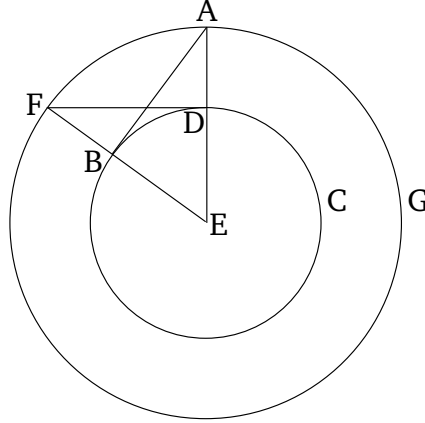


Book 3

Proposition 17

To draw a straight-line touching a given circle from a given point.



Let A be the given point, and BCD the given circle. So it is required to draw a straight-line touching circle BCD from point A .

For let the center E of the circle have been found [Prop. 3.1], and let AE have been joined. And let (the circle) AFG have been drawn with center E and radius EA . And let DF have been drawn from (point) D , at right-angles to EA [Prop. 1.11]. And let EF and AB have been joined. I say that the (straight-line) AB has been drawn from point A touching circle BCD .

For since E is the center of circles BCD and AFG , EA is thus equal to EF , and ED to EB . So the two (straight-lines) AE , EB are equal to the two (straight-lines) FE , ED (respectively). And they contain a common angle at E . Thus, the base DF is equal to the base AB , and triangle DEF is equal to triangle EBA , and the remaining angles (are equal) to the (correspond-

ing) remaining angles [Prop. 1.4]. Thus, (angle) EDF (is) equal to EBA . And EDF (is) a right-angle. Thus, EBA (is) also a right-angle. And EB is a radius. And a (straight-line) drawn at right-angles to the diameter of a circle, from its extremity, touches the circle [Prop. 3.16 corr.]. Thus, AB touches circle BCD .

Thus, the straight-line AB has been drawn touching the given circle BCD from the given point A . (Which is) the very thing it was required to do.