UNIT-III
PROJECTIONES OF PLANES

→ A plane figure (or) surface is a two dimensional object having 2 Dimensions length and breadth. It has neglegible thickness "true shape".

→ A plane may be of any shape & such as triangular, Square, pentagonal, Hexagonal, circular etc.

Types of planes:
planes may be divided into two types.

(a) 1^r planes

(b) oblique planes

(a) perpendicular plane:
planes which are 1^r to one of the reference plane and ||el (or) inclined to the other reference plane are called 1^r planes

① plane 1^r to H.P & ||el to v.P
② plane 1^r to v.P & ||el to H.P
③ plane 1^r to both H.P & v.P (||el to profile plae)
④ plane 1^r to v.P and inclined to H.P
⑤ plane 1^r to H.P and inclined to v.P

(b) oblique planes:
planes which are inclined to both H.P & v.P are known as oblique planes.

Important points:
→ when a plane is parallel to one of the reference plane, then the projection on that plane to which it is ||el will be its "true shape".

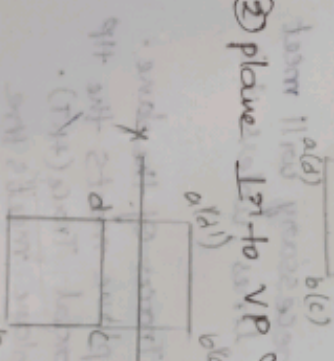→ When a plane is 1^r to one of the reference plane then the projection on that plane to which it is 1^r is a "st.line".

→ when a plane is inclined to one of the reference plane, then the projection on that plane to which it is inclined will be in "apparent shape".
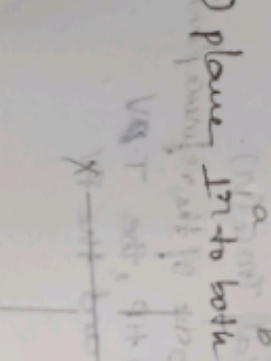
Positions:
① plane ||el to v.P & 1^r to H.P

② plane 1^r to v.P & ||el to H.P

③ plane 1^r to both H.P & v.P

④ plane ⊥ to VP & inclined to HP

⑤ plane ⊥ to HP & inclined to V.P
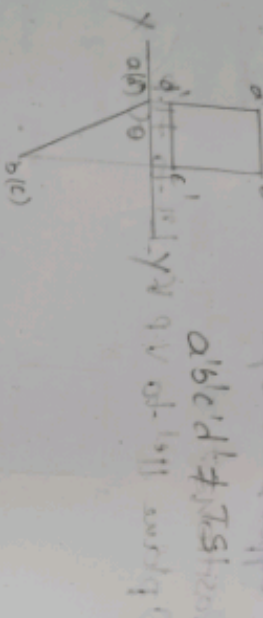
Traces of planes :

A plane, extended if necessary will meet the reference planes in lines, unless it is parallel to any of them.

→ There lines are called Traces of the plane.

→ The line in which the plane meets the +Horizontal Trace (H.T).
is called the Horizontal Trace (H·T).

→ The line in which the plane meets the VP is called the vertical Trace (VT).
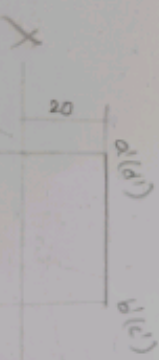
Projections of planes ||el to ne of the reference plane
→ when the plane is ||el to HP, the T.V
should be drawn first and the FV
projected from it.

→ when the plane is ||el to VP, the side view must
(||el to profile plane) the FV and TV are
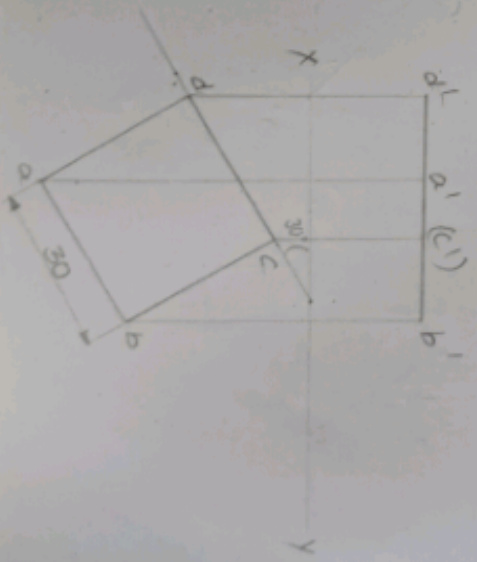be drawn first. The FV and TV are
projected from the side view.

