

ENGINEERING GRAPHICS

UNIT- 2

Topic:

Projection of Points

ORTHOGRAPHIC PROJECTIONS:

IT IS A TECHNICAL DRAWING IN WHICH DIFFERENT VIEWS OF AN OBJECT ARE
PROJECTED ON DIFFERENT REFERENCE PLANES
OBSERVING PERPENDICULAR TO RESPECTIVE REFERENCE PLANE

Reference planes are:

- **Horizontal Plane (HP),**
- **Vertical Frontal Plane (VP)**
- **Side Or Profile Plane (PP)**

and

Different Views are Front View (FV), Top View (TV) and Side View (SV)

FV is a view projected on VP

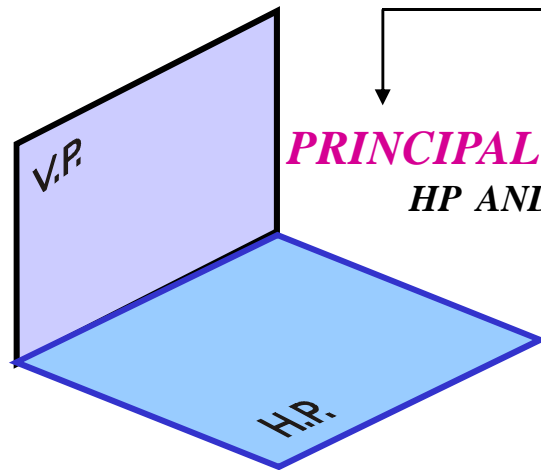
TV is a view projected on HP

SV is a view projected on PP

IMPORTANT TERMS OF ORTHOGRAPHIC PROJECTIONS:

- 1** Planes
- 2** Pattern of planes & pattern of views
- 3** Methods of drawing orthographic projections

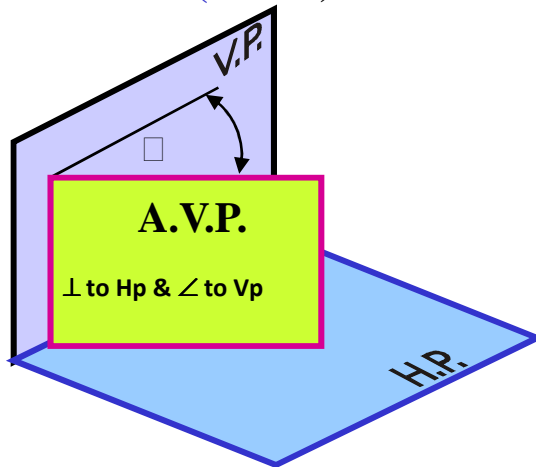
PLANES



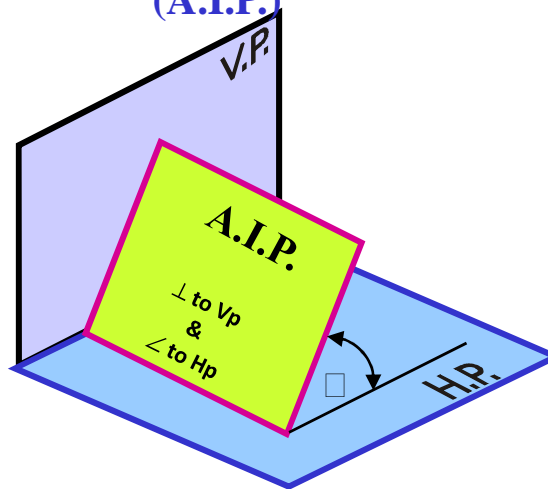
PRINCIPAL PLANES
HP AND VP

AUXILIARY PLANES

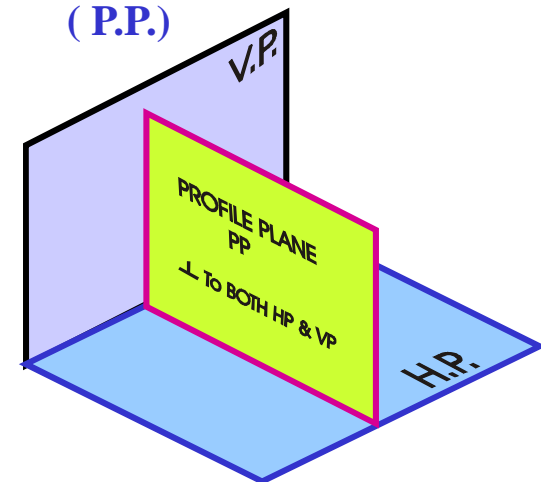
**Auxiliary Vertical Plane
(A.V.P.)**



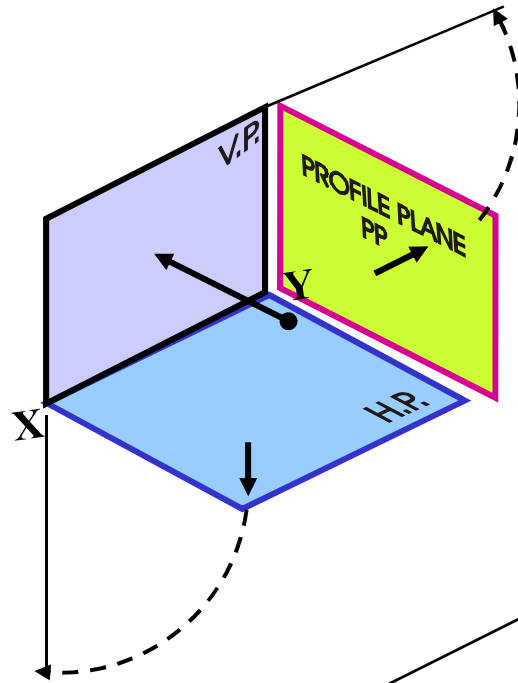
**Auxiliary Inclined Plane
(A.I.P.)**



**Profile Plane
(P.P.)**



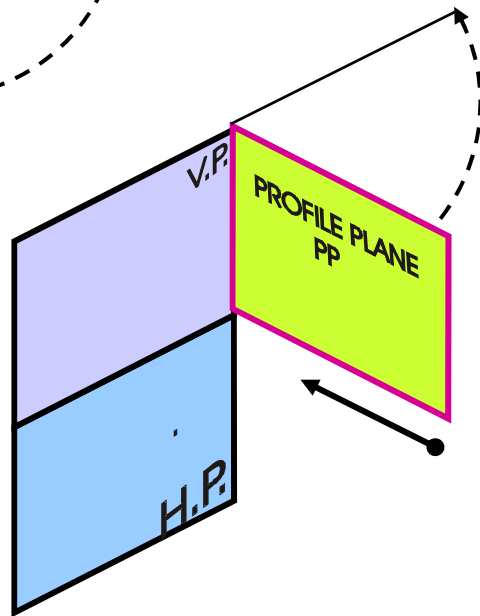
PATTERN OF PLANES & VIEWS (First Angle Method)



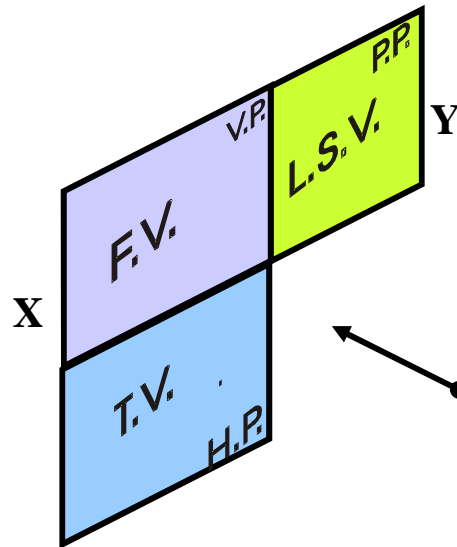
THIS IS A PICTORIAL SET-UP OF ALL THREE PLANES. ARROW DIRECTION IS A NORMAL WAY OF OBSERVING THE OBJECT. BUT IN THIS DIRECTION ONLY VP AND A VIEW ON IT (FV) CAN BE SEEN. THE OTHER PLANES AND VIEWS ON THOSE CAN NOT BE SEEN.

