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# PROJECTION OF POINTS

Following abbreviations, symbols and notation will be used in the entire course.

VP - Vertical plane

HP - Horizontal plane

XY - Reference line

$x_1y_2$ ,  $x_2y_2$  - Auxiliary reference plane

HT - Horizontal trace

VT - Vertical trace

A,B,C etc. - to represent a point/line ends/solid corners in space

a,b,c etc. - to represent top view of a point/line ends/solid corners

a', b', c' etc. - to represent front view of a point/line ends/solid corners

AVP - Auxiliary vertical plane

AIP - Auxiliary inclined plane

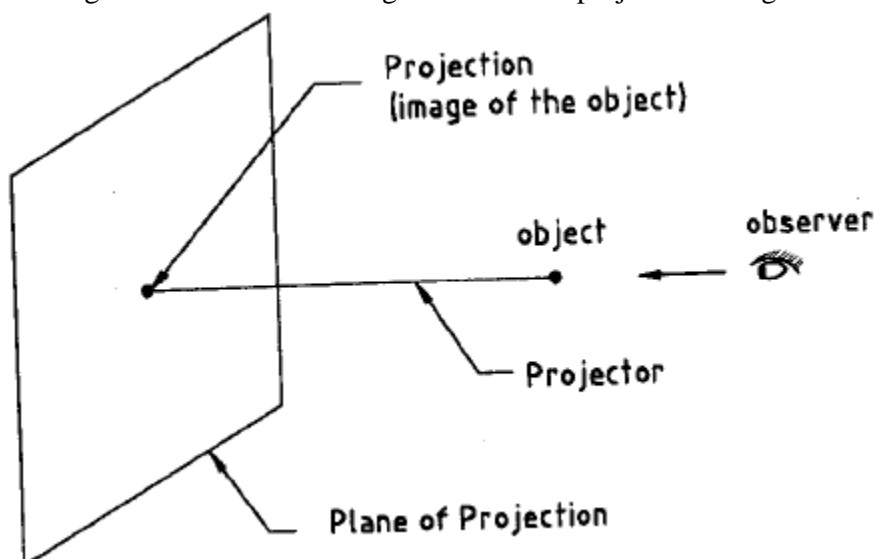
$\theta$  - True inclination of a line with HP

$\phi$  - True inclination of a line with VP

$\alpha$  - Apparent inclination of a line with HP

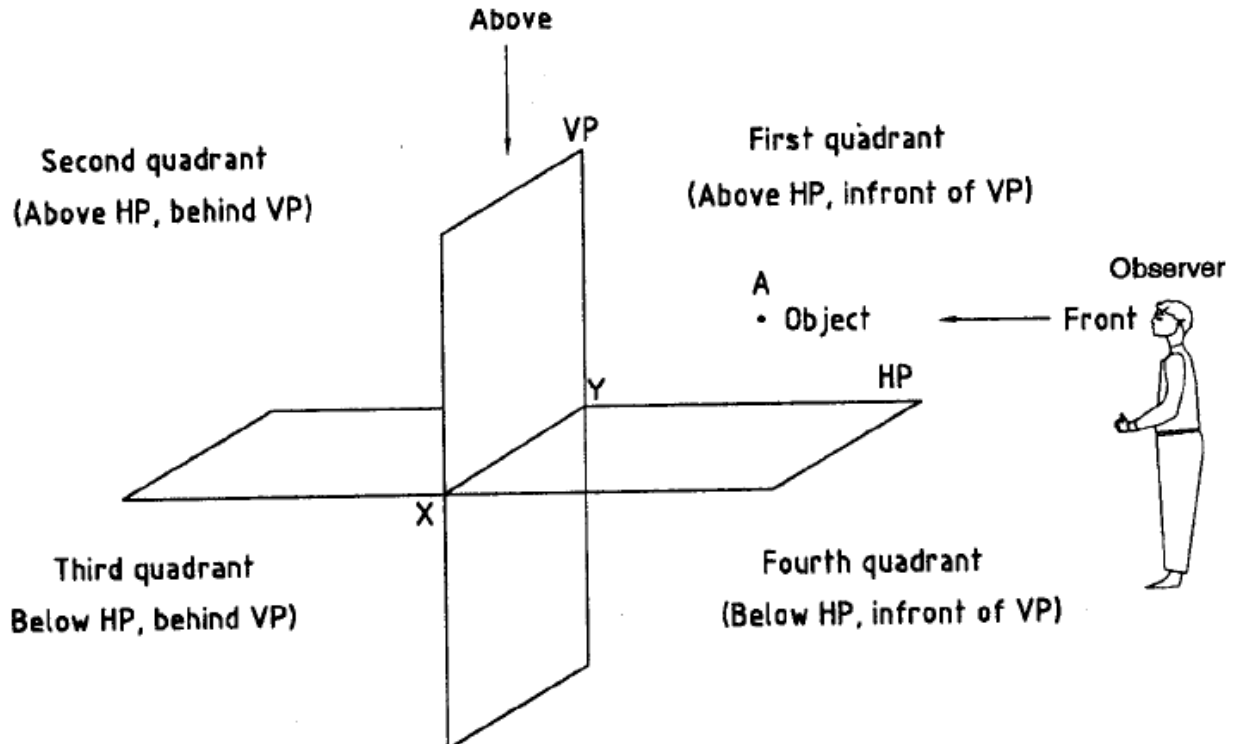
$\beta$  - Apparent inclination of a line with VP