Problems :

1) A Square plane ABCD of Side 30 mm. has
its plane ||el to HP and 20 mm away from
it. Draw the projections of the plane when
2 of its sides are a) ||el to VP b) inclined
at 30° to VP

2) An Equilateral Triangle of 50 mm Side has its Vertical Trace parallel to and 25 mm above XY. It has no Horizontal Trace. Draw its projection when one of its Sides is inclined at 45° to VP.

xy → plane ||el to H.P

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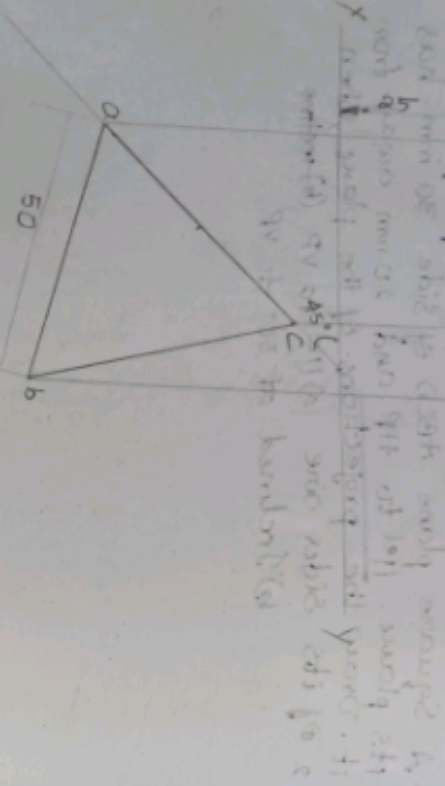
3) An Equilateral Triangular plane ABC of Side 40 mm has its plane ||el to VP and 20 mm away from it. Draw the projections of the plane when one of its Side is
(a) ⊥r to HP (b) ||el to HP (c) Inclined at 45° to HP

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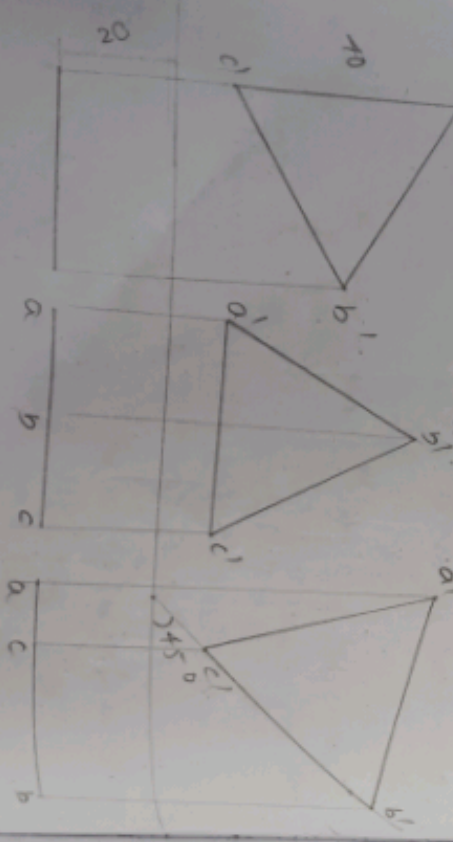
4) A Square ABCD of 40 mm Side has a Corner on HP and 20 mm, infront of VP. All Sides of the Square are Equally inclined to HP and ||el to VP. Draw its projections and Show its traces.
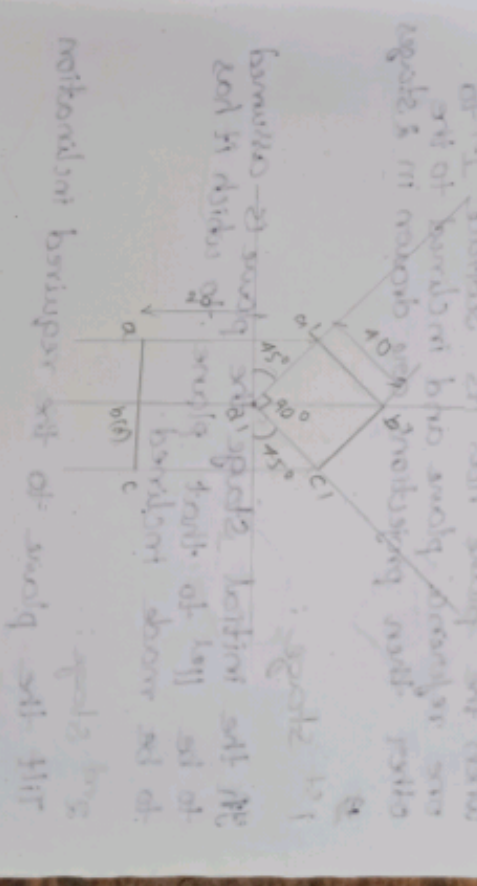
5) A Hexagon of 30 mm Side has one of its Corners, on the top HP. The plane of the Hexagon is ⊥r to Both HP and VP. The Longest Diagonal passing through the Corner which is on the HP is ⊥r to HP. Draw th Projections.

Projections of plane 1ʳ to one reference plane and inclined to the other

when the plane has its surface 1ʳ to one reference plane and inclined to the other, then projections are drawn in 2 stages
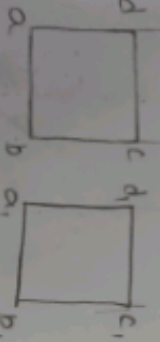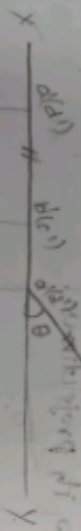
1ˢᵗ Stage :

In the initial stage the plane is assumed to be ‖ᵉˡ to that plane to which it has to be made inclined.

