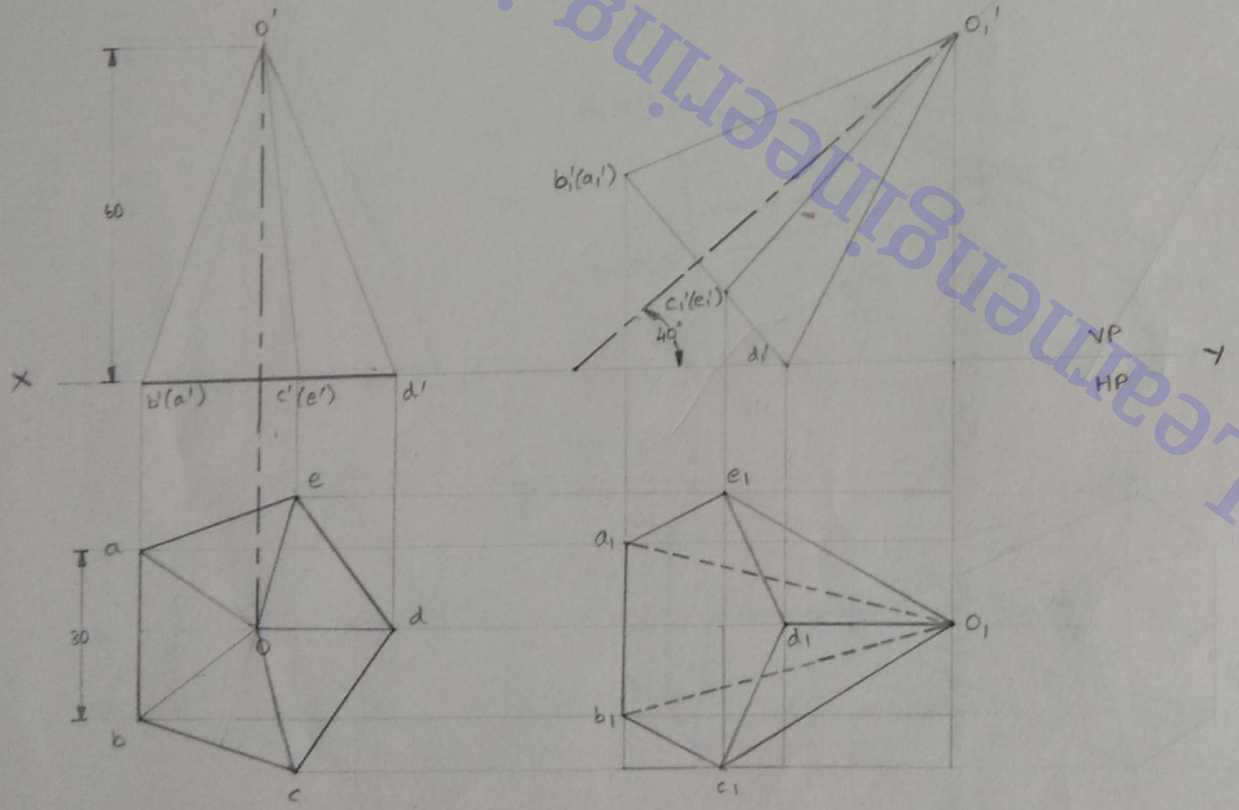
PROJECTION OF A CYLINDER



ALL DIMENSIONS ARE

11. A pentagonal pyramid of side 30mm and height 60mm rest with one of its base corner on HP.
a) Axis is inclined at 40^0 to HP & parallel to VP. Draw its projections. [*Change of position method

PROJECTION OF A PENTAGONAL PYRAMID

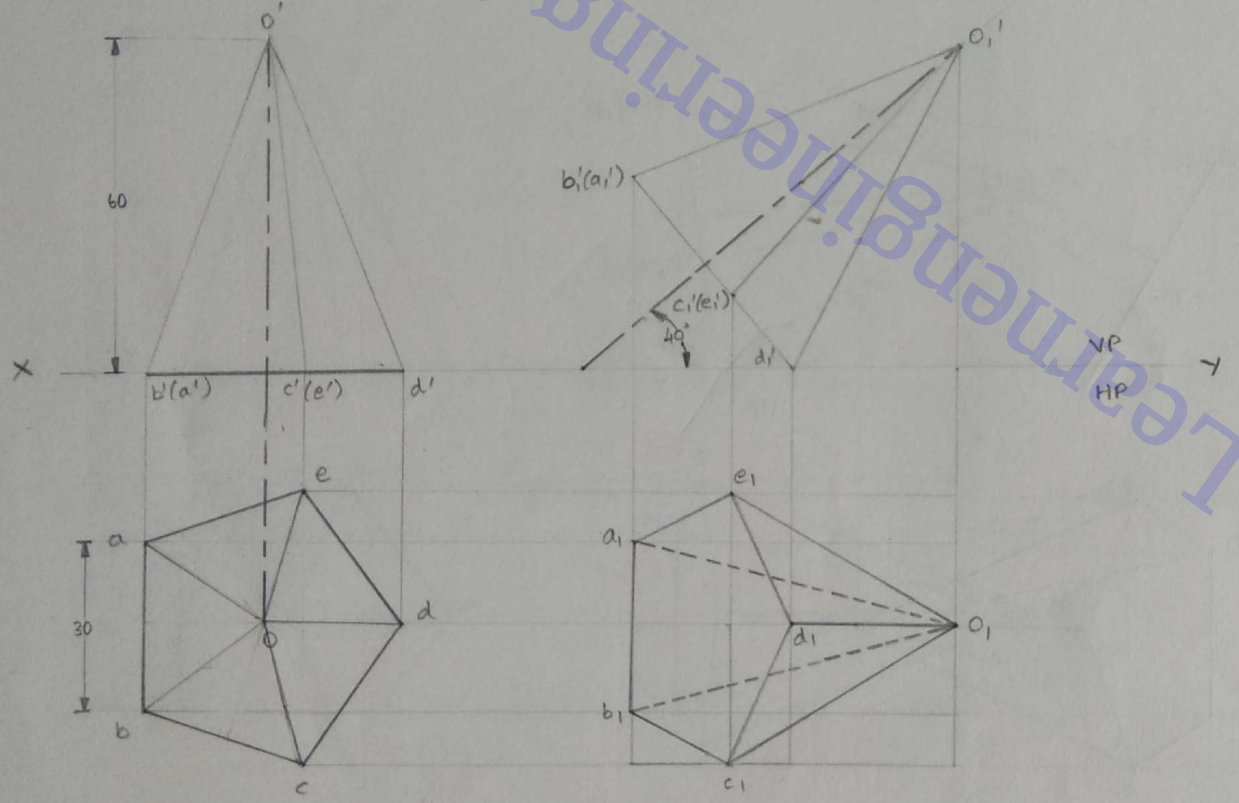


ALL DIMENSIONS ARE IN "mm

SCALE 1:1

11. A pentagonal pyramid of side 30mm and height 60mm rest with one of its base corner on HP.
a) Axis is inclined at 40^0 to HP & parallel to VP. Draw its projections. [*Change of position method

PROJECTION OF A PENTAGONAL PYRAMID

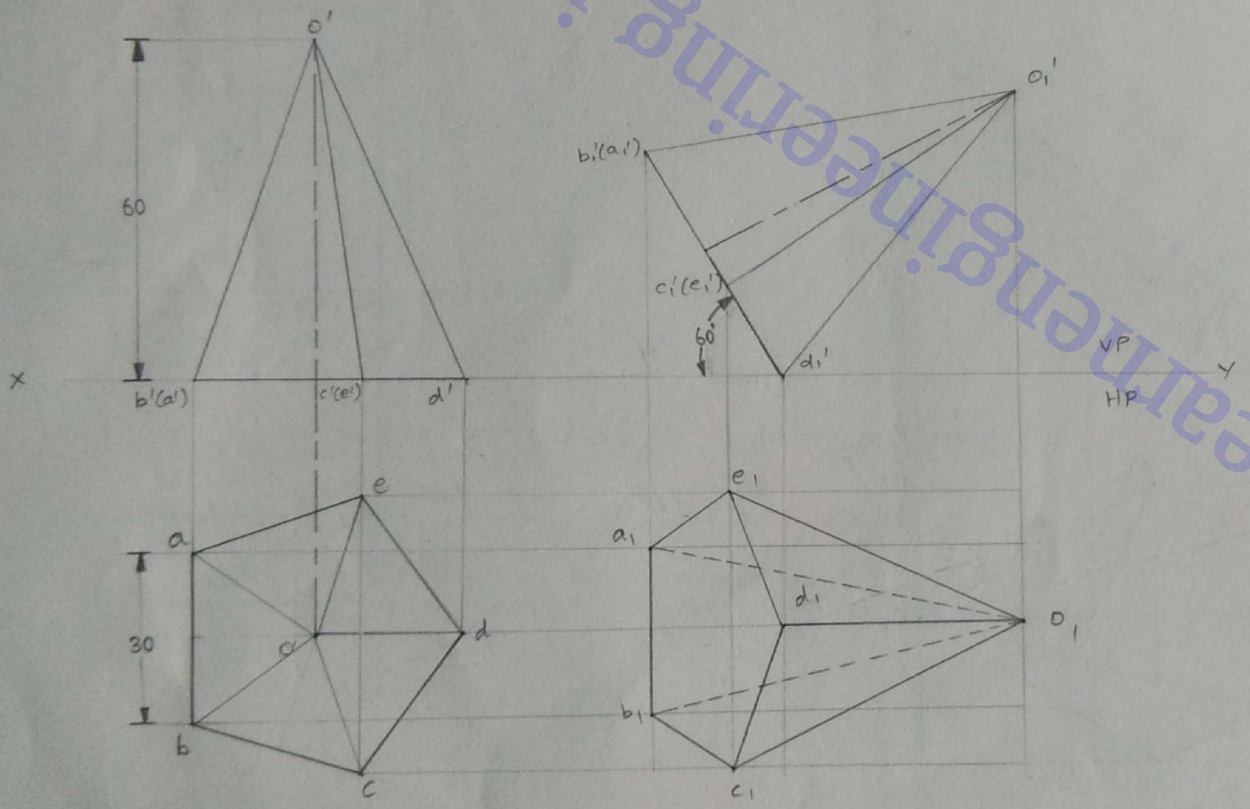


ALL DIMENSIONS ARE IN "mm

SCALE 1:1

b) Base surface is inclined at 60^0 to HP & its axis is parallel to VP. Draw its projections.

PROJECTION OF A PENTAGONAL PYRAMID

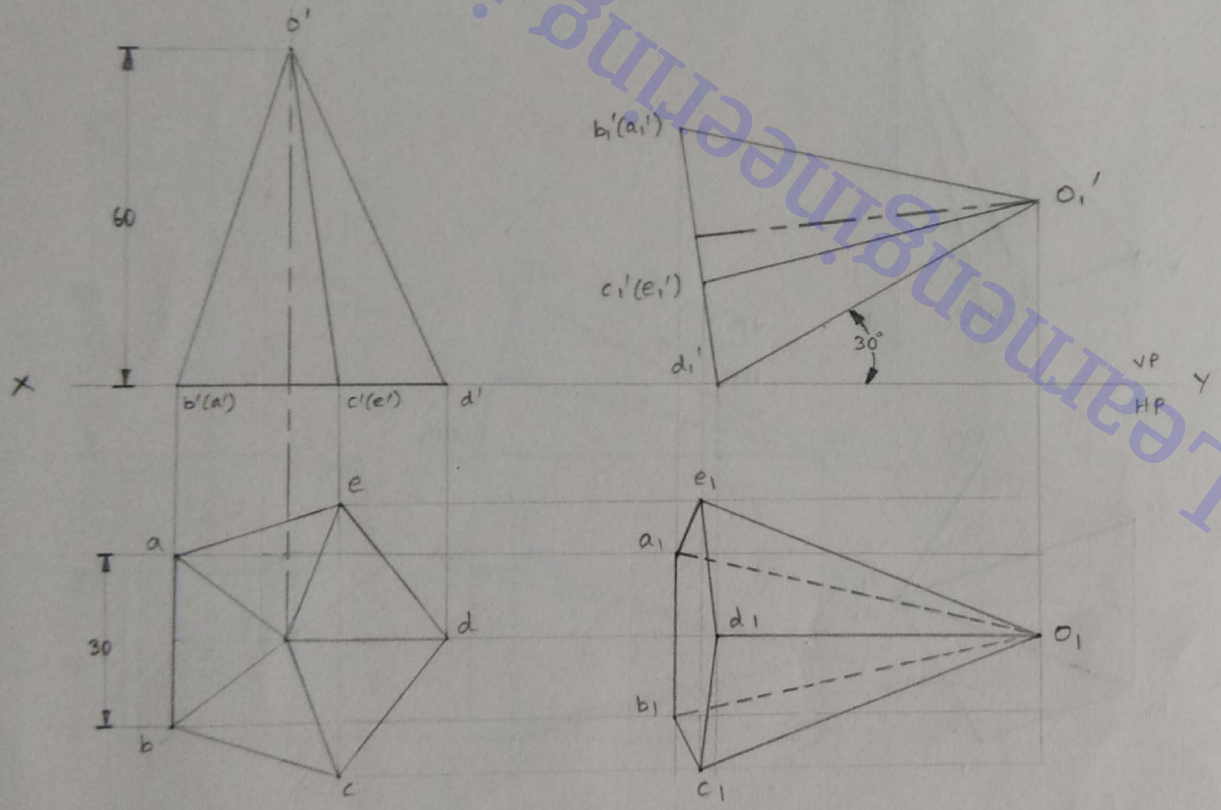


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

c) Slant edge is inclined at 30^0 to HP & parallel to VP. Draw its projections.

PROJECTION OF A PENTAGONAL PYRAMID

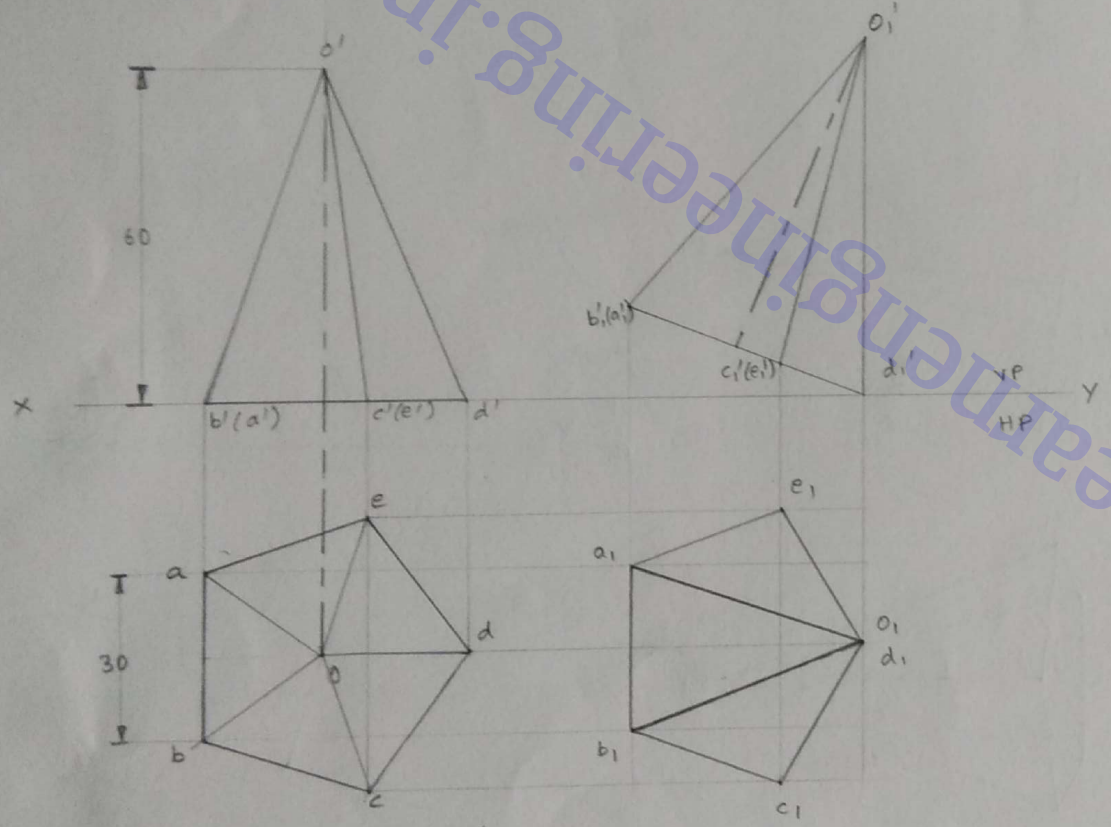


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

d) Slant edge containing the resting corner is vertical and [illegible]. Draw its projections.

PROJECTION OF A PENTAGONAL PYRAMID

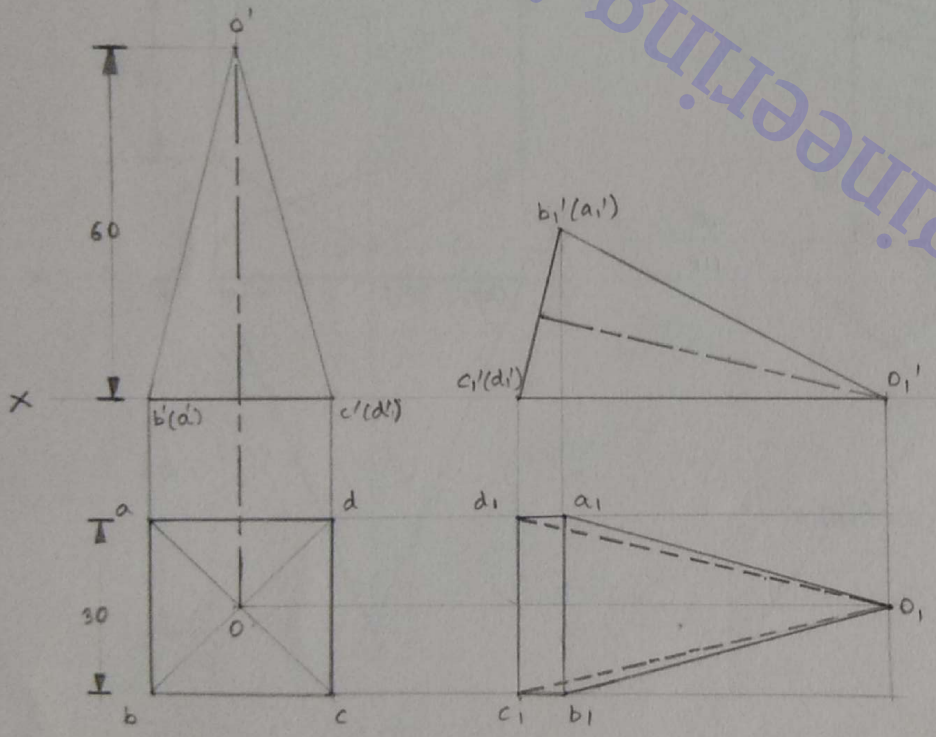


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

12. A square pyramid of side 30mm and height 60mm rest with one of its triangular face on HP and axis parallel to VP. Draw its projections.

PROJECTION OF A SQUARE PYRAMID

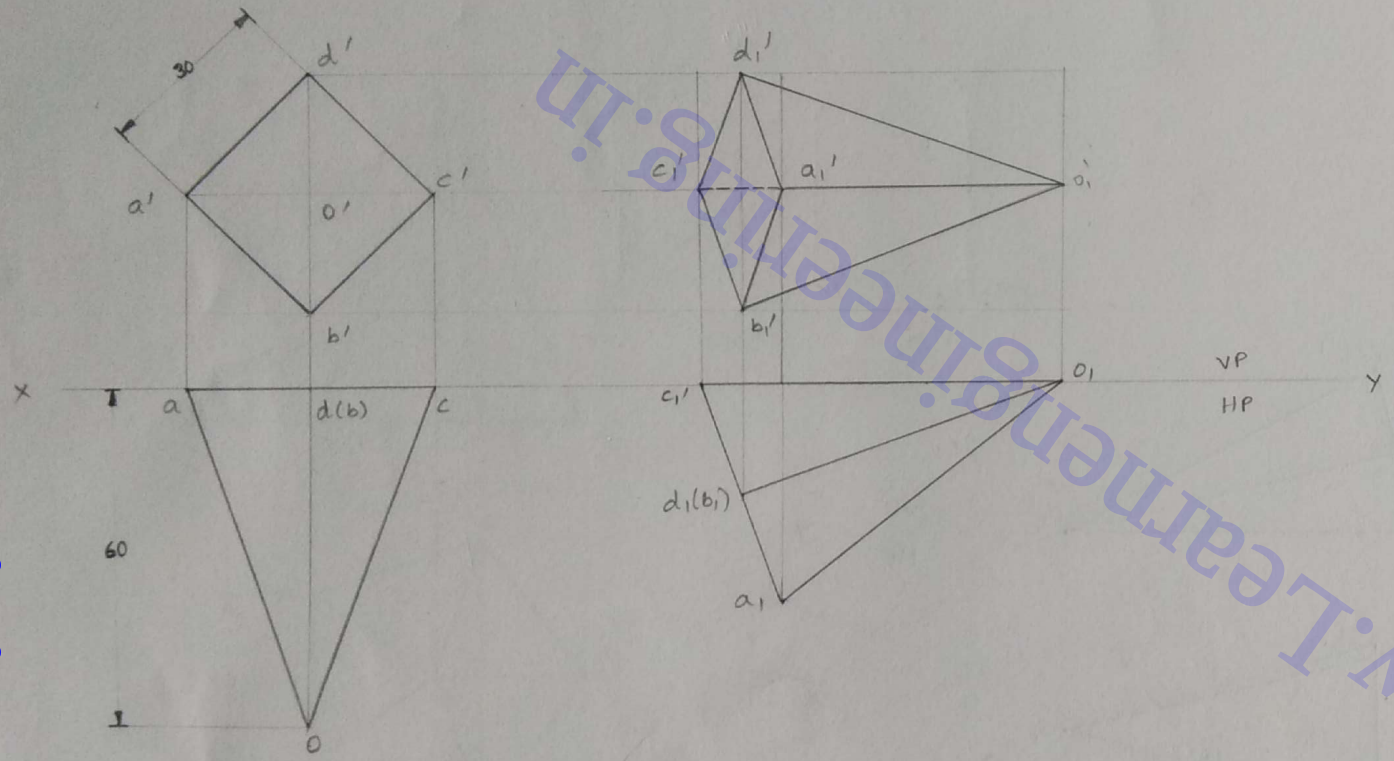


ALL DIMENSIONS ARE IN "mm

SCALE 1:1

13. A square pyramid of side 30mm and height 60mm rest with one of its slant edge on VP and axis parallel to HP. Draw its projections.

