Projection of a Plane:

In this chapter, we deal with two dimensional objects called planes. Planes have length, breadth and negligible thickness. Only those planes are considered in the chapter whose shape can be defined geometrically and are regular in nature.

ORIENTATIONS OF PLANES
The possible orientations of the surface of a plane with respect to the principal planes are given below-
1. Surface of plane is parallel to the H.P. (and perpendicular to the V.P.).
2. Surface of plane is parallel to the V.P. (and perpendicular to the H.P.).
3. Surface of plane is perpendicular to both H.P. and V.P. (i.e., parallel to profile plane).
4. Surface of plane is inclined to the H.P. and perpendicular to the V.P.
5. Surface of plane is inclined to the V.P. and perpendicular to the H.P.
6. Surface of plane is inclined to both H.P. and V.P.

PROJECTIONS OF PLANES
In this topic various plane figures are the objects.
What is usually asked in the problem...?
To draw their projections means F.V., T.V. & S.V.
What will be given in the problem?
1. Description of the plane figure.
2. Its position with HP and VP.
In which manner its position with HP & VP will be described?
1. Inclination of its SURFACE with one of the reference planes will be given.
2. Inclination of one of its EDGES with other reference plane will be given.

TRACES OF PLANES
A plane which is not parallel to any of the principal planes will meet the reference planes in a line, extended if necessary. This line is called trace of the plane.