PROCEDURE TO SOLVE ABOVE PROBLEM:-

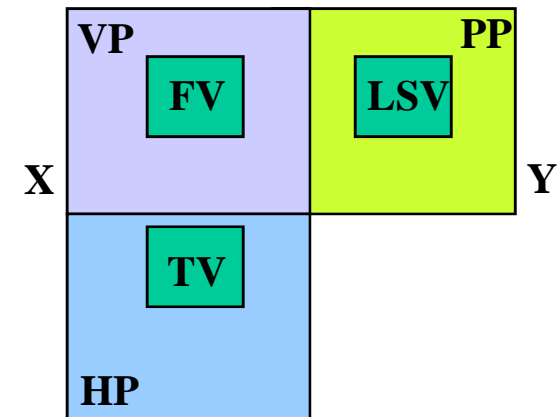
TO MAKE THOSE PLANES ALSO VISIBLE FROM THE ARROW DIRECTION,
 A) HP IS ROTATED 90° DOWNWARDS
 B) PP, 90° IN RIGHT SIDE DIRECTION.
 THIS WAY BOTH PLANES (HP & PP) ARE BROUGHT IN THE SAME PLANE CONTAINING VP.



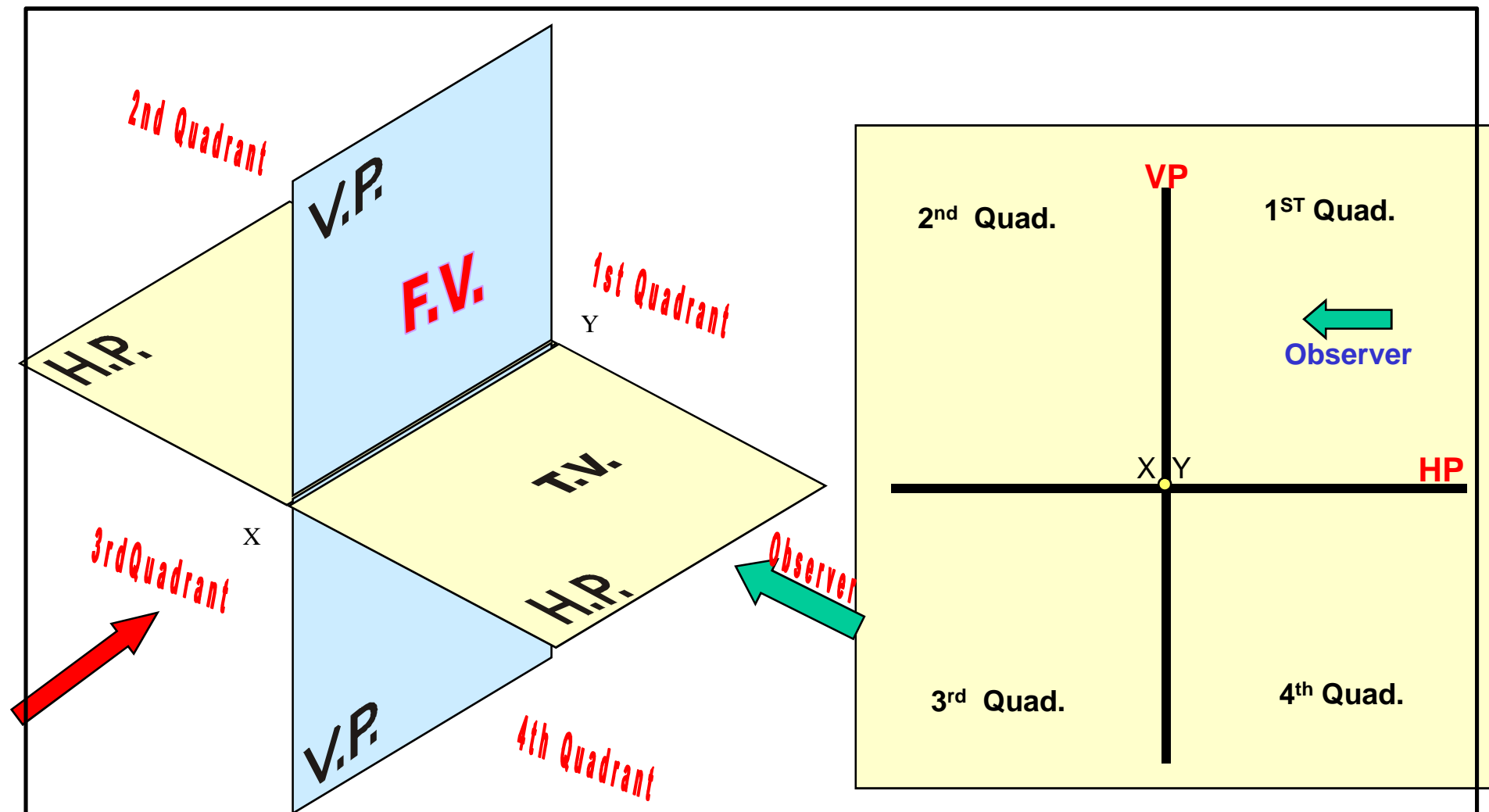
HP IS ROTATED DOWNWARD 90°
AND
BROUGHT IN THE PLANE OF VP.



PP IS ROTATED IN RIGHT SIDE 90°
AND
BROUGHT IN THE PLANE OF VP.



ACTUAL PATTERN OF PLANES & VIEWS
OF ORTHOGRAPHIC PROJECTIONS
DRAWN IN
FIRST ANGLE METHOD OF PROJECTIONS



THIS QUADRANT PATTERN,
IF OBSERVED ALONG X-Y LINE (IN **RED** ARROW DIRECTION)
WILL EXACTLY APPEAR AS SHOWN ON RIGHT SIDE AND HENCE,
IT IS FURTHER USED TO UNDERSTAND ILLUSTRATION PROPERLY.

Projection of Points

- A 'Point' may be situated, in space, in any one of the 'four quadrants' formed by the 'two reference/ principal planes' or a point may lie in any one or both of them,
- The projections of a 'Point' are obtained by extending **projectors** perpendicular to the reference/ principal planes,
- One of the reference/ principal planes is then **rotated**, so that the first and third quadrants are opened out,
- The projections of point are shown on a **flat surface** in their respective positions either **above** or **below** or in **xy line**.

Projection of Points

The position of a **point** in engineering drawing is defined with respect to its distance from the three principle planes i.e., with respect to the VP, HP, & PP.

VP: The plane in front of observer is the vertical plane. (VP) or it is also called a Frontal plane.

HP: The plane which is Horizontal and perpendicular to VP is Horizontal Plane.

Note: The planes HP and VP are called Principal Planes.

Reference Line: The line of intersection of HP and VP is called reference line, which is denoted by X-Y

PROJECTIONS OF POINTS

TO DRAW PROJECTIONS OF ANY OBJECT (E.g. POINT), ONE MUST HAVE FOLLOWING INFORMATION:

- a) **OBJECT (POINT)**
{WITH IT'S DESCRIPTION, WELL DEFINED}
- b) **OBSERVER**
{ALWAYS OBSERVING PERPENDICULAR TO RESP. REF. PLANE}
- c) **LOCATION OF OBJECT**
{MEANS IT'S POSITION WITH REFERENCE TO H.P. & V.P.}

TERMS 'ABOVE' & 'BELOW' WITH RESPECTIVE TO H.P.
AND TERMS 'INFRONT' & 'BEHIND' WITH RESPECTIVE TO V.P
FORM 4 QUADRANTS.

OBJECTS CAN BE PLACED IN ANY ONE OF THESE 4 QUADRANTS.

IT IS INTERESTING TO LEARN THE EFFECT ON THE POSITIONS OF VIEWS (FV, TV)
OF THE OBJECT WITH RESP. TO X-Y LINE, WHEN PLACED IN DIFFERENT QUADRANTS.

TO MAKE IT EASY, HERE A POINT **A** IS TAKEN AS AN OBJECT. BECAUSE IT'S ALL VIEWS ARE JUST POINTS.

Types of Views

Front View (FV): The projection on the VP is called the Front View (FV) or Vertical Projection or front elevation

Top View (TV): The projection on the HP is called the Top View (TV) or Horizontal Projection or Plan.

Side View: The projection on the side from the object is called the side views.