2ⁿᵈ stage :

Tilt the plane to the required inclination

Positions :

① plane 1ʳ to VP and inclined to HP
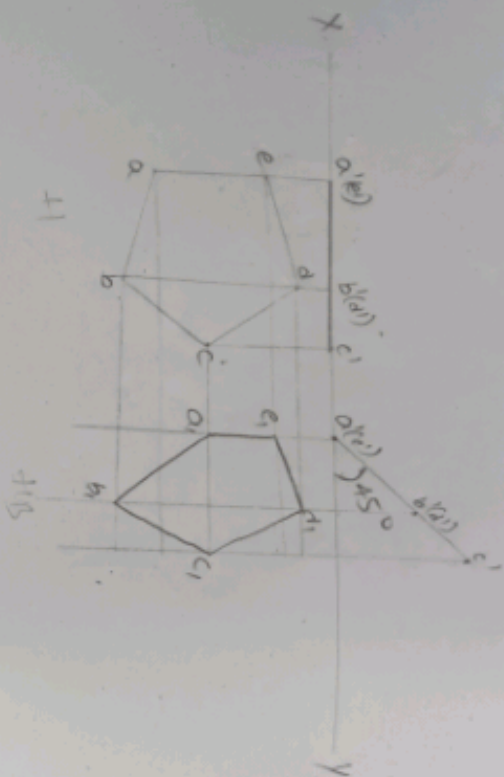
② plane 1ʳ to HP & inclined to V.P

**Important points :**

Side on HP/VP   Corners on HP/V.P

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Problems:

(1) A regular pentagon of 25 mm has one side on its plane is inclined at 45° to H.P & its plane is inclined at 45° to H.P & 1" to VP draw its projections

(2) Draw the projections of a regular pentagon of 25 mm side with its surface making an angle of 45° with HP one of its sides of pentagon is ||el to HP and 15 mm away from it. The plane is 1" to V.P
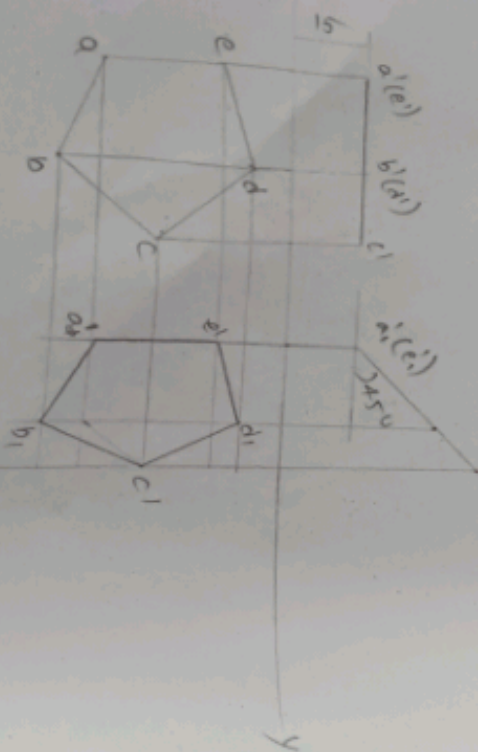
(3) A regular Hexagon of 40 mm side has a side in the HP its surface is inclined at 45° to HP and 1" to V.P. draw its projections
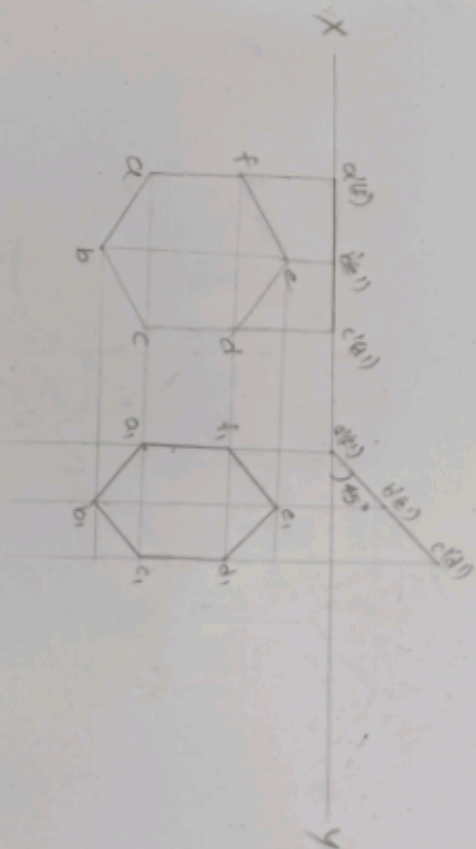
(4) A regular Hexagon of 30 mm side has a corner in the HP its surface is inclined at 45° to HP and 1" to VP. Draw its projections.
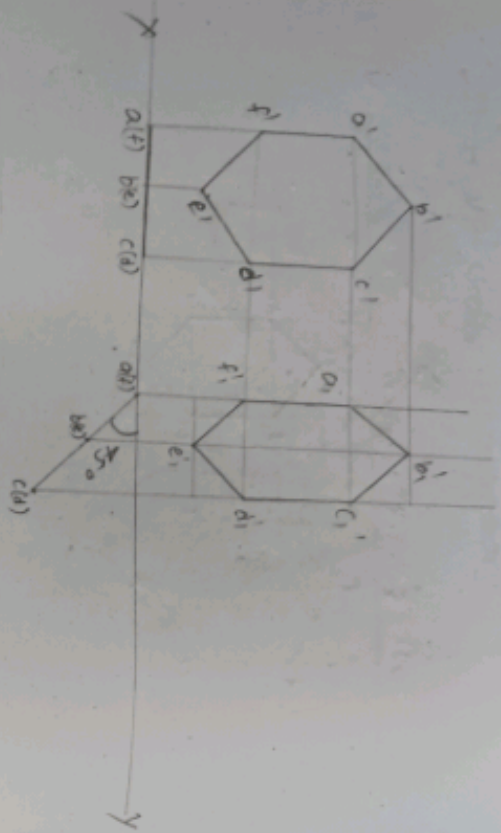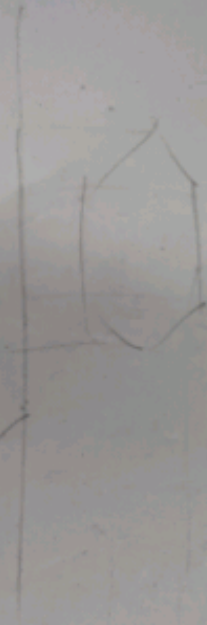

