

MT 453 Elements Day 3

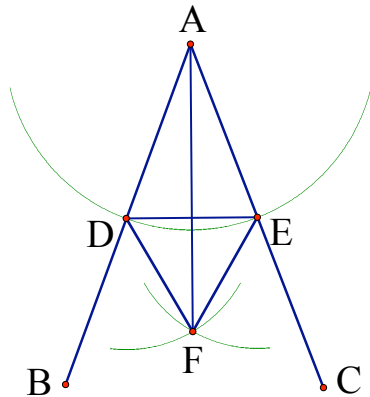
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Scribes: Andrew McFarlane, Professor Reeder

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Proposition I.9

How to bisect an angle



Let angle BAC be the angle to bisect

Pick a point on AB called D

Pick the point E on AC such that $AD = AE$ (prop I.3)

Draw line DE

Construct equilateral triangle DEF (prop I.1)

Draw line AF

Claim: angle BAC is bisected by AF

We know that $AD = AE$

AF is common to both triangles ADF and AEF

Since triangle DEF is equilateral, $DF = EF$

Therefore triangle ADF is congruent to AEF by SSS (prop I.8)

Thus angle BAF is equal to angle CAF

Therefore AF bisects angle BAC

QEF

Comments: Point D can be picked at random on line AB , however point E must be selected such that $AD = AE$, which we are able to do because of prop I.3

The previously proved prop I.8, or side side side, is necessary here because it is used in order to prove that the supposedly bisected angle is made up of two equal angles