Horizontal trace (H.T.) when the plane meets the H.P. in the line, extended if necessary, then that line called horizontal trace.
Vertical trace (V.T.) when the plane meets the V.P. in the line, extended if necessary, then that line called vertical trace.
CASE OF A RECTANGLE – OBSERVE AND NOTE ALL STEPS –
**PROCEDURE OF SOLVING THE PROBLEM:-**
IN THREE STEPS EACH PROBLEM CAN BE SOLVED:
 STEP 1. Assume suitable conditions & draw Fv & TV of initial position.
STEP 2. Now consider surface inclination & draw 2nd Fv & TV.
STEP 3. After this, consider side/edge inclination and draw 3rd (final) Fv & TV.
**ASSUMPTIONS FOR INITIAL POSITION:-**
(Initial Position means assuming surface // to HP or VP)
1.If in problem surface is inclined to HP – assume it // HP
Or If surface is inclined to VP – assume it // to VP
2. Now if surface is assumed // to HP- its TV will show True Shape.
 And If surface is assumed // to VP – its FV will show True Shape.
3. Hence begin withdrawing TV or FV as True Shape.
4. While drawing this True Shape –
 Keep one side/edge (which is making inclination) perpendicular to xy line.
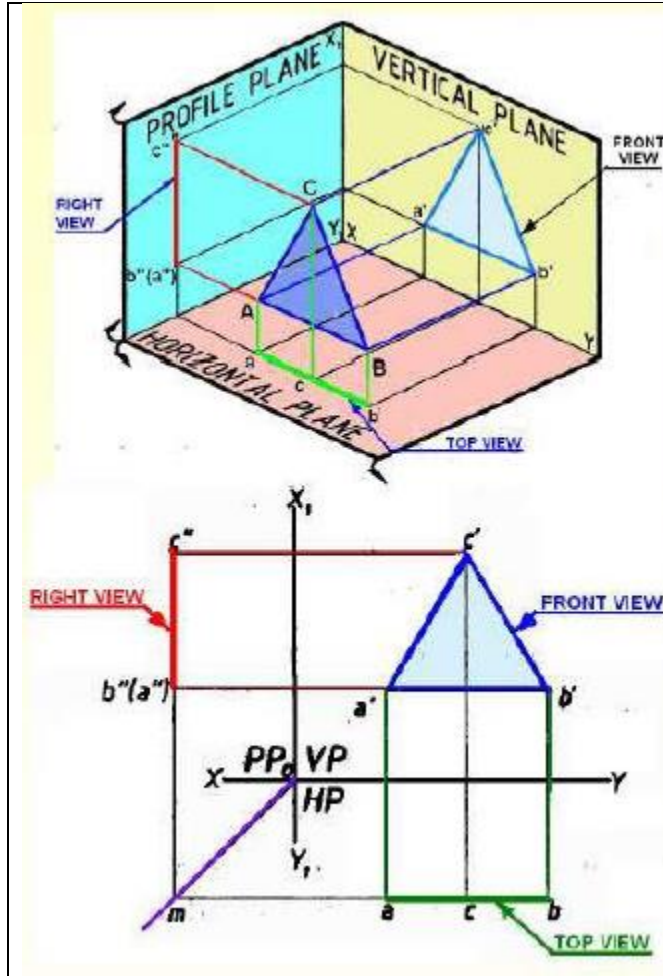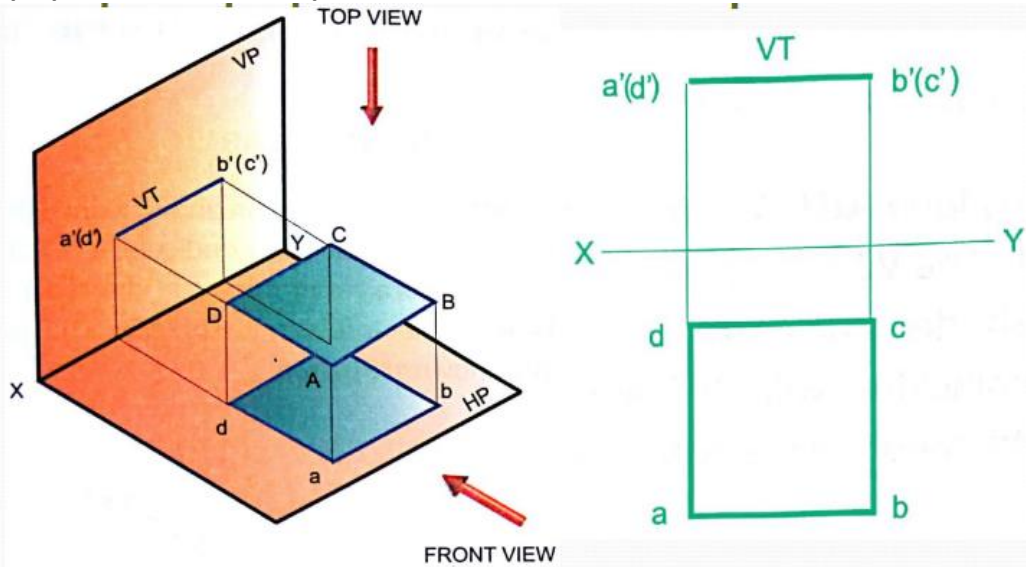
After projecting the triangular lamina on VP, HP and PP, both HP and PP are rotated about XY and X_1Y_1 lines till they lie in-plane with that of VP.
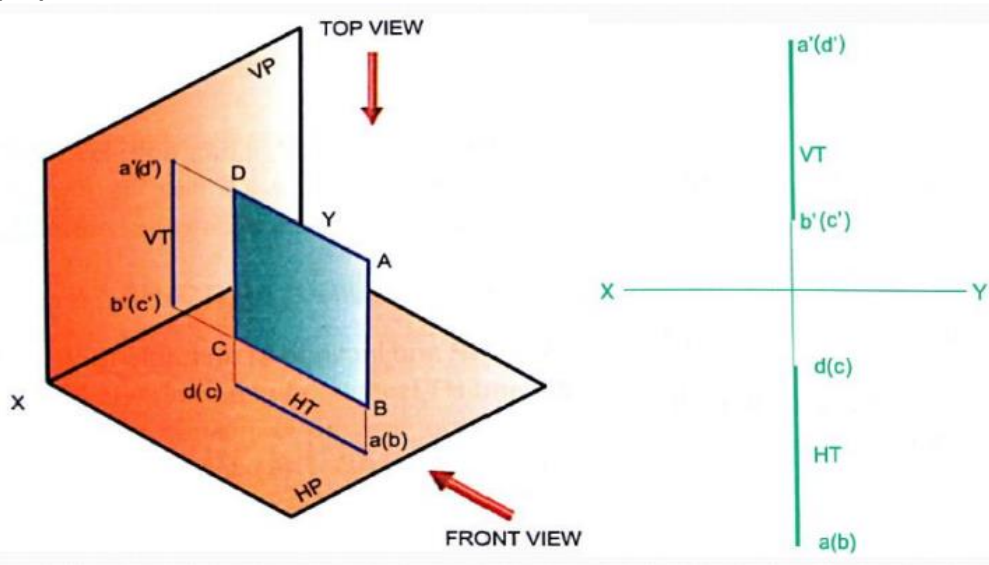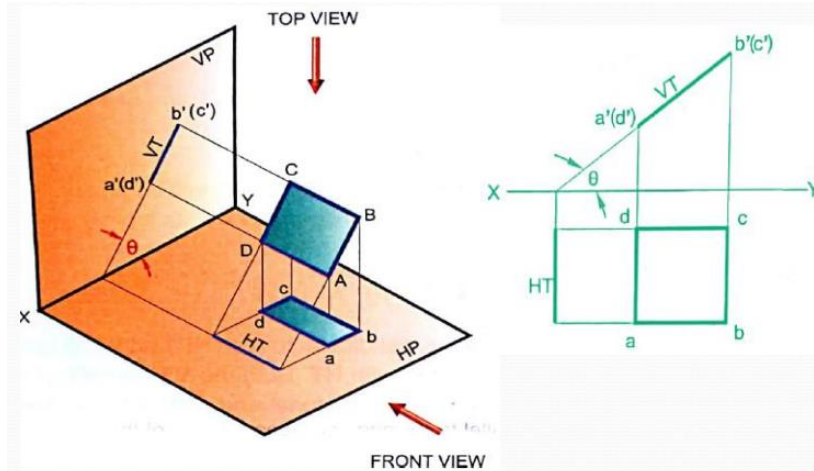
1.A plane perpendicular to HP and parallel to VP
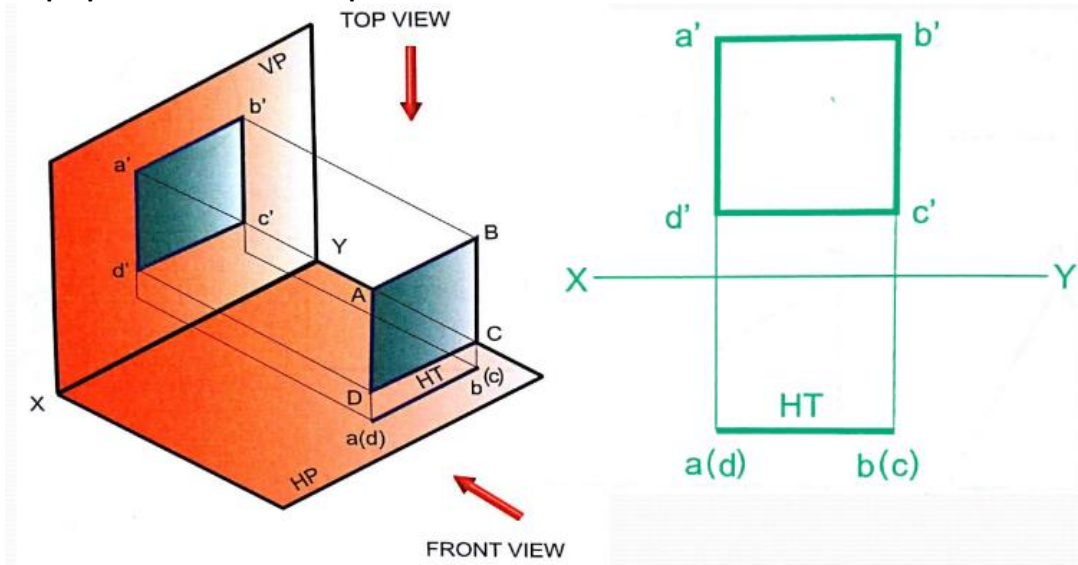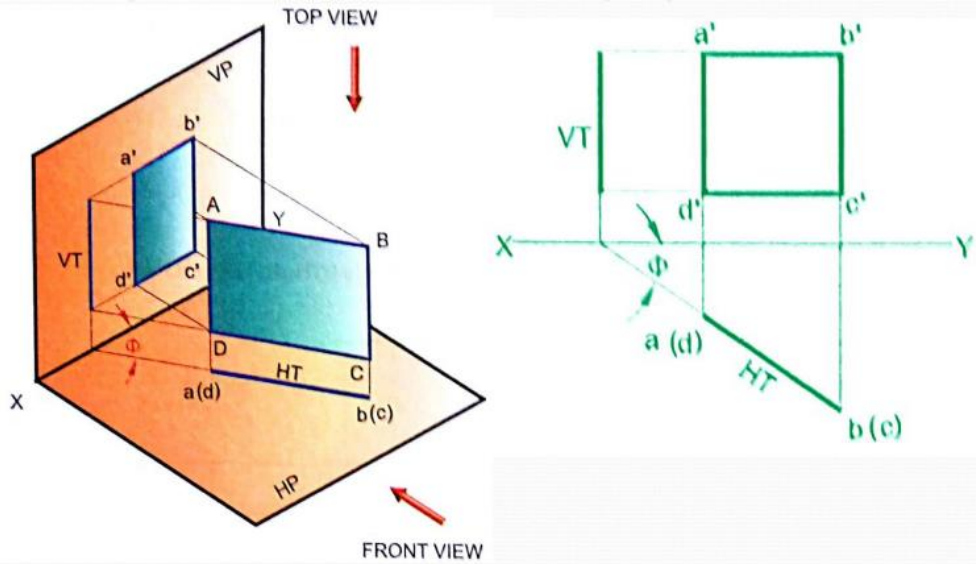
2.A plane perpendicular to VP and parallel to HP
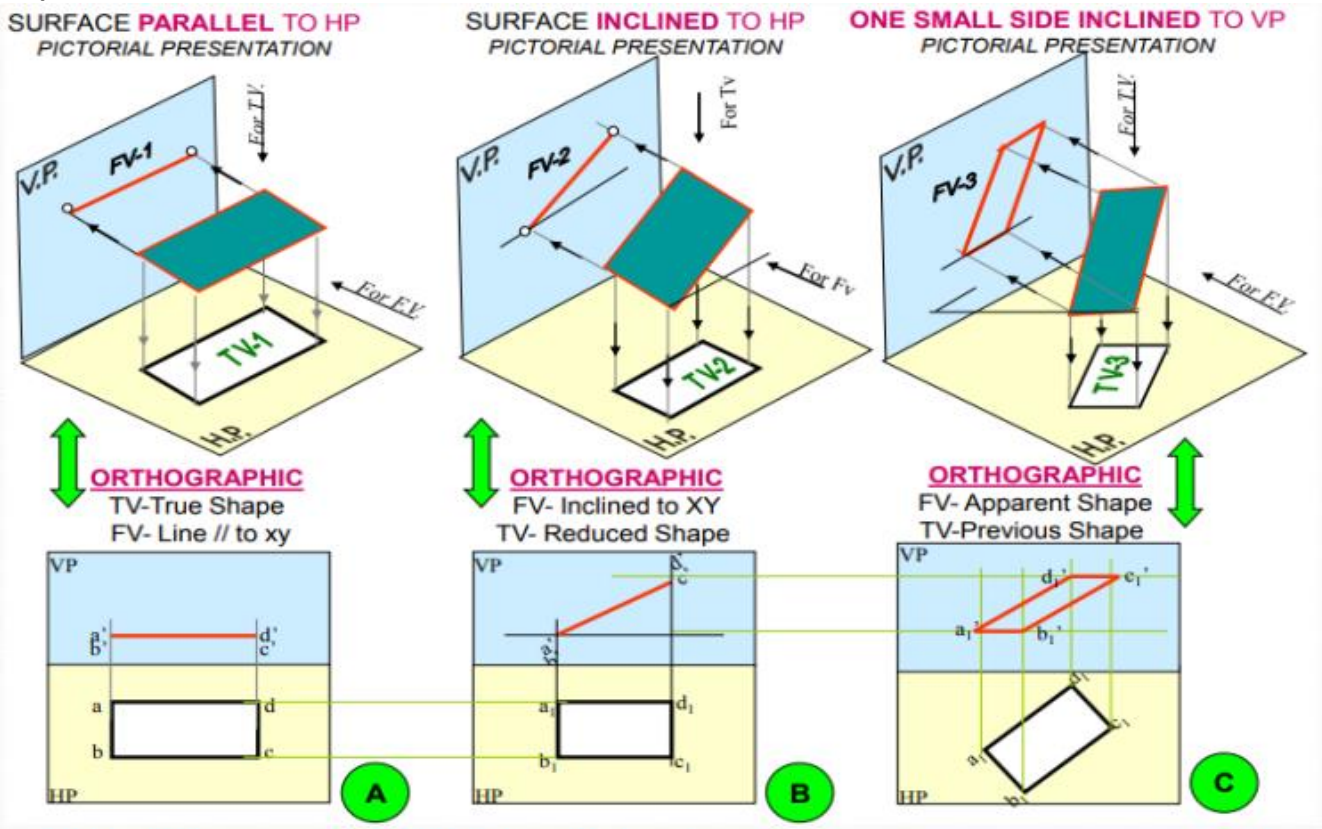

