CHANDIGARH UNIVERSITY

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University Institute of Engineering

Academic Unit-1-5

Bachelor of Engineering

Computer Graphics using CAD Lab. (24MEP-102)

Experiment No. 4

Prepared By: Paras Khullar

PROJECTION OF POINTS

PROJECTION OF POINTS

Course Outcome

CO Number	Title After completion of the course the students may be able to:	Level
CO1	Understand the various concepts and elements of engineering graphics using CAD software.	Remember & Understand
CO2	Learn fundamentals of CAD (computer aided drafting).	Understand
CO3	**Evaluate the true lengths and true shapes of the simple engineering objects.**	**Understand**
CO4	Apply the concept of CAD and convert 2D drawings into 3D and vice versa and draw orthographic views of engineering objects.	Understand
CO5	Construct the front and top views of the objects and draw relevant figures related to engineering on CAD software.	Understand

Image Source: http://cadmasters.guru/2d-to-3d-conversions/

Will be covered in this lecture

COURSE OBJECTIVES

Students may be able to

- Understand the concept of orthographic projections
- Differentiate between different views
- Locate a point in orthographic projections
- Understand the placement of a point in different quadrants
- Label the projections in different planes
- Understand the concept of reference planes

Image Source: https://img-a.udemycdn.com/course/750x422/1925256_3592_5.jpg

Projection

- View of an object that is visible to the observer from a particular direction
- Projection observed from
  - the top is called as Top View
  - the front is called as Front View
  - the Side is called a Side View
- These types of projections are known as Orthographic Projections as the all the views are observed at and angle of 90° to each other

Concept of Projections

- To draw projections of any point, following information is must
  1. Object
  2. Observer
  3. Plane of Projection

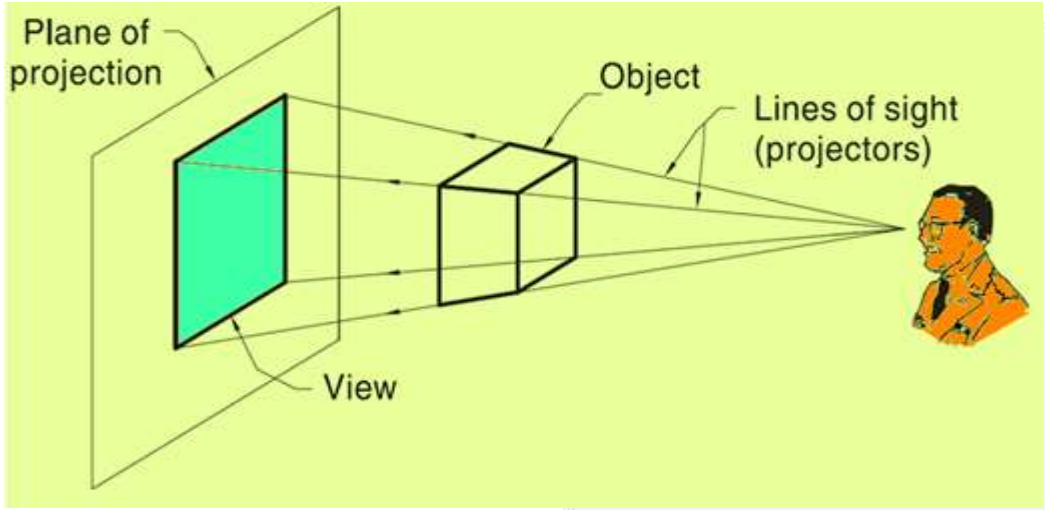


Fig. 3.1: Position of Object, Observer & Plane of Projection

Image Source:
http://ednotebook.hostgator.co.in/theory-of-projection

Orthographic Projections

- Type of technical drawing in which different views of an object are projected on different reference planes
- Views are observed perpendicular to the different reference planes
- All the views are observed at right angles to each other.
- For example front view, top view and side views are drawn by observing perpendicular to each other.

