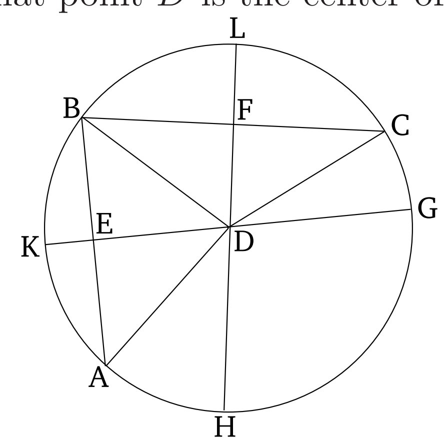
Book 3
Proposition 9

If some point is taken inside a circle, and more than two equal straight-lines radiate from the point towards the (circumference of the) circle, then the point taken is the center of the circle.

Let ABC be a circle, and D a point inside it, and let more than two equal straight-lines, DA, DB, and DC, radiate from D towards (the circumference of) circle ABC. I say that point D is the center of circle ABC.



For let AB and BC have been joined, and (then) have been cut in half at points E and F (respectively) [Prop. 1.10]. And ED and FD being joined, let them have been drawn through to points G, K, H, and L.

Therefore, since AE is equal to EB, and ED (is) common, the two (straight-lines) AE, ED are equal to the two (straight-lines) BE, ED (respectively). And the base DA (is) equal to the base DB. Thus, angle AED is equal to angle BED [Prop. 1.8]. Thus, angles AED and BED (are) each right-angles [Def. 1.10]. Thus, GK

cuts AB in half, and at right-angles. And since, if some straight-line in a circle cuts some (other) straight-line in half, and at right-angles, then the center of the circle is on the former (straight-line) [Prop. 3.1 corr.], the center of the circle is thus on GK. So, for the same (reasons), the center of circle ABC is also on HL. And the straight-lines GK and HL have no common (point) other than point D. Thus, point D is the center of circle ABC.

Thus, if some point is taken inside a circle, and more than two equal straight-lines radiate from the point towards the (circumference of the) circle, then the point taken is the center of the circle. (Which is) the very thing it was required to show.