3.A plane perpendicular to both VP and HP
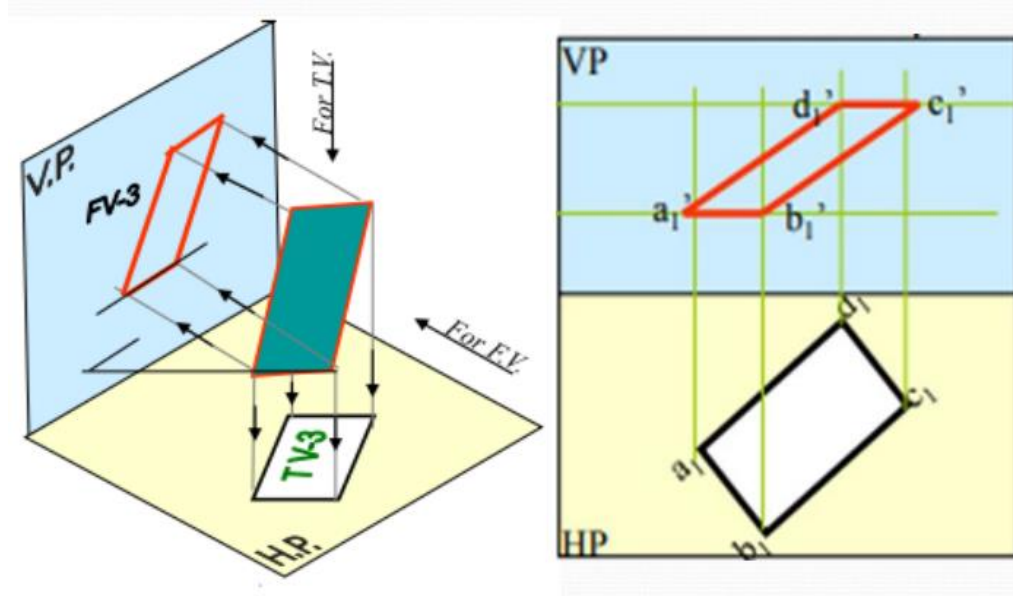

4. A plane inclined to HP and perpendicular VP

**5. A plane inclined to VP and perpendicular HP**

TOP VIEW

VP

b'

a'

A

Y

B

VT

d'

c'

Φ

D

HT

C

X

a(d)

b(c)

HP

FRONT VIEW

a'

b'

VT

d'

c'

X

Φ

Y

a (d)

HT

b (c)

6. A plane inclined to both VP and HP

SURFACE PARALLEL TO HP PICTORIAL PRESENTATION	SURFACE INCLINED TO HP PICTORIAL PRESENTATION	ONE SMALL SIDE INCLINED TO VP PICTORIAL PRESENTATION

V.P. FV-1 For T.V.

V.P. FV-2 For Tv

V.P. FV-3 For T.V.

For EV

For Fv

For EV

TV-1

TV-2

TV-3

H.P.

H.P.

H.P.

ORTHOGRAPHIC TV-True Shape FV- Line // to xy	ORTHOGRAPHIC FV- Inclined to XY TV- Reduced Shape	ORTHOGRAPHIC FV- Apparent Shape TV-Previous Shape

VP

a' b'

d' c'

a

d

b

c

HP

A

VP

c'

a₁'

d₁

b₁

c₁

HP
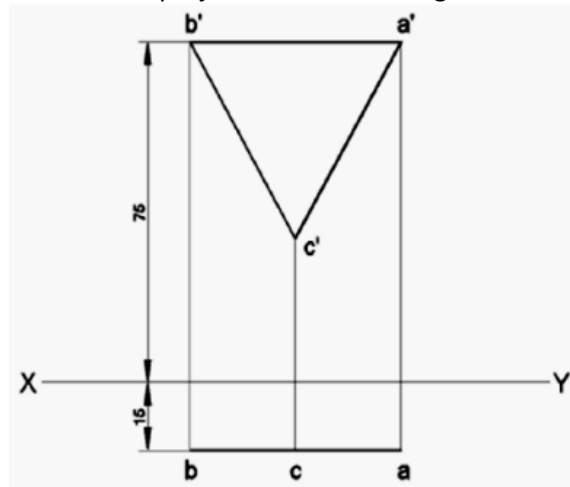
B

VP

d₁'

c₁'

a₁'

b₁'

d₁

c₁

a₁

b₁

HP

C

Plane is perpendicular to HP and parallel to VP

1.A square lamina ABCD of side 40mm is perpendicular to HP and parallel to VP. Draw its projections.
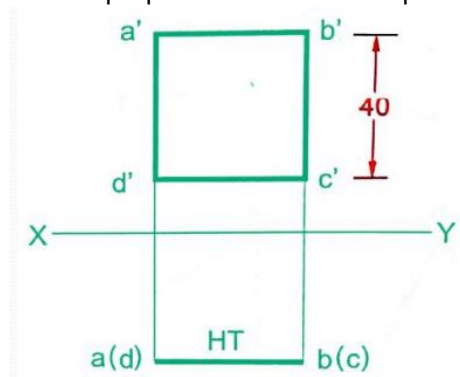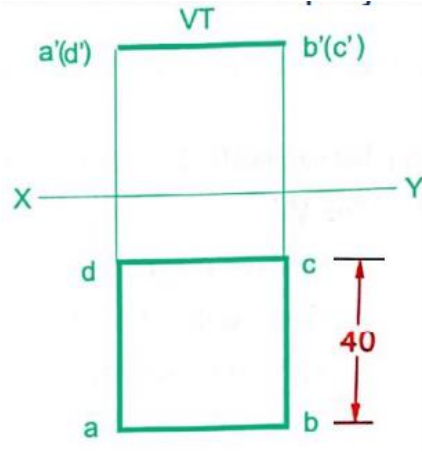

Plane is perpendicular to HP and parallel to VP

2. An equilateral triangle ABC of 50 mm side is parallel to VP and 15 mm in front of V.P, its base AB is parallel and 75 mm above H.P. Draw the projections of the triangle when the corner is near the H.P
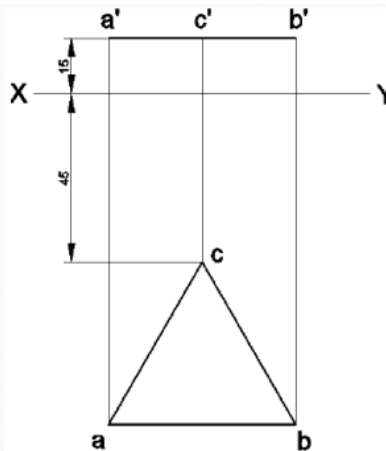
Plane is perpendicular to VP and parallel to HP

3.A square lamina ABCD of side 40mm is perpendicular to VP and parallel to HP. Draw its projections

Plane is perpendicular to VP and parallel to HP

4. An equilateral triangle ABC of 50 mm side has its plane parallel to H.P and side AB parallel to V.P Draw its projections when the corner C is 15 mm from H.P and 45mm from the V.P

