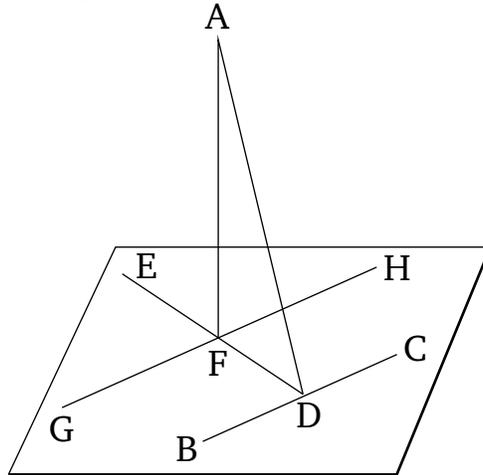


Book 11

Proposition 11

To draw a perpendicular straight-line from a given raised point to a given plane.



Let A be the given raised point, and the given plane the reference (plane). So, it is required to draw a perpendicular straight-line from point A to the reference plane.

Let some random straight-line BC have been drawn across in the reference plane, and let the (straight-line) AD have been drawn from point A perpendicular to BC [Prop. 1.12]. If, therefore, AD is also perpendicular to the reference plane then that which was prescribed will have occurred. And, if not, let DE have been drawn in the reference plane from point D at right-angles to BC [Prop. 1.11], and let the (straight-line) AF have been drawn from A perpendicular to DE [Prop. 1.12], and let GH have been drawn through point F , parallel to BC [Prop. 1.31].

And since BC is at right-angles to each of DA and

DE , BC is thus also at right-angles to the plane through EDA [Prop. 11.4]. And GH is parallel to it. And if two straight-lines are parallel, and one of them is at right-angles to some plane, then the remaining (straight-line) will also be at right-angles to the same plane [Prop. 11.8]. Thus, GH is also at right-angles to the plane through ED and DA . And GH is thus at right-angles to all of the straight-lines joined to it which are also in the plane through ED and AD [Def. 11.3]. And AF , which is in the plane through ED and DA , is joined to it. Thus, GH is at right-angles to FA . Hence, FA is also at right-angles to HG . And AF is also at right-angles to DE . Thus, AF is at right-angles to each of GH and DE . And if a straight-line is set up at right-angles to two straight-lines cutting one another, at the point of section, then it will also be at right-angles to the plane through them [Prop. 11.4]. Thus, FA is at right-angles to the plane through ED and GH . And the plane through ED and GH is the reference (plane). Thus, AF is at right-angles to the reference plane.

Thus, the straight-line AF has been drawn from the given raised point A perpendicular to the reference plane. (Which is) the very thing it was required to do.