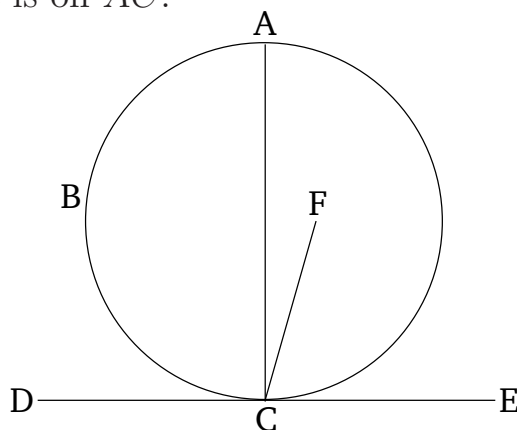


Book 3

Proposition 19

If some straight-line touches a circle, and a straight-line is drawn from the point of contact, at right-[angles] to the tangent, then the center (of the circle) will be on the (straight-line) so drawn.

For let some straight-line DE touch the circle ABC at point C . And let CA have been drawn from C , at right-angles to DE [Prop. 1.11]. I say that the center of the circle is on AC .



For (if) not, if possible, let F be (the center of the circle), and let CF have been joined.

[Therefore], since some straight-line DE touches the circle ABC , and FC has been joined from the center to the point of contact, FC is thus perpendicular to DE [Prop. 3.18]. Thus, FCE is a right-angle. And ACE is also a right-angle. Thus, FCE is equal to ACE , the lesser to the greater. The very thing is impossible. Thus, F is not the center of circle ABC . So, similarly, we can show that neither is any (point) other (than one) on AC . Thus, if some straight-line touches a circle, and a

straight-line is drawn from the point of contact, at right-angles to the tangent, then the center (of the circle) will be on the (straight-line) so drawn. (Which is) the very thing it was required to show.