A plane inclined to HP and parallel to VP

5. A rectangle ABCD of size 40x25 has the corner A, 10mm above HP and 15 mm in front of VP. All the sides of the rectangle are inclined at 45⁰ to HP and parallel to VP. Draw the projection of lamina.
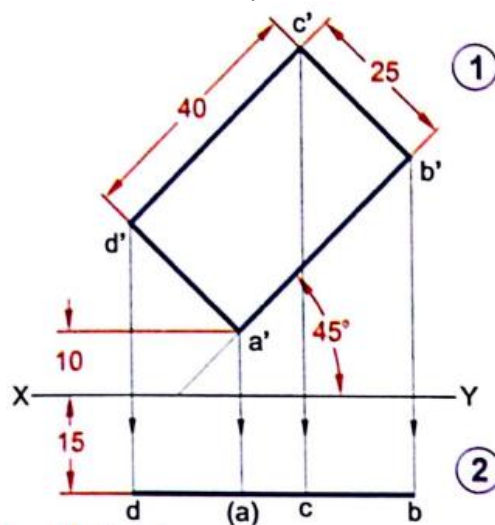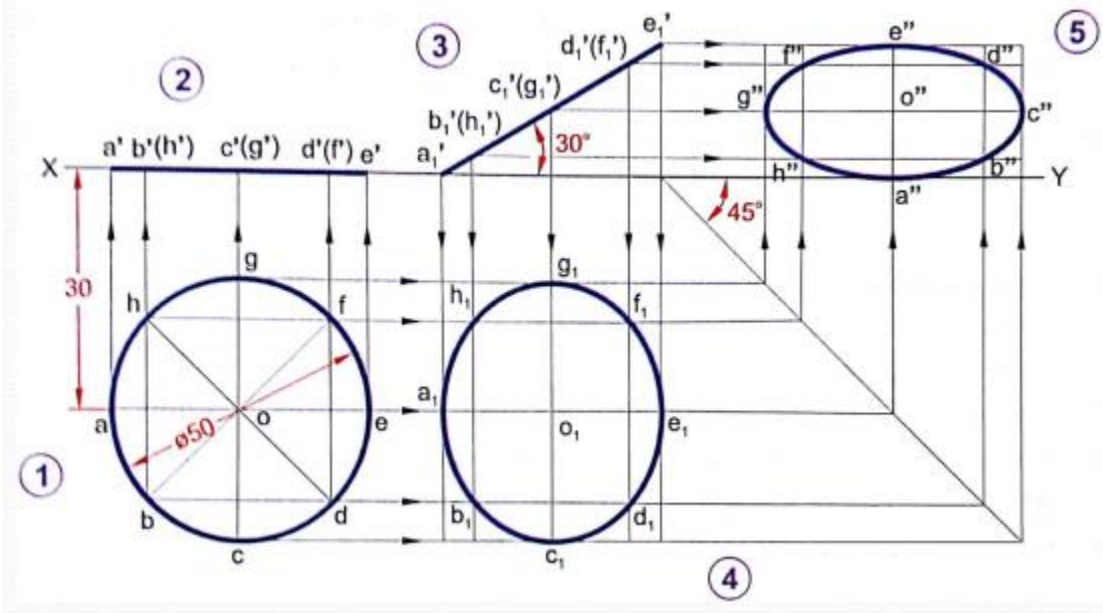
6. A pentagonal plate of side 30mm is placed with one side on the HP and the surface inclined at 500 to HP and perpendicular to VP. Draw the projection of lamina.
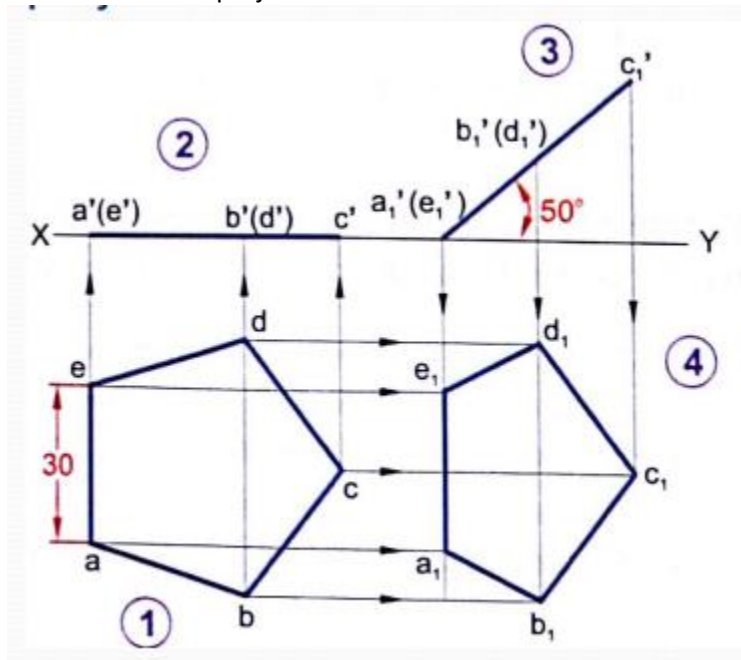

7. A circular plate of diameter 50mm is resting non the HP on a point on the circumference with its surface inclined at 450 to HP and perpendicular to VP. Draw the projection of lamina.
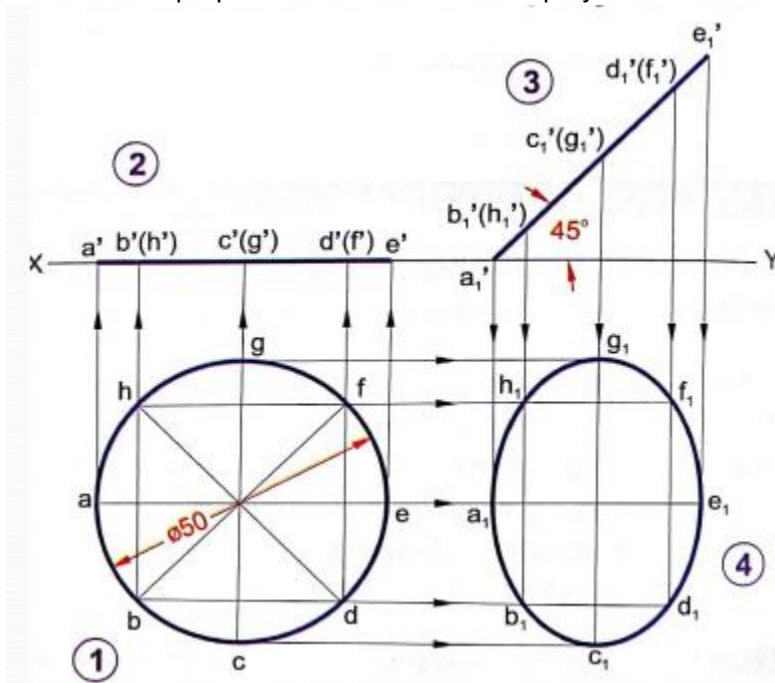
8. A circle of diameter 50 mm inclined at 300 to HP and perpendicular to VP. Has its centre 30 mm in front of VP. Draw the projection of lamina and side view.
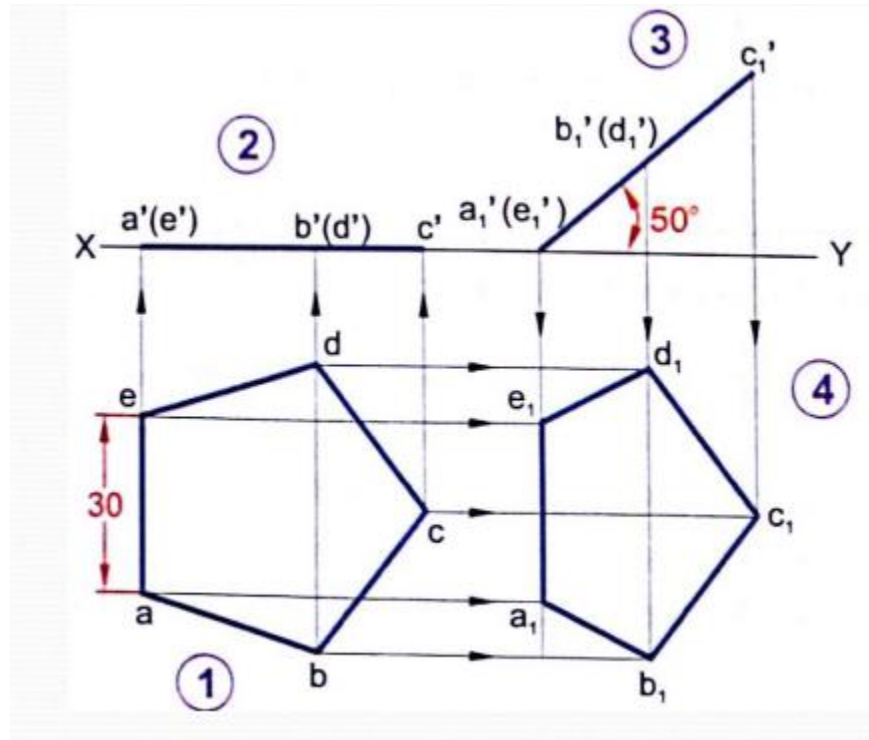
9.A regular hexagon of 25mm side and Has its a lamina is perpendicular to VP and inclined at 400 HP. Draw the three views.
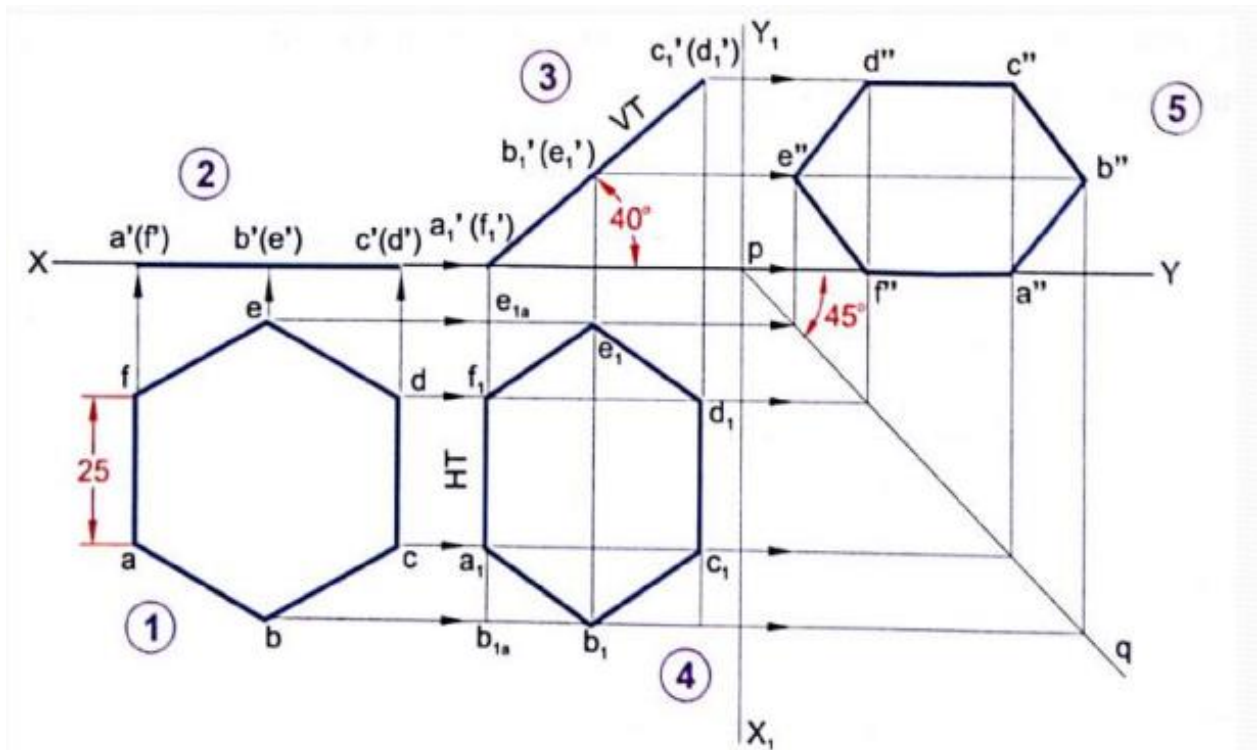