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1) A Hexagonal plane of size 30 mm is placed with a side on V.P and Scale inclined at 45° to V.P and its side on V.P and Scale inclined at 45° to V.P and 1π to HP draw its projections.

4) A Circular plate of diameter 50 mm is resting on HP on a pt on the circumference with its Surface inclined at 45° to HP and 1π to VP. Draw its projections.
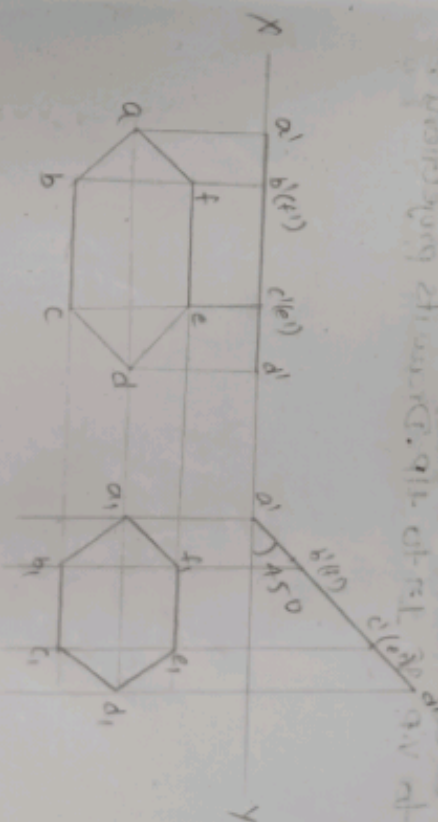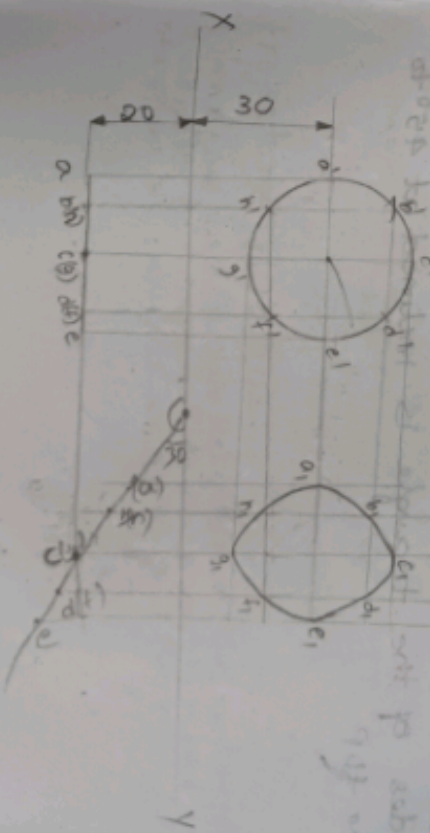

6) A Hexagonal plate of size 30 mm is resting on HP with a corner on V.P and Surface inclined at 45° to V.P & 1π to HP. Draw its projections.
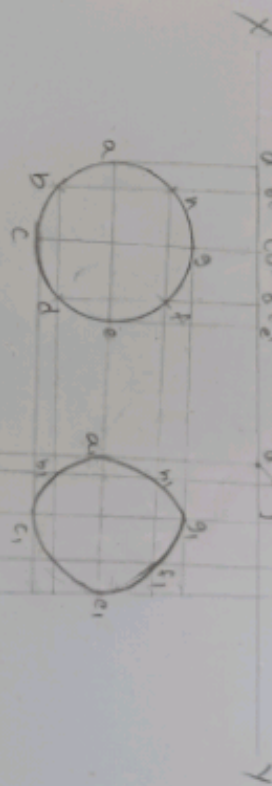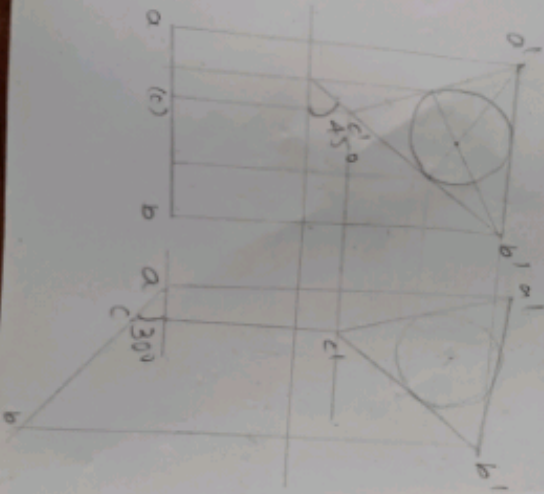
8) Draw the projections of a 0 & 0 of 50 mm diameter having its plane vertical and inclined at 30° to the VP. Its Centre is 30 mm above the HP and 20 mm infront of the VP.