Side views is classified in to

- 1. Left side view and (LSV)**
- 2. Right side view (RSV)**

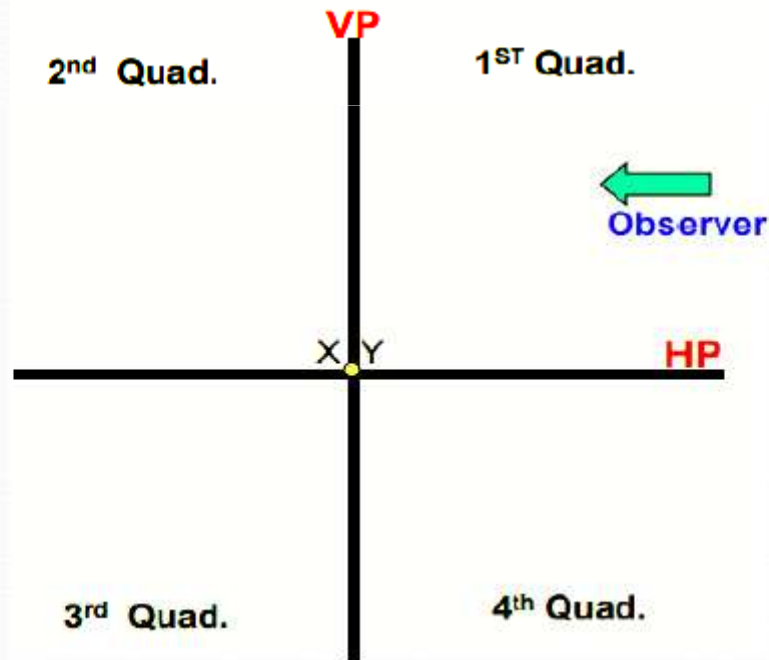
Positions of Points

First quadrant -- Above HP & in front of VP

Second quadrant -- Above HP & behind VP

Third quadrant -- Below HP & behind VP

Fourth quadrant -- Below HP & in front of VP

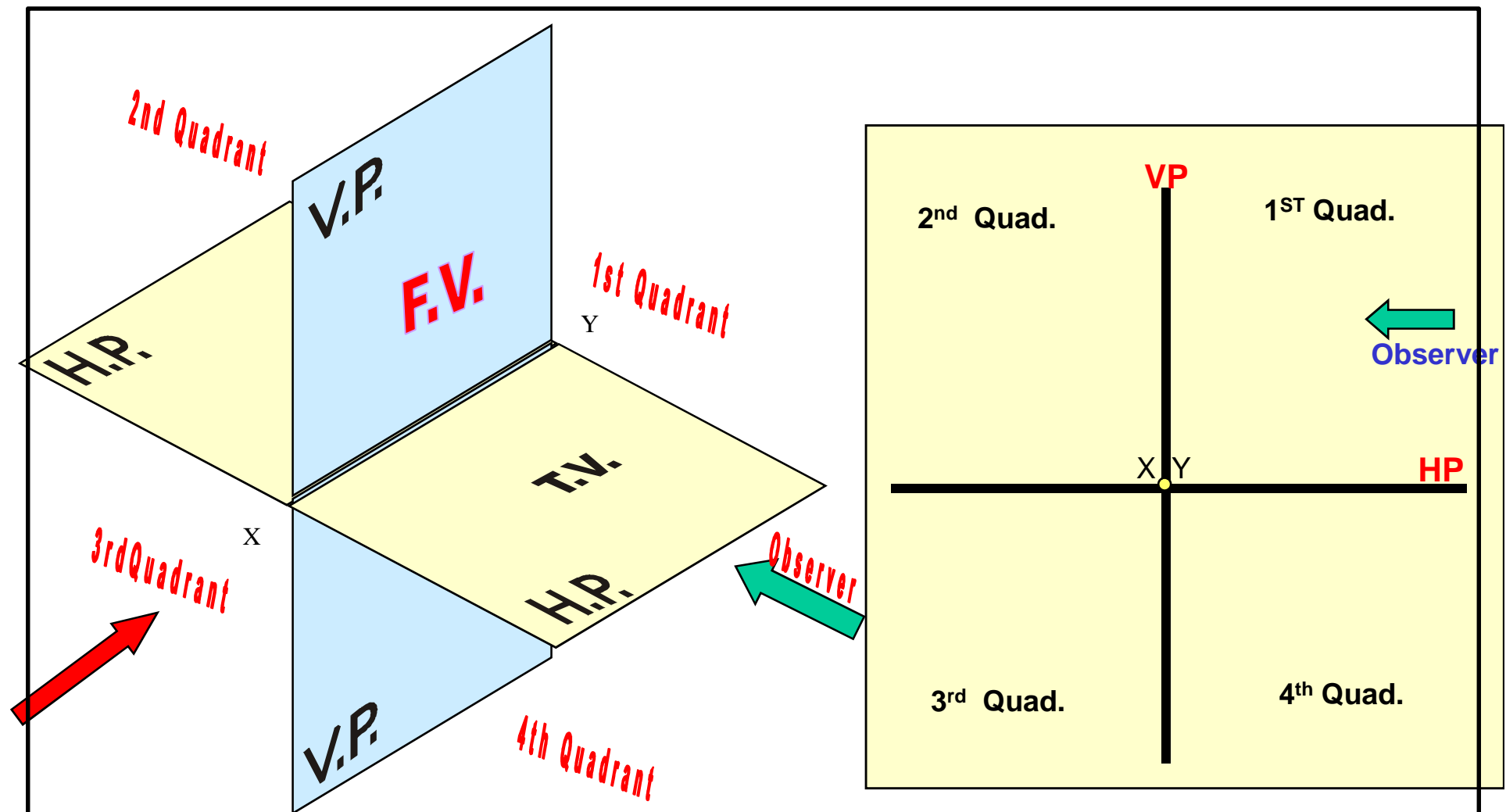


NOTATIONS

FOLLOWING NOTATIONS SHOULD BE FOLLOWED WHILE NAMING DIFFERENT VIEWS IN ORTHOGRAPHIC PROJECTIONS.

OBJECT	POINT A	LINE AB
IT'S TOP VIEW	a	a b
IT'S FRONT VIEW	a'	a' b'
IT'S SIDE VIEW	a''	a'' b''

***SAME SYSTEM OF NOTATIONS SHOULD BE FOLLOWED
INCASE NUMBERS, LIKE 1, 2, 3 – ARE USED.***



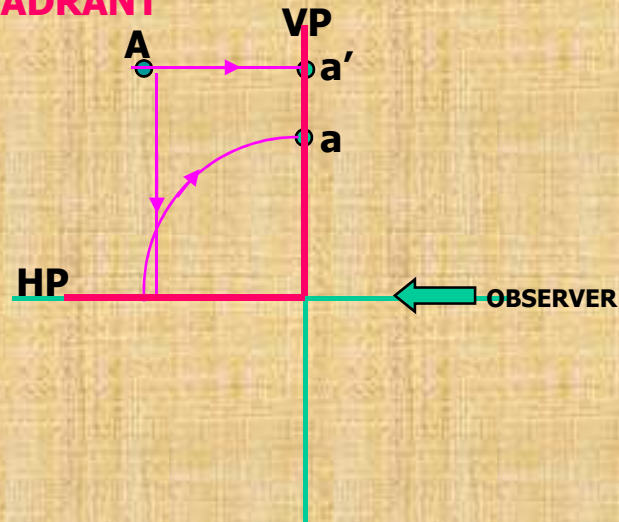
THIS QUADRANT PATTERN,
IF OBSERVED ALONG X-Y LINE (IN **RED** ARROW DIRECTION)
WILL EXACTLY APPEAR AS SHOWN ON RIGHT SIDE AND HENCE,
IT IS FURTHER USED TO UNDERSTAND ILLUSTRATION PROPERLY.

Point A is Placed In different quadrants and it's Fv & Tv are brought in same plane for Observer to see clearly.