**INTRODUCTION TO PROJECTION-** Projecting the image of an object to the plane of projection is known as *projection*. The object may be a point, line, plane, solid, machine component or a building. Consider the following illustration to project the image of an object on to a plane.

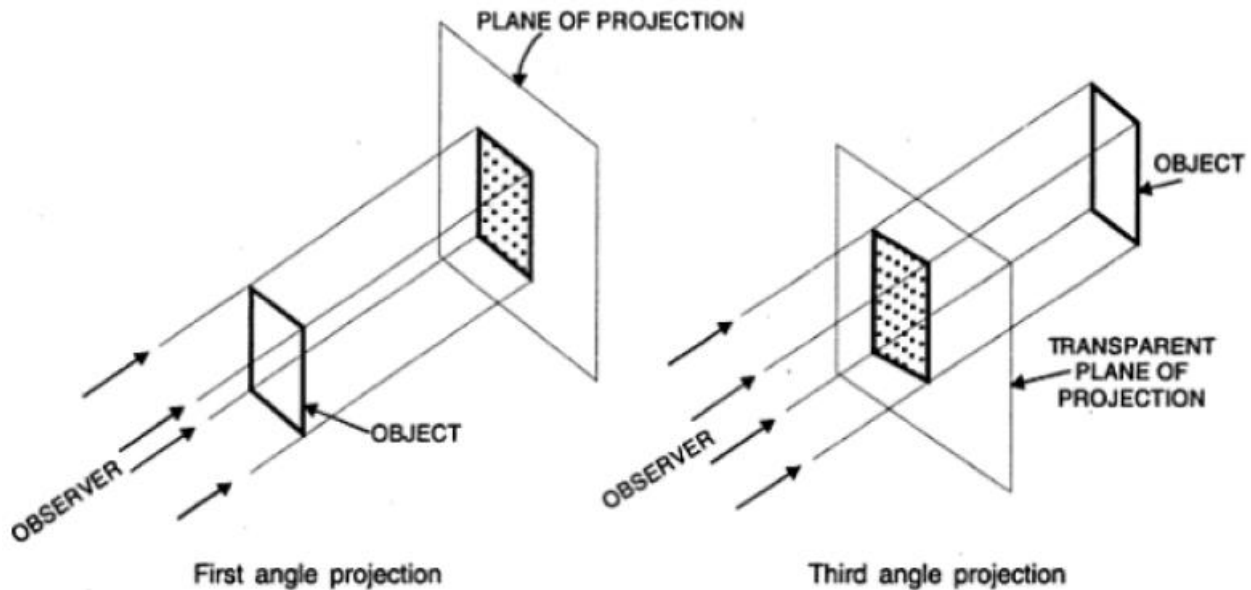


(1) Vertical plane (VP) which is assumed to be placed vertically. The front view of the object is projected onto this plane.