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9) ND Bhatt Ex:12-5 prob

Draw a regular hexagon of 40mm side, with its two sides vertical. Draw a circle of 40mm diameter in its centre. The fig represents a hexagonal plate with a hole in it, and having its surface parallel to the V.P. Draw its projections when the surface is vertical and inclined at 30° to the V.P. Assume the thickness of the plate to be equal to that of a line.

11) ND Bhatt Ex:12-8

The top view of a plate, the surface of which is ⊥r to the V.P. and inclined at 60° to the H.P. is a circle of 60mm diameter. Draw its 3 views:

10) ND Bhatt Ex:12-1

Draw an equilateral triangle of 75 mm side and inscribe a circle in it. Draw the projection of the figure, when its plane is vertical and inclined at 30° to the V.P. and one of the sides of the triangle is inclined at 45° to the H.P.
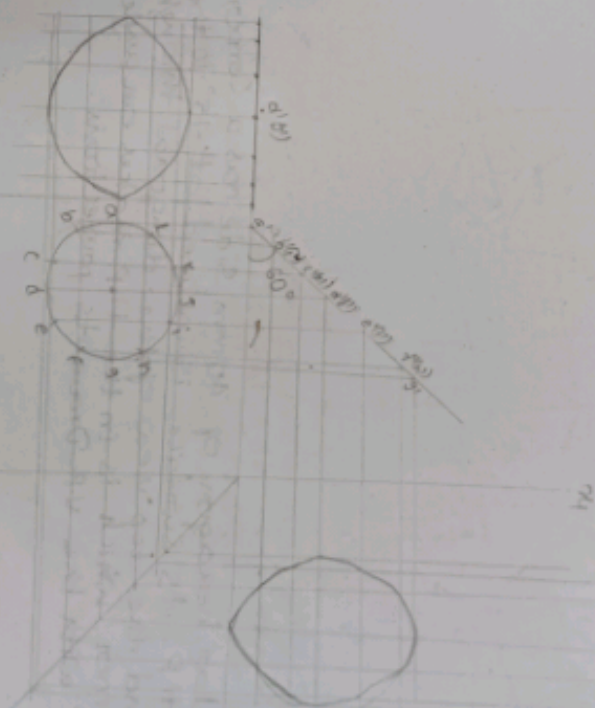

Projections of Oblique:

(When a plane has its surface inclined to one plane, and an edge (or) a diameter (or) a diagonal ‖el to that plane and inclined to the other plane, its projections are drawn in 3 stages

Problems on projections of oblique planes

Problems on projections of oblique planes

1) Draw the projections of a regular hexagon of 25 mm side, having one of its sides in the H.P. and inclined @ 60° to the V.P., and its surface making an angle of 45° with the H.P.
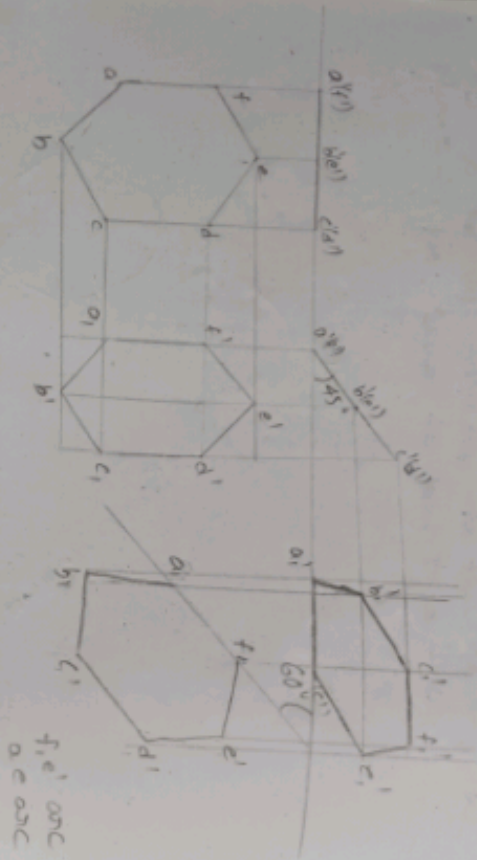