10. A pentagonal plate of side 30mm is placed with one side on the HP and the surface inclined at 500 to HP and perpendicular to VP. Draw the projection of lamina.

A plane inclined to VP and perpendicular HP

11. A hexagonal plate of side 30mm side has a corner at 20mm from VP and 50 mm from HP. Its surface is inclined at 500 to VP and perpendicular to HP. Draw the projection of lamina.
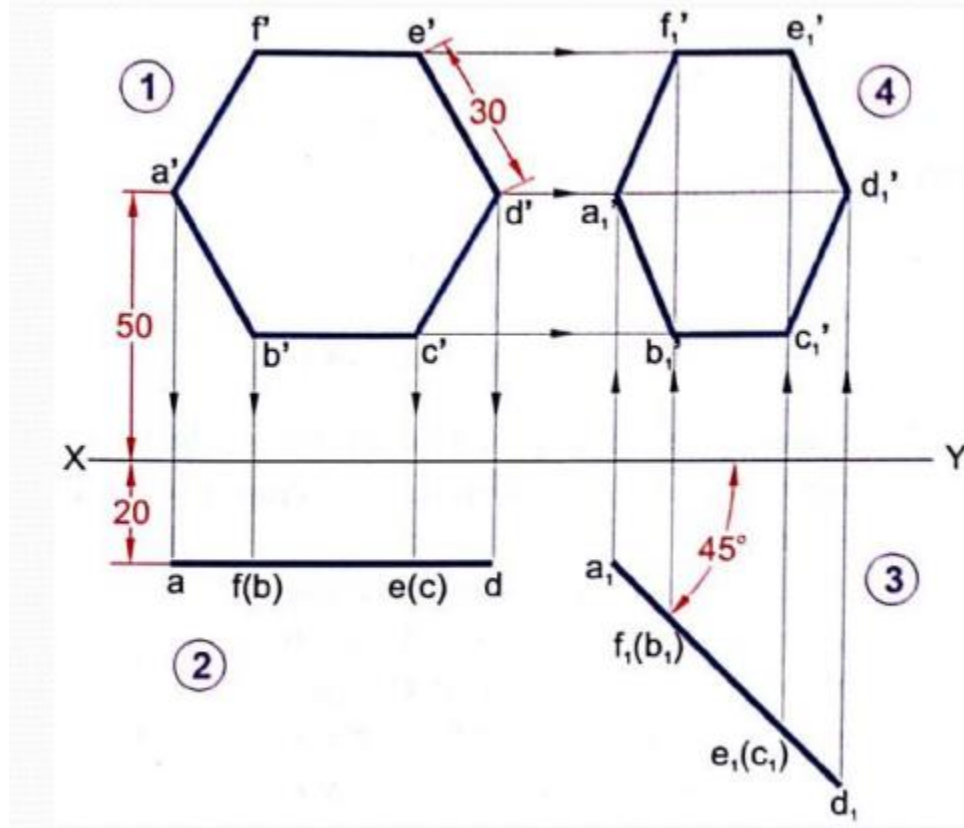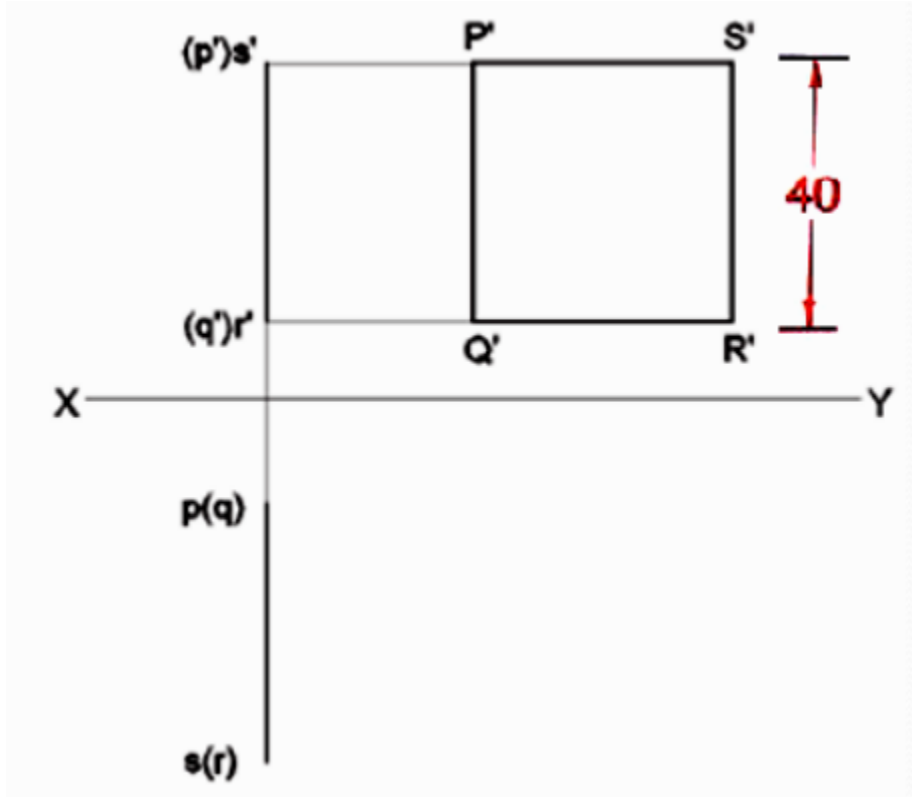
12.Draw the projections of a circular lamina of 30 mm diameter. The lamina is inclined a an angle of 45° to V.P and 25mm above HP in centre of circular lamina and 15 mm in front of VP
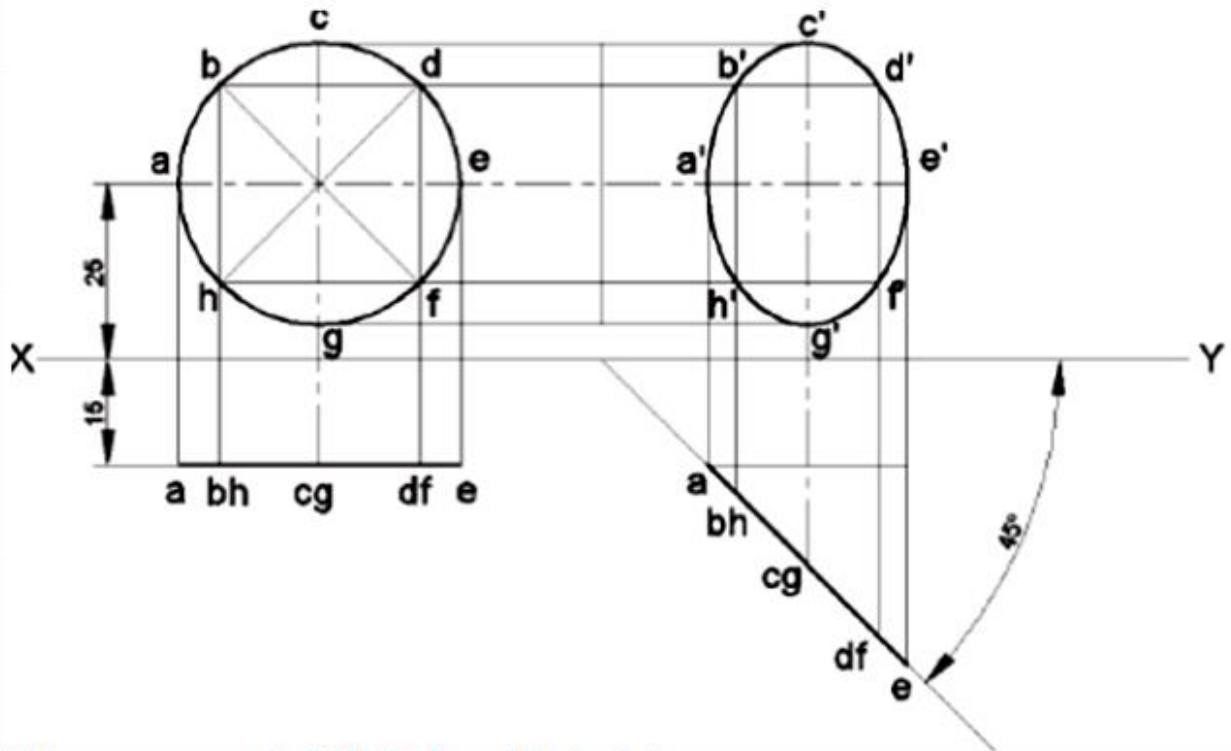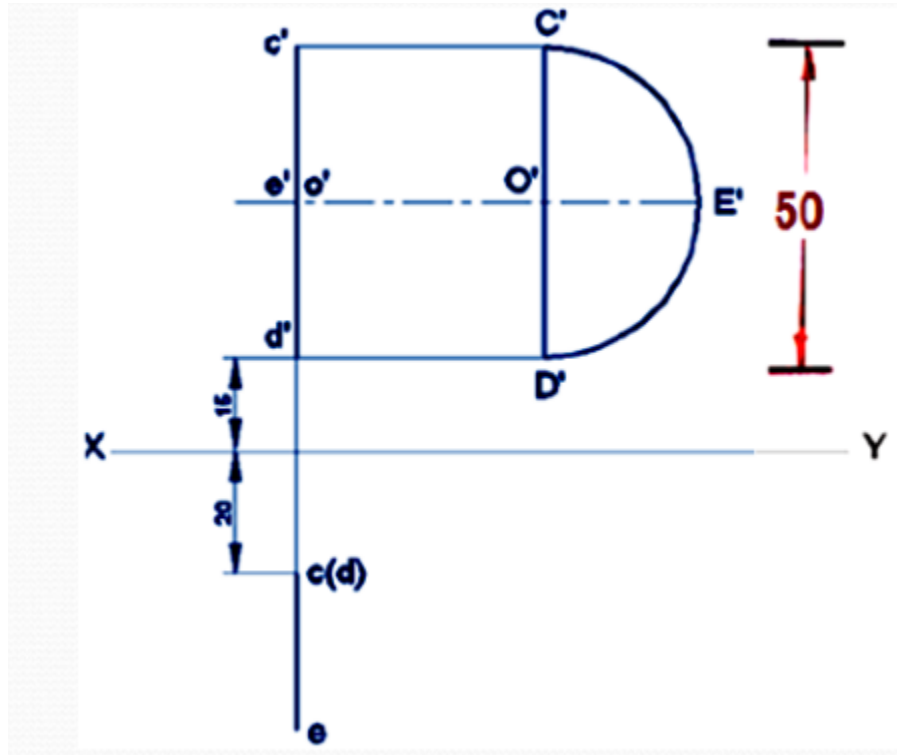