(2) Horizontal plane (HP) which assumed to be placed horizontally. The top view of the object is projected onto this plane.



When an object is assumed to be placed in first quadrant, the projection method followed is called as *first angle projection*. In this method, the object is placed between the observer and the plane of projection.

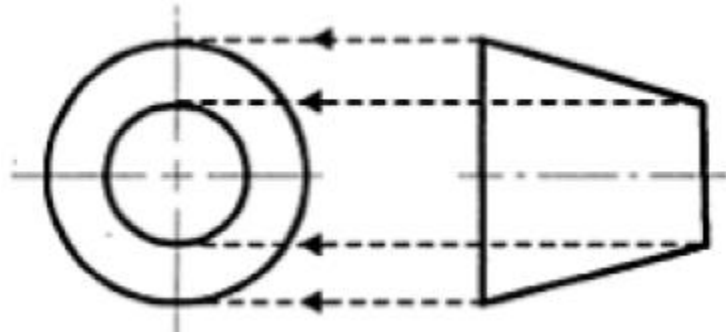


Bureau of Indian Standards has recommended that only *first angle projection* method

### First Angle Method

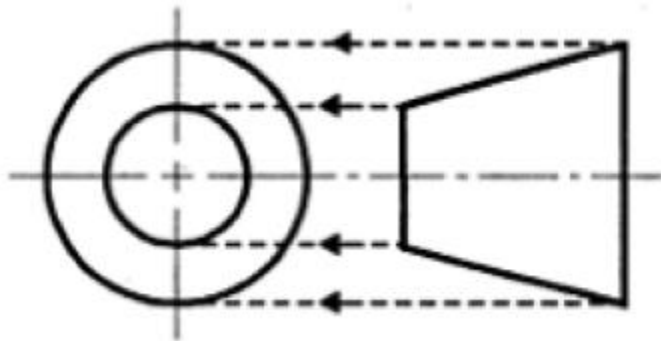
1. The object lies In between the observer and the plane of projection. The plane of projection Is always behind the object.
2. The object is assumed to be placed in first quadrant.
3. The front view or the elevation Is always above the top view or the plan.

4. The right hand end view/side view Is drawn to the left and left hand end view Is drawn to the right.
5. The plane of projection may or may not be transparent.
6. It Is represented by the following symbol:



### Third Angle Method

1. Between the observer and the object ore transparent planes of projection. The plane of projection Is always In front of the object.
2. The projections are drawn assuming that Uie object Is situated In third quadrant.
3. The front view Is always below the top view.
4. The right hand end view is drawn to the right and left hand end view Is drawn to the left.
5. The plane of projection Is always transparent.
6. It Is represented by the following symbol :



