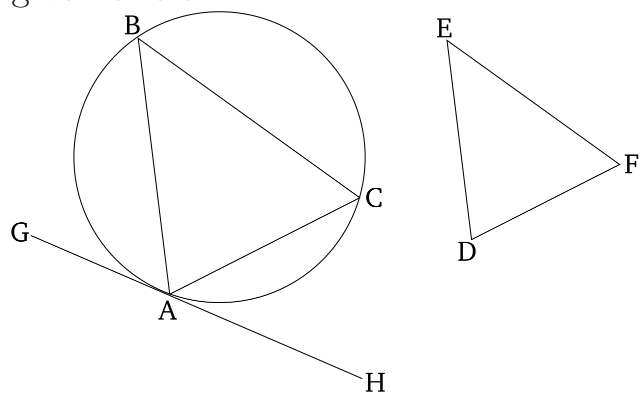
Book 4
Proposition 2

To inscribe a triangle, equiangular with a given triangle, in a given circle.



Let ABC be the given circle, and DEF the given triangle. So it is required to inscribe a triangle, equiangular with triangle DEF, in circle ABC.

Let GH have been drawn touching circle ABC at A.† And let (angle) HAC, equal to angle DEF, have been constructed on the straight-line AH at the point A on it, and (angle) GAB, equal to [angle] DFE, on the straight-line AG at the point A on it [Prop. 1.23]. And let BC have been joined.

Therefore, since some straight-line AH touches the circle ABC, and the straight-line AC has been drawn across (the circle) from the point of contact A, (angle) HAC is thus equal to the angle ABC in the alternate segment of the circle [Prop. 3.32]. But, HAC is equal to DEF. Thus, angle ABC is also equal to DEF. So, for the same (reasons), ACB is also equal to DFE. Thus, the remaining (angle) BAC is equal to the remaining (angle) EDF

[Prop. 1.32]. [Thus, triangle ABC is equiangular with triangle DEF, and has been inscribed in circle ABC].

Thus, a triangle, equiangular with the given triangle, has been inscribed in the given circle. (Which is) the very thing it was required to do.