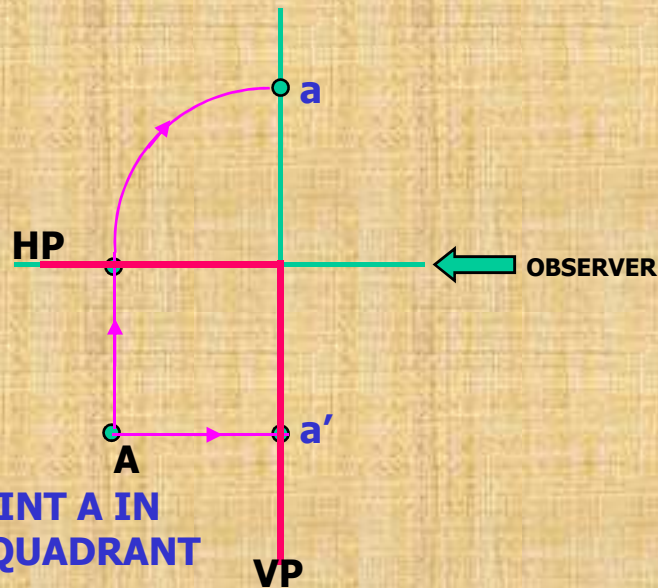
Fv is visible as it is a view on VP. But as Tv is is a view on Hp, it is rotated downward 90° , In clockwise direction. The In front part of Hp comes below xy line and the part behind Vp comes above.

Observe and note the process.

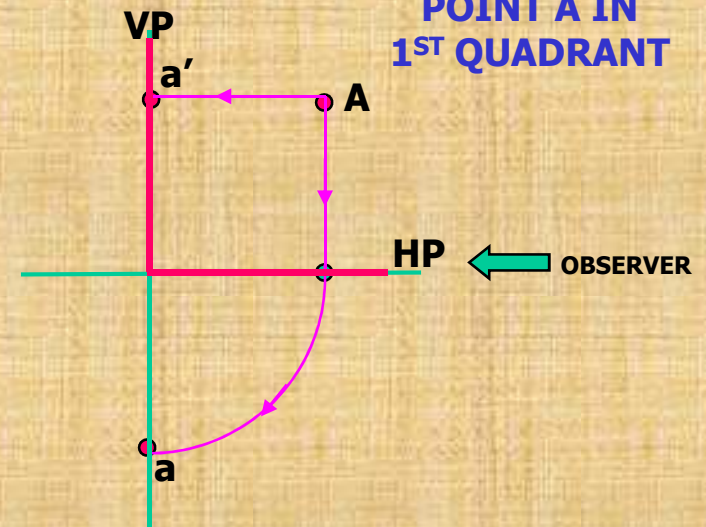
POINT A IN 2ND QUADRANT



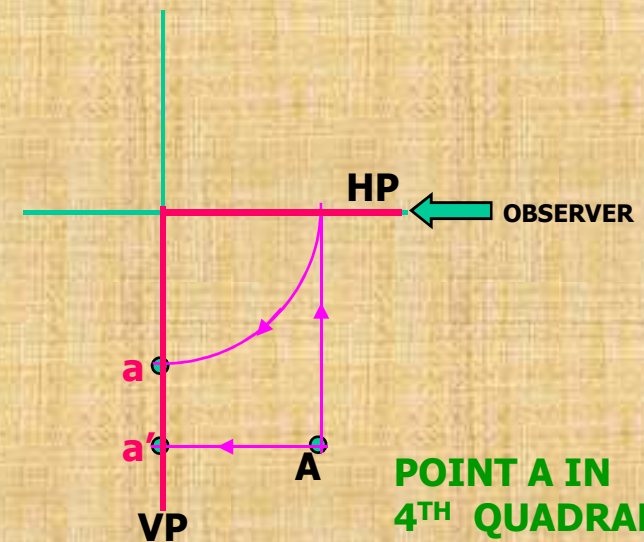
POINT A IN 3RD QUADRANT



POINT A IN 1ST QUADRANT

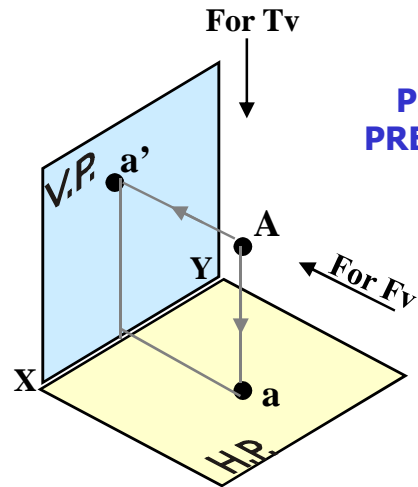


POINT A IN 4TH QUADRANT



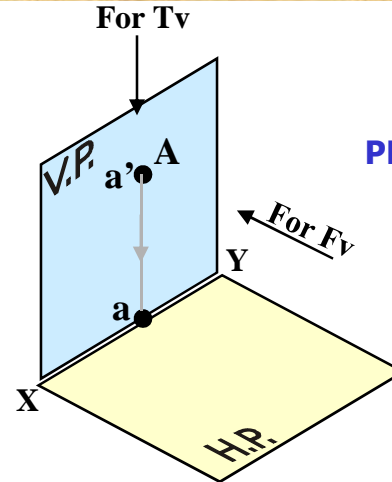
PROJECTIONS OF A POINT IN FIRST QUADRANT.

POINT **A** ABOVE HP
& IN FRONT OF VP



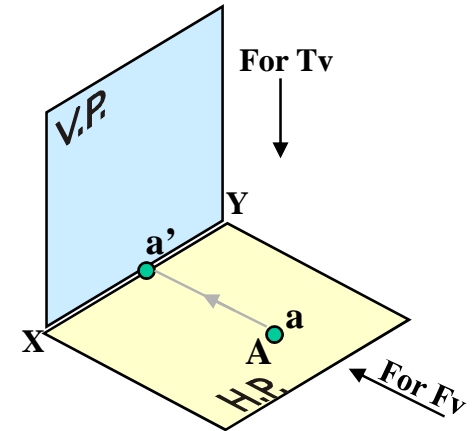
PICTORIAL
PRESENTATION

POINT **A** ABOVE HP
& IN VP



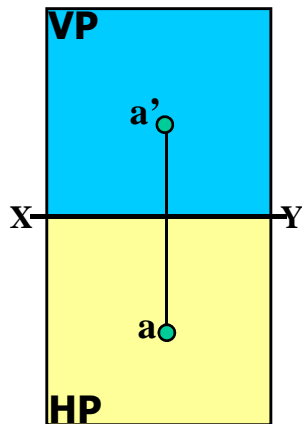
PICTORIAL
PRESENTATION

POINT **A** IN HP
& IN FRONT OF VP

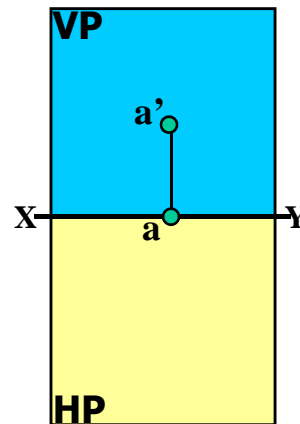


ORTHOGRAPHIC PRESENTATIONS
OF ALL ABOVE CASES.