PROJECTION OF A SQUARE PYRAMID

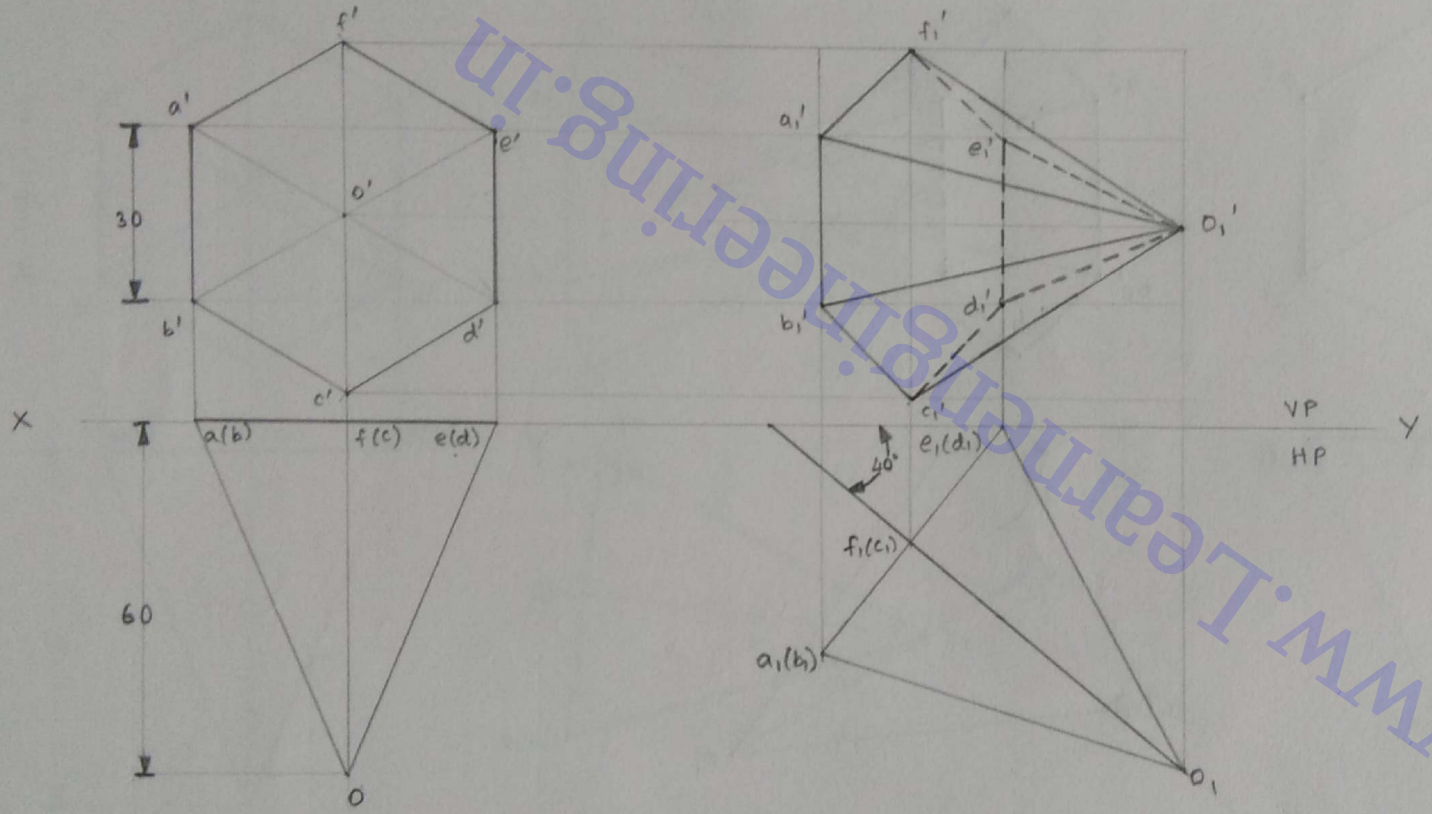


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

14. A hexagonal pyramid of side 30mm and height 60mm rest with one of its base edge on VP.
a) Axis is inclined at 40^0 to VP & parallel to HP. Draw its projections.

PROJECTION OF A HEXAGONAL PYRAMID

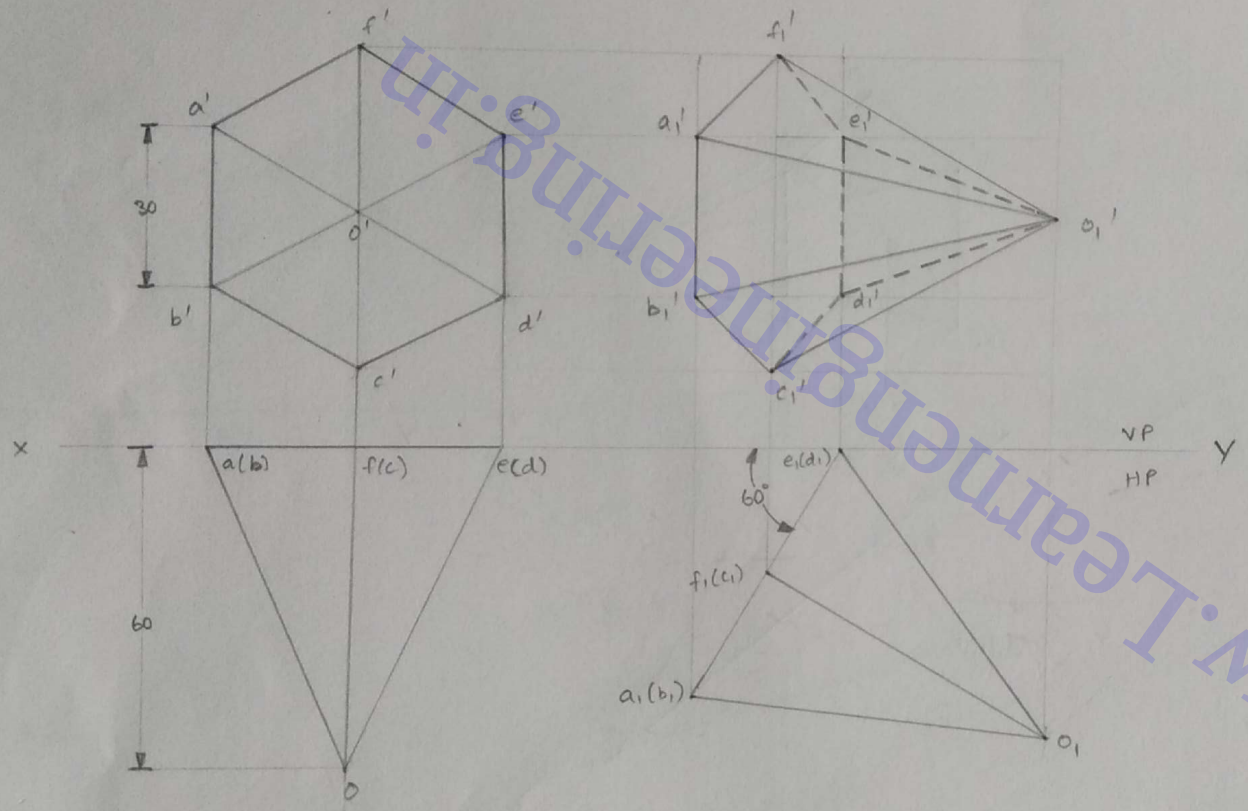


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

b) Base surface is inclined at 60^0 to VP & its axis is parallel to HP. Draw its projections.

PROJECTION OF A HEXAGONAL PYRAMID

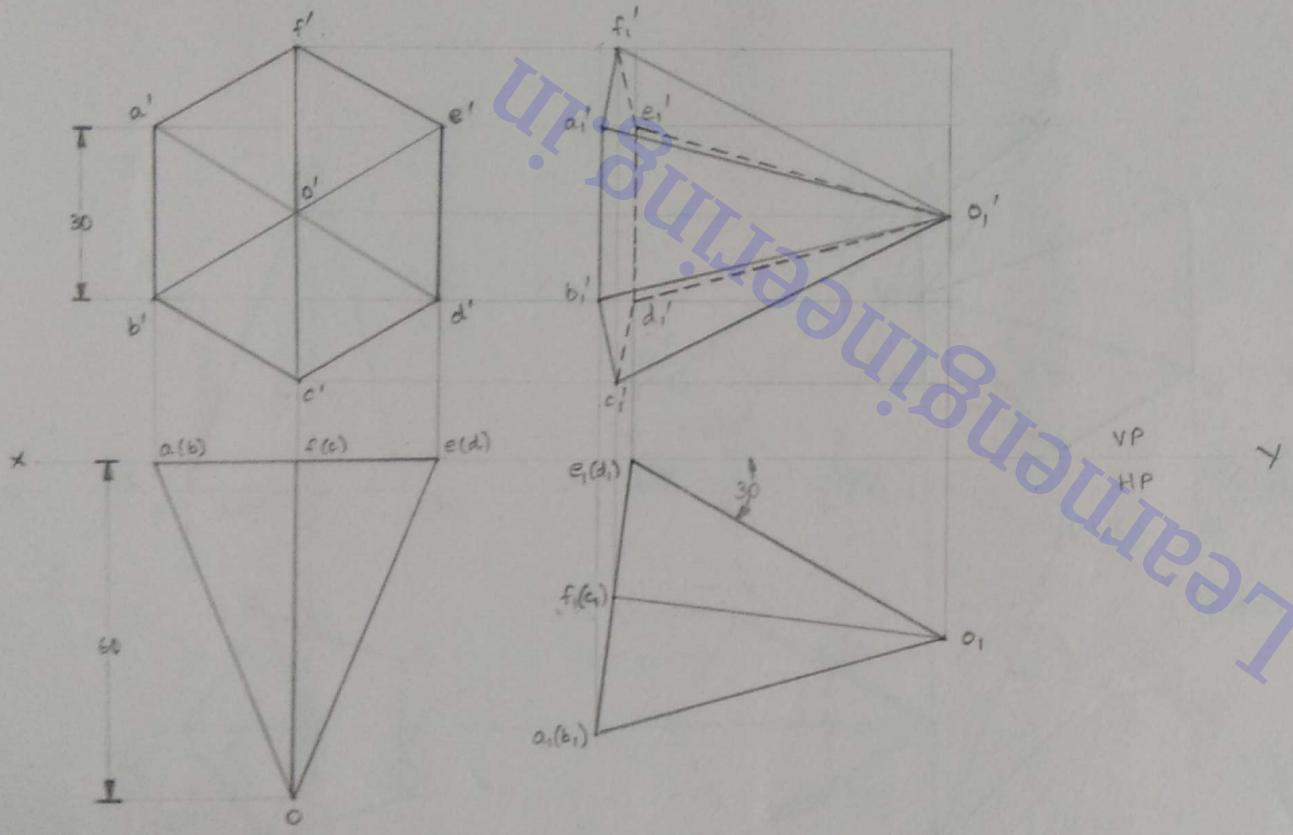


ALL DIMENSIONS ARE IN "MM"

SCALE 1:1

c) Triangular face is inclined at 30^0 to VP & parallel to HP. Draw its projections.

PROJECTION OF A HEXAGONAL PYRAMID

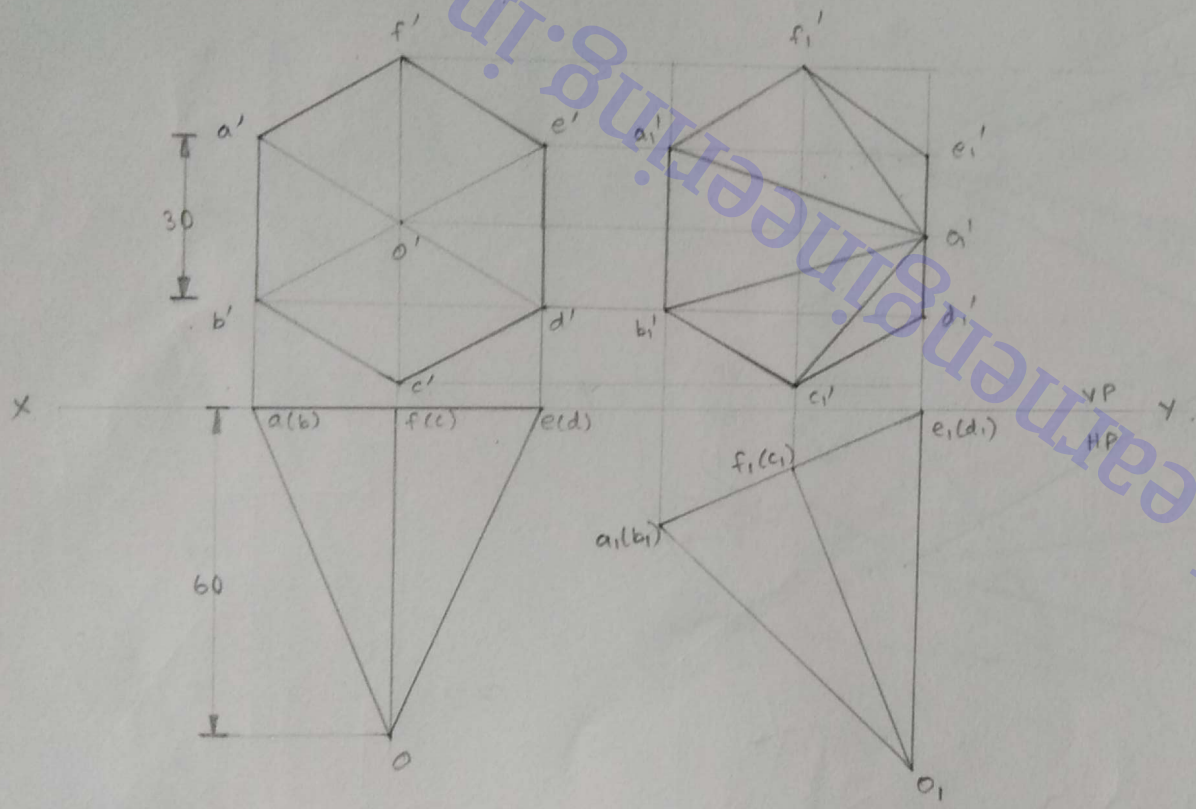


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

d) Triangular face containing the resting edge is vertical [or] Triangular face containing the resting edge perpendicular to both VP and HP. Draw its projections.

PROJECTION OF A HEXAGONAL PYRAMID

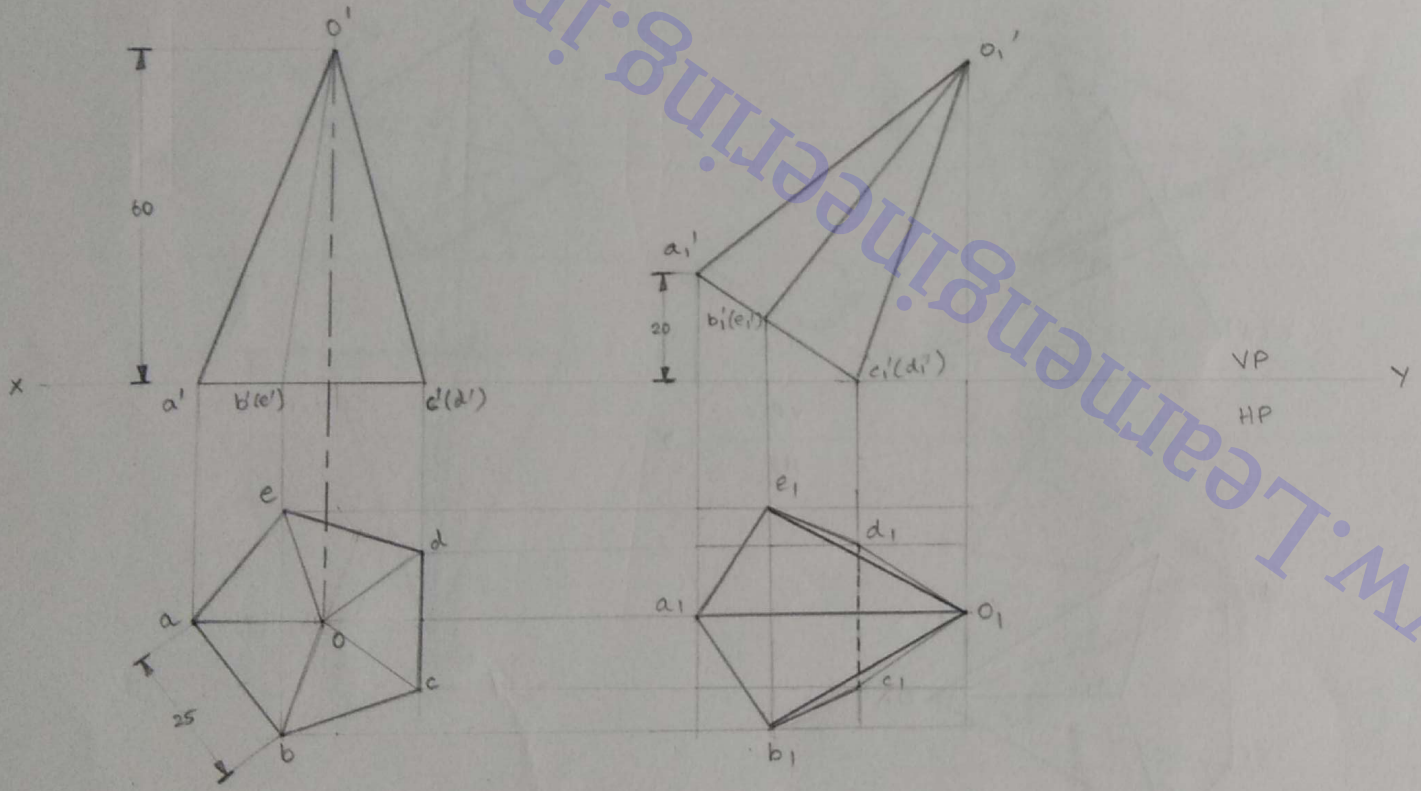


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

15. A right pentagonal pyramid of base side 25mm and altitude 60mm rests on one of its base edge on HP, the base being lifted up until the highest corner in its is 20mm above HP. Draw its projections.

PROJECTION OF A RIGHT PENTAGONAL PYRAMID

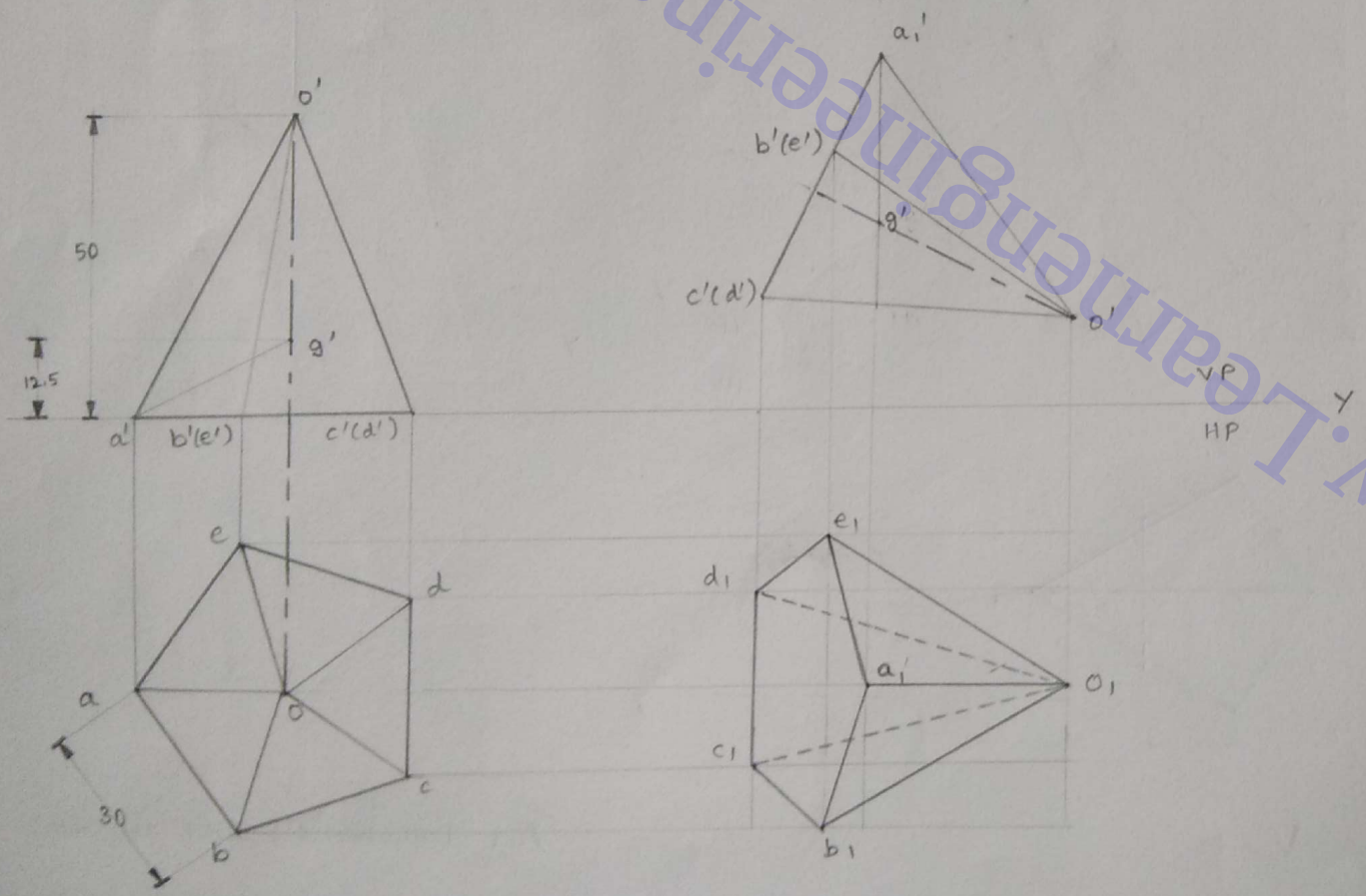


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

16. A pentagonal pyramid of base side 30mm and axis length 50mm is freely suspended by means of a string from one of its base corners with its axis parallel to VP. Draw its projections.

PROJECTION OF A PENTAGONAL PYRAMID

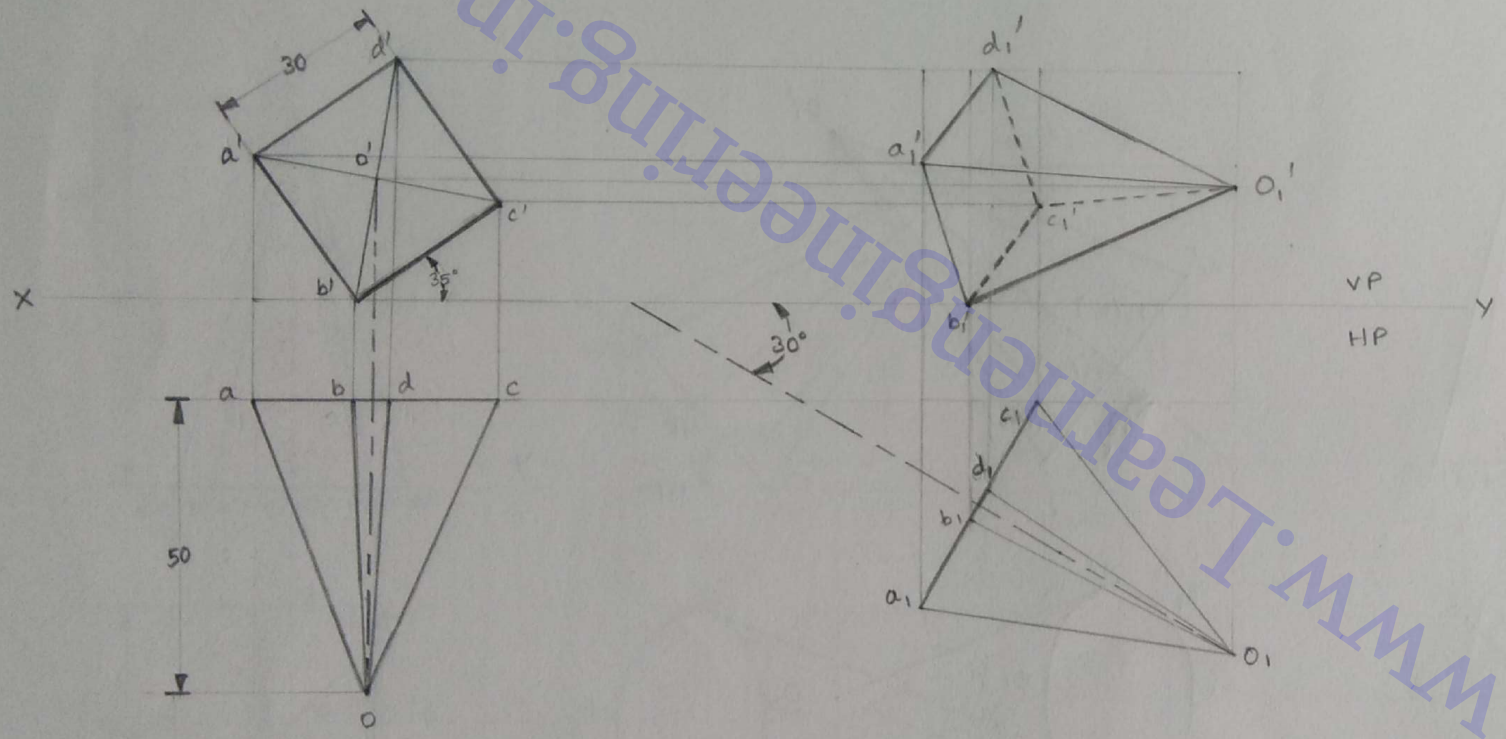


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

17. Draw the projections of a square pyramid of base of side 30mm and axis 50mm when it is resting on the HP on one of its base corners with a base side containing the corner making 35^0 with the HP. The axis is inclined at 30^0 to the VP and is parallel to the HP and the vertex is away from the VP.