A plane perpendicular both VP and HP
13.A square lamina PQRS of side 40mm is perpendicular to VP and HP. Draw its projections

14 . A semicircle of diameter, CD = 50 is kept in the 1st quadrant such that its diameter is perpendicular to V.P and H.P, Draw its projections, when the diameter is near V.P, distance of diameter from H.P is 15 mm and from V.P is 20mm


A plane inclined to both VP and HP

15.Rectangle 30mm and 50mm sides is resting on HP on one small side which is at 30° inclined to VP. while the surface of the plane makes at 45° inclination with HP. Draw it's projections.
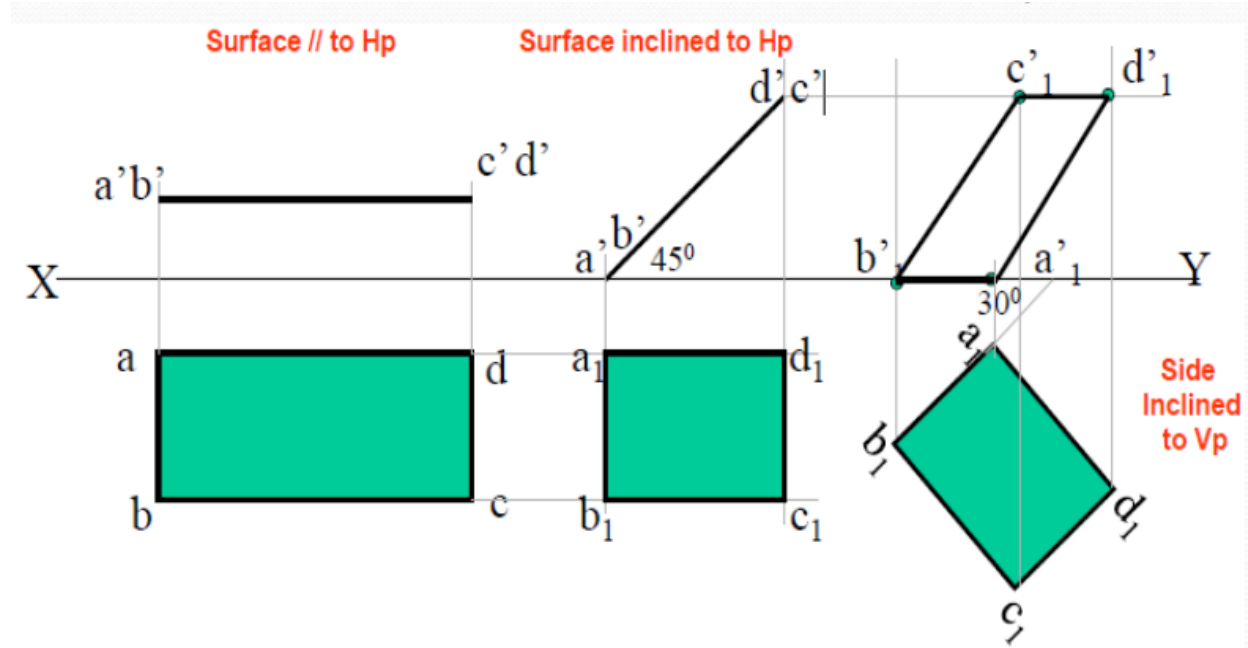
16. A regular pentagon of 30 mm sides is resting on HP on one of it's sides with it's surface 45° inclined to HP. Draw it's projections when the side in HP makes 30° angle with VP.
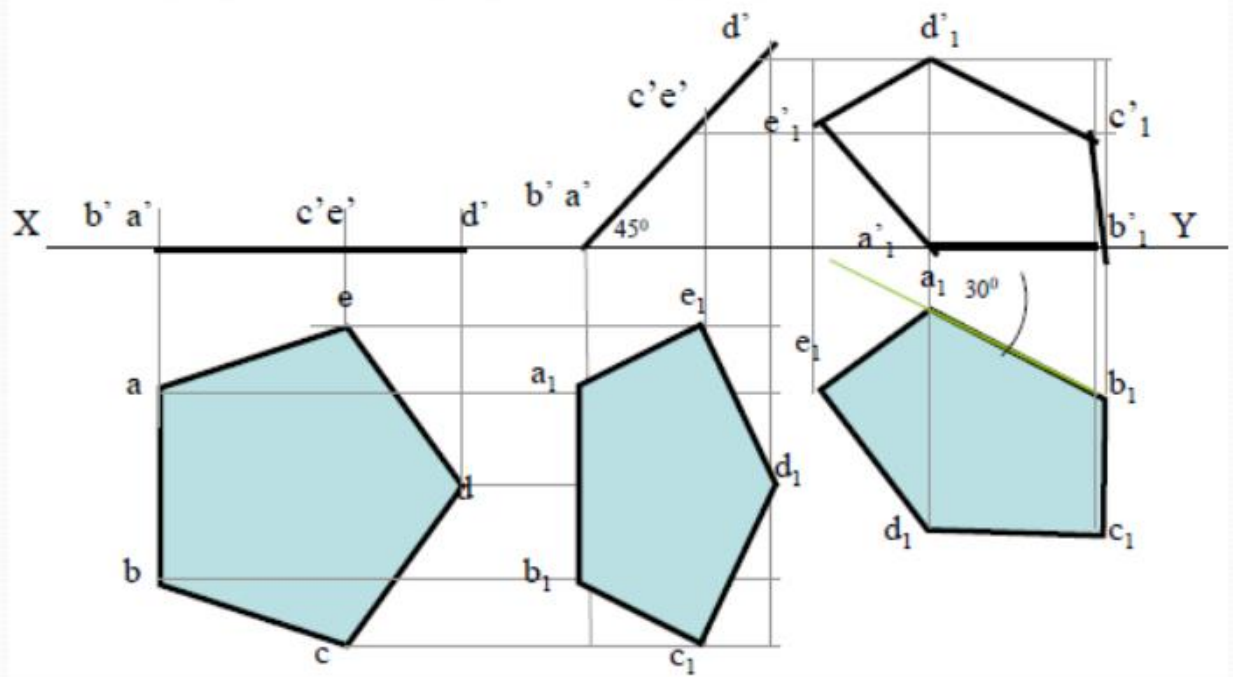