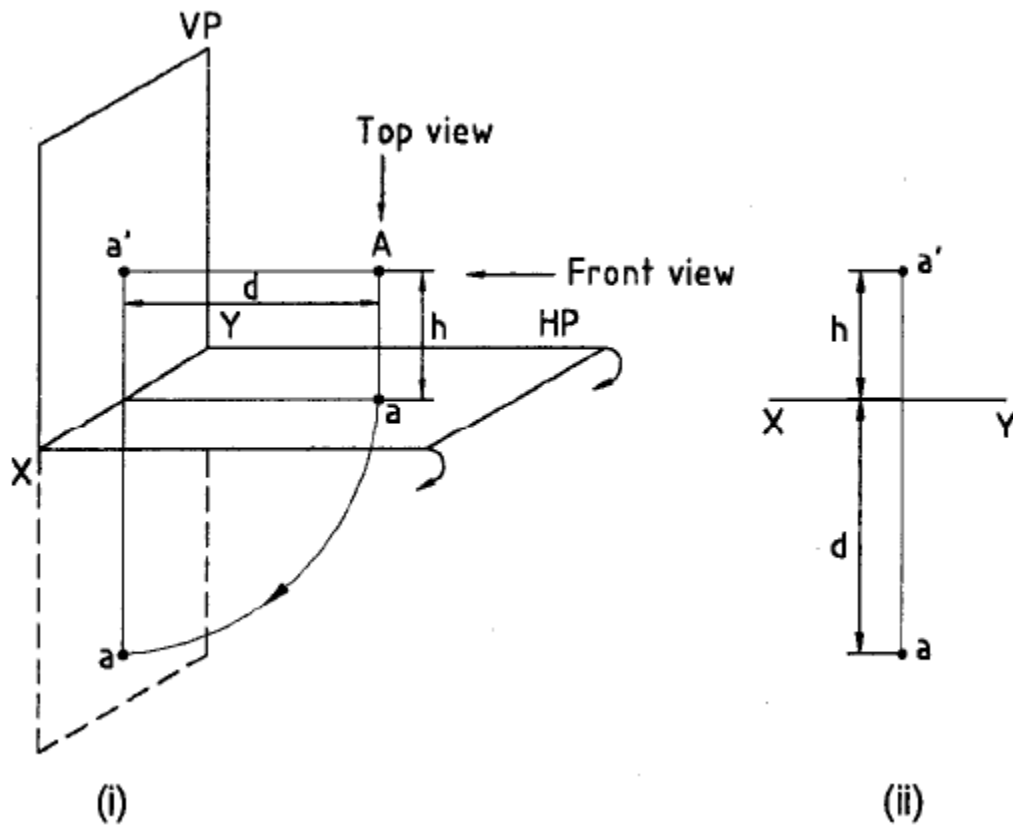
### CONVENTIONS FOLLOWED

- (1) In drawing practice, capital letters A,B,C etc are used to represent objects in space.
- (2) Their *top views* are represented by small letters a,b,c etc.
- (3) The *front views* are represented by small letters with dashes a',b',c', etc.
- (4) These letters are used to represent a point, ends of a straight line, corners of solid etc.
- (5) Actual projections in top and front views are drawn in thick lines, construction lines and projectors are drawn using thin lines.
- (6) Top view is also known as *plan* and front view is known as *elevation*.

### PROJECTION OF A POINT IN FIRST QUADRANT

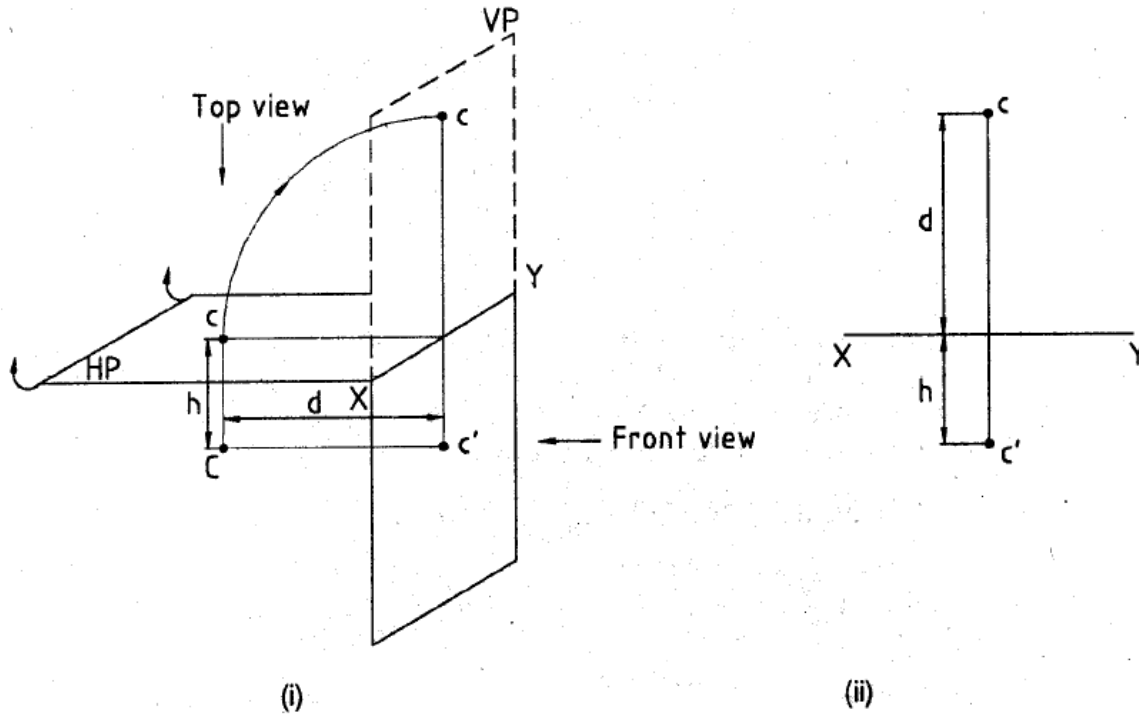
Consider a point A placed in the first quadrant. This is at a height h mm above HP, at a distance d mm in front of VP. Its front view a' is projected onto VP and the top view a is projected onto HP.

