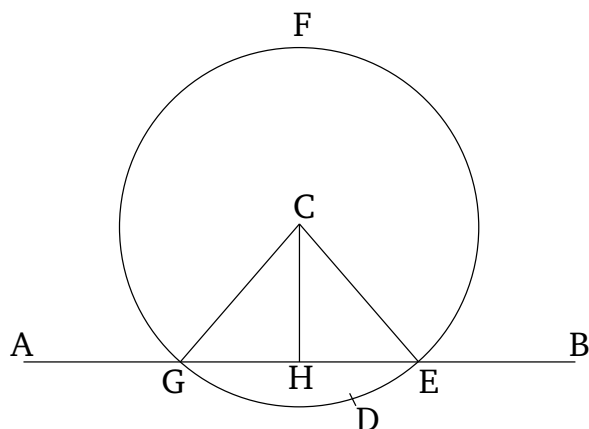


Book 1

Proposition 12

To draw a straight-line perpendicular to a given infinite straight-line from a given point which is not on it.



Let AB be the given infinite straight-line and C the given point, which is not on (AB) . So it is required to draw a straight-line perpendicular to the given infinite straight-line AB from the given point C , which is not on (AB) .

For let point D have been taken at random on the other side (to C) of the straight-line AB , and let the circle EFG have been drawn with center C and radius CD [Post. 3], and let the straight-line EG have been cut in half at (point) H [Prop. 1.10], and let the straight-lines CG , CH , and CE have been joined. I say that the (straight-line) CH has been drawn perpendicular to the given infinite straight-line AB from the given point C , which is not on (AB) .

For since GH is equal to HE , and HC (is) common,

the two (straight-lines) GH , HC are equal to the two (straight-lines) EH , HC , respectively, and the base CG is equal to the base CE . Thus, the angle CHG is equal to the angle EHC [Prop. 1.8], and they are adjacent. But when a straight-line stood on a(nother) straight-line makes the adjacent angles equal to one another, each of the equal angles is a right-angle, and the former straight-line is called a perpendicular to that upon which it stands [Def. 1.10].

Thus, the (straight-line) CH has been drawn perpendicular to the given infinite straight-line AB from the given point C , which is not on (AB) . (Which is) the very thing it was required to do.