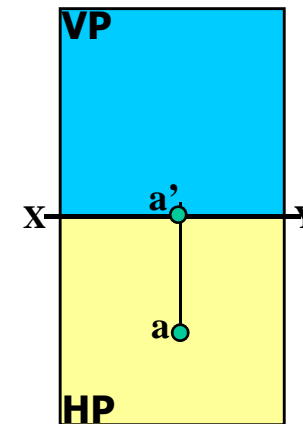
*Fv above xy,
Tv below xy.*



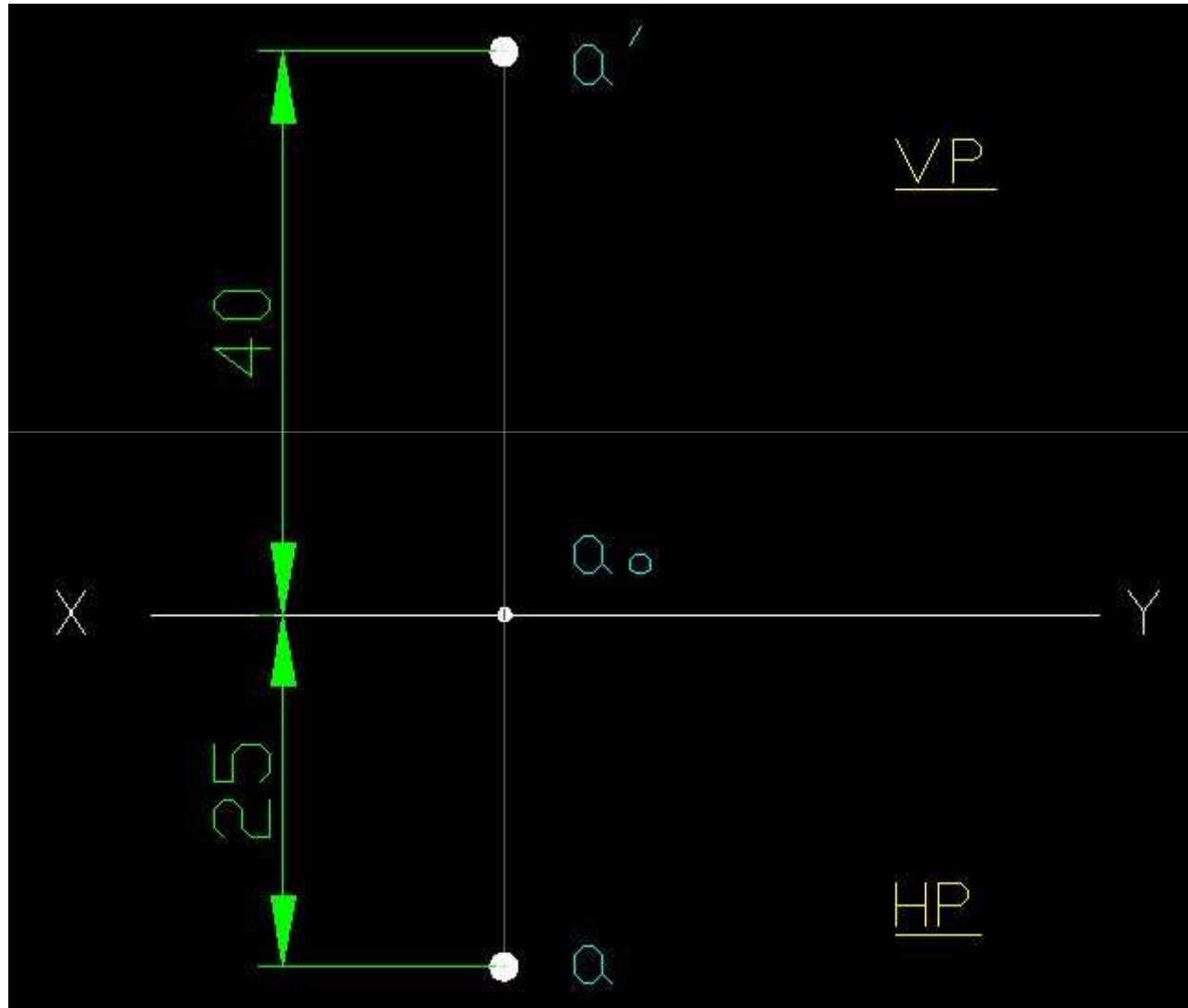
*Fv above xy,
Tv on xy.*



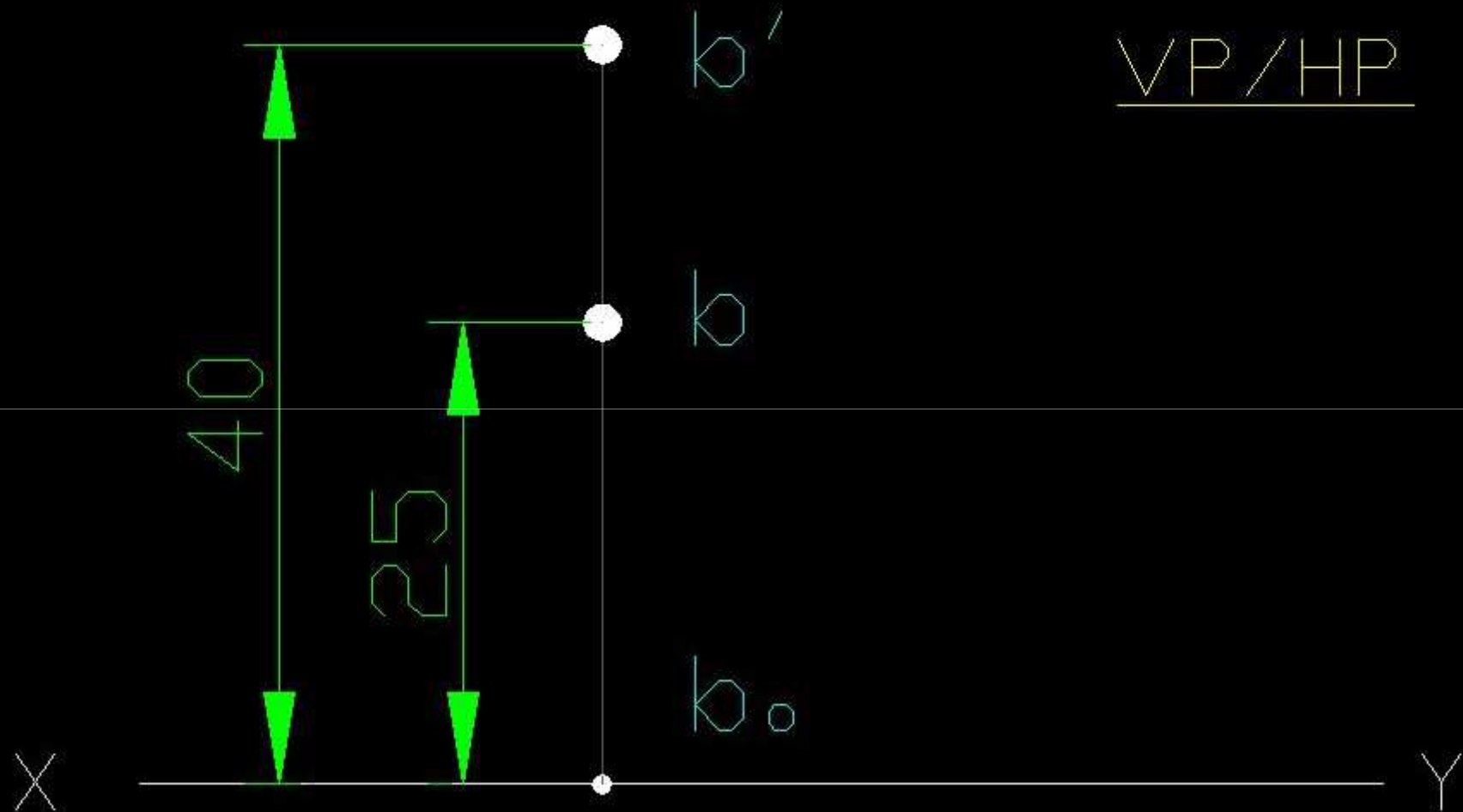
*Fv on xy,
Tv below xy.*



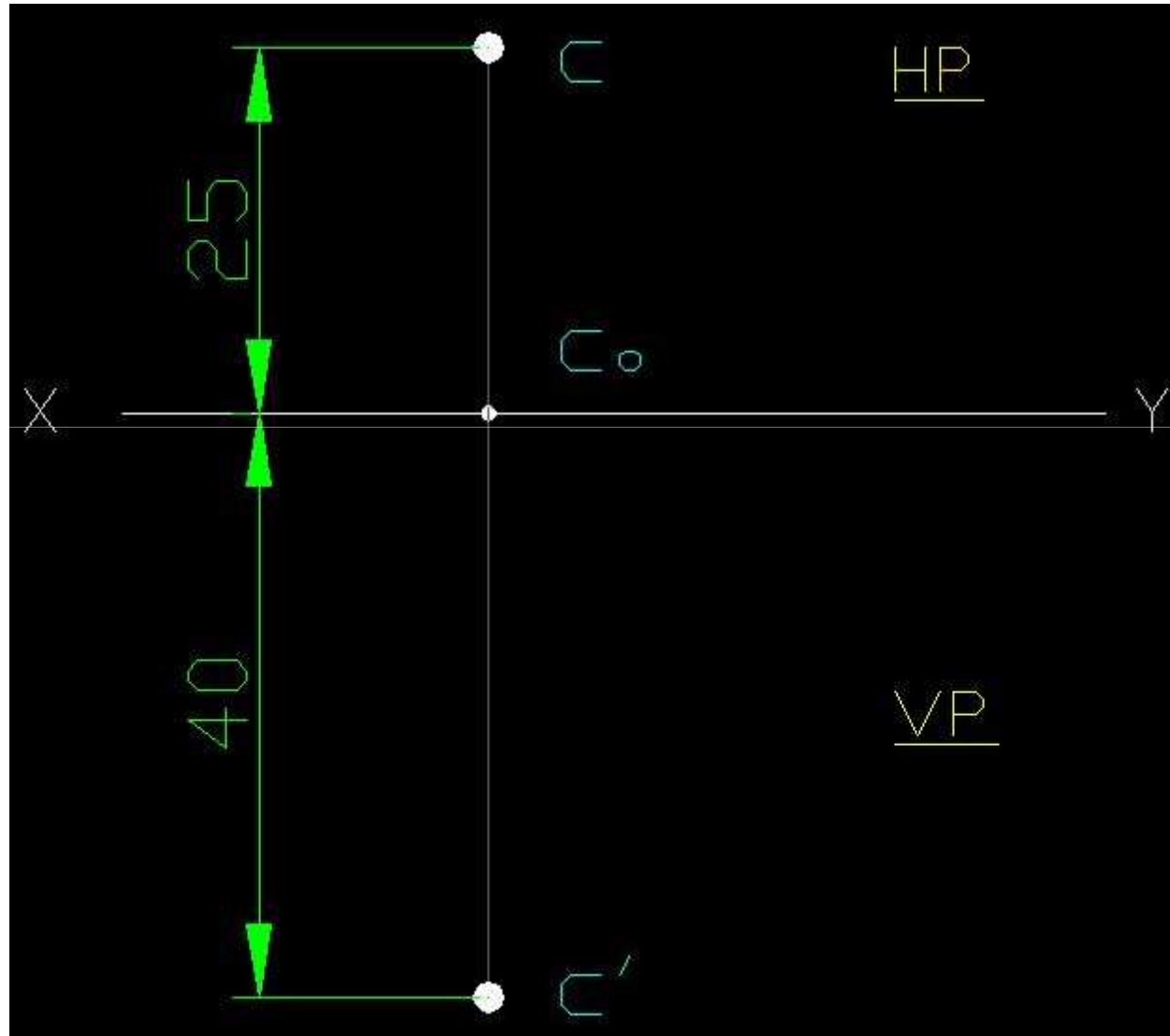