2) A regular hexagon of 40mm side has a corner in the H.P. Its surface is inclined at 45° to the H.P. and the top view of the diagonal through the corner which is in the H.P. makes an angle of 60° with the V.P. Draw its projections.
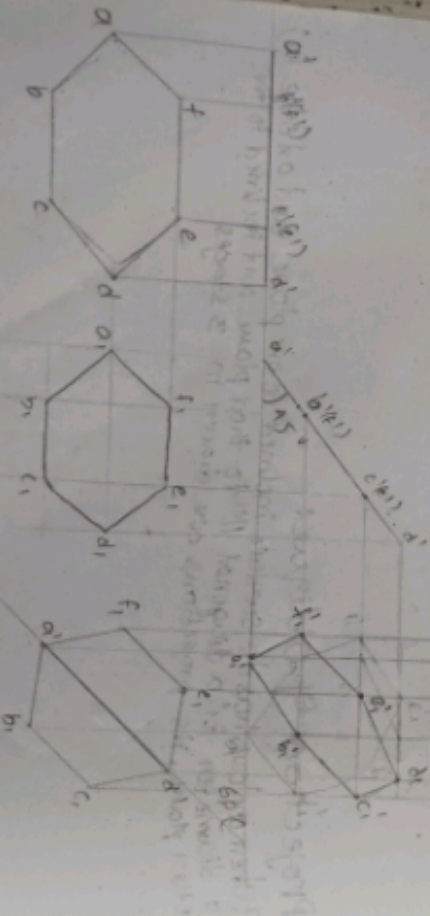
3) A square ABCD of 50 mm side has its corner A in the H.P. Its diagonal AC inclined @ 30° to the H.P. and the diagonal BD inclined @ 45° to the V.P. and the diagonal BD inclined @ 45° to the H.P. Draw its projections.
→ b & plan
→ ⊥el to the H.P. Draw its projections.
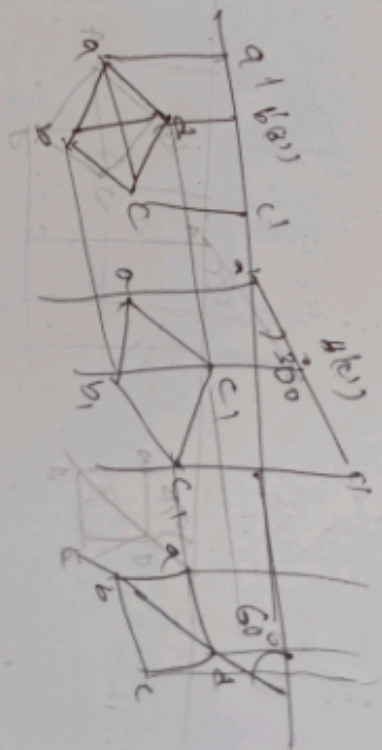
4) A 60° set-square of 125 mm longest side is so kept that the longest side is in the H.P. making an angle 30° with the V.P. and the set-square itself inclined @ 45° to the H.P. Draw the projection of set square.
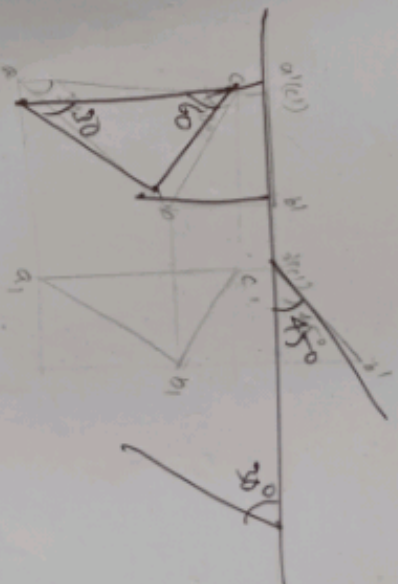
5) Draw the projections of a regular pentagon of 40 mm side, having its surface inclined @ 30° to the H.P and a side ||el to the H.P and inclined @ an angle of 60° to the V.P.
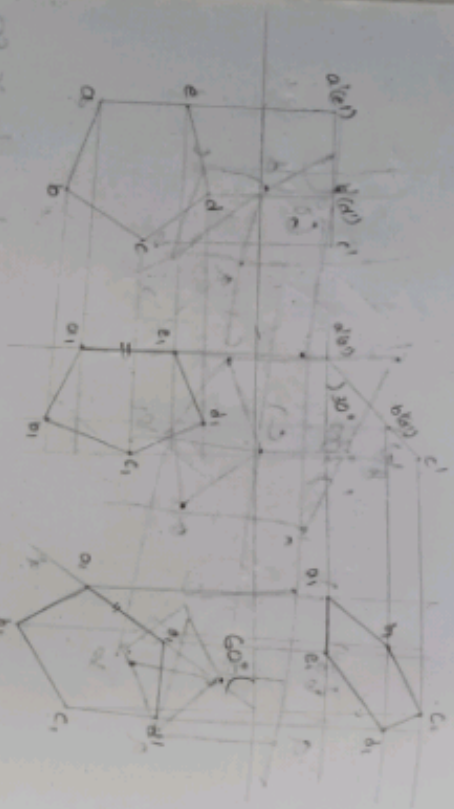
**6)** A composite plate of negligible thickness is made up of a rectangle 60 mm × 40 mm and a Semi-circle on its longer side. Draw its projections when the longer side is ||el to the H.P, and inclined @ 45° to the V.P. The surface of the plate making 30° angle with the H.P.
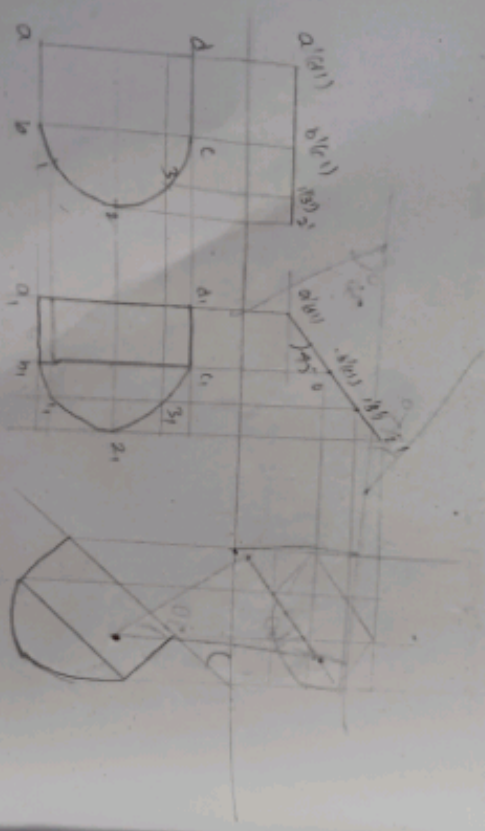