PROJECTION OF A SQUARE PYRAMID

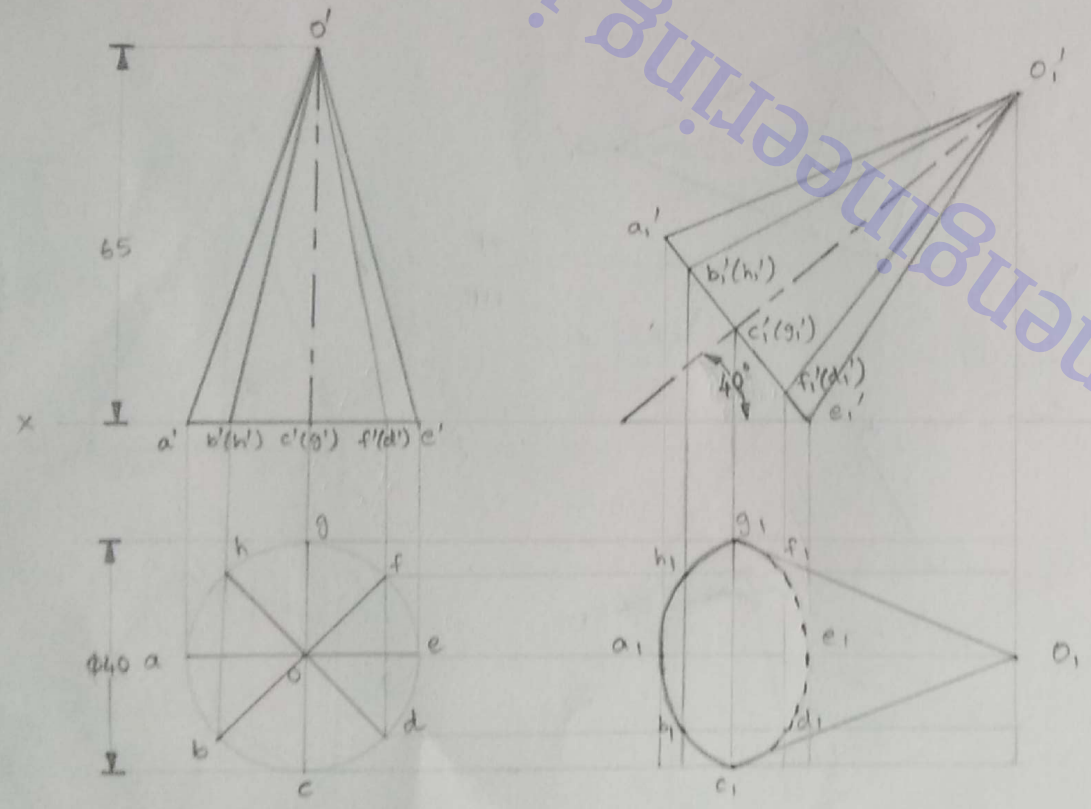


ALL DIMENSIONS ARE IN "MM"

SCALE 1:1

18. A cone of base diameter 40mm & height 65mm is resting on HP on a point on the circumference of the base.
a) Axis is inclined at 40^0 to HP and axis parallel to VP. Draw its projections. [*Change of position method

PROJECTION OF A CONE

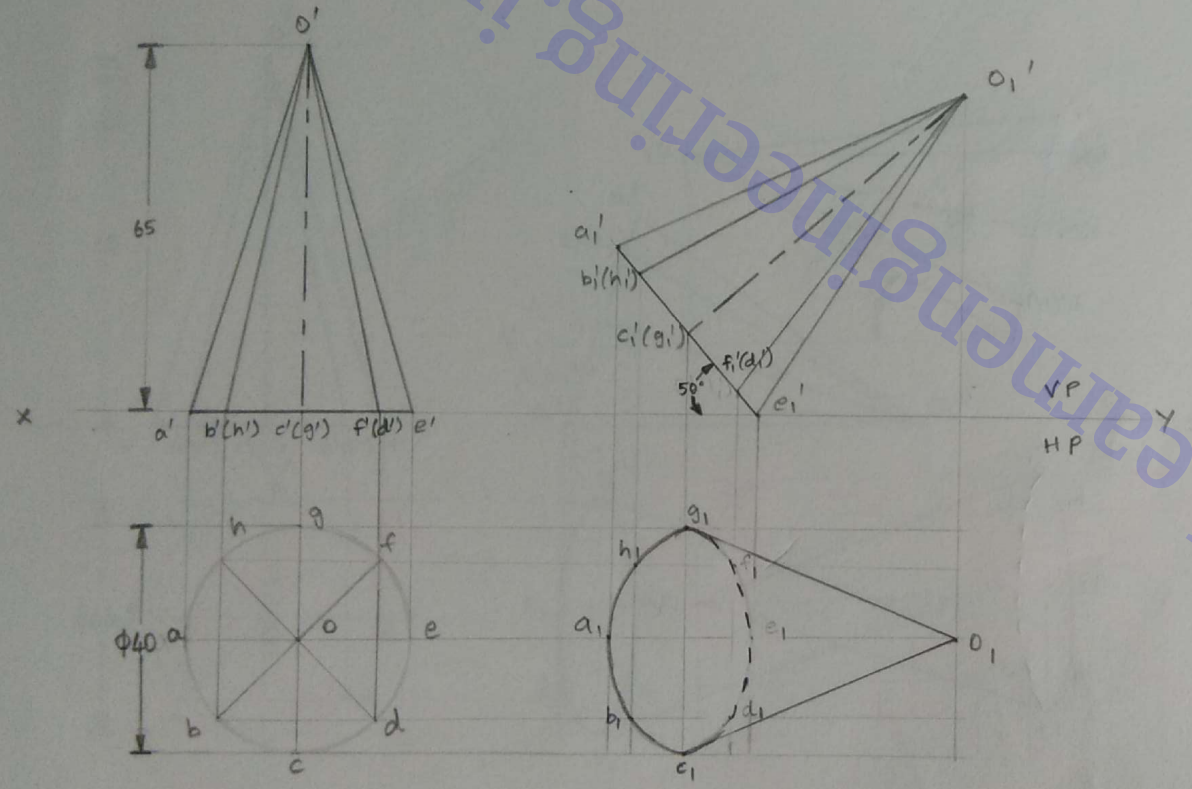


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

b) Base surface is inclined at 50^0 to HP and axis parallel to VP. Draw its projections.

PROJECTION OF A CONE

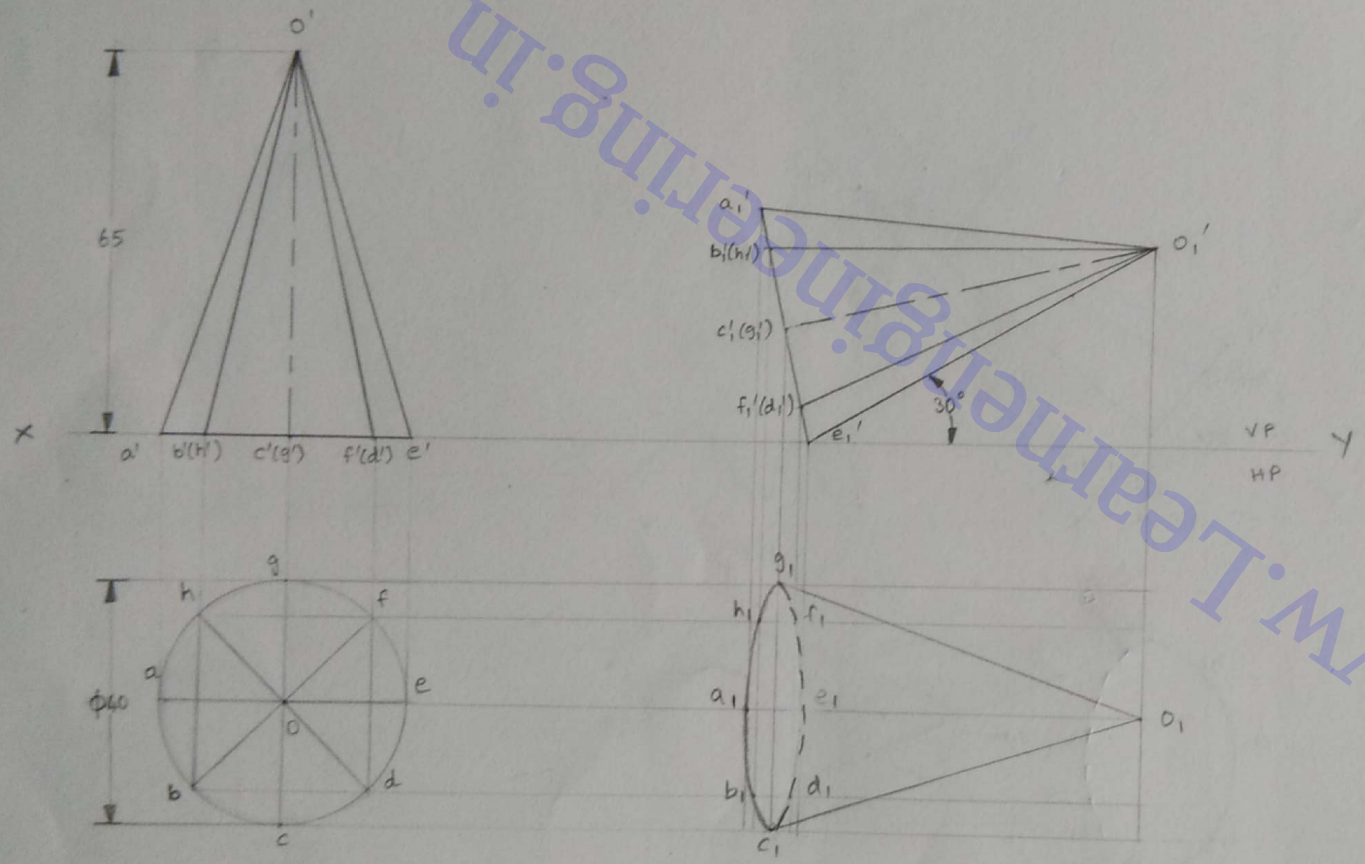


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

c) One of the generator lines is inclined at 30^0 to HP and axis parallel to VP. Draw its projections.

PROJECTION OF A CONE

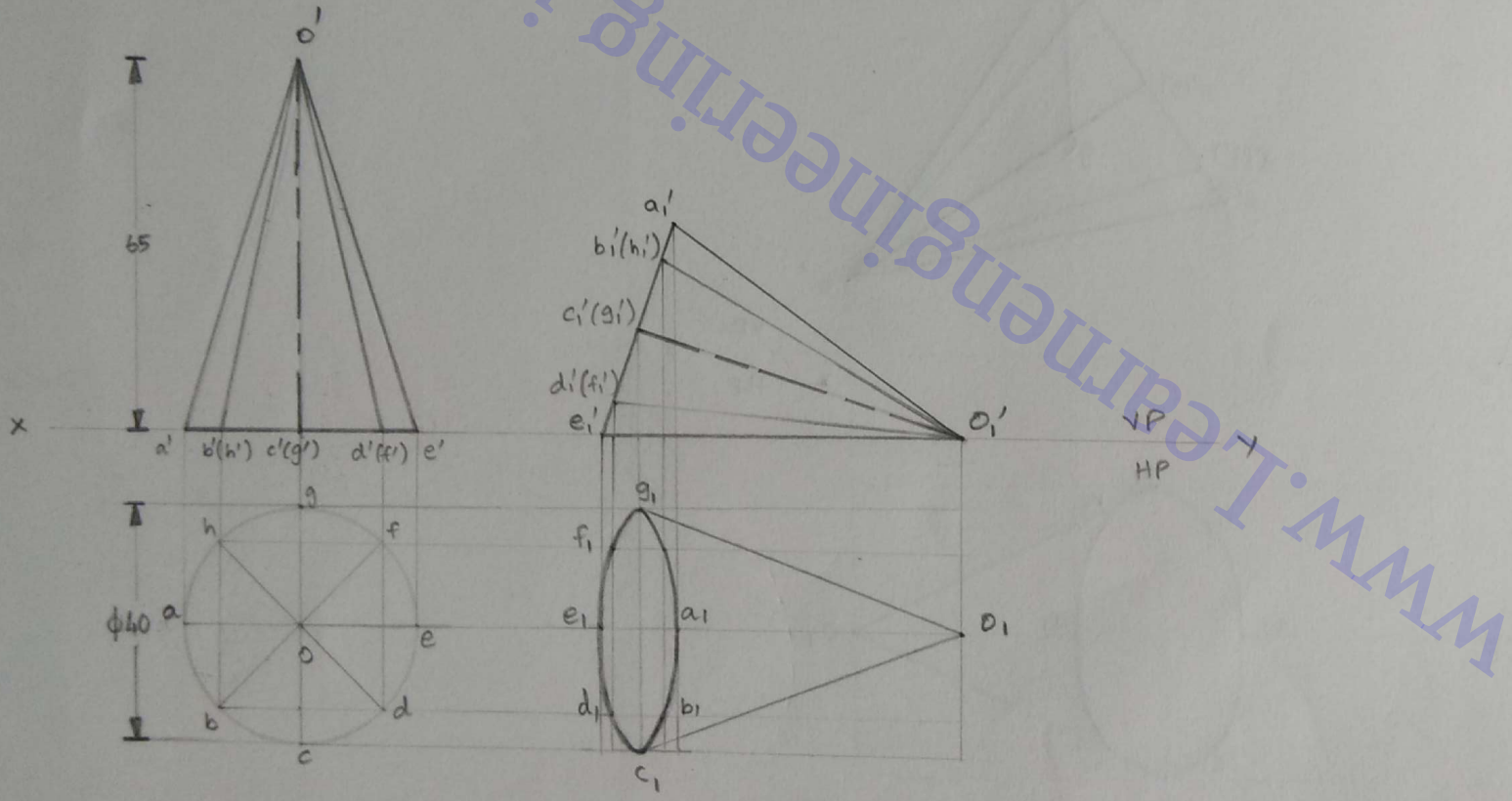


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

19. A cone of base diameter 40mm & height 65mm is resting on HP on one of its generators with its axis parallel to VP. Draw its projections. [*Change of position method*Change of reference line method

PROJECTION OF A CONE

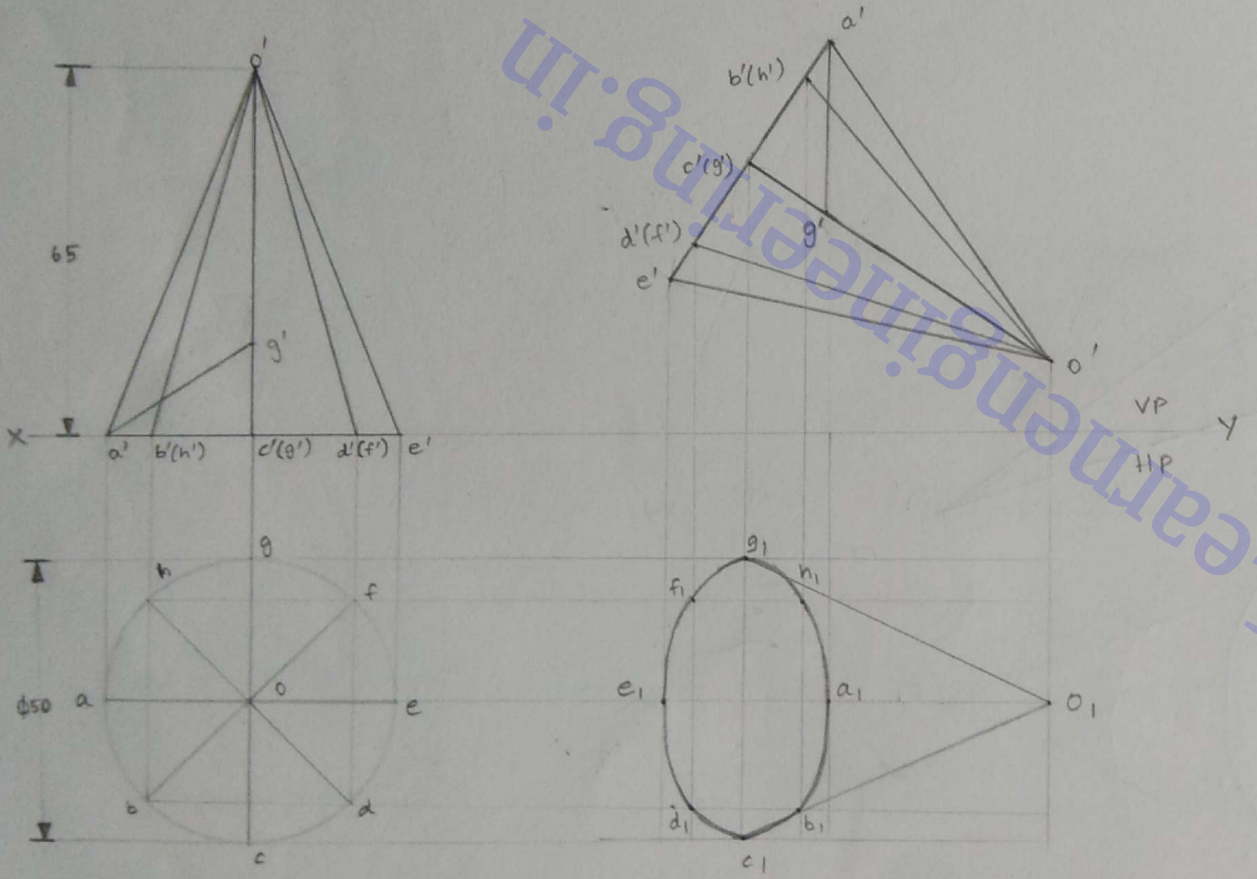


ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

20. A cone of base diameter 50mm and altitude 65mm is freely suspended by means of a string from one of its base point with its axis parallel to VP. Draw its projections.

PROJECTION OF A CONE



ALL DIMENSIONS ARE IN "mm"

SCALE 1:1

UNIT - 3

PROJECTION OF SOLIDS

STAFF INCHARGE - Mr. G. ASHWIN PRABHU
ASSISTANT PROFESSOR
MECHANICAL

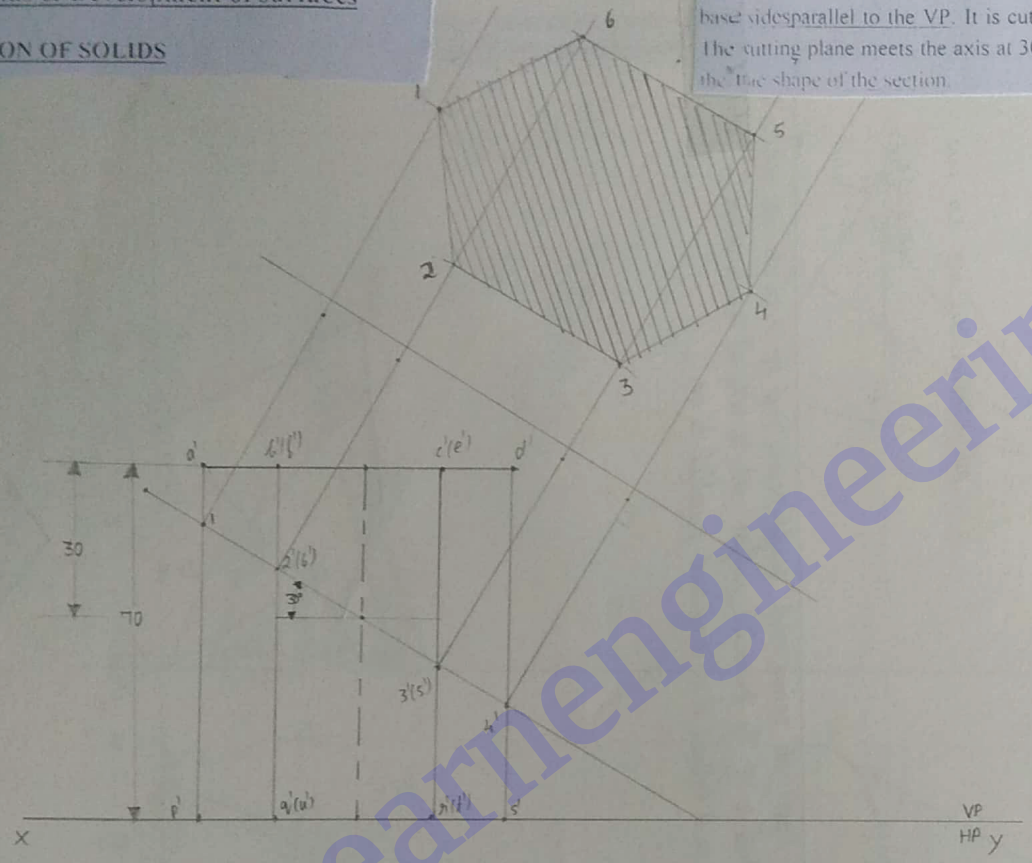
- S. KAVIN RAGHAV
MECHANICAL - 'B'

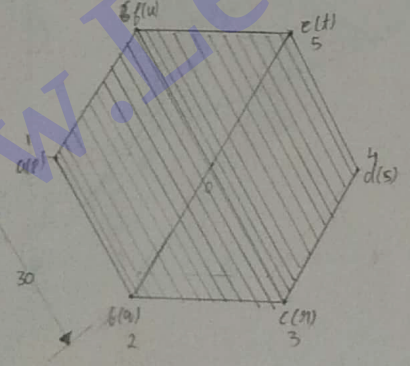
MR. G. ASHWIN PRABHU
ASSISTANT PROFESSOR
MECHANICAL

Unit-4 Section of solids & Development of surfaces

SECTION OF SOLIDS

A Hexagonal prism of base side 30mm and axis length 70mm rests on one of its ends on the HP with two base sidesparallel to the VP. It is cut by a plane perpendicular to the VP and inclined at 30° to the HP. The cutting plane meets the axis at 30mm from the top. Draw the plan, elevation, sectional top view and the true shape of the section.

