Math 621 - Elem. Geom.

20 Aug '18

RE. Read §1.1.

EX. Given a line segment $\overline{AB}$, construct an equilateral triangle on $\overline{AB}$.

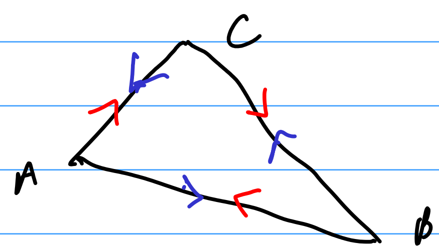
Construction — on board

steps

1. Draw the points A, B and the segment connecting them. (Given)
2. Set the compass's starting point at A, drawing pt at B, and construct the circle centered at A w/ radius $\overline{AB}$.
3. Repeat w/ the starting pt B and drawing point at A.
4. Choose one intersection point of these circles and and name it C.
5. ΔABC is the desired equilateral triangle. $\blacksquare$

Some notation.

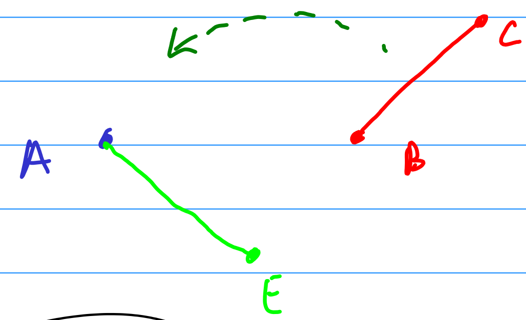
- A is a point
- $\overline{AB}$ is the line segment connecting A and B.
- $C(r)$ is the circle centered at C w/ radius $r>0$.
- ΔABC is the triangle oriented from A to B then to C.



ΔABC
ΔACB $\}$

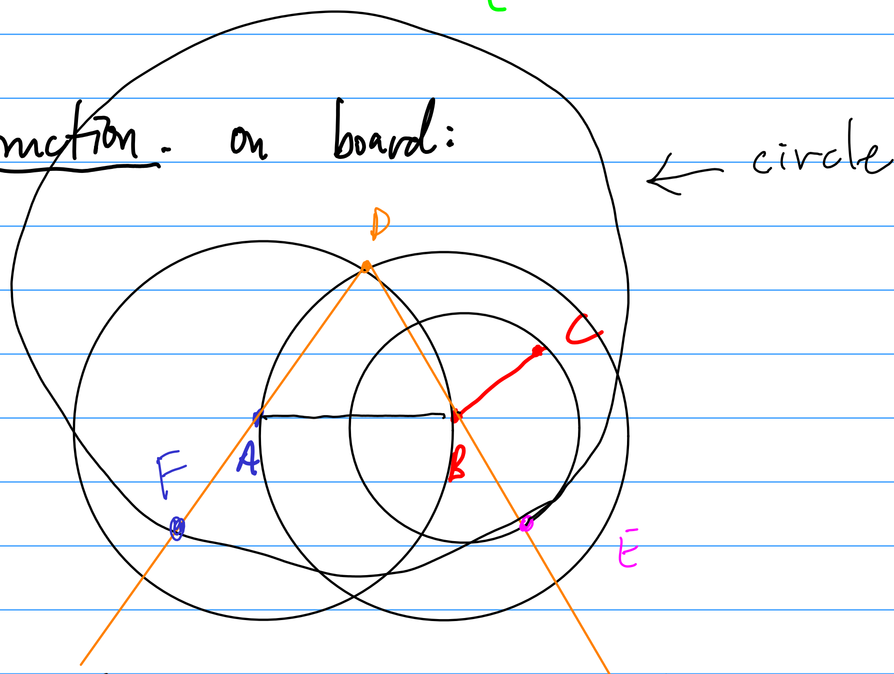
Ex. **Proposition 2.** Given a point A and a line segment $\overline{BC}$, place the segment at A.

schematic.



The lengths of $\overline{AE}$ and $\overline{BC}$ should be equal.

Construction. on board:



$\overline{AF}$ is the segment.

Claim: $\overline{AF}$ is equal in length to $\overline{BC}$.

Proof: $\overline{DF} = \overline{DE}$ because they are radii of the same circle.

$\overline{BC} = \overline{BE}$ by a similar argument.

$\overline{DA} = \overline{DB}$ since ΔABD is equilateral.

Then

$\overline{DF} = \overline{DA} + \overline{AF} = \overline{DB} + \overline{BE} = \overline{DE}$

Then by cancellation and transitivity,

$\overline{BC} = \overline{BE} = \overline{AF}$. ∎