7) Draw the projections of a rhombus having diagonals 125 mm and 50 mm long, the smaller diagonal of which is ||el to both the principal planes, while the other is inclined @ 30° to the H.P.
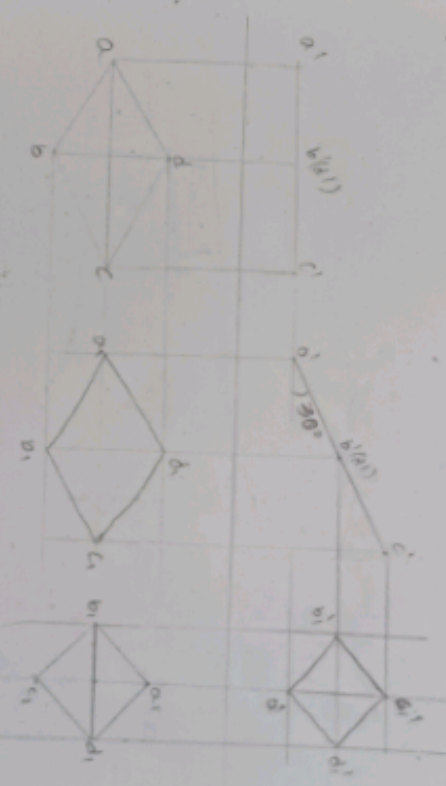
8) A thin 30°-60° Set-Square has its longest edge in the V.P. and inclined @ 30° to the H.P. Its surface makes an angle of 45° with the V.P. draw its projections.
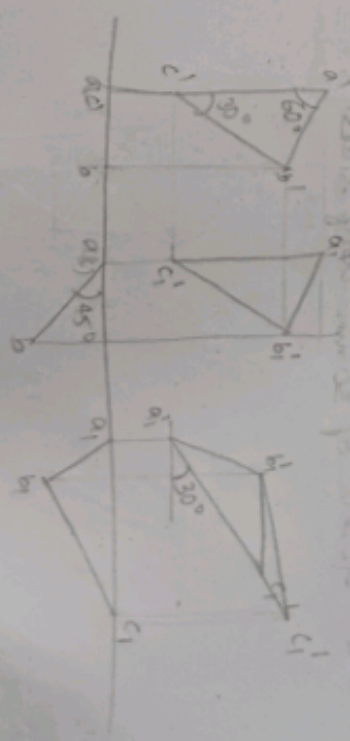
9) A Semi circular plate of 80 mm diameter has its st edge in the V.P. and inclined @ 45° to the H.P. The surface of the plate makes an angle of 30° with the V.P. Draw its projections.
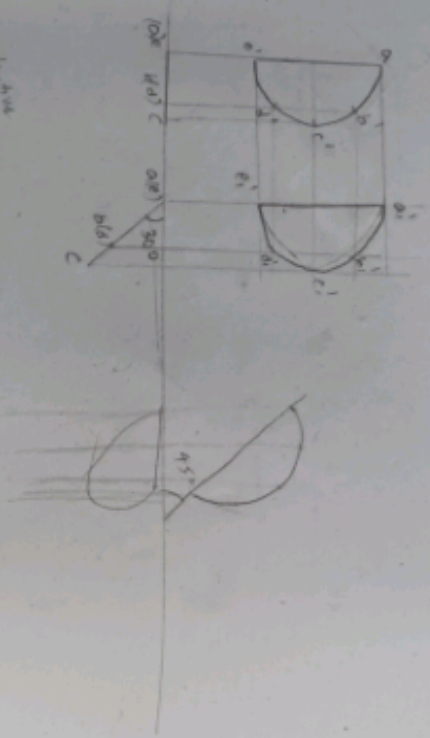
10) A thin rectangular plate of sides 60mm × 30mm has its shorter side in the V.P. and inclined @ 30° to the H.P. project its top view if its FV is a square of 30 mm long sides.