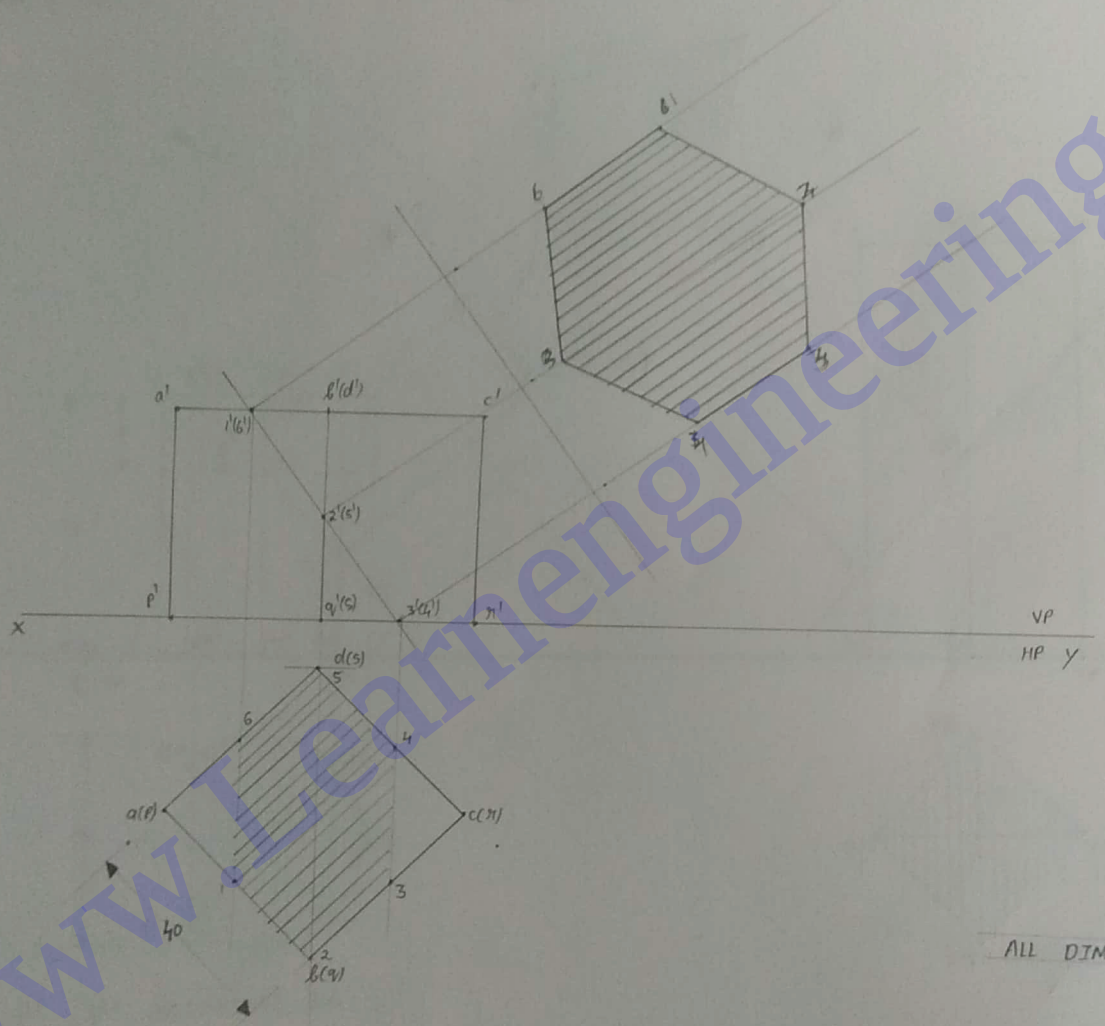




ALL DIMENSIONS ARE IN 'mm'

SCALE 1:1

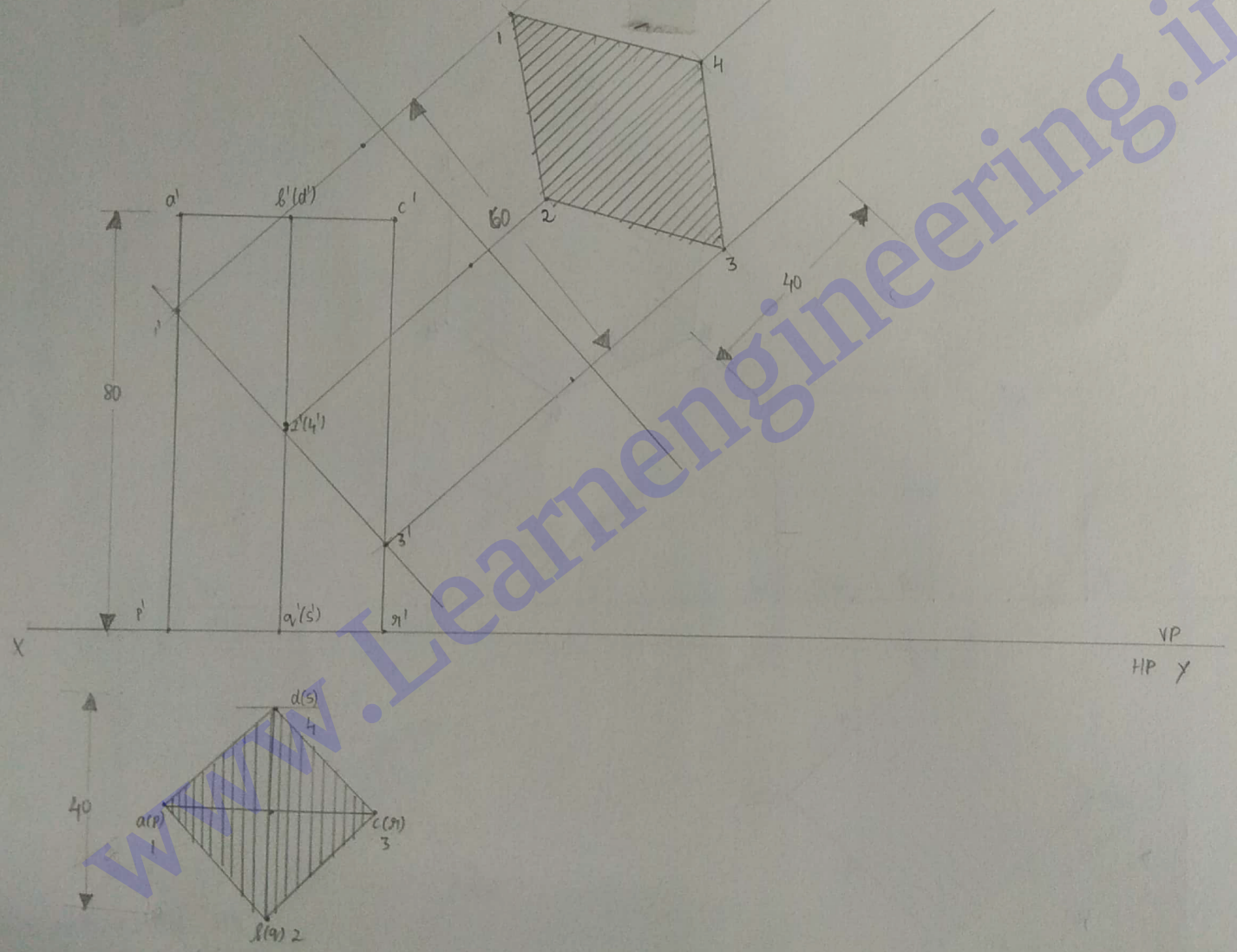
A cube of side 30mm is placed and cut by a plane in such a way that the true shape of the section is a regular hexagon. Draw the front and top views of the cube and determine the inclination of the plane with the HP.



ALL DIMENSIONS ARE IN 'mm'

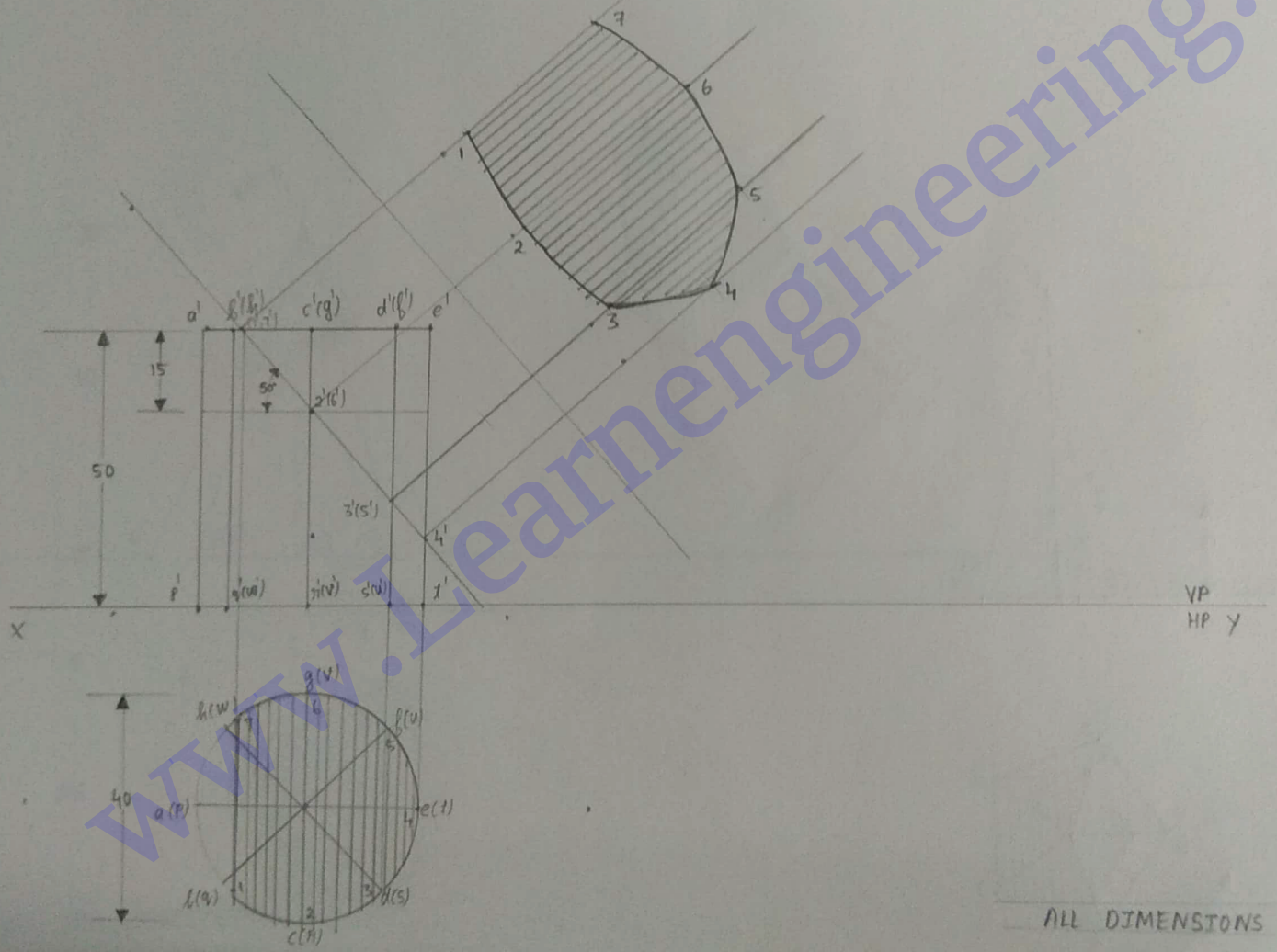
SCALE 1:1

3 A square prism of height 80mm and base of diagonal 40mm rests on the HP on its base with base edges equally inclined to the VP. It is cut by a section plane passing through the midpoint of the axis of the prism perpendicular to the VP and inclined to the HP. Find the inclinations of the cutting plane if the true shape of the section is a rhombus ofdiagonal 60mm and 40mm.



ALL DIMENSIONS ARE IN 'mm'

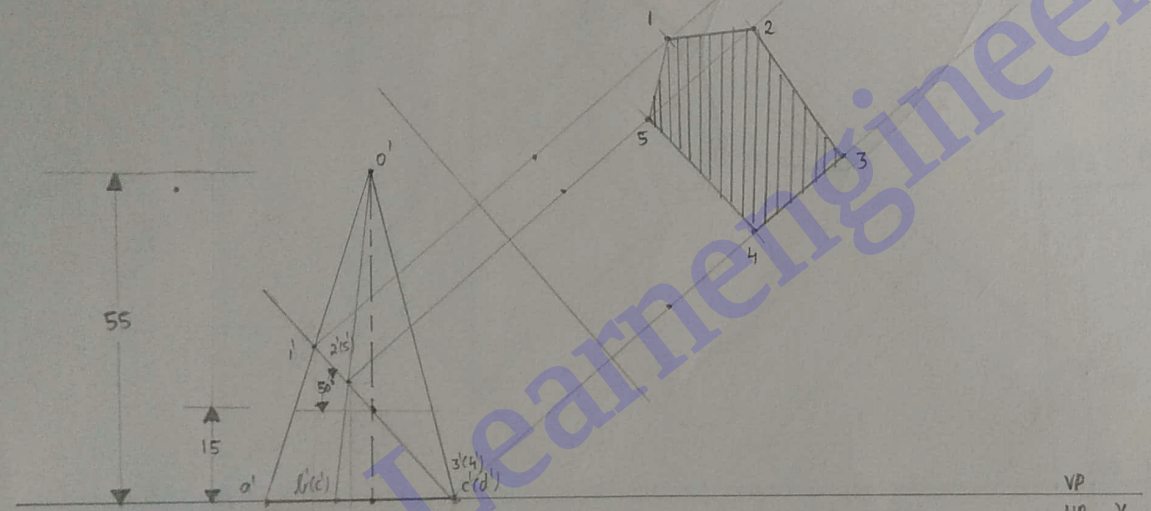
4. A cylinder of base diameter 40mm and height 50mm rest on its base on HP. It is cut by a plane perpendicular to VP and inclined at 50^0 to HP. The cutting plane meets the axis at a distance of 15mm from the top. Draw the front view, sectional top view and the true shape of the section.

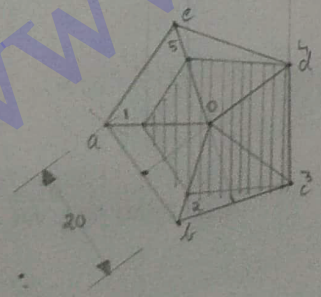


ALL DIMENSIONS ARE IN 'mm'

SCALE 1:1

5. A pentagonal pyramid of base side 20mm and altitude 55mm rests on its base on the HP with one of the base edges perpendicular to the VP. It is cut by a plane inclined at 50^0 to the base & meets the axis at 15mm above the base. Draw the plan, elevation, sectional top view and the true shape of the section.

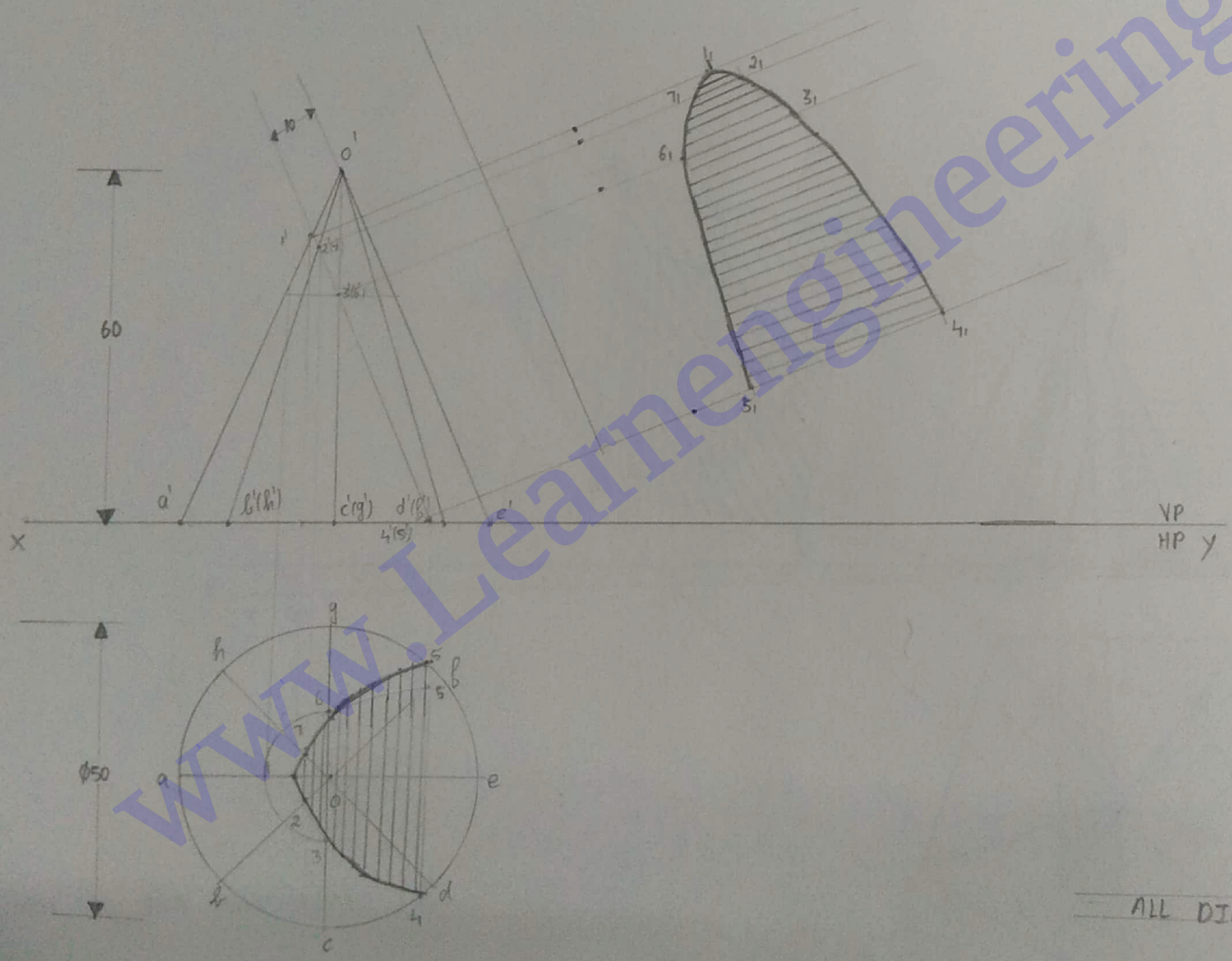




ALL DIMENSIONS ARE IN 'mm'

SCALE 1:1

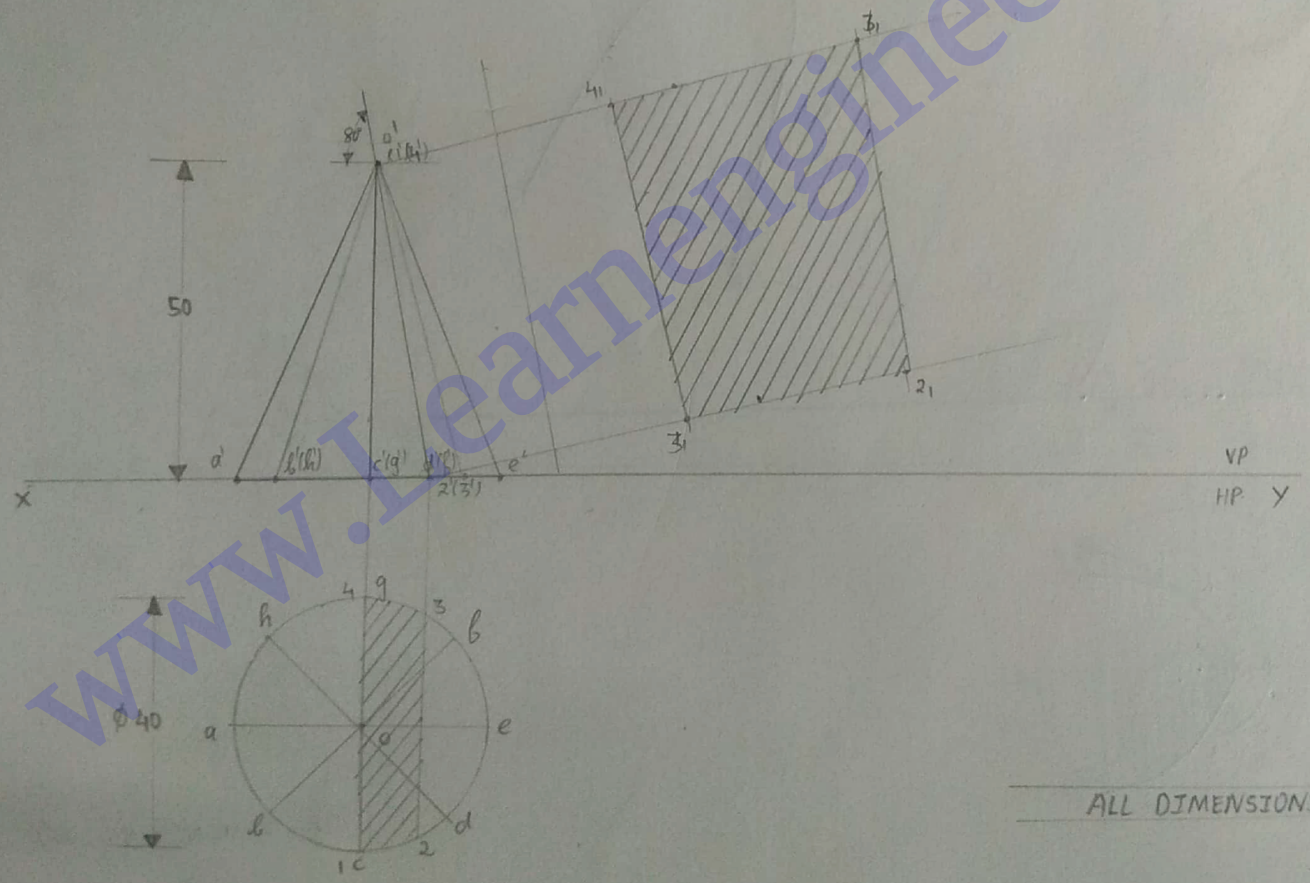
6. A conc. base 50mm diameter and axis 60mm long. rests with its base on HP. It is cut by a section plane perpendicular to VP. parallel to one of the Extreme generators and 10mm away from it. Draw the plan, elevation, sectional top view and the true shape of the section.