Planes

There are two types of planes

1. Principal Planes:

- Horizontal Plane
- Vertical Plane

2. Auxiliary Planes:

- Auxiliary Inclined Plane
- Auxiliary Vertical Plane
- Profile Plane

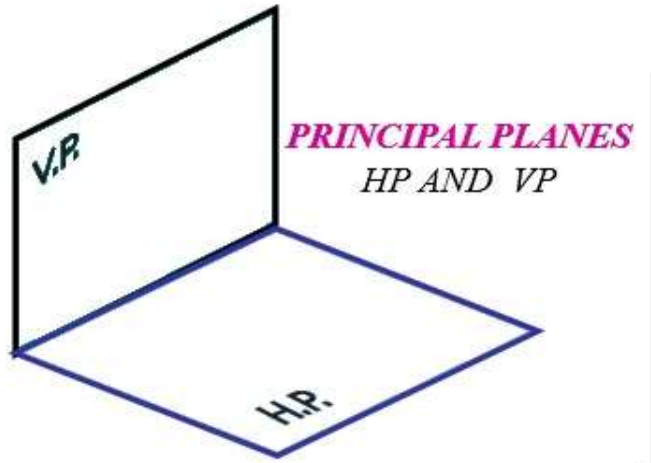


Fig. 3.2: Principal Planes

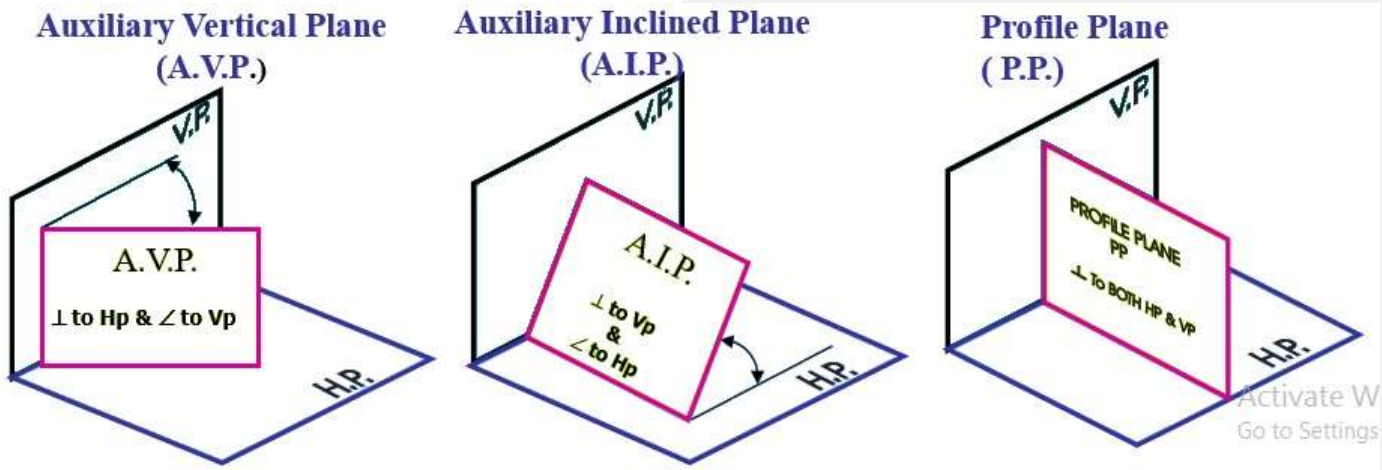
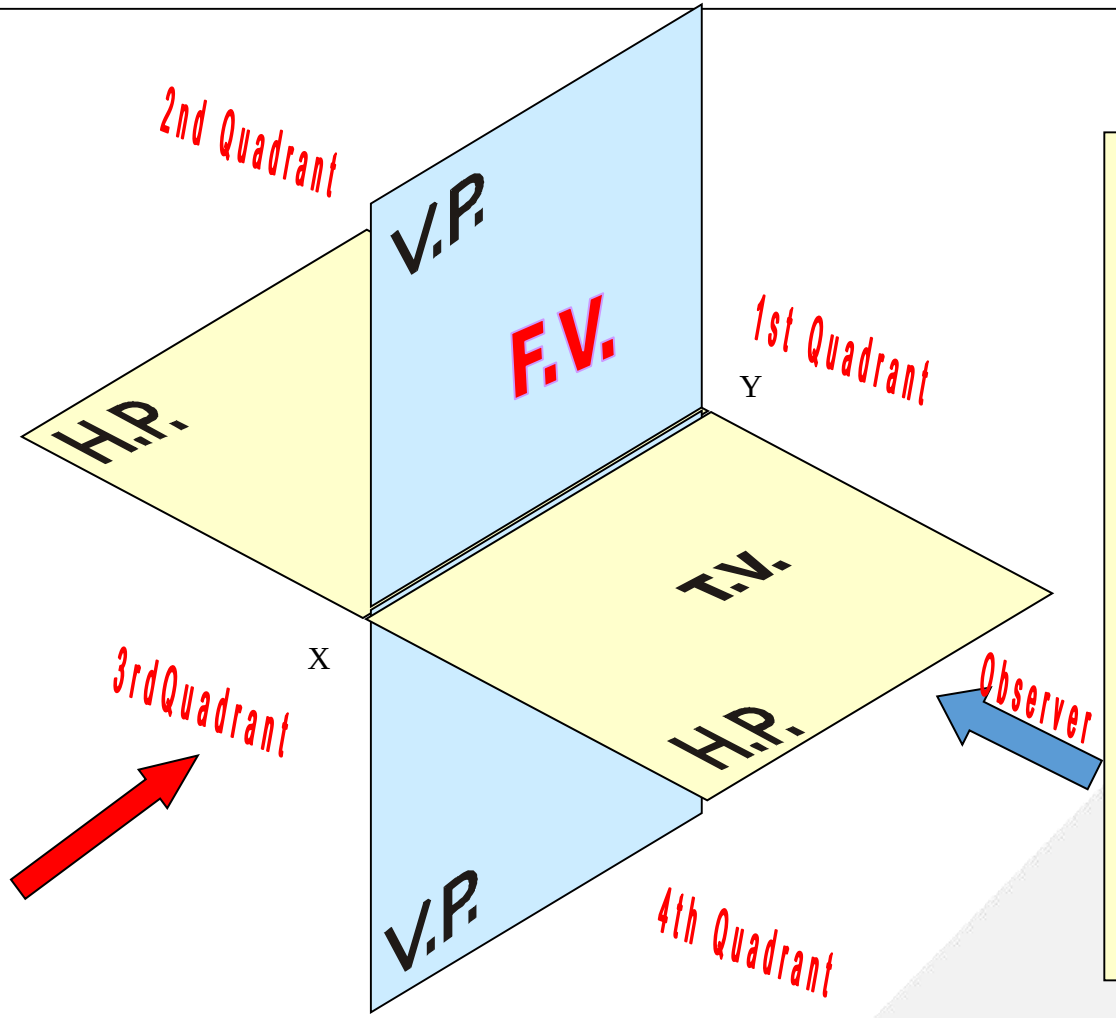