11) A plate having shape of an isosceles triangle has base 50 mm long and altitude 70 mm. It is so placed that in the FV it is seen as an Equilateral triangle of 50 mm sides and one side inclined @ 45° to XY. Draw its TV.
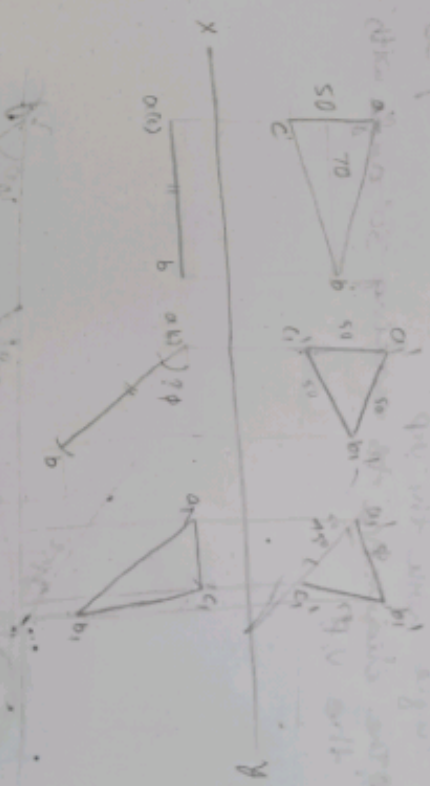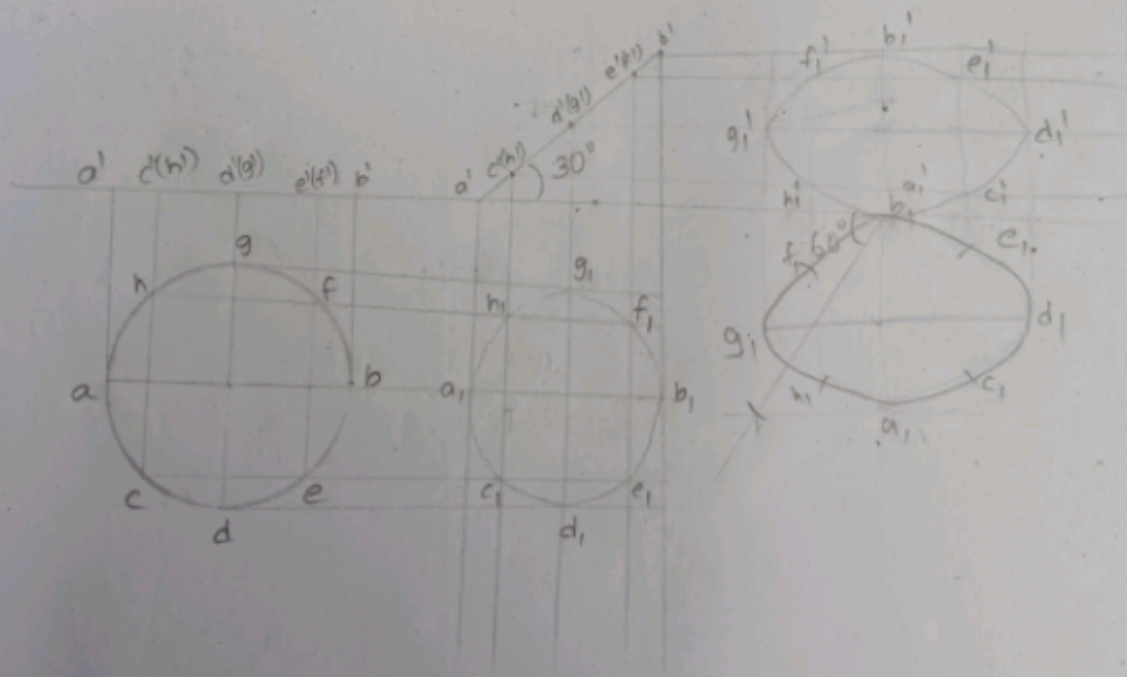
12) Draw a rhombus of diagonals 100mm and 60mm long, with the longer diagonal horizontal. The figure is the top view of a square of 100 mm long diagonals, with a corner on the ground. Draw its FV and determine the angle which its surface makes with the ground.
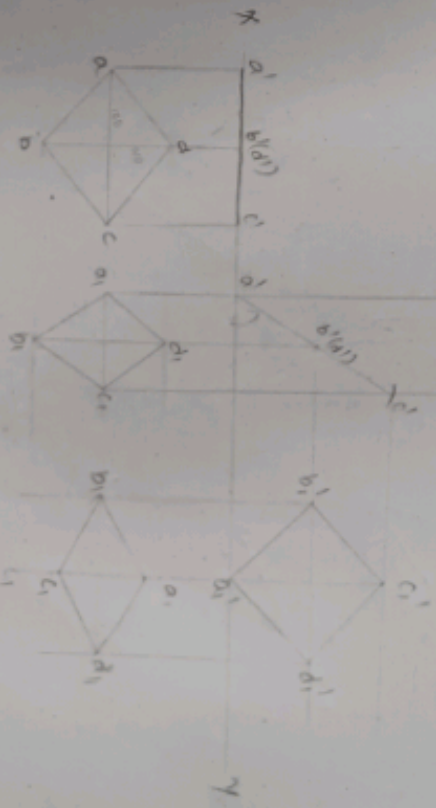
14) Draw the projections of a ole of 75 mm diameter appears as an Ellipse in the FV, having the end 'A' of the diameter AB in the HP, the end B in the V.P, and the surface inclined @ 30° to the H.P and @ 60° to the V.P

a' c'(h') d'(g) e'(f') b'   a' c'(h'))30°

d'(g') e'(f') b'

g
h   f
a   b   a₁   b₁
c   e   c₁   e₁
d   d₁

g₁
h₁   f₁

f₁' b₁' e₁'
g₁'   d₁'
h₁'   b₁' c₁'
f 60°   e₁.
g₁   d₁
h₁   c₁
a₁₁

nb the arc on 60° line
a₁, b₁ on docus

75

13)

15) A star plate of negligible thickness and 50 mm diameter appears as an Ellipse in the FV, having its major axis 50 mm long and minor axis 30 mm long. Draw its TV when the major axis of the Ellipse is horizontal.

x