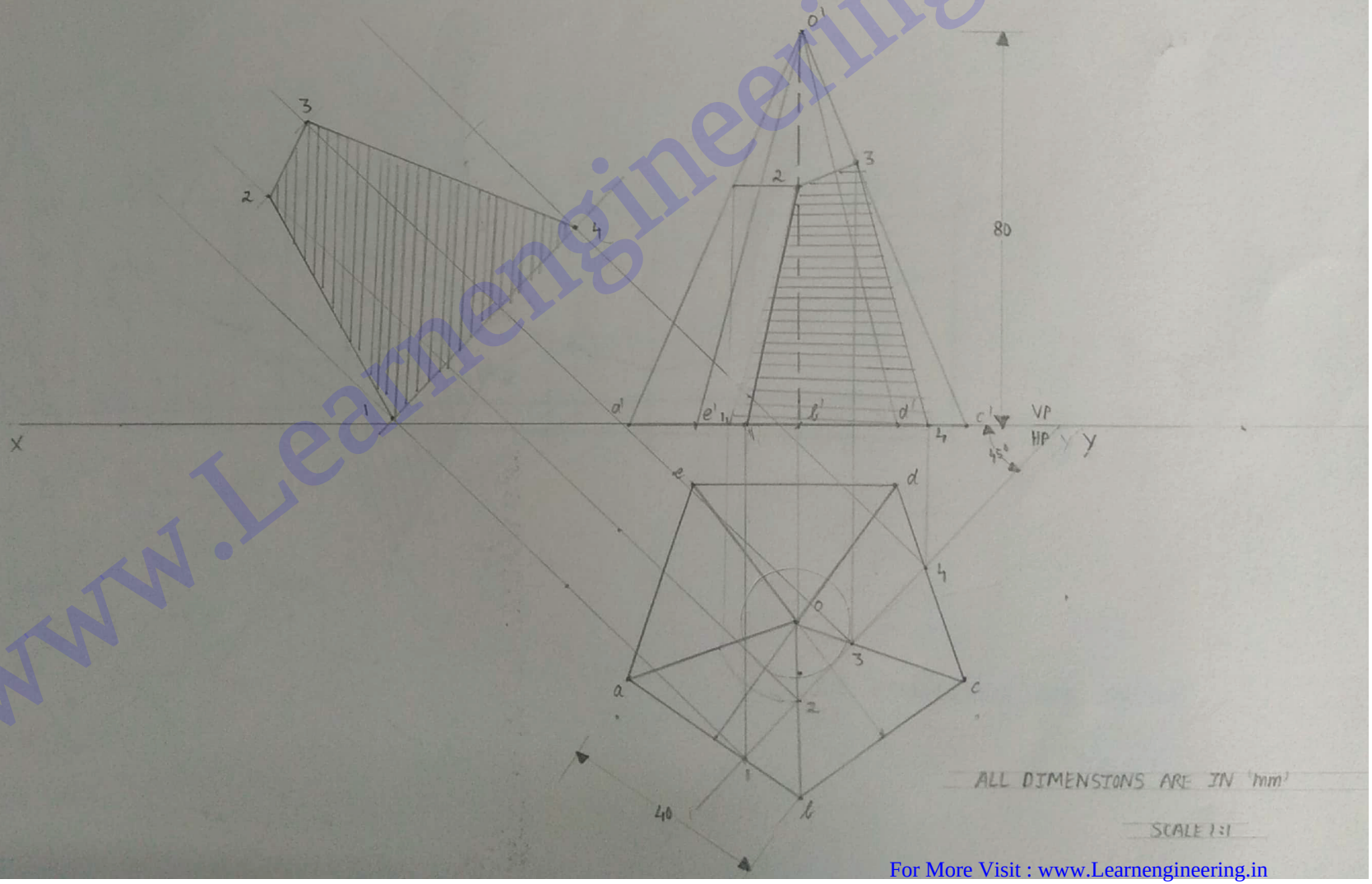
ALL DIMENSIONS ARE IN 'mm'

SCALE 1:1

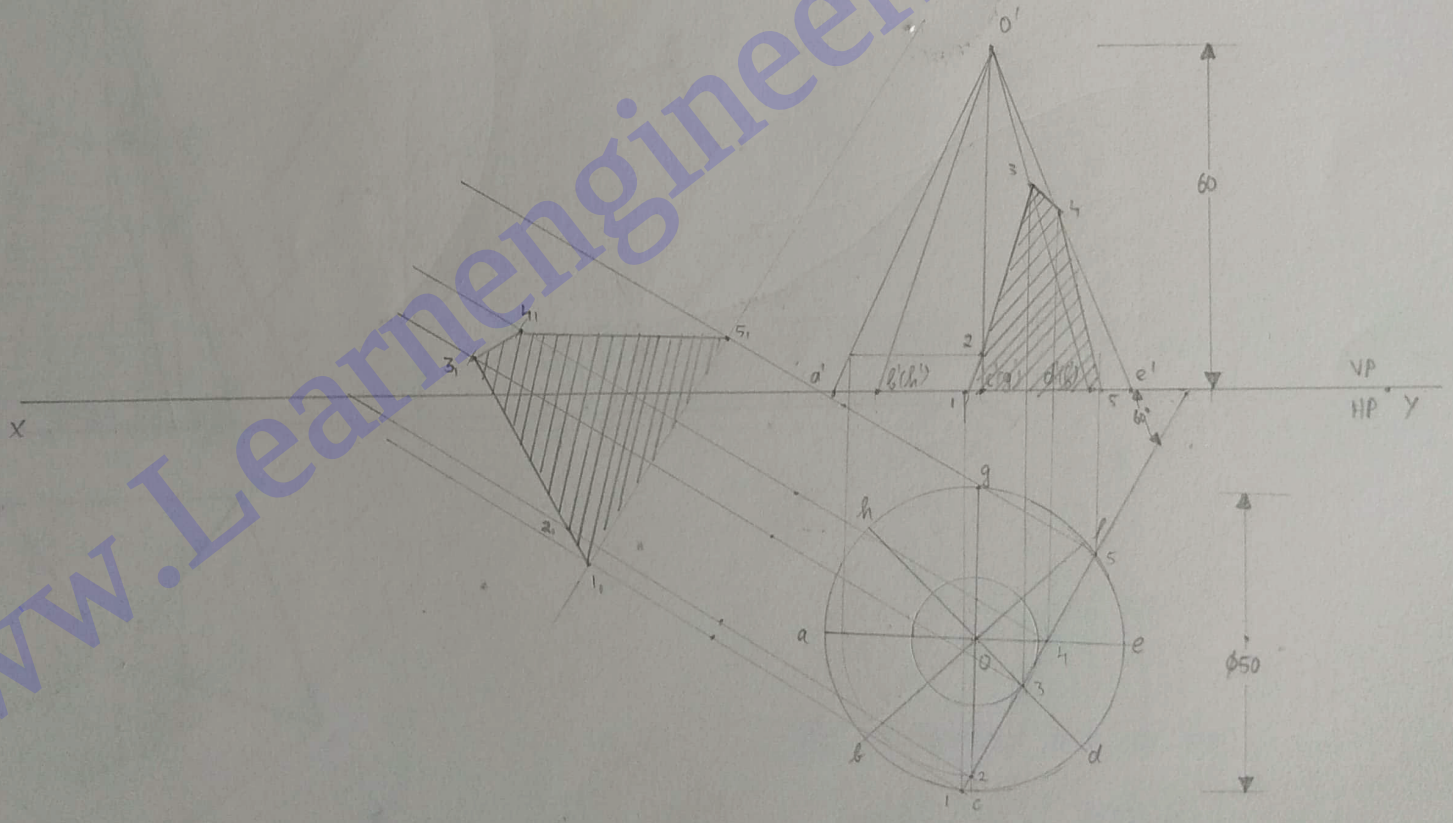
7. A cone, base 40mm diameter and axis 50mm long, rests with its base on HP. It is cut by a section plane perpendicular to VP, inclined at 80^0 to HP and passing through the apex. Draw the front view, sectional top view and the true shapeof the section.



8 A pentagonal pyramid of base side 40mm and altitude 80mm rests on its base on the HP with one of the base edge parallel to the VP. It is cut by a plane perpendicular to HP, inclined at 45° to VP at a distance 10mm from the axis. Draw the top view, sectional front view and the true shape of the section.

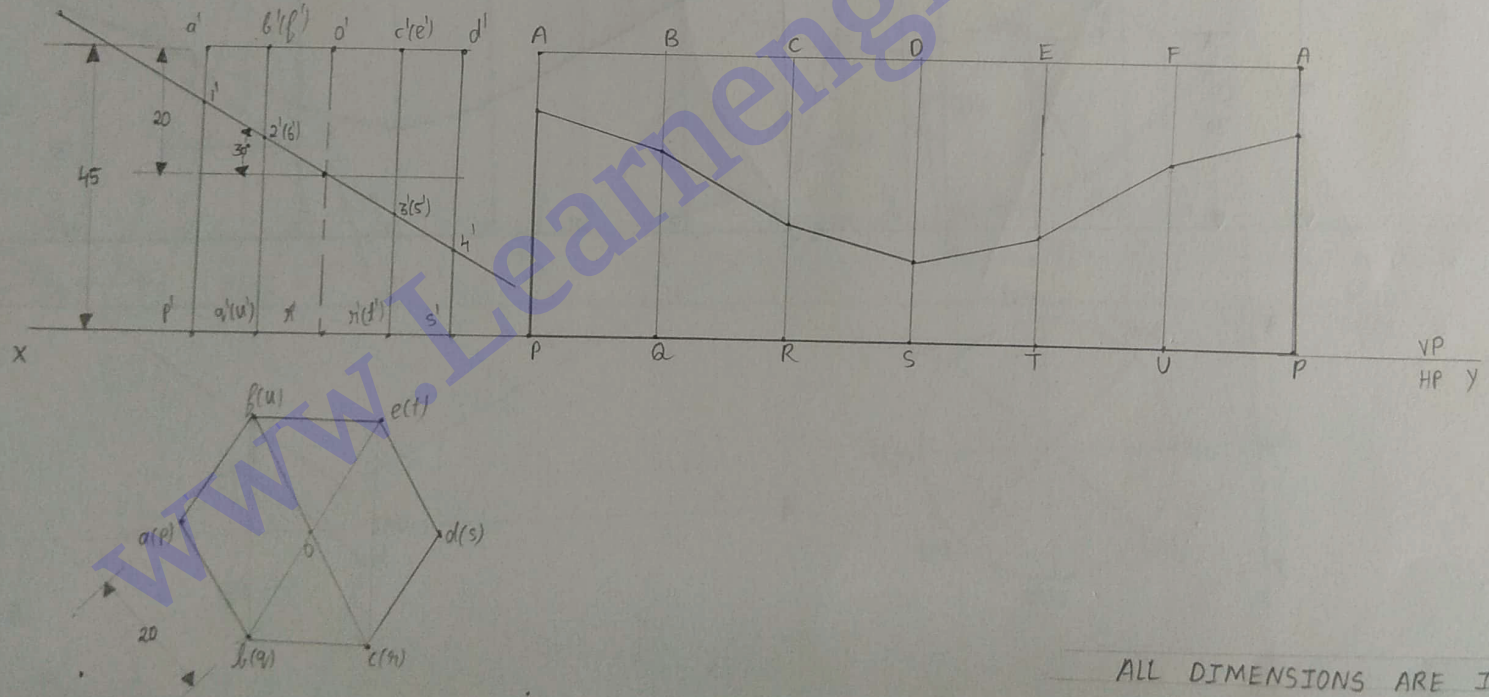


9. A cone of base diameter 50mm and axis length 60mm rest on its base on HP. It is cut by a plane perpendicular to HP and inclined at 60^0 to VP and is 10mm away from the axis. Draw the top view, sectional front view and the true shapeof the section.



DEVELOPMENT OF SURFACES

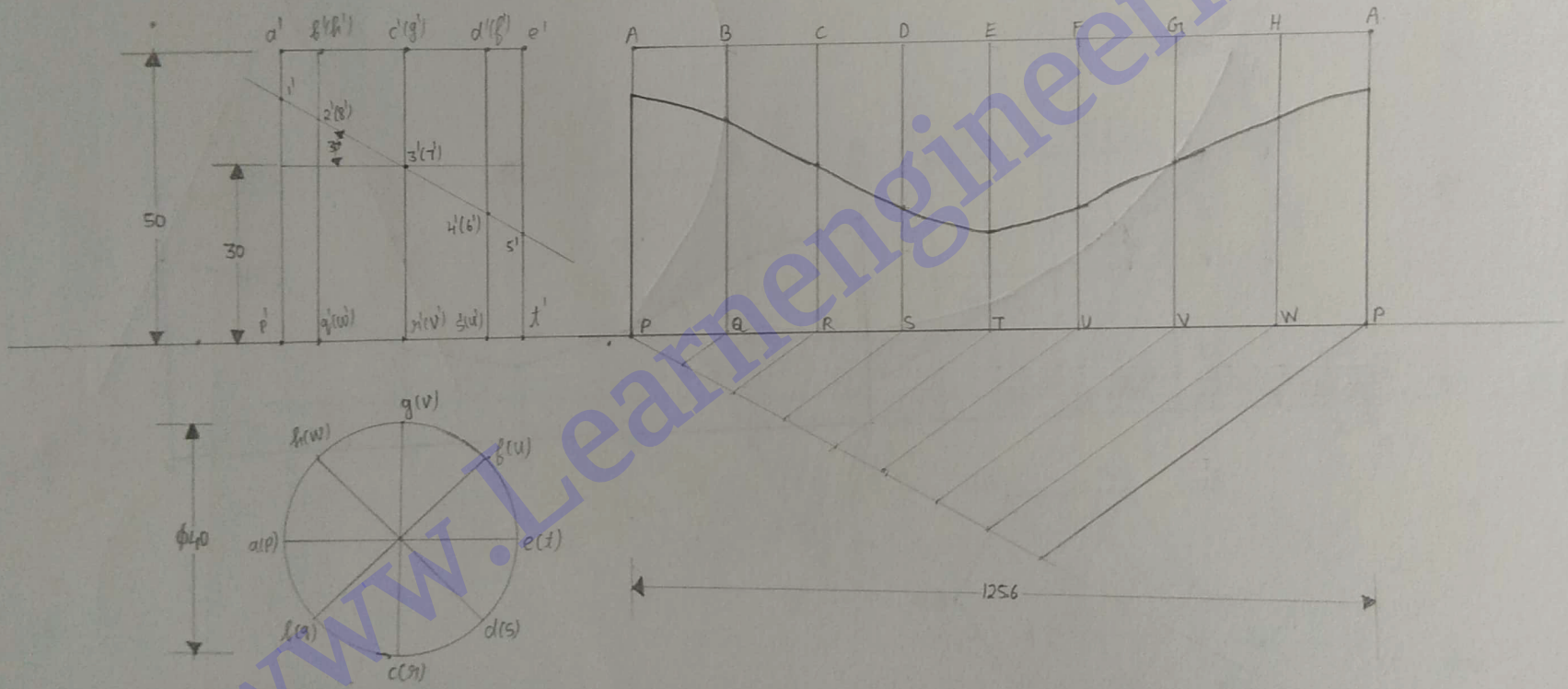
1. A hexagonal prism of base side 20mm and axis length 45mm rests on one of its ends on the HP with two base sidesparallel to the VP. It is cut by a plane perpendicular to the VP and inclined at 30° to the HP. The cutting plane meets the axis at 20mm from the top. Develop the lateral surface of the truncated solid.



ALL DIMENSIONS ARE IN 'mm'

SCALE 1:1

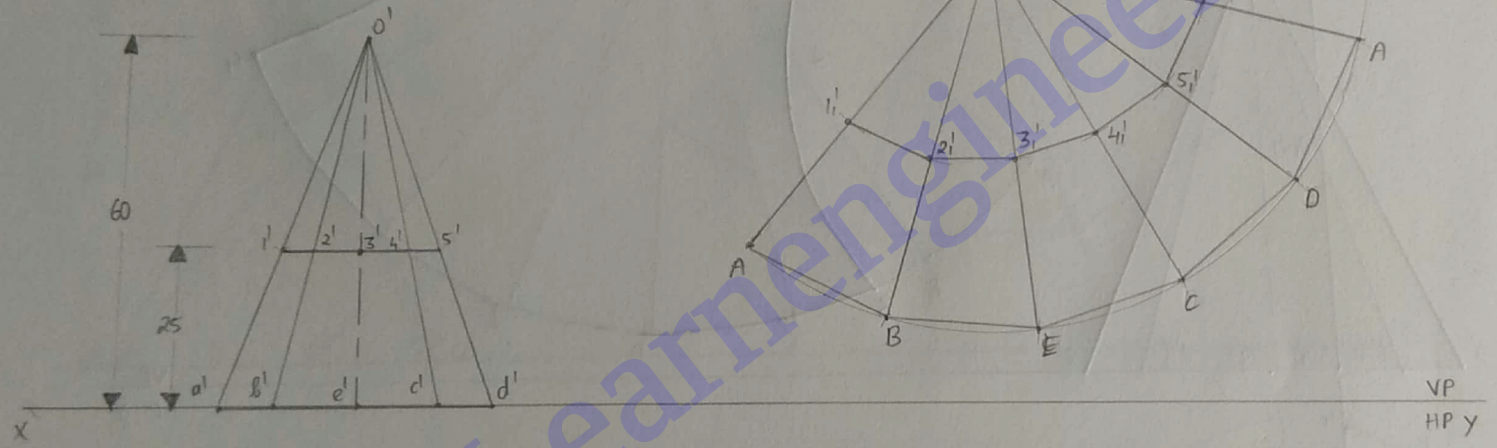
2. A cylinder of base diameter 40mm and height 50mm rest on its base on HP. It is cut by a plane perpendicular to VP and inclined at 30^0 to HP. The cutting plane meets the axis at a distance of 30mm from the base. Develop the lateral surface of truncated solid.

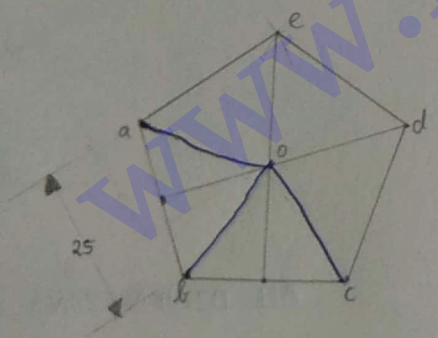


ALL DIMINSIONS ARE IN 'mm'

SCALE 1:1

3. A pentagonal pyramid of base side 25mm and altitude 60mm resting vertically on its base on the ground with one of the sides of the base parallel to the VP. It is cut by a plane perpendicular to the VP and parallel to the HP at the distance of 25mm above the base. Develop the lateral surface of truncated solid.

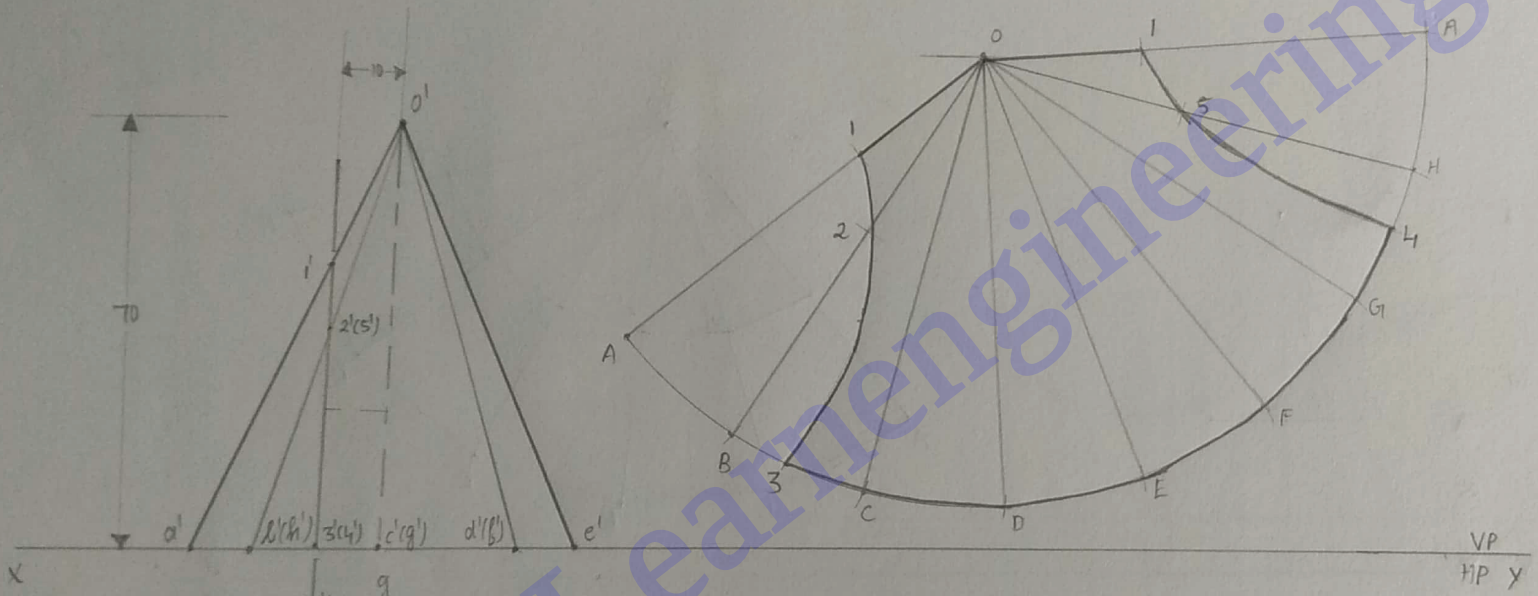


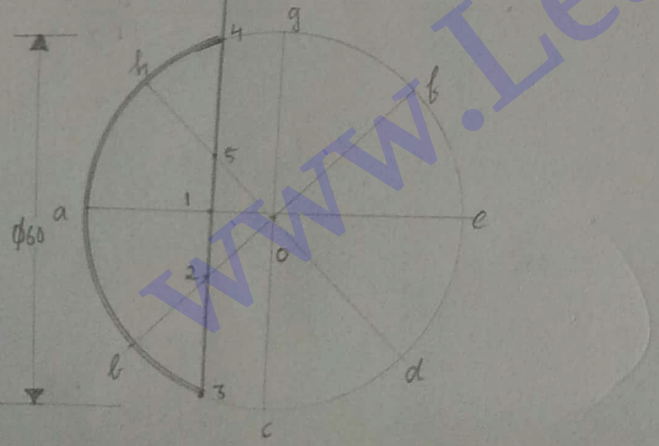


ALL DIMENSIONS ARE IN 'mm'

SCALE 1:1

4. A cone, base 60mm diameter and axis 70mm long, rests with its base on HP. It is cut by a section plane perpendicular to both the HP and the VP and passing through the cone 10mm to the left of the axis of the cone. Develop the lateral surface of truncated solid.

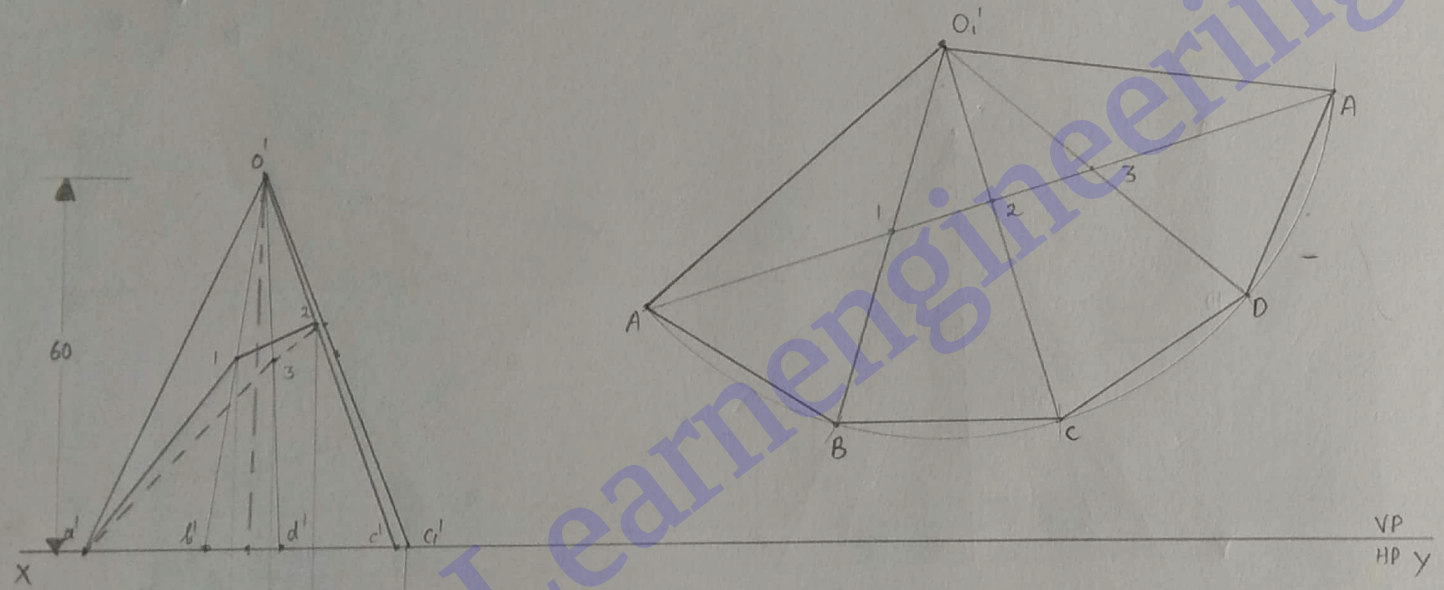


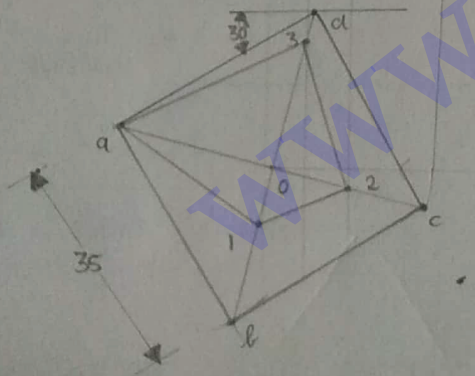


ALL DIMENSIONS ARE IN (mm)

SCALE

5. A square pyramid of base side 35mm & axis 60mm rests on its base on the ground with one of the sides of the base inclined at 30^0 to the VP. A string is wound round the surfaces of the pyramid from left extreme point on the base & ending at the same point. Find the shortest length of the string required. Also trace the path of the string in the front and top view.

