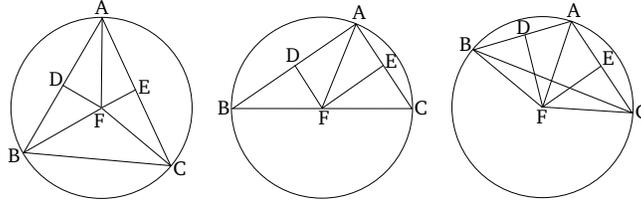


Book 4 Proposition 5

To circumscribe a circle about a given triangle.



Let ABC be the given triangle. So it is required to circumscribe a circle about the given triangle ABC .

Let the straight-lines AB and AC have been cut in half at points D and E (respectively) [Prop. 1.10]. And let DF and EF have been drawn from points D and E , at right-angles to AB and AC (respectively) [Prop. 1.11]. So (DF and EF) will surely either meet inside triangle ABC , on the straight-line BC , or beyond BC .

Let them, first of all, meet inside (triangle ABC) at (point) F , and let FB , FC , and FA have been joined. And since AD is equal to DB , and DF is common and at right-angles, the base AF is thus equal to the base FB [Prop. 1.4]. So, similarly, we can show that CF is also equal to AF . So that FB is also equal to FC . Thus, the three (straight-lines) FA , FB , and FC are equal to one another. Thus, the circle drawn with center F , and radius one of A , B , or C , will also go through the remaining points. And the circle will have been circumscribed about triangle ABC . Let it have been (so) circumscribed, like ABC (in the first diagram from the left).

And so, let DF and EF meet on the straight-line BC

at (point) F , like in the second diagram (from the left). And let AF have been joined. So, similarly, we can show that point F is the center of the circle circumscribed about triangle ABC .

And so, let DF and EF meet outside triangle ABC , again at (point) F , like in the third diagram (from the left). And let AF , BF , and CF have been joined. And, again, since AD is equal to DB , and DF is common and at right-angles, the base AF is thus equal to the base BF [Prop. 1.4]. So, similarly, we can show that CF is also equal to AF . So that BF is also equal to FC . Thus, [again] the circle drawn with center F , and radius one of FA , FB , and FC , will also go through the remaining points. And it will have been circumscribed about triangle ABC .

Thus, a circle has been circumscribed about the given triangle. (Which is) the very thing it was required to do.