CASE 1: Point A is 40 mm above HP & 25 mm in front of VP. Draw Projections.



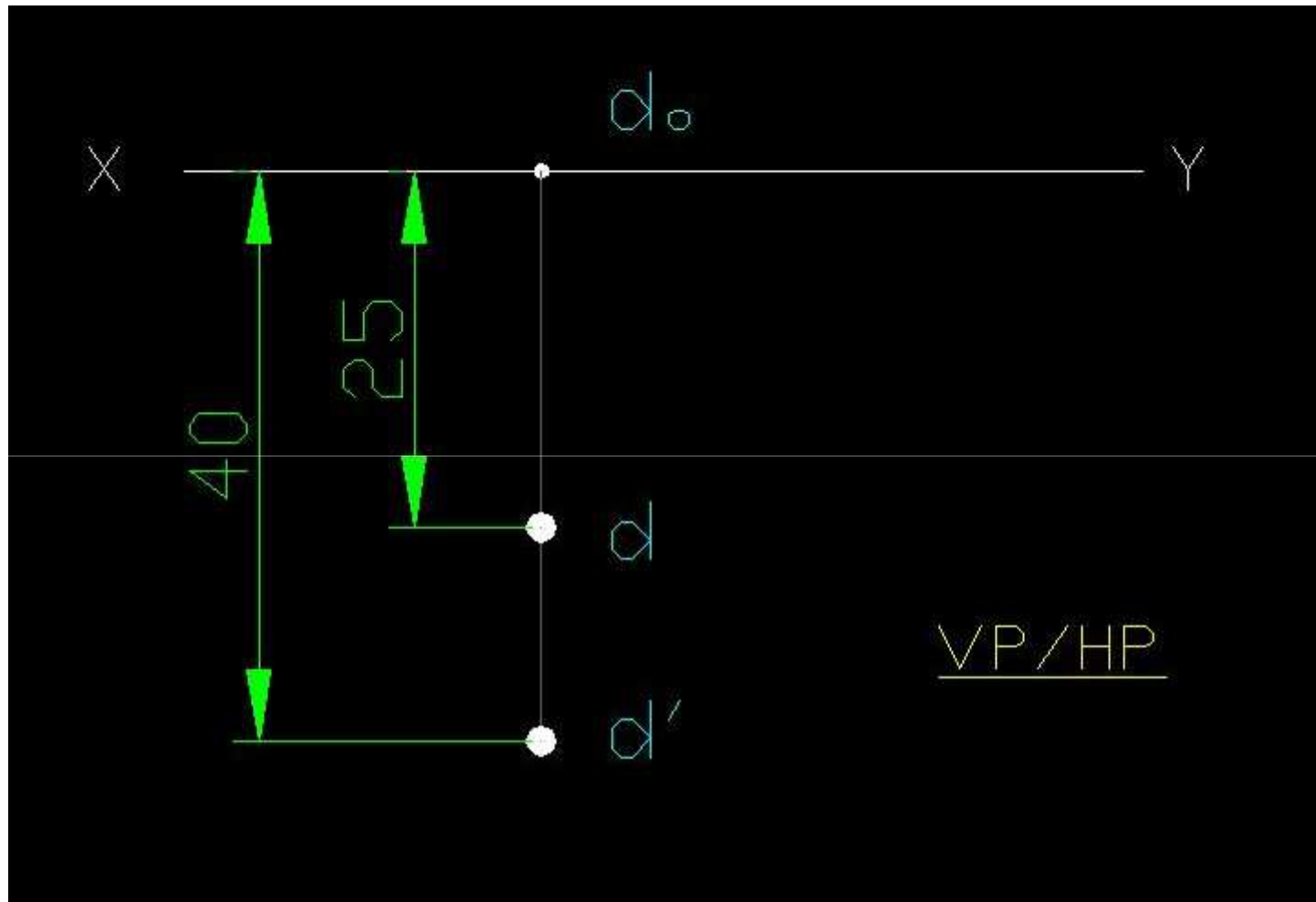
CASE 2: Point B is 40 mm above HP & 25 mm behind VP. Draw Projections.



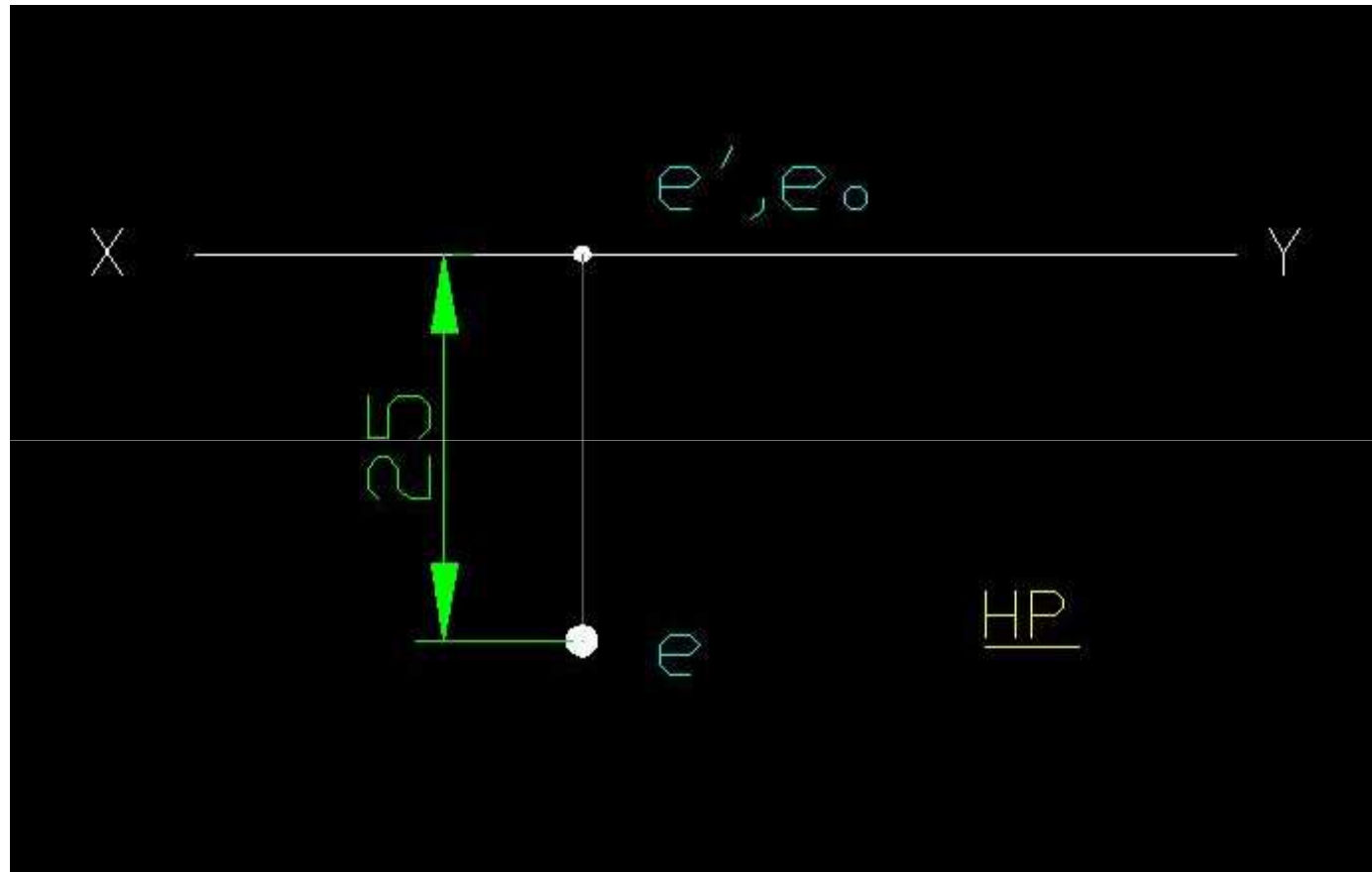
CASE 3: Point C is 40 mm below HP & 25 mm behind VP. Draw Projections.