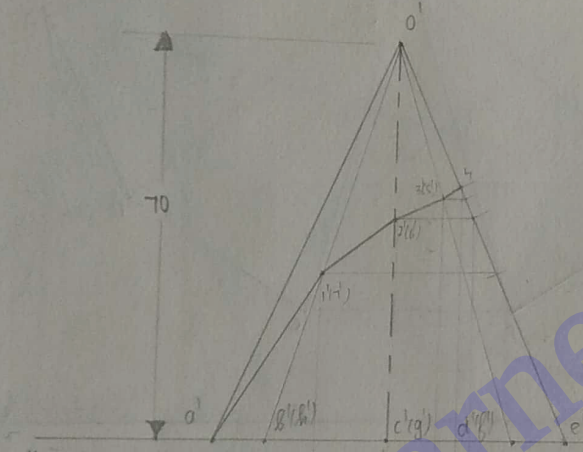


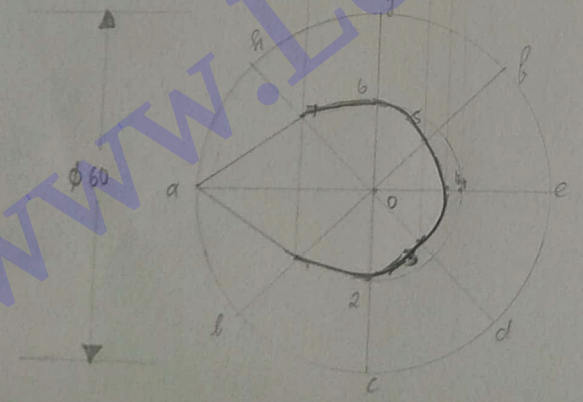


ALL DIMENSIONS ARE IN 'mm'

SCALE 1:1

6. A cone of base diameter 60mm and height 70mm rests vertically on its base on the ground. A string is wound round the curved surface of the cone starting from left extreme point on the base and ending at the same point. Find theshortest length of the string required. Also trace the path of the string in the front and top view.





$\theta = \frac{r}{\text{slant length}} \times 150^\circ$

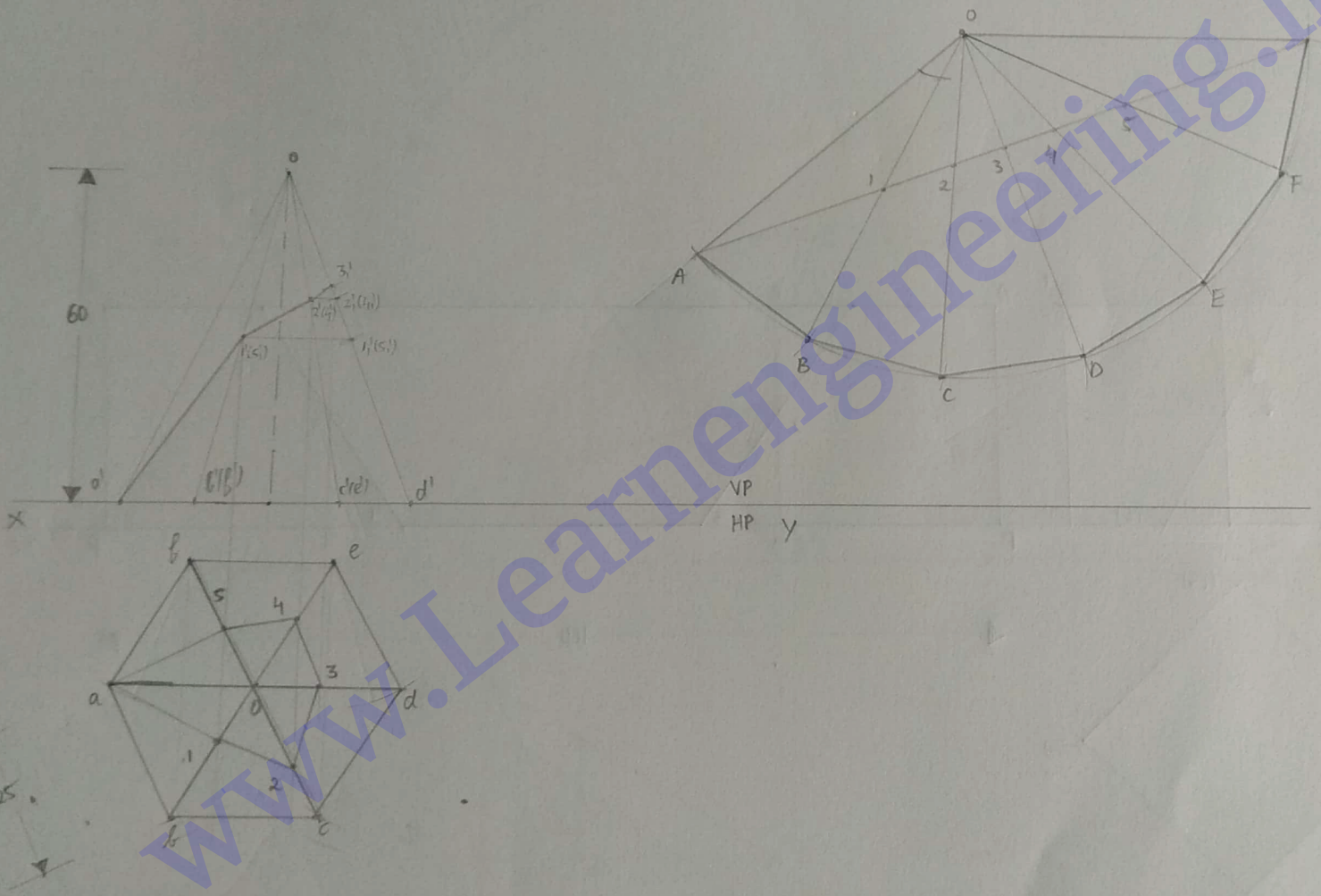
$\theta = 144^\circ$

Shortest length = 14.2mm

ALL DIMENSIONS ARE IN 'mm'

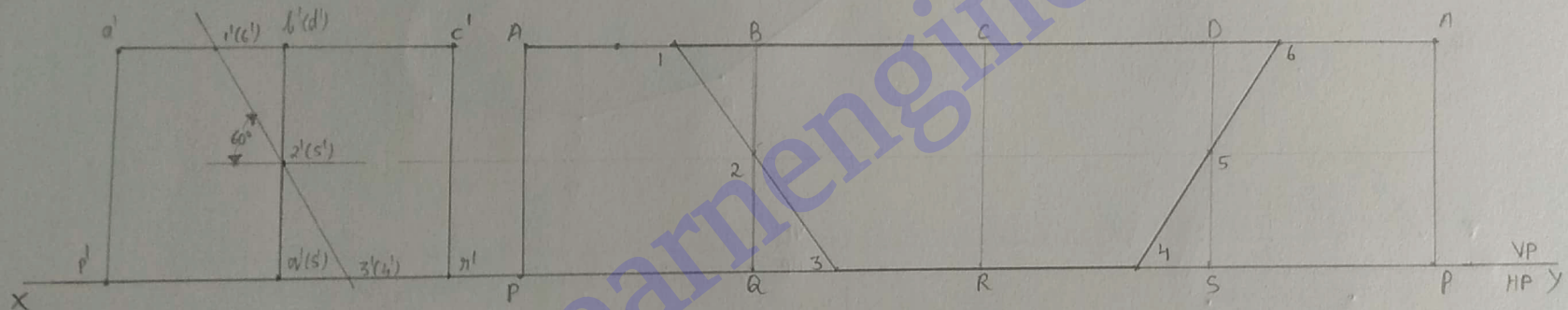
SCALE 1:1

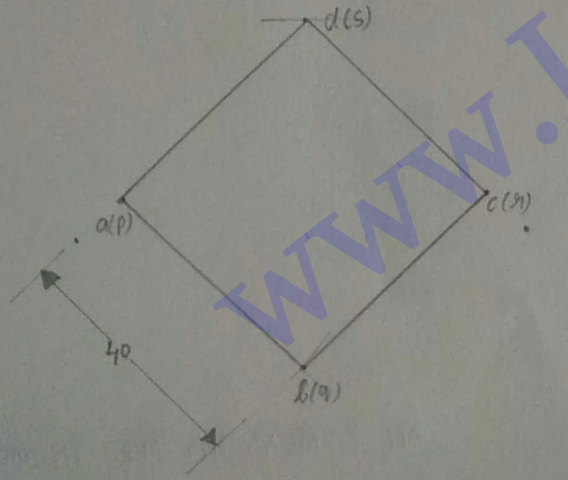
7. A hexagonal ~~prism~~ pyramid of base side 25mm & height 60mm is rests vertically on the HP with a base side parallel to the VP. A String is wound round the surface of the prism starting from extreme point on the base. passing through the diametrically opposite corner on the top and ending at the starting point. Find graphically the shortest required. Also show the path of the string in the front view.



ALL DIMENSIONS ARE IN 'mm'

8. A cube of side 40mm is placed in the ground with two vertical faces equally inclined to VP. It is cut by a plane perpendicular to the VP and inclined at 60^0 to the HP: cutting plane bisects the axis of the cube. Develop the lateralsurface of the truncated solid.





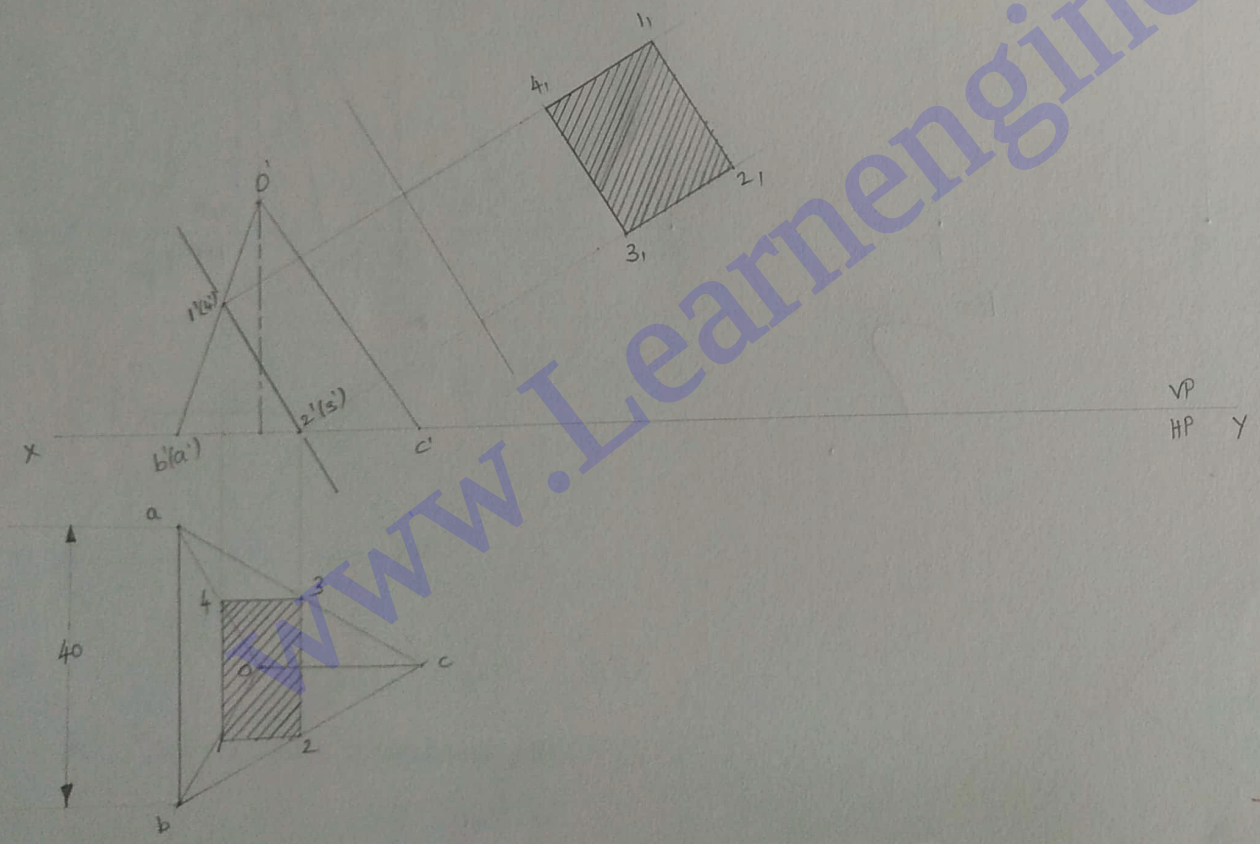
160

ALL DIMENSIONS ARE IN 'mm'

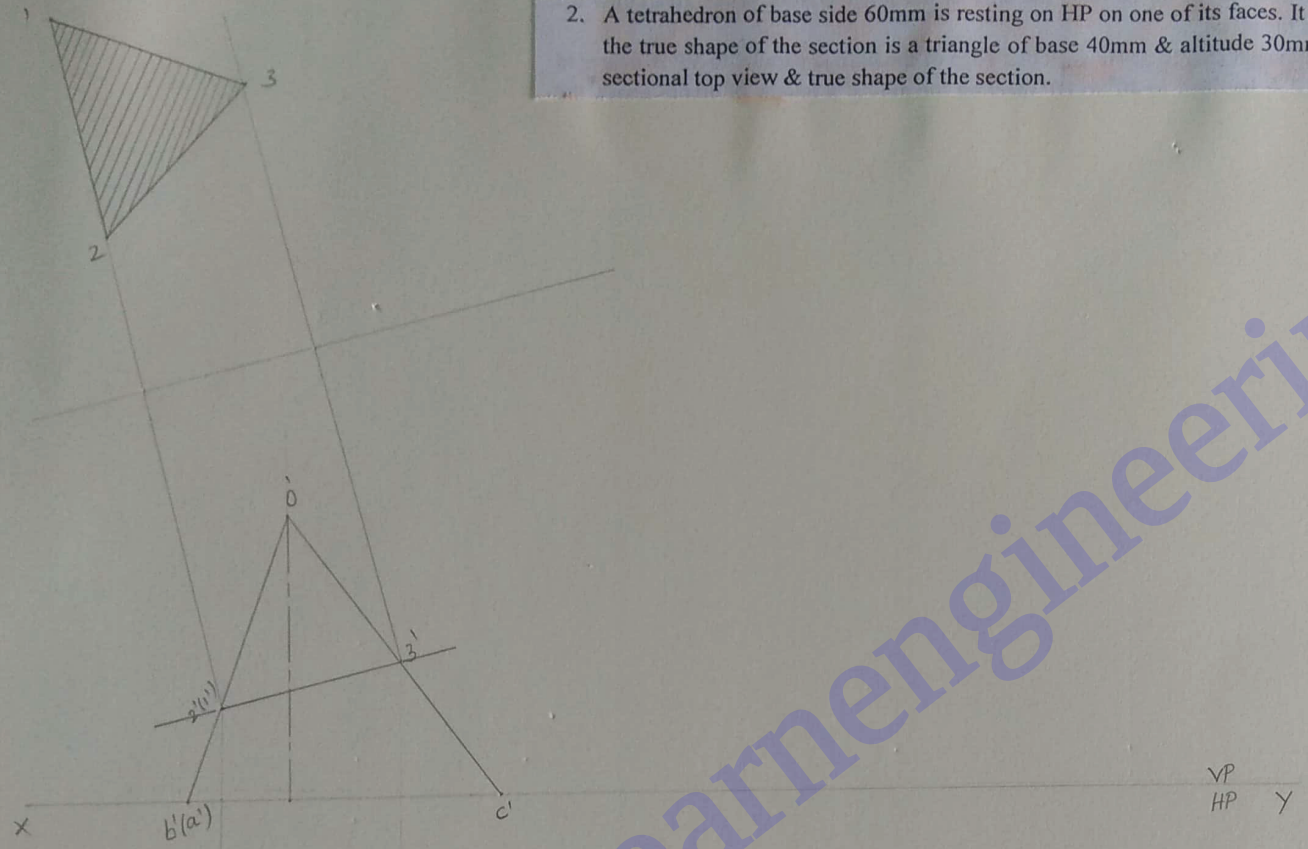
SCALE 1:1

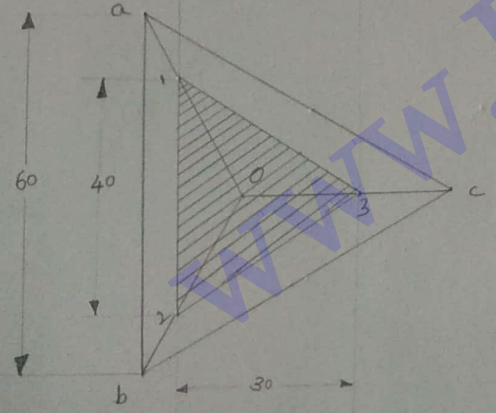
SECTION OF SOLIDS

1. Draw a tetrahedron of side 40mm, which is cut by a plane perpendicular to VP & inclined to HP. Such that true shape of the section is a square. . Draw the sectional top view & true shape of the section



2. A tetrahedron of base side 60mm is resting on HP on one of its faces. It is cut by a plane perpendicular to VP. So that the true shape of the section is a triangle of base 40mm & altitude 30mm. locate the cutting plane position. Draw the sectional top view & true shape of the section.





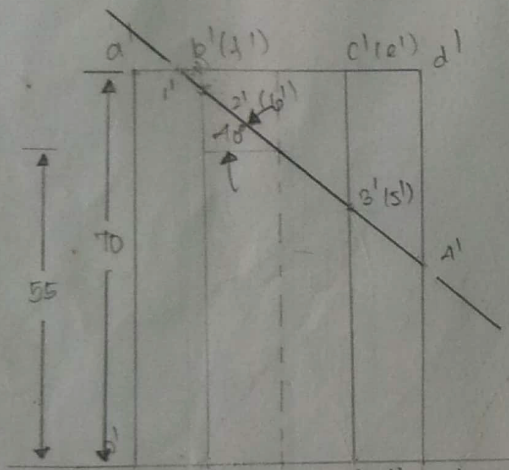
ALL DIMENSIONS ARE IN mm

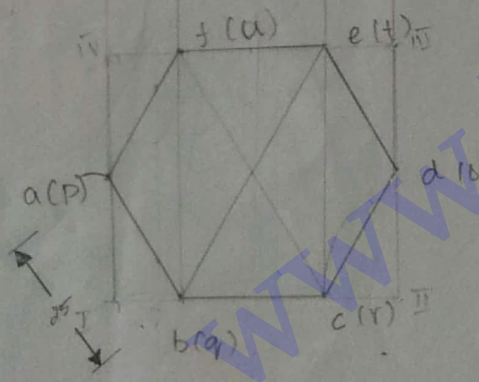
SCALE 1:1

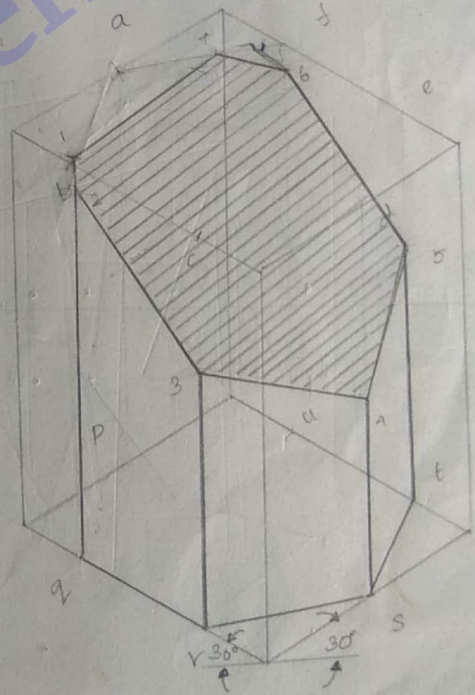
MR. G. ASHWIN PRABHU
ASSISTANT PROFESSOR
MECHANICAL

ISOMETRIC PROJECTION OF HEXAGONAL PRISM

3. A hexagonal prism of side 25mm and height 70mm rest on HP and one of the edges of its base is parallel to VP. A section plane perpendicular to VP & inclined to 40^0 to HP cuts the axis of the prism 55mm above HP. Draw the isometric view of the truncated portion of the prism.





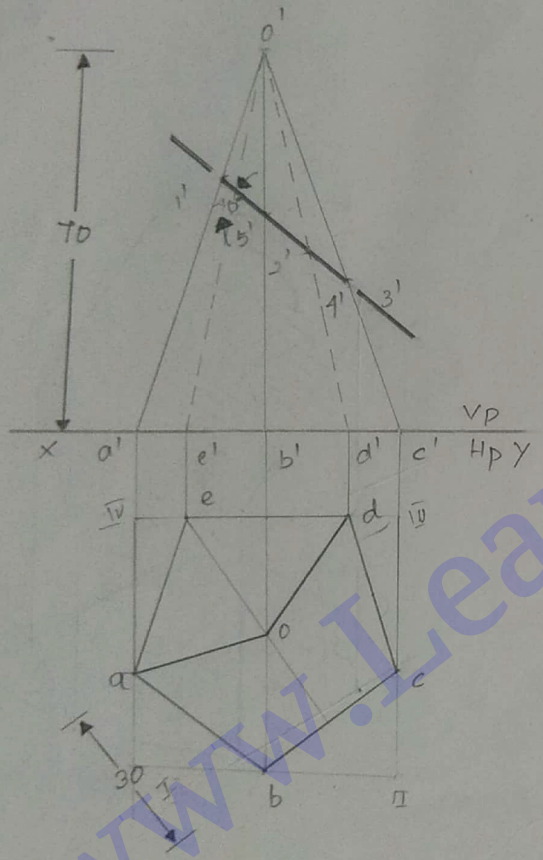


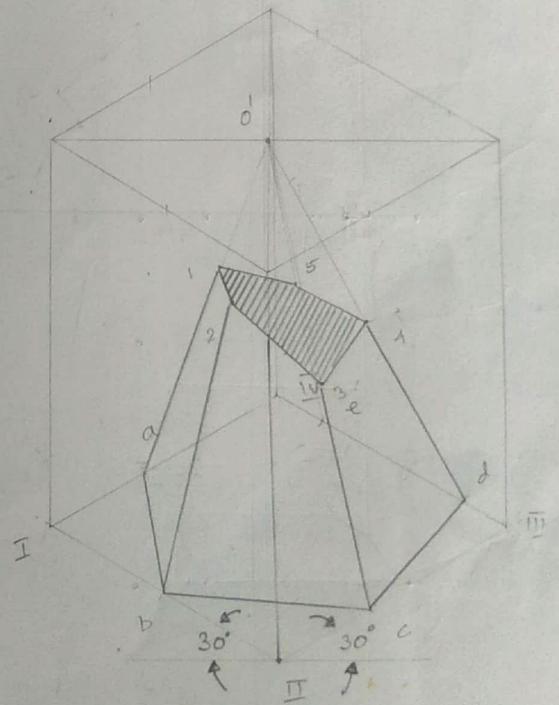
ALL DIMENSIONS ARE IN 'mm'

SCALE 1:1

ISOMETRIC VIEW OF PENTAGONAL PYRAMID

4. A pentagonal pyramid 30mm edge 70mm height stands on HP such that edge of the base is parallel to VP & nearer to it. A section plane is perpendicular to VP & inclined to 40^0 to HP meeting the axis at a height of 40mm above the base. Draw the isometric view.



