

## Construction from Definition (Part 1)

**Narrator:** Han, Clare, and Andre need to construct an angle bisector.

**Han:** We can use a circle to construct two points the same distance from point  $A$ . Let's label those points  $D$  and  $E$ .

**Clare:** Now we can connect  $D$  and  $E$ . Let's label the midpoint of segment  $DE$  and call it  $F$ .

**Andre:** So now draw ray  $AF$ . That's the bisector of angle  $DAE$ .

**Narrator:** Now Han, Clare, and Andre need to write a proof that ray  $AF$  is the angle bisector of angle  $DAE$ . They each start by sharing some rough draft thinking.

**Han:** We know  $F$  is the midpoint of segment  $DE$ . So segments  $DF$  and  $EF$  are the same length. I notice that  $F$  is also on the perpendicular bisector of angle  $DAE$ .

**Clare:** Since segment  $DA$  is congruent to segment  $EA$ , triangle  $DEA$  is isosceles. And  $DF$  has to be congruent to  $EF$  because they are the same length. So,  $AF$  has to be the angle bisector.

**Andre:** What if you draw a segment from  $F$  to  $A$ ? Segments  $DF$  and  $EF$  are congruent. Also, angle  $DAF$  is congruent to angle  $EAF$ . Then both triangles are congruent on either side of the angle bisector line.

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