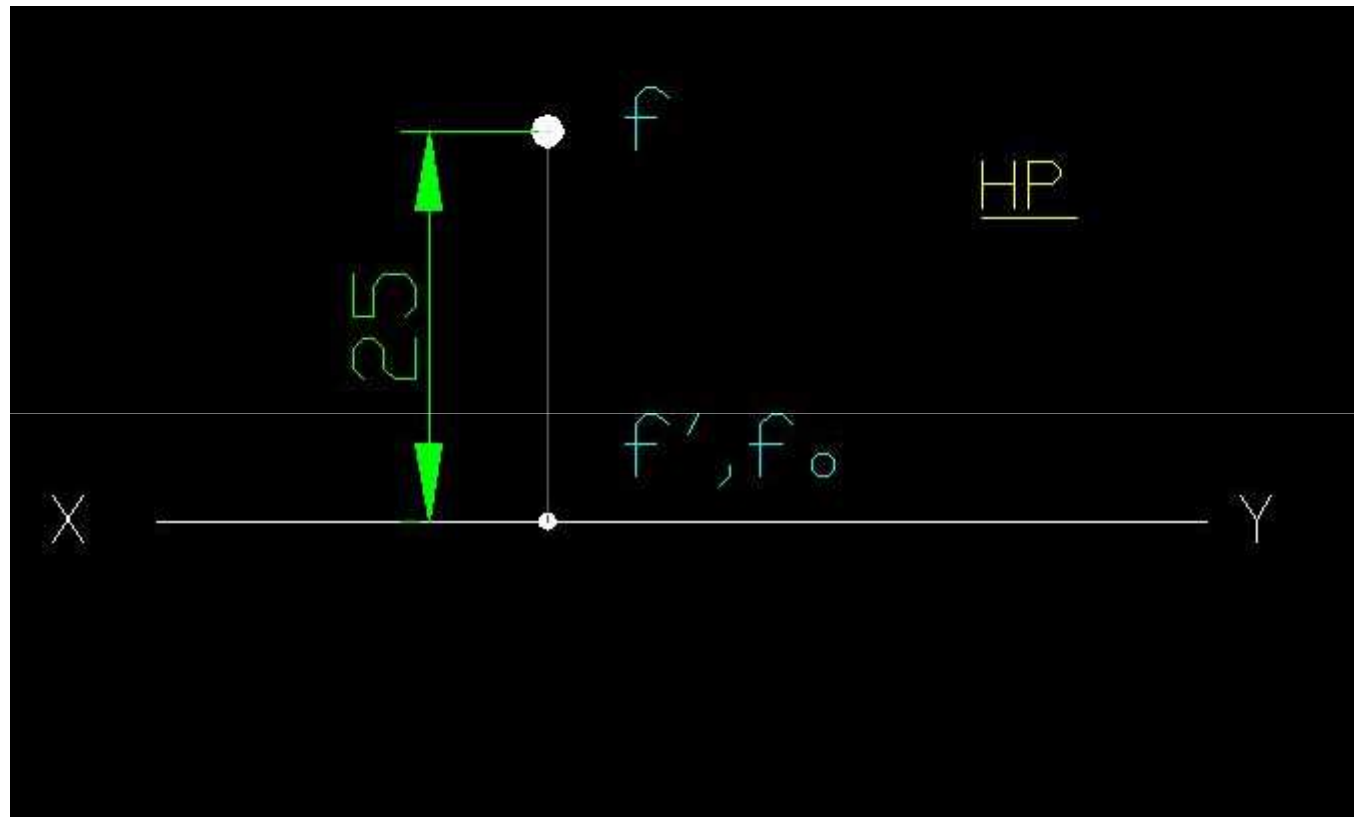
CASE 4: Point D is 40 mm below HP & 25 mm in front of VP. Draw Projections.



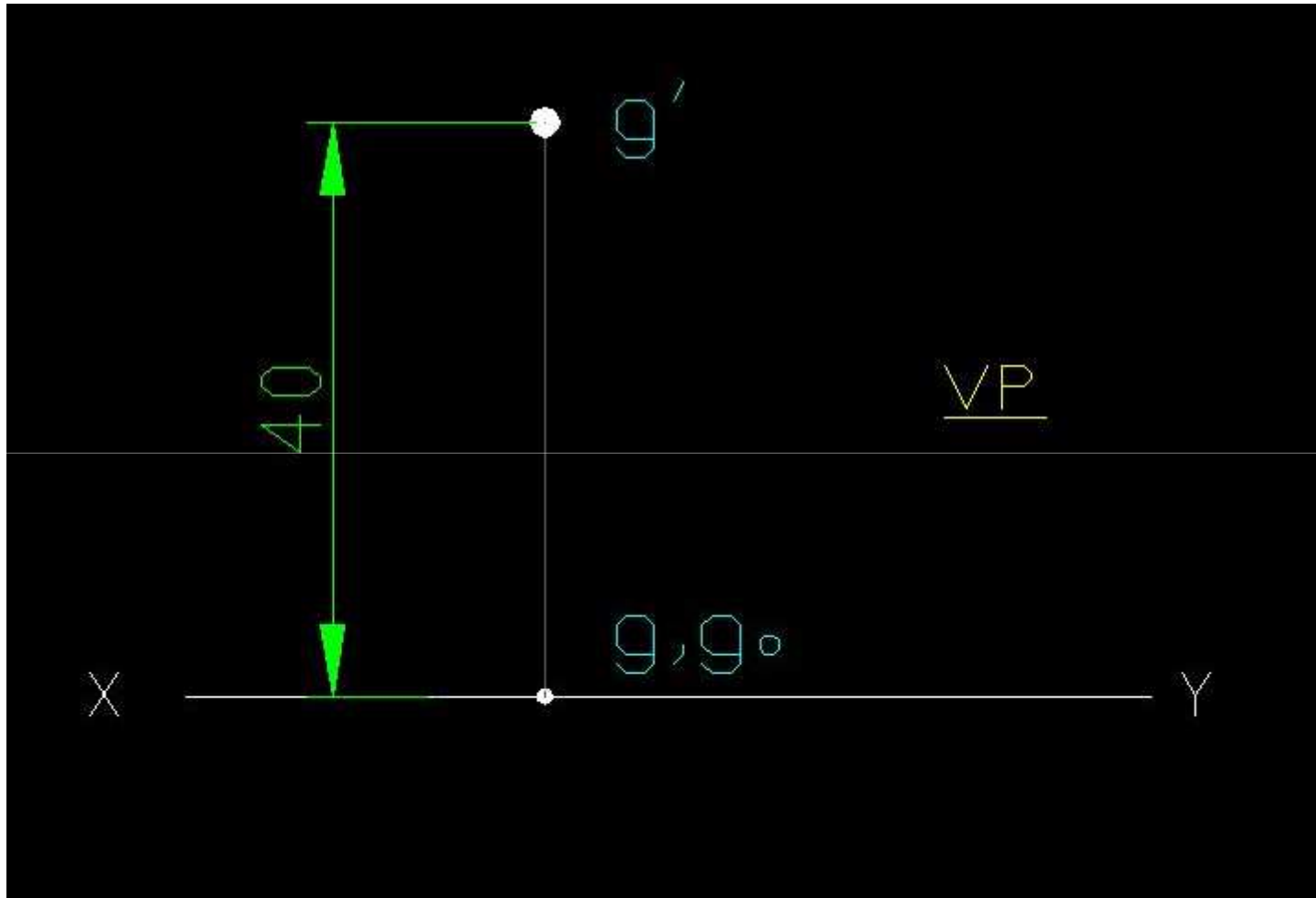
CASE 5: Point E is in HP & 25 mm in front of VP. Draw Projections.