17. A regular pentagon of 30 mm sides is resting on HP on one of it's sides while it's opposite vertex (corner) is 30 mm above HP. Draw projections when side in HP is 30° inclined to VP.
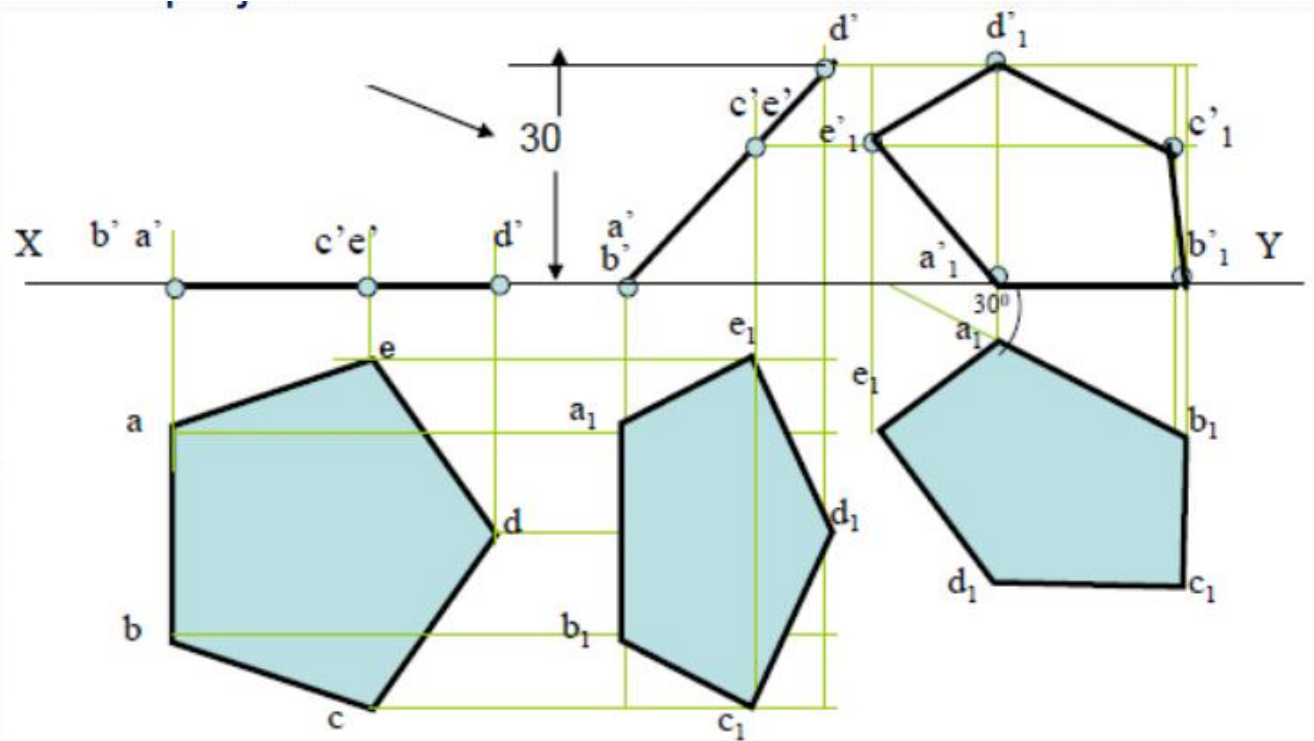
18. A rectangular plate of 60x40 mm has one of its shorter edge in the VP and inclined 40° to the HP. Draw its top view is a square of side 40 mm.
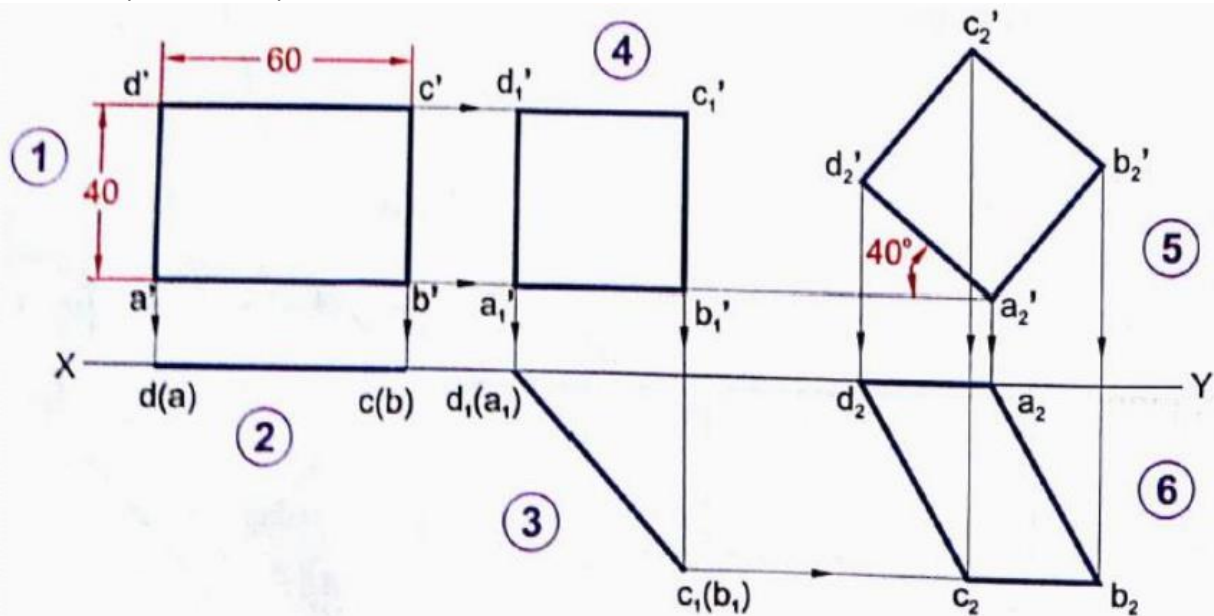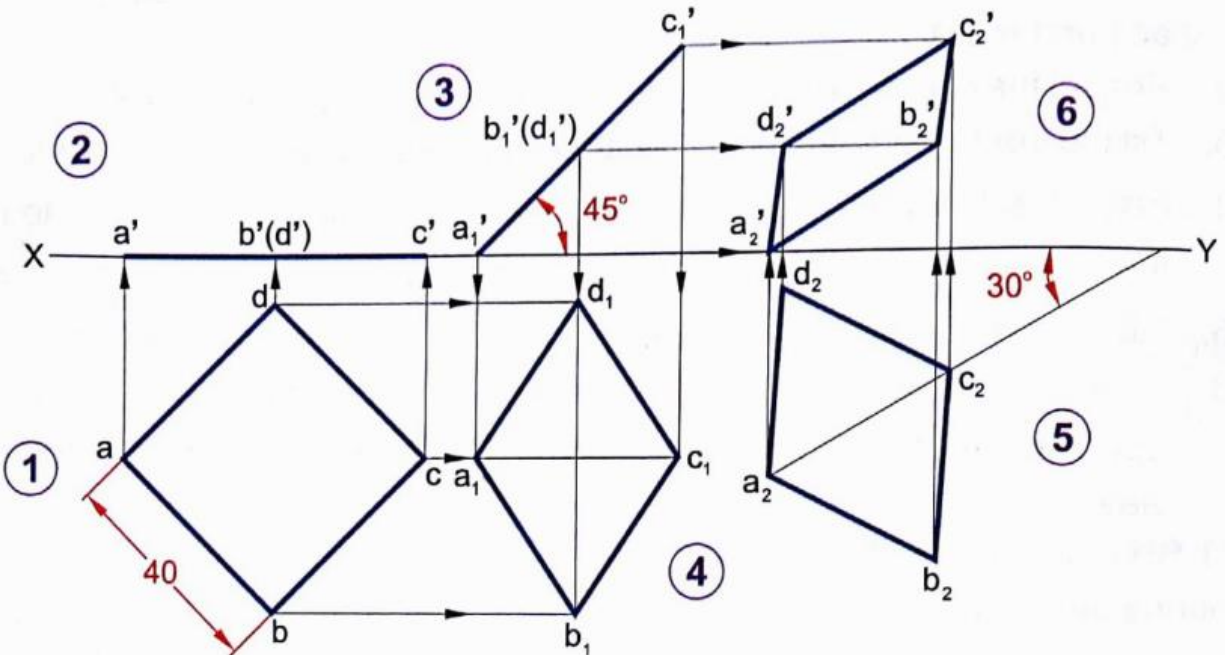