Now the HP is rotated in the clockwise direction for 90° and is obtained in vertical position. The projections will be seen as given in Fig.(ii).

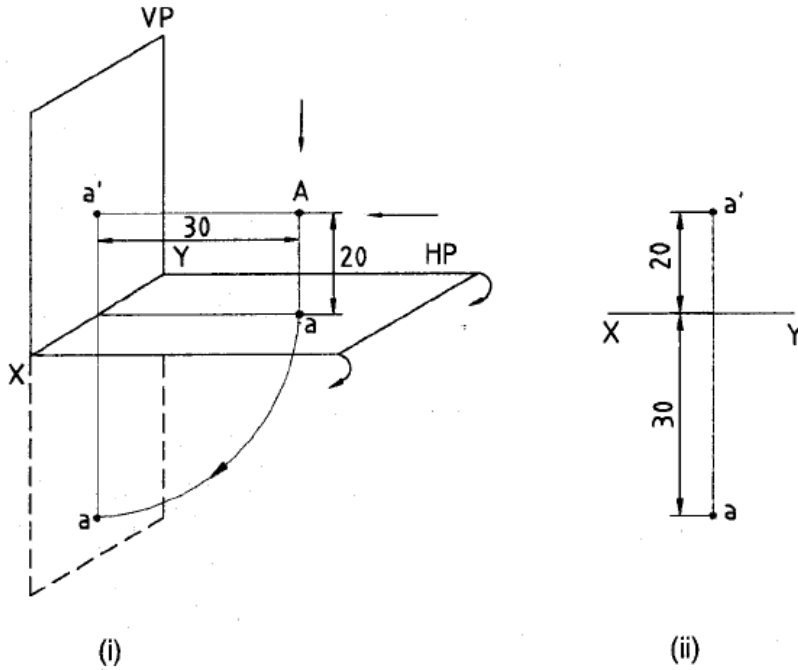


It is drawn with reference to XY line. Mark a point  $a'$  at a height  $h$  mm above XY, and  $a$  at a distance  $d$  mm below XY. The projector joining  $a'$  and  $a$  is always perpendicular to XY.