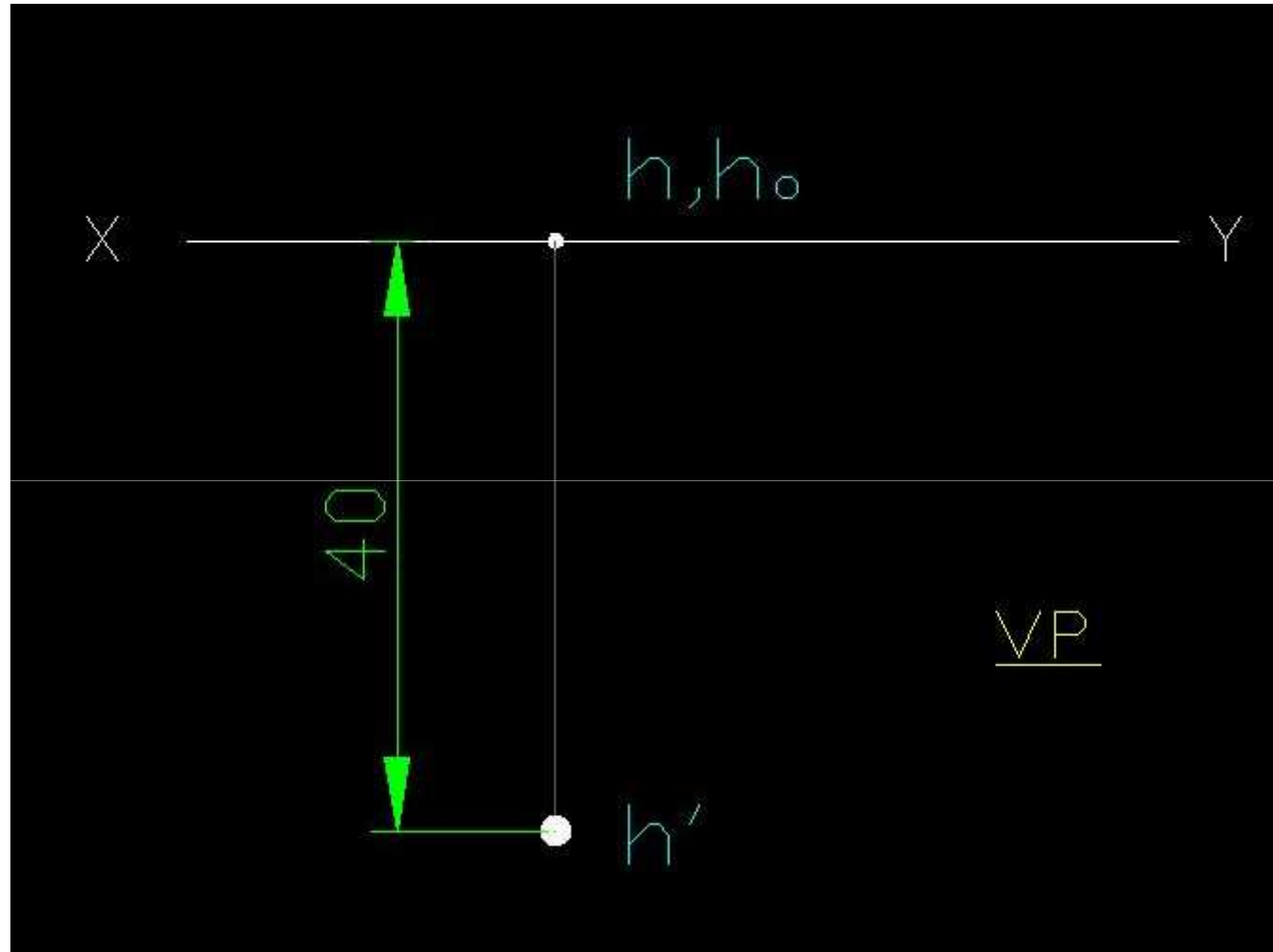
CASE 6: Point F is in HP & 25 mm behind VP. Draw Projections.



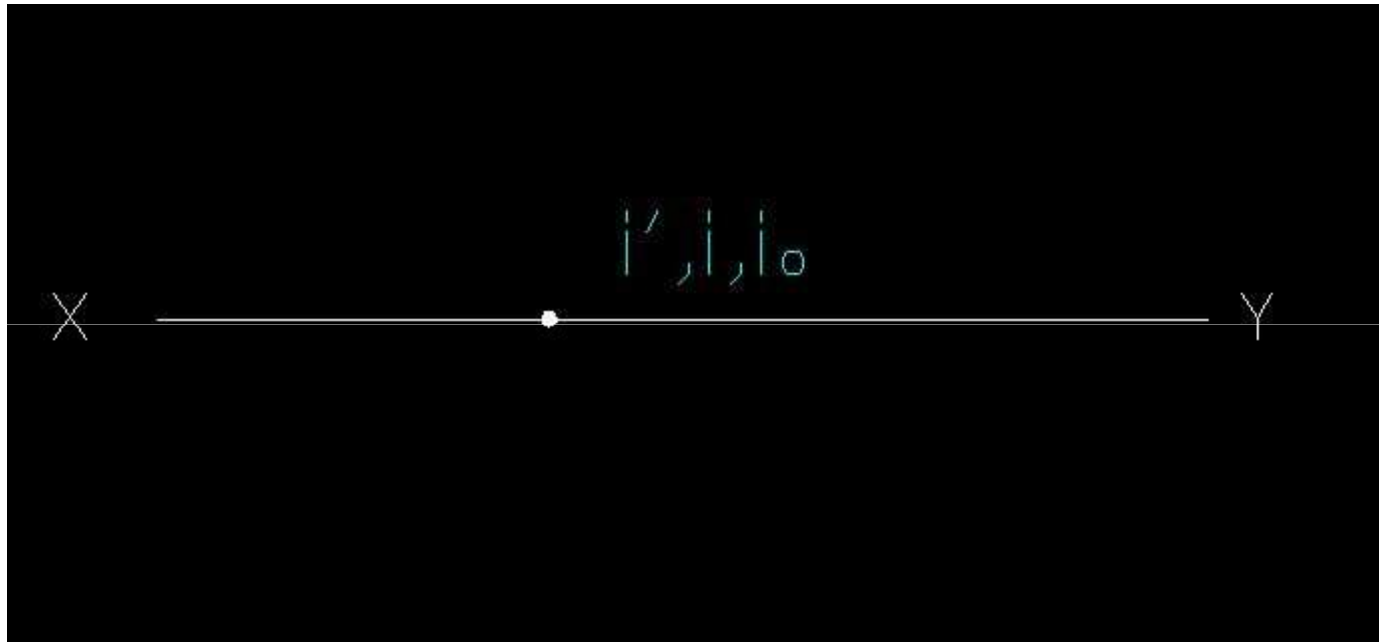
CASE 7: Point G is 40 mm above HP & in VP. Draw Projections.



CASE 8: Point H is 40 mm below HP & in VP. Draw Projections.



CASE 9: Point I is in HP & in VP. Draw Projections.



THANKS