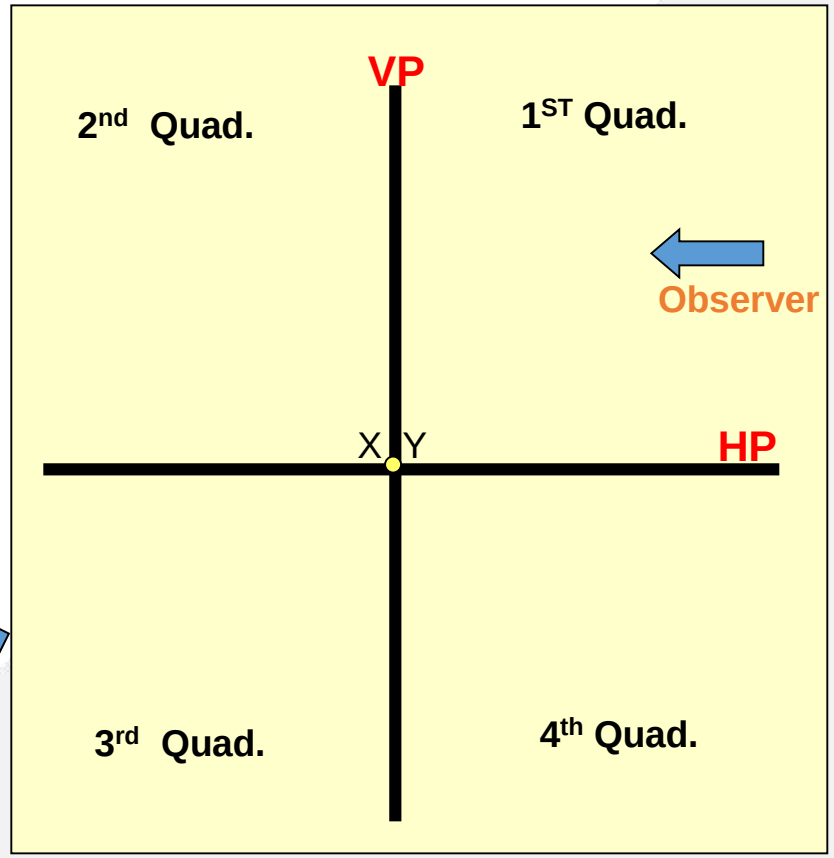
Fig. 3.3: Auxiliary Planes

Image Source: www.slideshare.net

Quadrant System and Reference Planes

- Observer is assumed to view the object from right side





Animation Source: www.slideshare.net

Quadrant System and Reference Planes

- VP stands for Vertical Plane and HP stands for Horizontal Plane
- For every quadrant, HP rotates by 90° clockwise direction and VP remains stationary
- Front View is always drawn on VP, also known as Vertical Projection
- Top View is always drawn on HP, also known as Horizontal Projection

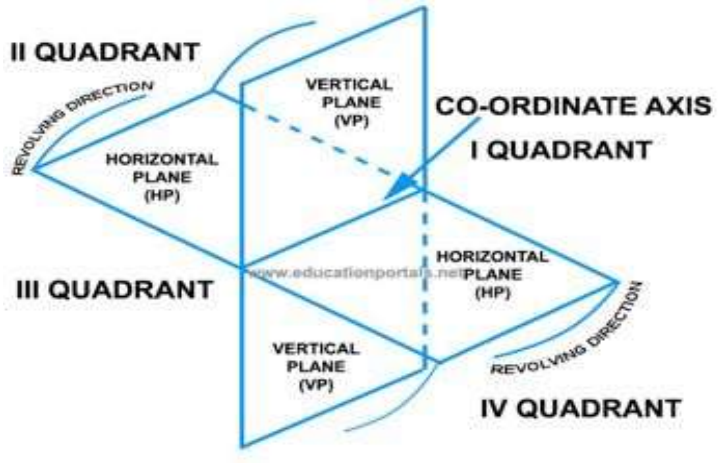


Fig. 3.4: Quadrant System

Image Source: www.educationportals.net

Notations

- Every projection has a particular notation
- Every object (point, line, plane, etc.) is always represented by upper case letters. For example:
  - A for a point
  - AB for a line
  - ABCD for a plane
- The projections for the different objects are represented as the same alphabet of its name in the lowercase