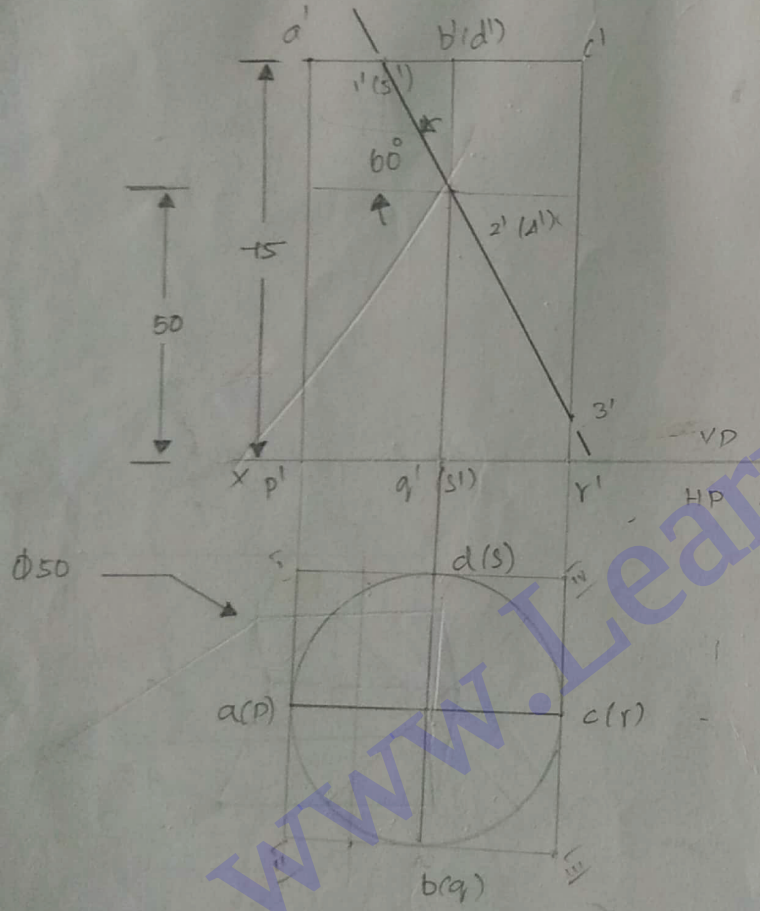


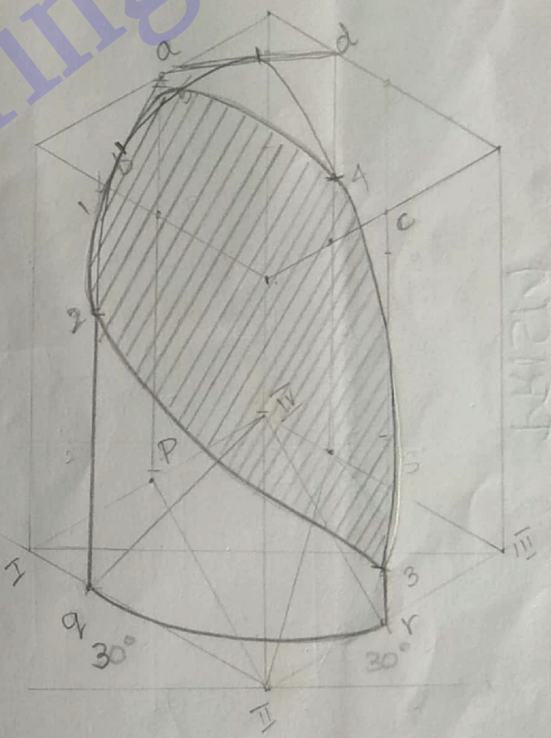
ALL DIMENSIONS ARE IN 'mm'

SCALE 1:1

ISOMETRIC VIEW OF CYLINDER

5. A Cylinder 50 mm diameter & 75 mm height stands on HP. A section plane perpendicular to VP inclined to 60° to HP & 50 mm height above the base. Draw the isometric view of the cylinder.



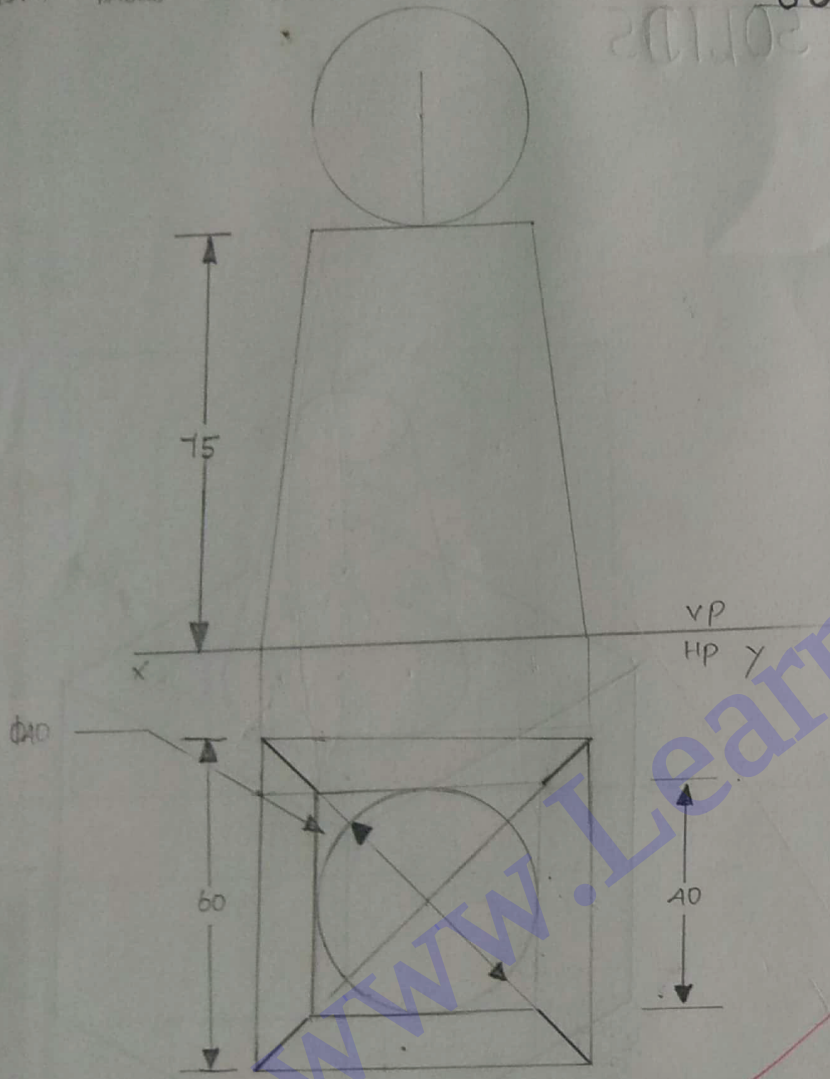


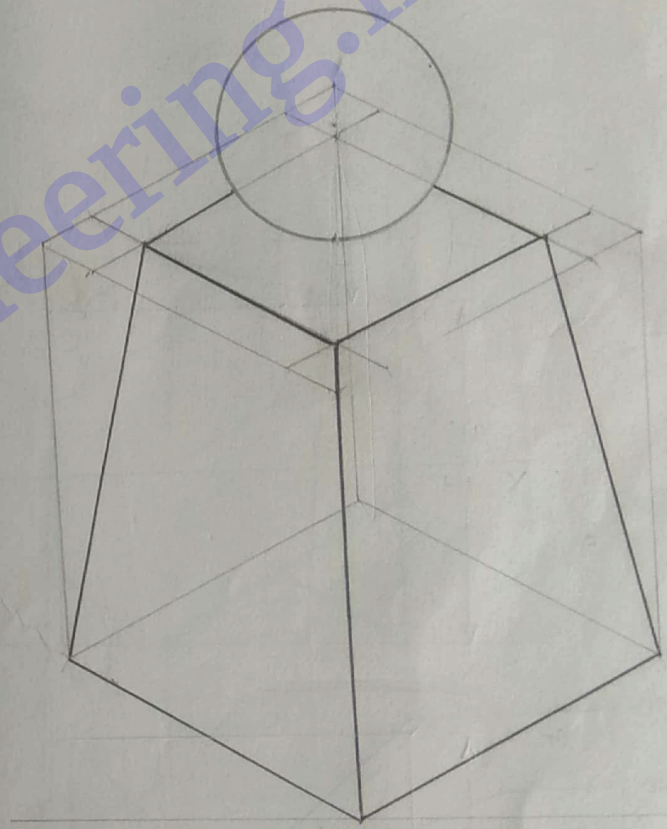
ALL DIMENSIONS ARE IN 'mm'

SCALE 1:1

A sphere of diameter 20mm. is kept vertically top end of the prism of base side 60 mm, top side 40mm, and height 75m. Draw the isometric view of the solid.

COMINATION OF SOLIDS



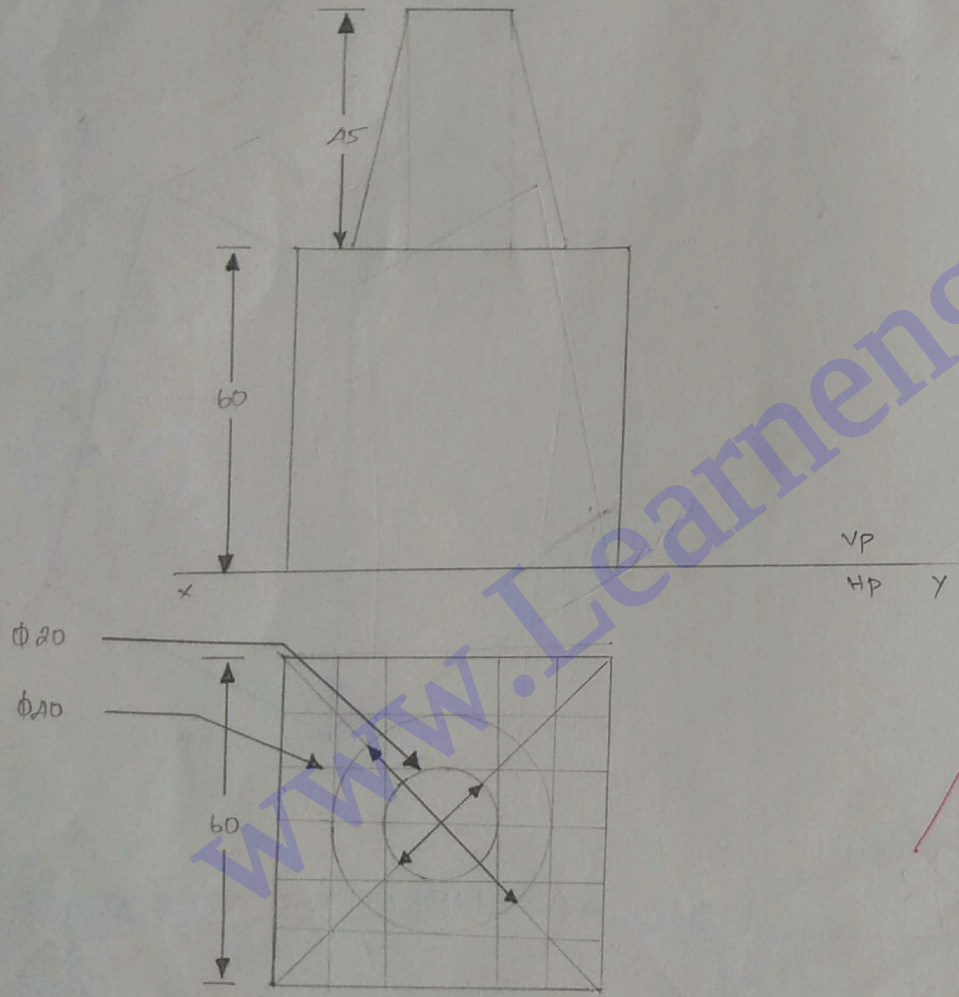


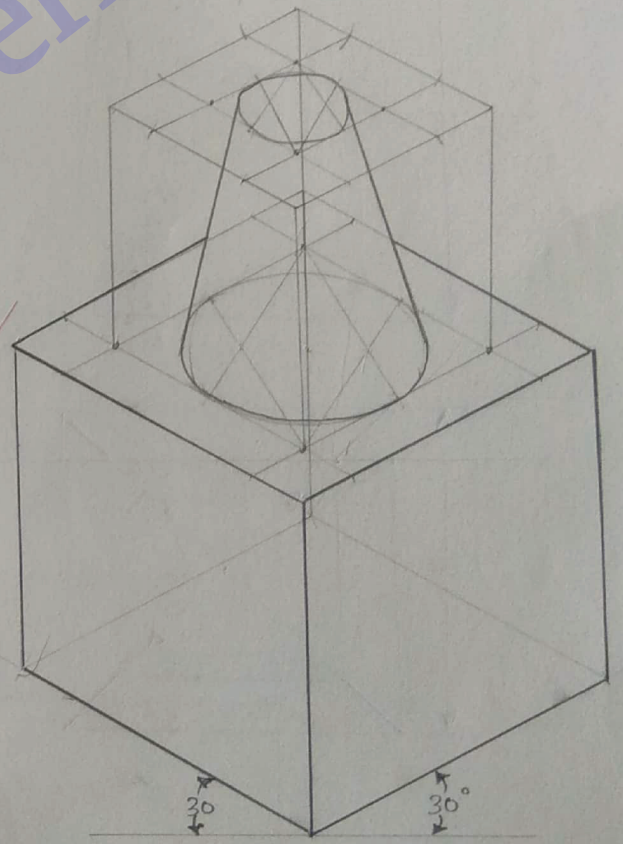
ALL DIMENSIONS ARE IN (mm)

SCALE 1:1

2) Draw the isometric view of a frustum of a cone of height 45 mm base diameter 80 mm and diameter of top face 20 mm when it is placed centrally over the cube and height 60mm.

COMINATION OF SOLIDS





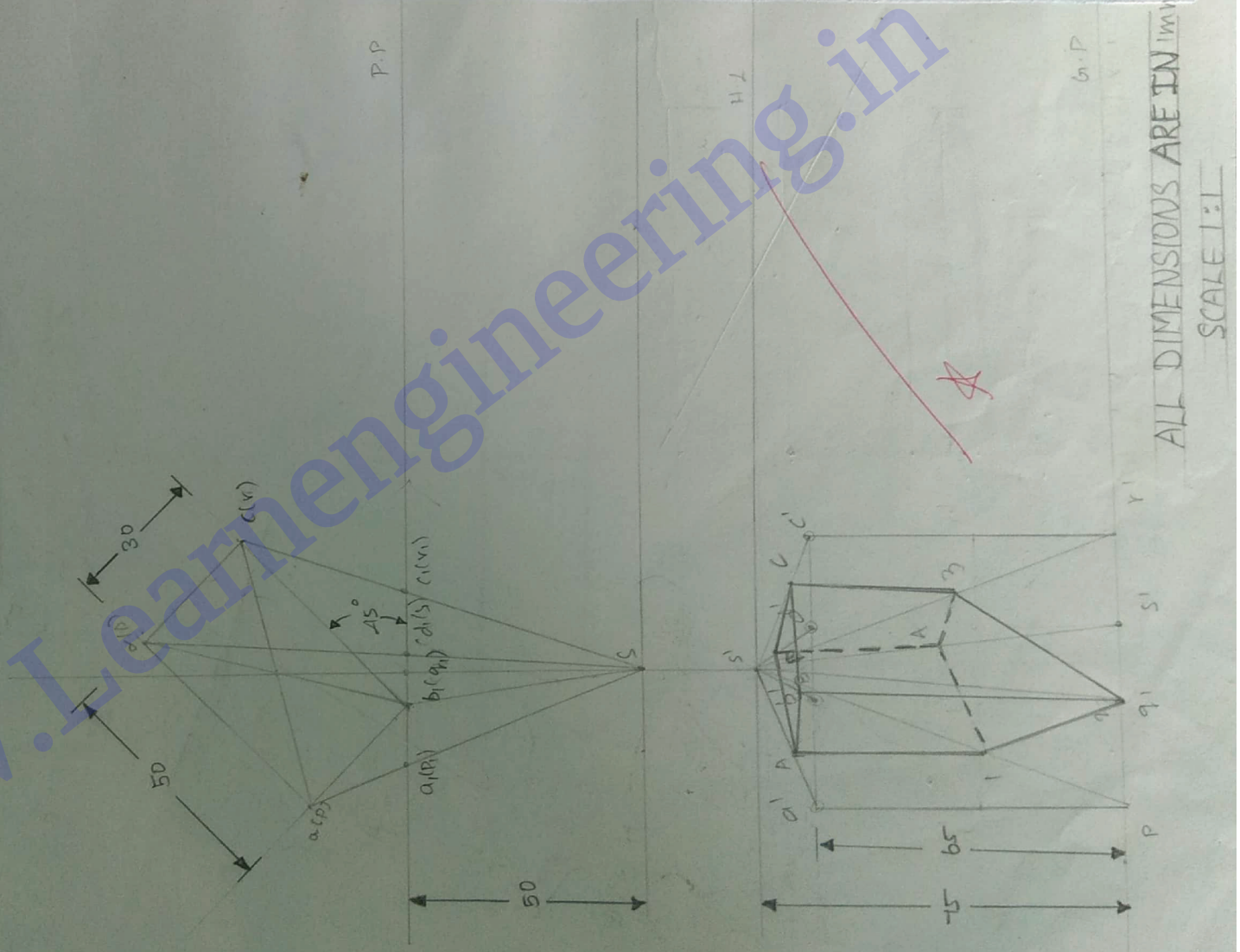
ALL DIMENSIONS ARE IN 'mm'

SCALE 1:1

PERSPECTIVE VIEW OF RECTANGULAR PRISM

PERSPECTIVE PROJECTION

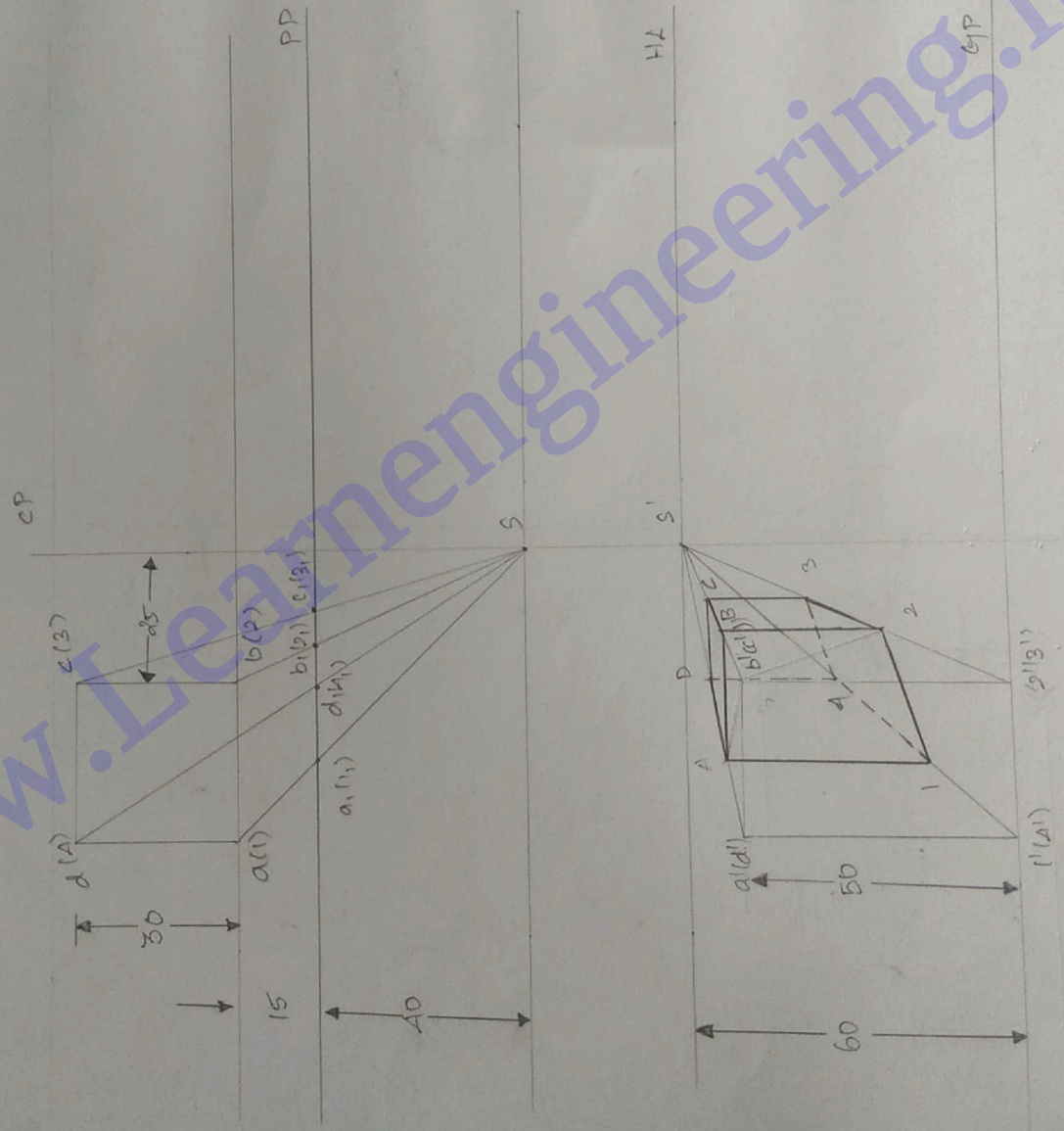
1. A rectangular Prism side of base 50mm X 30mm and height 65mm rest with its base on the ground. The Vertical edge is in picture plane (PP) & one of the longer edge of the base is inclined at 45^0 to PP and behind it. The stationery point is 50mm infront of PP & 75mm above Ground plane (GP). The Stationery point lies in the central plane which passes at ~~10mm~~ to the left of the axis of the solid. Draw the perspective view of the given solid.



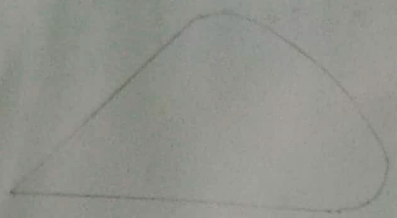
A square prism of base side 30mm and axis height 50mm is lying on the ground on its base with a face parallel to @ 50 mm beyond PP. Stationary point is 40mm Infront of VP and 60mm about GP. Passing through a point 25 mm to the extreme right end of the prism.

PERSPECTIVE VIEW OF SQUARE PRISM

ALL DIMENSIONS ARE IN mm



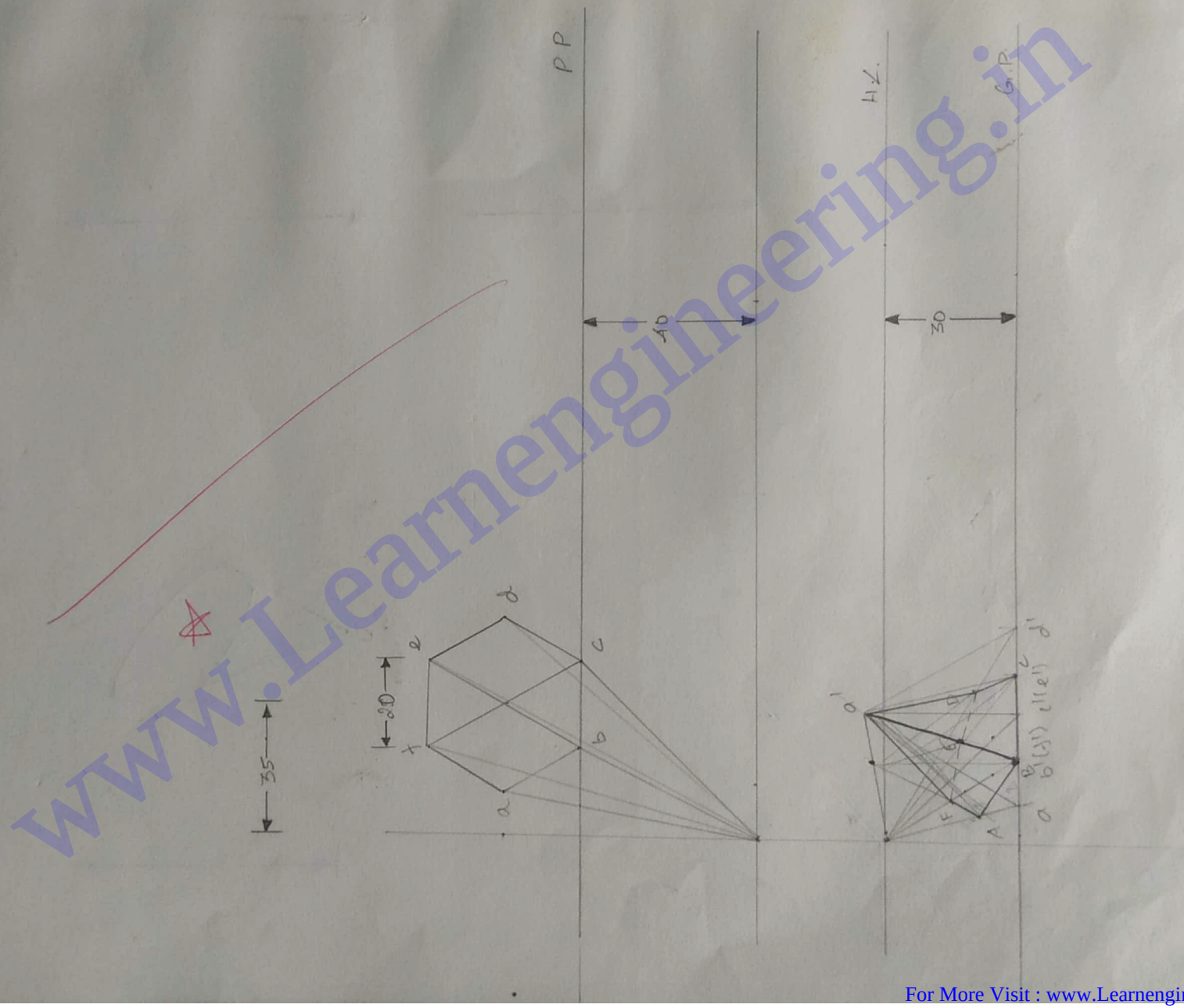
7. A Cone of base diameter 50mm & axis height 60mm resting on the ground with its base. The vertex of the cone is 30mm behind VP. A Stationery point is 50mm to the right of the vertex & 40mm IF of PP & 70mm above GP. Draw the perspective projections.



