An object having three dimensions may be shown on a single plane by means of ***projection***. The projection of a point on a plane is a point. The projection of a line on a plane is generally a line. The plane upon which points or lines are projected is the ***plane of projection***. The ***direction of projection*** is the direction in which a point is projected into the plane of projection. The direction of projection is perpendicular to the plane of projection in ***Normal projection***.

Normal projection is illustrated in Fig. (1). Points and lines have been projected into the horizontal plane represented by the upper surface of the blocks. In Figure (1-A), point ***B*** is the projection of point ***A;*** line ***EF*** is the projection of line ***CD***. In Figure (1-B), line ***GI*** is the projection of line ***GH*** into this plane.

The line of intersection of two planes is the trace of one plane upon the other. The trace of one plane of projection upon a second plane of two planes is call*ed a* folding line. In normal projection the angle between two planes having a common folding line always **90** degrees.

To represent a plan (*map*) and a *section* on one plane (paper), it is required to rotate the section into the plane of the map around the ***folding line*** as an axis. In the following problems it is best to consider the section as lying below the folding line; the section will then be rotated upward into the horizontal plane. In figure (1-C), point B is the projection of point A into a horizontal plane; point C is the projection of point A into a vertical plane represented by side of the block. Figure (1-D) shows the projection after the vertical plane has been rotated into the plane of the paper about the folding line (F.L.) as an axis.

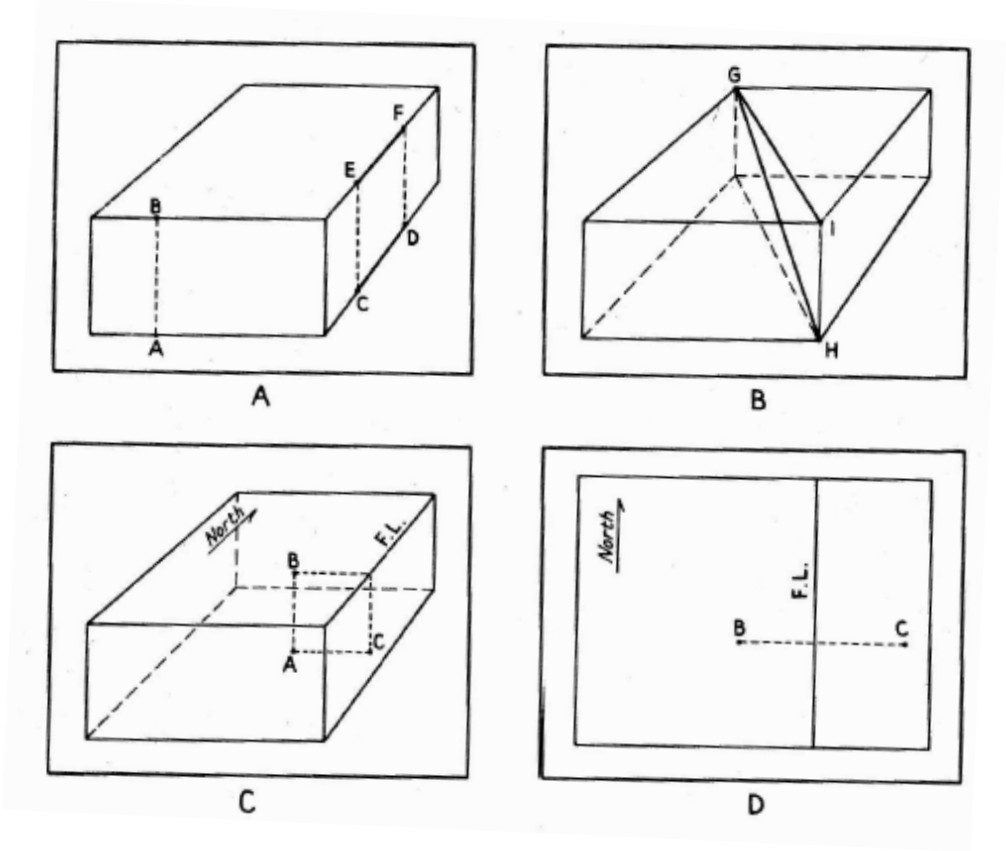


**Figure. (1): Normal projection of points and planes on horizontal and vertical planes.**

Exercise (1): A vein that strikes N40ºE and dips 40ºNW intersect a vein that strikes S30ºE and dips 55ºNE.Draw the projection of the intersection of the intersection of the two vein on a horizontal plane, and find the attitude of the intersection

Exercise (2):A vein that strikes S53ºW and dips 32ºSE intersect a vein that strikes S48ºE and dips 57ºNE.Draw the projection of the intersection of the intersection of the two vein on a horizontal plane, and find the attitude of the intersection

Exercise (3):A joint that strikes N41ºE and dips 55ºNW intersects a vein that strikes N64ºW and dips 40º SW. Draw the projection of the intersection on a horizontal plane ,and find the orientation of the intersection

Exercise (H.W.): a vertical vein that strikesN49ºW intersects a joint that strikes N39ºE and dips 41ºNW.Determine the trend and plunge of the intersection.

Exercise (H.W.):The two limbs of a fold strike N62ºE and S46ºE,dip 34ºNW and 56ºNE,respectively.Find attitude of the hinge line of the fold .

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## Procedure:

**(1)** Draw AB and CD parallel to the respective strike of the vein.
**(2**) Construct a folding line FF' perpendicular to AB**.**
**(3)** Using these folding lines as the horizontal, to make cross section. Draw HH' parallel to F.L. and at an arbitrary distance (h) from FF'. HH' and II' represent a level which will be called the lower reference plane (L.R.P.) F" is the intersection FF' with AB.
**(4)** Draw angle FF"J and G'G"K equal to the respective dips of the two veins. F"J intersects HH' at J'**.**
**(5)** Draw J'M and K'L parallel to AB and CD. These two lines represent the horizontal projections (H.P.) of contours on the two veins at (h) distance below the plan. Point N is the (H.P.) of intersection of the veins on the L.R.P. and point O is the intersection of the two veins on the plan.
Therefore, line ON is the (H.P.) of the intersection of the two veins.