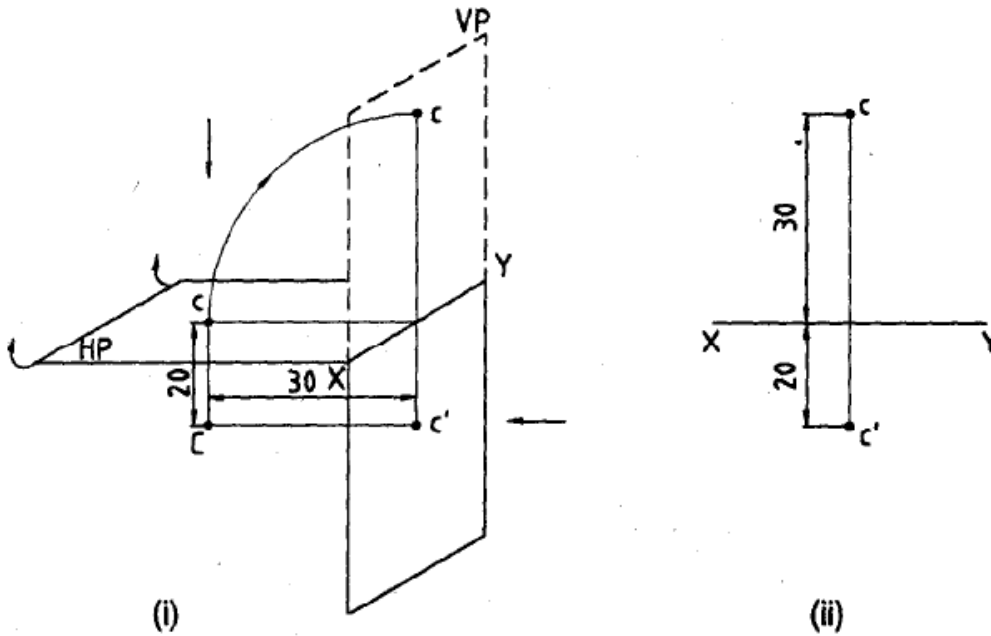
### PROJECTION OF POINT IN THIRD QUADRANT



**EXAMPLE-**A point A is 20 mm above HP and 30 mm in front of VP. Draw its projection.

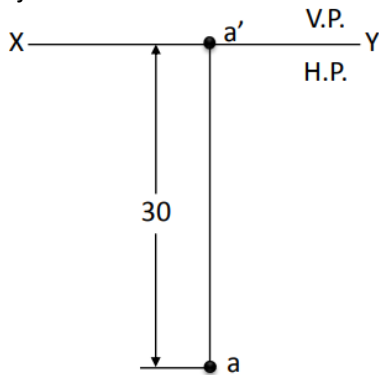


**EXAMPLE-**A point C is 20mm below HP and 30 mm behind VP. Draw its projection.



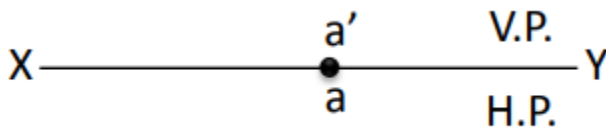
**EXAMPLE--**A Point M is 35 mm above H.P. and 45 mm in front of V.P. Draw its projections.

**EXAMPLE--**Draw the projections of a point A lying on H.P. and 30 mm in front of V.P. Draw its projections.



Ex--Draw the projections of a point A lying on V.P. and 35 mm above H.P. Draw its projections.

Ex--Draw the projections of a point F which lies in both the H.P. and V.P. Draw its projections.



# Summary

Sl.No	Location of Point	Front View	Top View	Quadrant
1.	Above H.P. & In front of V.P.	Above XY	Below XY	First
2.	Above H.P. & Behind V.P.	Above XY	Above XY	Second
3.	Below H.P. & Behind V.P.	Below XY	Above XY	Third
4.	Below H.P. & In front of V.P.	Below XY	Below XY	Fourth
5.	Above H.P. On V.P.	Above XY	On XY	First or Second
6.	Below H.P. On V.P.	Below XY	On XY	Third or Fourth
7.	On H.P. In Front of V.P.	On XY	Below XY	First or Fourth
8.	On H.P. Behind V.P.	On XY	Above XY	Second or Third

## PROJECTIONS OF POINTS

**Problem 1** Draw the projections of the following Points on the same XY line, keeping convenient distance between each projectors. Name the Quadrants in which they lie.