PERSPECTIVE VIEW OF CONE

PERSPECTIVE PROJECTION OF HEXAGONAL PYRAMID

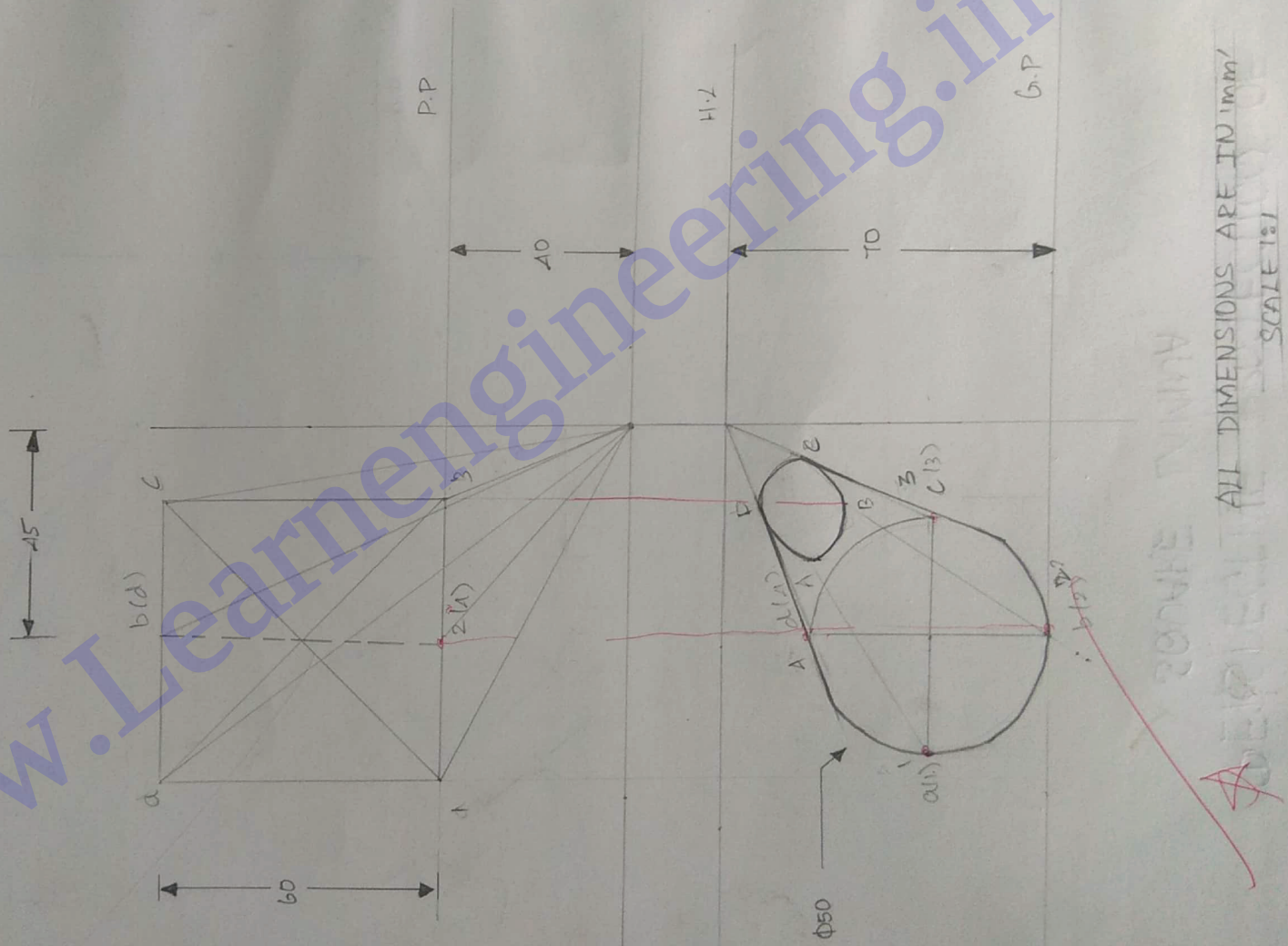
6. A Regular hexagonal pyramid of base edge 20mm & height 35mm rests on its base on the ground with one of its base edges touching the PP. A Stationery point is 30mm above the GP & 40mm IF of PP. The central plane is 30mm to the Left of the Axis. Draw the perspective projections.



ALL DIMENSIONS ARE IN mm

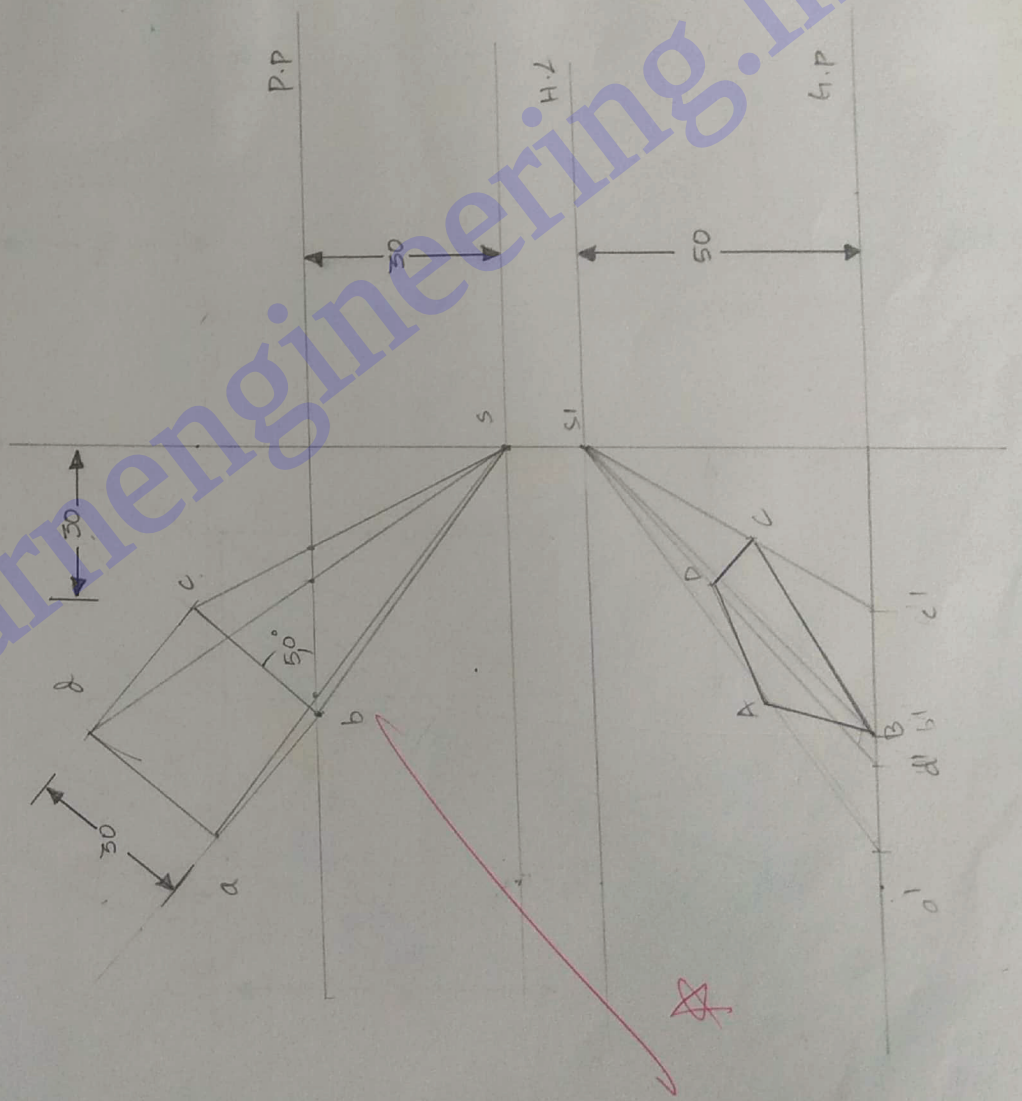
PERSPECTIVE VIEW OF CYLINDER

5. A Cylinder of diameter 50mm & length 60mm lies on the ground with its axis perpendicular to VP. A Stationery point is 45mm to the right side of the axis of the cylinder & 40mm infront of PP & 70mm above GP. Draw the perspective view of the Cylinder.



4. A square lamina of side 30mm lies on the ground plane one of its corner is touching the PP & its edge is inclined at 50^0 to VP. Stationery point is 35mm infront (IF) of PP & 50mm above GP. Stationery point lies in the central plane which is at a distance of 30mm to the right of the corner touching the PP. Draw the perspective view of the Square lamina.

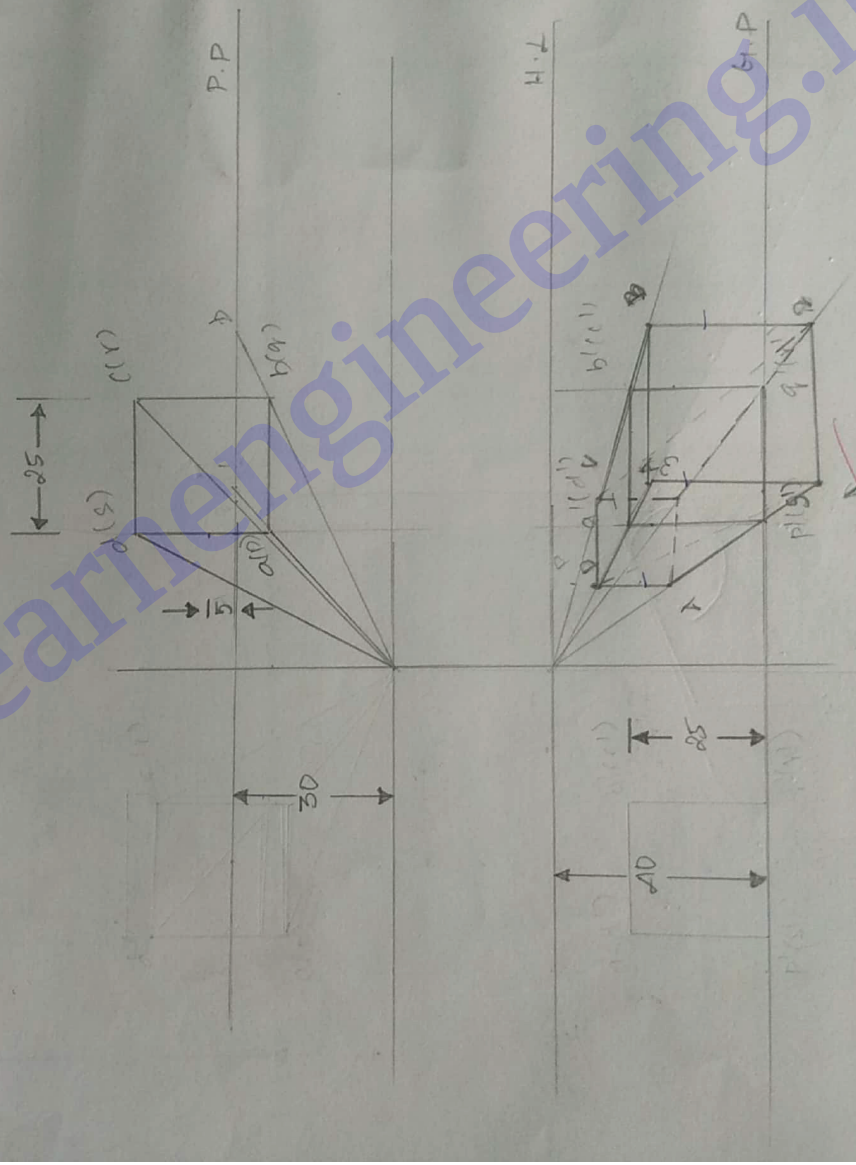
PERSPECTIVE PROJECTION OF SQUARE LAMINA



ALL DIMENSIONS ARE IN 'MM'
SCALE 1:1

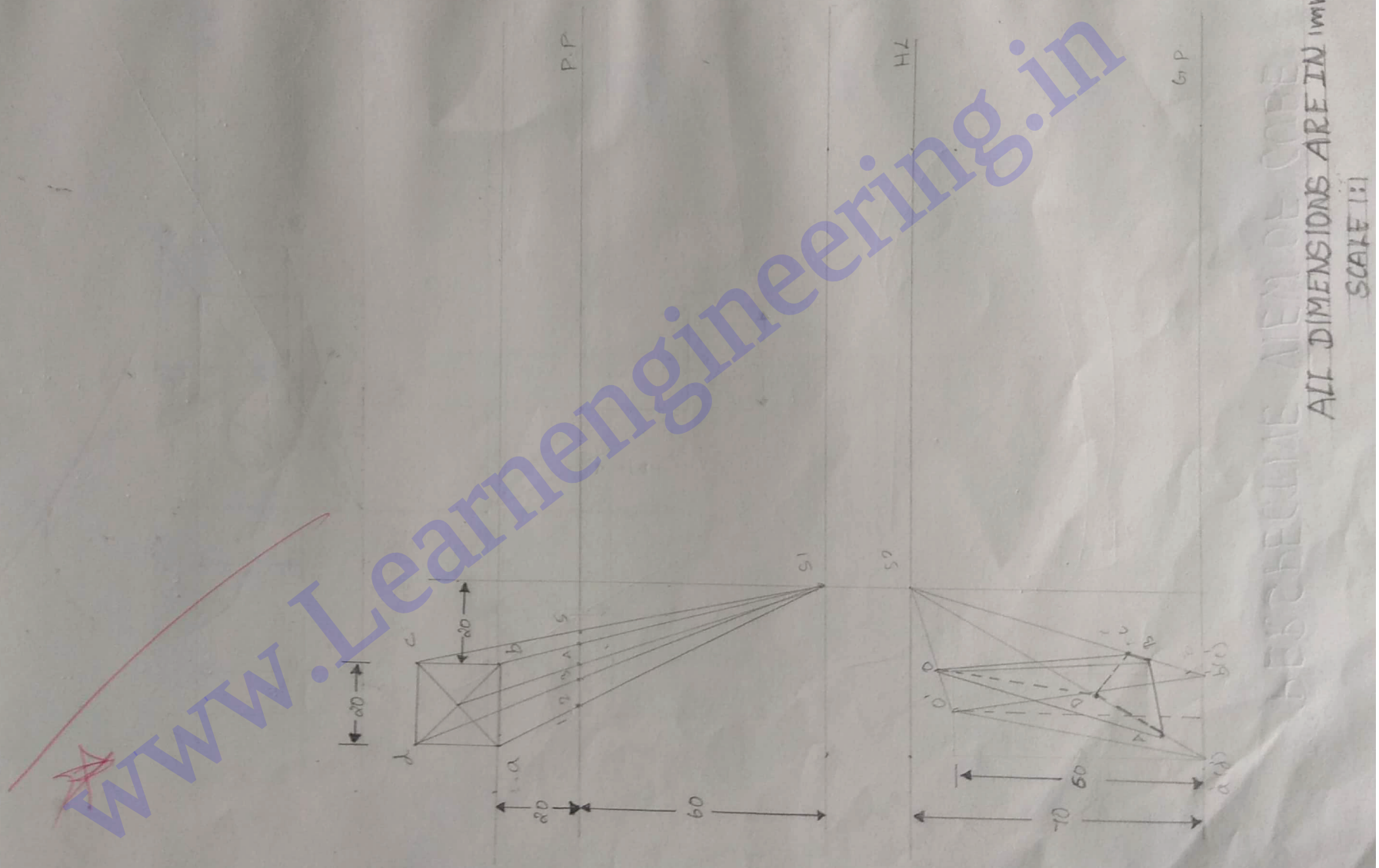
PERSPECTIVE VIEW OF CUBE

3. A Cube of side 25mm resting on the ground on one of its faces parallel to PP & the center is 5mm behind PP. A Stationery point is located 25mm to the left of the nearest face & 30mm infront (IF) of PP & 40mm above the GP. Draw the perspective view of the given cube.



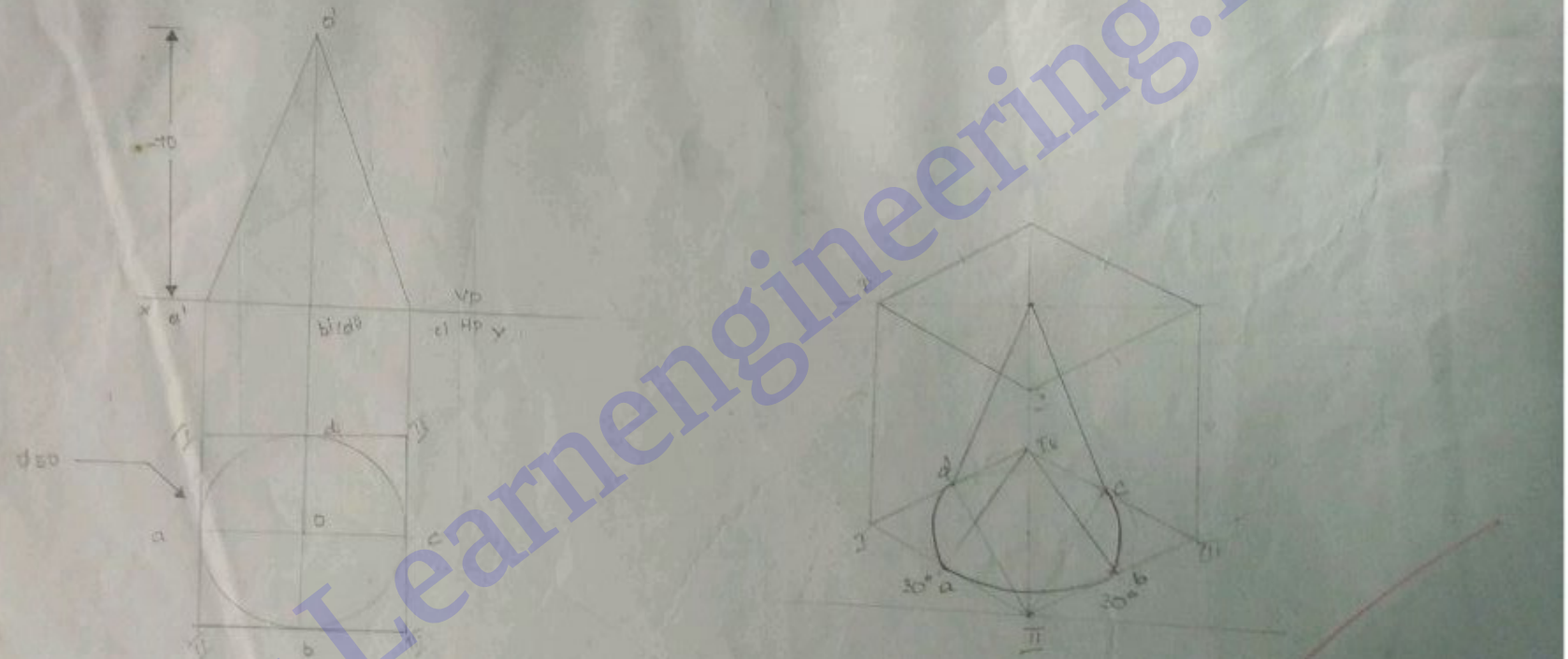
PERSPECTIVE PORJECTIONS OF SQUARE PYRAMID

2. A Square pyramid of the side 20mm and axis 60mm long is resting on the ground & placed 10mm from the PP such that one of the edge is parallel to the PP. A Stationery point is at a distance of 20mm to the right side of the Central Plane (CP). Stationery point is 70mm above the GP & 60mm Infront (IF) of the PP. Draw the perspective projections.



ISOMETRIC PROJECTION OF CONE

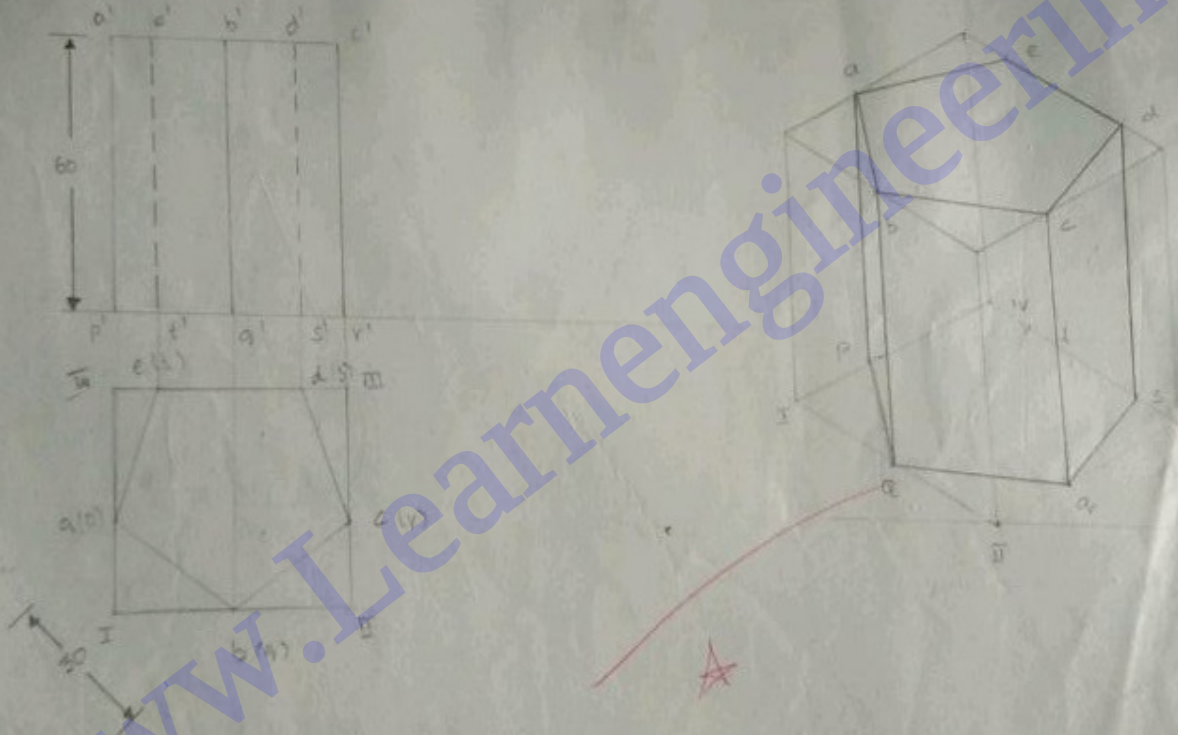
2. A Cone of diameter 50mm & height 70mm resting on HP. Draw the Isometric projections.



ISOMETRIC VIEW OF PETAGONAL PRISM

ISOMETRIC PROJECTION

1. Draw the Isometric view of pentagonal prism of side 30mm & height 60mm resting on HP such that one of the edges are parallel to VP.



ALL DIMENSIONS ARE IN 'MM'
SCALE 1:1