19. A square plate ABCD of 50mm side has one of its corner A on the ground, its diagonal AC inclined at 30° to the HP and the diagonal BD inclined at 45° to the VP and parallel to the HP. Draw its projection.
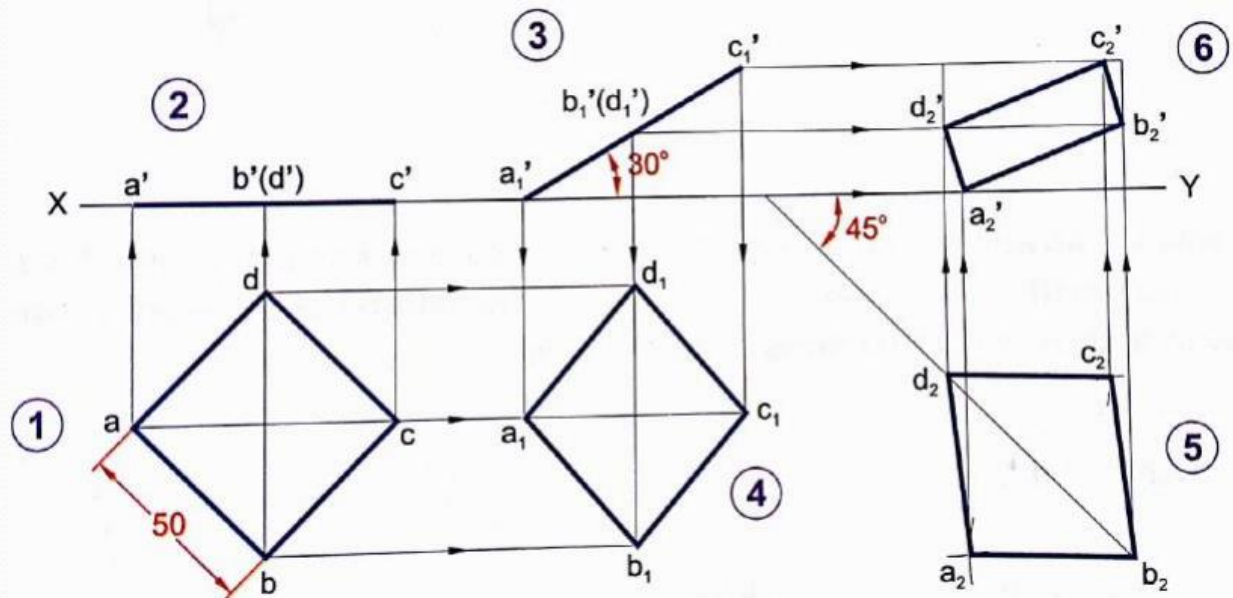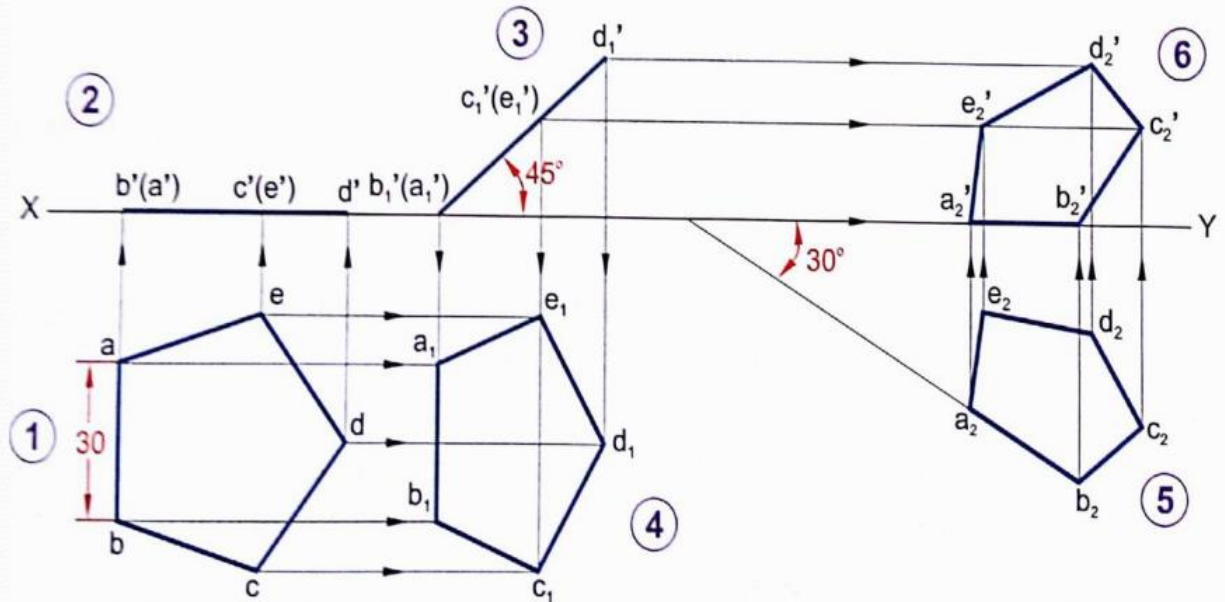

20. A square plate ABCD of 40mm side has one of its corner A on the ground, its diagonal AC inclined at 45° to the HP and apparently inclined at 30° to the VP. Draw its projection.
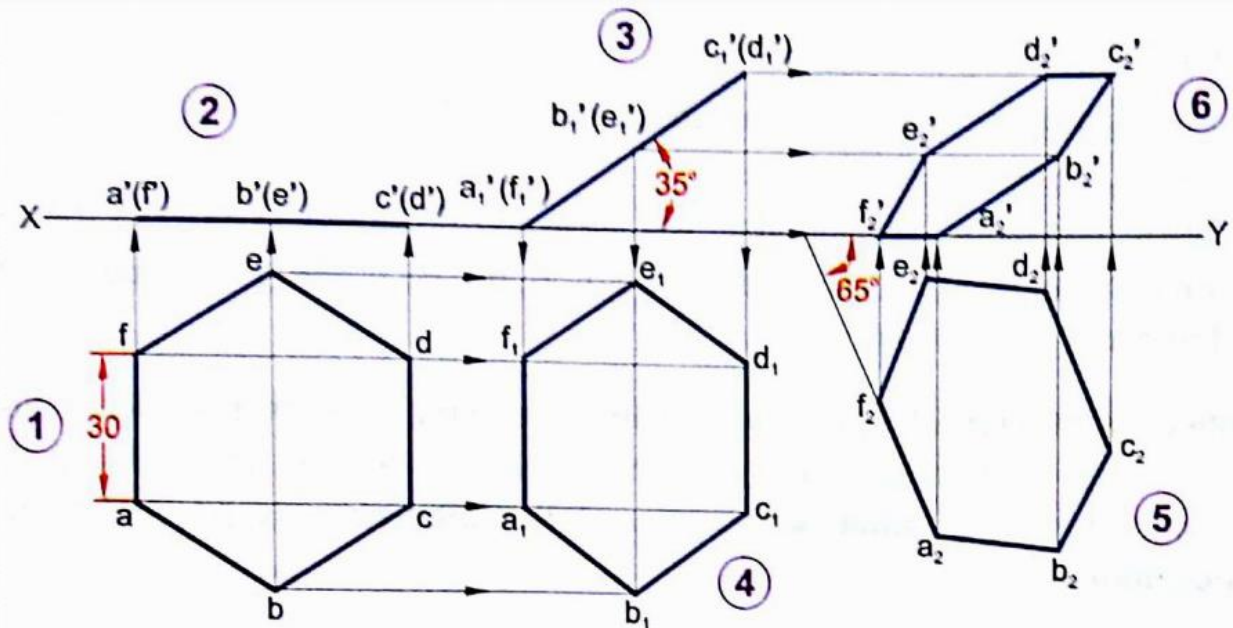
21. A pentagonal lamina of 30mm side has one edge in HP and inclined at 30° to the VP. Draw its projection when its surface is inclined at 45° to the HP.

22.Draw the projections of a hexagon of side 30mm having one of its sides in HP and top view inclined at 65° to the VP and the surfaces inclined at 35° to the HP.

23. A circular plate of diameter 60 mm has the end A of the diameter AB in the HP and the plate is inclined at 45° to the HP. Draw its projections when the diameter AB appears to be inclined at 60° to the VP in the top view.

projections in simple position

projections after tilting the circle about a

Final projections using apparent inclination with the vp