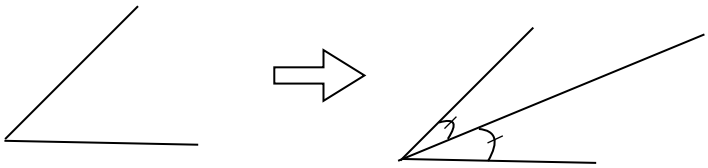
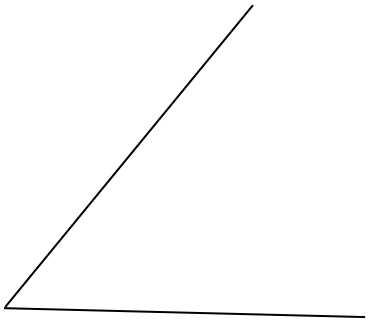
Lesson 14: Proposition 1.9 & 1.10

Proposition 1.9 (Problem): Bisect a given rectilineal angle.





Construct

1. Let $\angle ABC$ be the given angle.
2. Let point D be on line $\overline{AB}$.
3. Cut off from $\overline{BC}$ a line equal to $\overline{BD}$, and let it be $\overline{BE}$ (**Prop 1.3**). Therefore, $\overline{BD} = \overline{BE}$.
4. Join points D and E (**P1**).
5. Using $\overline{DE}$, construct an equilateral triangle, $\triangle DEF$ (**Prop 1.1**).
6. Join points B and F (**P1**).
7. $\overline{BF}$ bisects $\angle ABC$

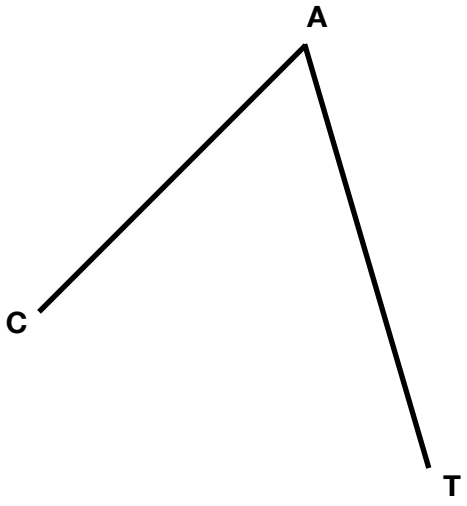
Proof

1. Since $\overline{BD} = \overline{BE}$, $\overline{DF} = \overline{EF}$ (**Def 20**), and $\overline{AF} = \overline{AF}$, then $\angle DBF = \angle EBF$ (**Prop 1.8**).

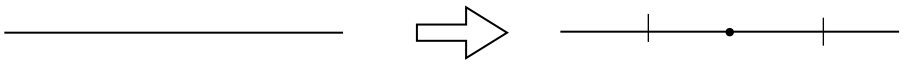
Q.E.F.

Practice

Bisect $\angle CAT$.



Proposition 1.10 (Problem): Bisect a given finite straight line.
Given: a finite straight line
Construct: a point on the line that cuts it into two lines
Prove: the two lines are equal



Construct

1. Let $\overline{AB}$ be the given finite straight line.
2. Using $\overline{AB}$, construct an equilateral triangle, $\triangle ABC$ (**Prop 1.1**).
3. Bisect $\angle ACB$ by the straight line $\overline{CD}$, such that point D is on line $\overline{AB}$ (**Prop 1.9**). Therefore, $\angle ACD = \angle BCD$.
4. Point D bisects $\overline{AB}$.

Proof

1. Since $\overline{AC} = \overline{BC}$ (**Def 20**), $\overline{CD} = \overline{CD}$, and $\angle ACD = \angle BCD$, then the bases are equal, $\overline{AD} = \overline{BD}$ (**Prop 1.4**)

Q.E.F

Practice
Bisect $\overline{IT}$.