S.No	Type of Projection	Drawn on	Notation for object Point A	Line AB	Plane ABCD
1	Top View	HP	a	ab	abcd
2	Front View	VP	a’	a’b’	a’b’c’d’
3	Side View	PP	a”	a”b”	a”b”c”d”

Table 3.1: Notations for the Objects

Locations of the Point w.r.t. Reference Planes

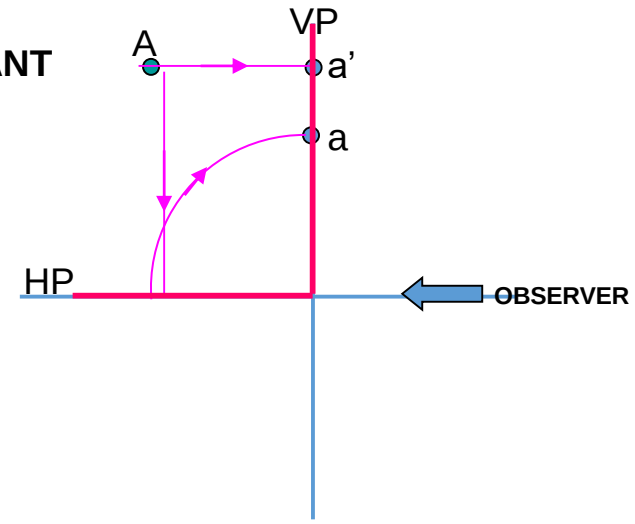
- As the position of the observer is fixed, the location of the point is determined as follows:
- If point A
  - lies above HP and in front of VP the point lies in 1st quadrant
  - lies above HP and behind VP, the point lies in 2nd quadrant
  - lies below HP and behind VP, the point lies in 3rd quadrant
  - lies below HP and in front of VP, the point lies in the 4th quadrant

Locations of the Point w.r.t. Reference Planes

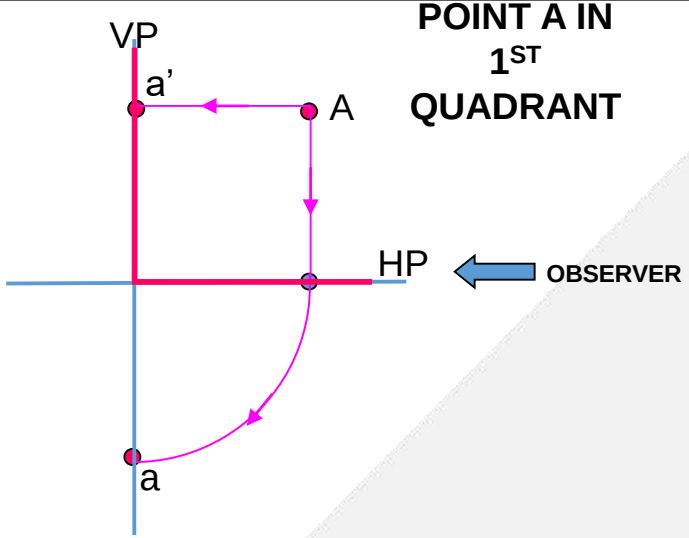
- First quadrant: V.P is above X-Y line and H.P is below X-Y line
- Second quadrant: V.P and H.P both are above X-Y line
- Third quadrant: H.P is above X-Y line and V.P is below X-Y line
- Fourth quadrant: V.P and H.P both are below X-Y line