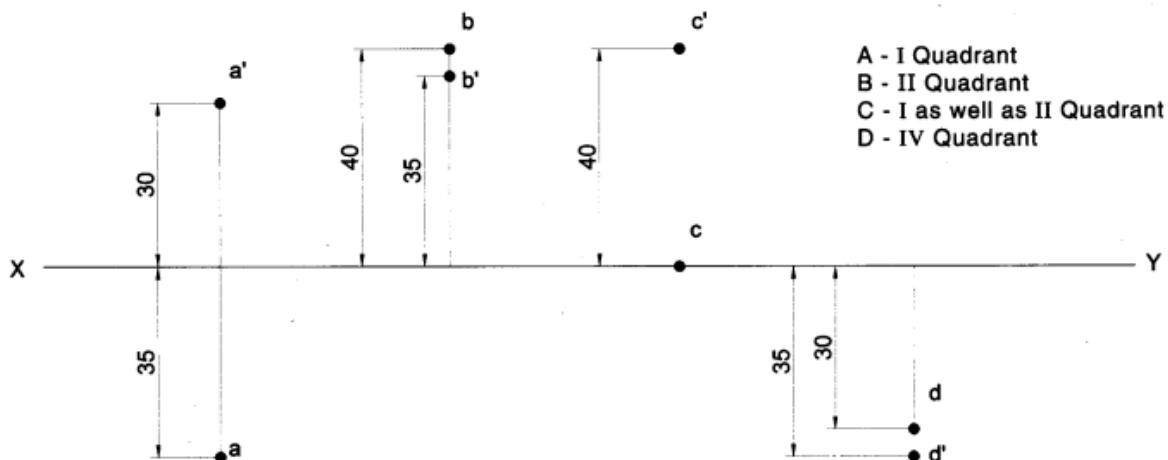
A – 30 mm above HP & 35 mm in front of VP.

B – 35 mm above HP & 40 mm behind VP.

C – 40 mm above HP & on VP.

D – 35 mm below HP & 30 mm in front of VP.

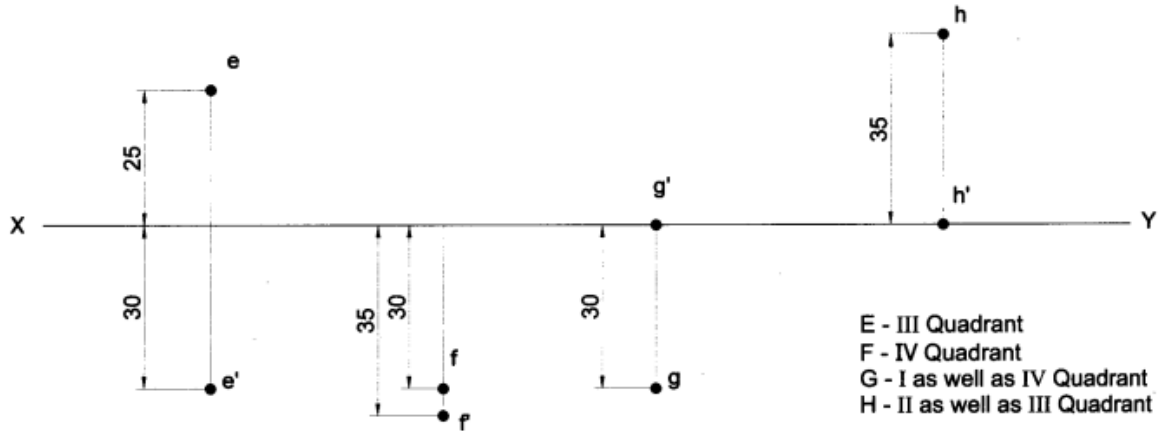
**Solution**



**Problem 2** Draw the projections of the following Points on the same XY line, Keeping convenient distance between each projectors. Name the Quadrants in which they lie.

- E – 30 mm below HP & 25 mm behind VP.
- F – 35 mm below HP & 30 mm in front of VP.
- G – On HP & 30 mm in front of VP.
- H – On HP & 35 mm behind VP.

**Solution**



**Problem 26** Draw the projections of the following Points on the same XY line, Keeping convenient distance between each projectors. Name the Quadrants in which they lie.

- M – 30 mm below HP & 25 mm behind VP.
- N – 35 mm below HP & 30 mm in front of VP.
- P – on HP & 30 mm in front of VP.
- Q – on HP & 35 mm behind of VP.

**Solution**

