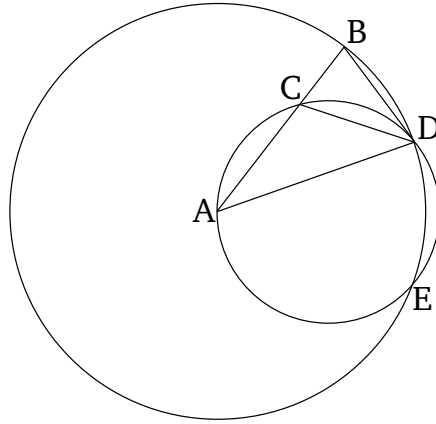


Book 4

Proposition 10

To construct an isosceles triangle having each of the angles at the base double the remaining (angle).

Let some straight-line AB be taken, and let it have been cut at point C so that the rectangle contained by AB and BC is equal to the square on CA [Prop. 2.11]. And let the circle BDE have been drawn with center A , and radius AB . And let the straight-line BD , equal to the straight-line AC , being not greater than the diameter of circle BDE , have been inserted into circle BDE [Prop. 4.1]. And let AD and DC have been joined. And let the circle ACD have been circumscribed about triangle ACD [Prop. 4.5].



And since the (rectangle contained) by AB and BC is equal to the (square) on AC , and AC (is) equal to BD , the (rectangle contained) by AB and BC is thus equal to the (square) on BD . And since some point B has been taken outside of circle ACD , and two straight-lines BA and BD have radiated from B towards the circle ACD , and (one) of them cuts (the circle), and (the other) meets

(the circle), and the (rectangle contained) by AB and BC is equal to the (square) on BD , BD thus touches circle ACD [Prop. 3.37]. Therefore, since BD touches (the circle), and DC has been drawn across (the circle) from the point of contact D , the angle BDC is thus equal to the angle DAC in the alternate segment of the circle [Prop. 3.32]. Therefore, since BDC is equal to DAC , let CDA have been added to both. Thus, the whole of BDA is equal to the two (angles) CDA and DAC . But, the external (angle) BCD is equal to CDA and DAC [Prop. 1.32]. Thus, BDA is also equal to BCD . But, BDA is equal to CBD , since the side AD is also equal to AB [Prop. 1.5]. So that DBA is also equal to BCD . Thus, the three (angles) BDA , DBA , and BCD are equal to one another. And since angle DBC is equal to BCD , side BD is also equal to side DC [Prop. 1.6]. But, BD was assumed (to be) equal to CA . Thus, CA is also equal to CD . So that angle CDA is also equal to angle DAC [Prop. 1.5]. Thus, CDA and DAC is double DAC . But BCD (is) equal to CDA and DAC . Thus, BCD is also double CAD . And BCD (is) equal to to each of BDA and DBA . Thus, BDA and DBA are each double DAB .

Thus, the isosceles triangle ABD has been constructed having each of the angles at the base BD double the remaining (angle). (Which is) the very thing it was required to do.