Locations of the Point w.r.t. Reference Planes

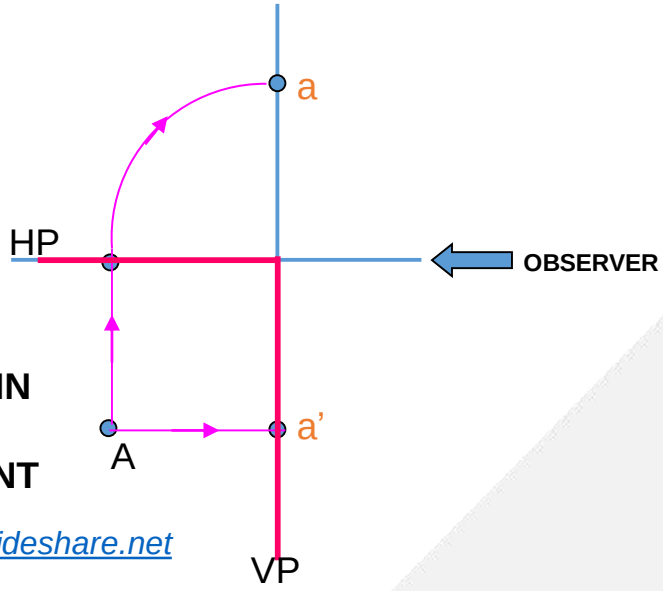
POINT A IN 2ND QUADRANT



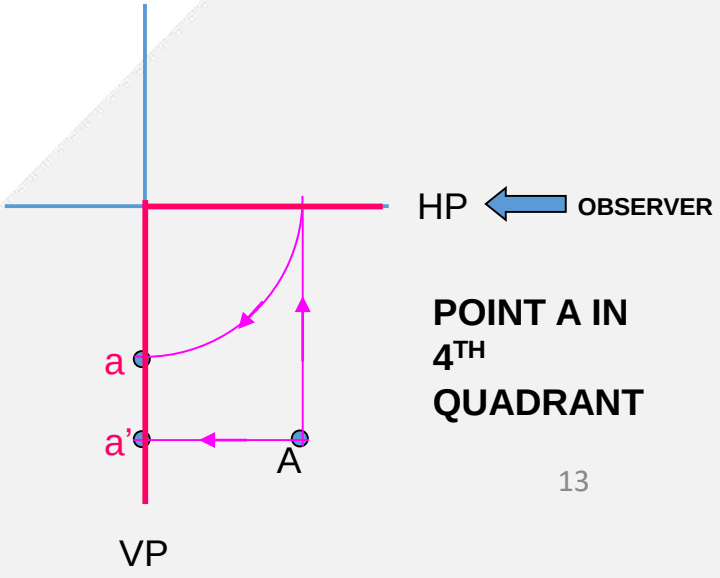
POINT A IN 1ST QUADRANT



POINT A IN 3RD QUADRANT



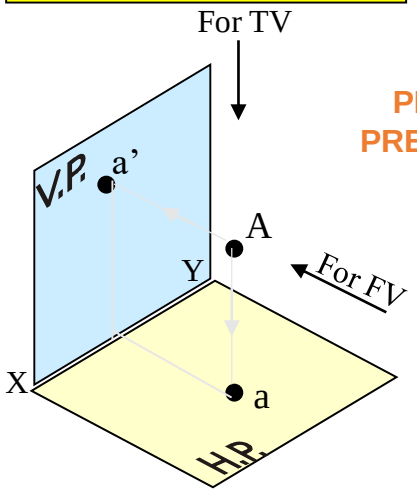
POINT A IN 4TH QUADRANT



Animation Source: www.slideshare.net

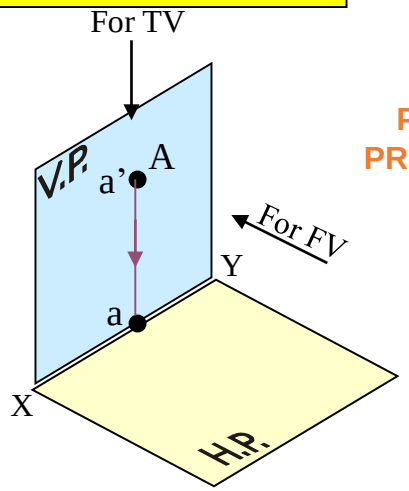
Projections of Point in 1st quadrant

POINT A ABOVE HP & INFRONT OF VP



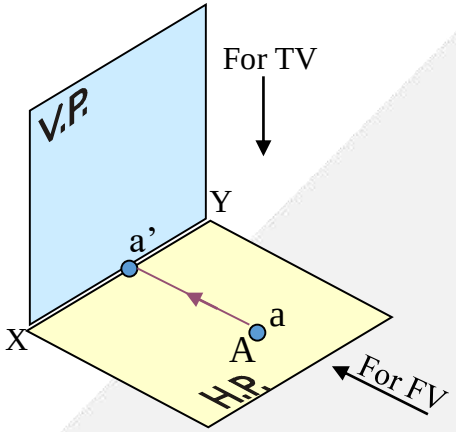
PICTORIAL PRESENTATION

POINT A ABOVE HP & IN VP



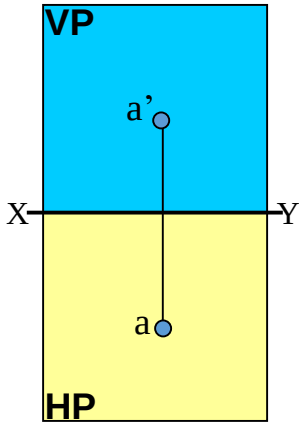
PICTORIAL PRESENTATION

POINT A IN HP & INFRONT OF VP

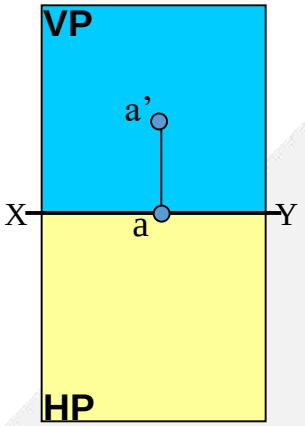


ORTHOGRAPHIC PRESENTATIONS OF ALL ABOVE CASES.

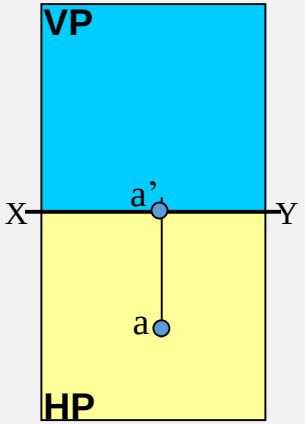
FV above XY, TV below XY.



FV above XY, TV on XY.



FV on XY, TV below XY.



Animation Source: www.slideshare.net

Applications

- Projection of points are applicable for fitting of bulbs in the buildings.
- These are also used for the installation of towers and poles.

Summary

- In this PPT we have studied the concept of projections
- The concept of object observer and plane of projection
- Quadrant system and its rules
- Various principal planes
- Views of orthographic projections
- Nomenclature of various views of orthographic projections

Frequently Asked Questions

- What is orthographic projection?
- What are the basic requirements in order to draw projections?
- On which plane is front view drawn?
- How will be the front view of point A represented?
- What is the position of object in 3rd angle projection?

Recommended Books

- Rhodes R.S, Cook L.B; Basic Engineering Drawing, Pitman Publishers,
- Rana and Shah; Engineering Drawing, Pearson Education India Publishers.
- Jolhe D.A; Engineering Drawing: With an Introduction to AutoCAD, Tata McGraw Hill
- Gill P.S; Engineering Drawing, S.K. Kataria and Sons Publications.
- Dhawan R. K; Engineering Drawing, S. Chand and Sons Publishers.

References & Image Links

- Engineering Drawing by P. S. Gill
- Engineering Drawing by Dr. R. K. Dhawan
- Engineering Drawing and Computer Graphics by Harwinder Singh
- www.educationportals.net
- http://ednotebook.hostgator.co.in/theory-of-projection
- https://www.slideshare.net/kashyapshah11/projection-of-lines-12770216

THANK YOU

For queries
Email: paras.me@cumail.in