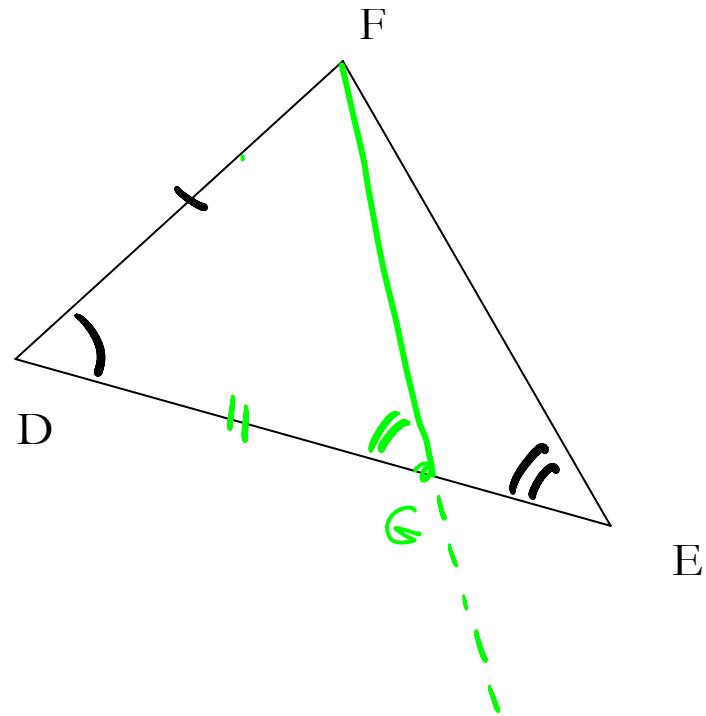
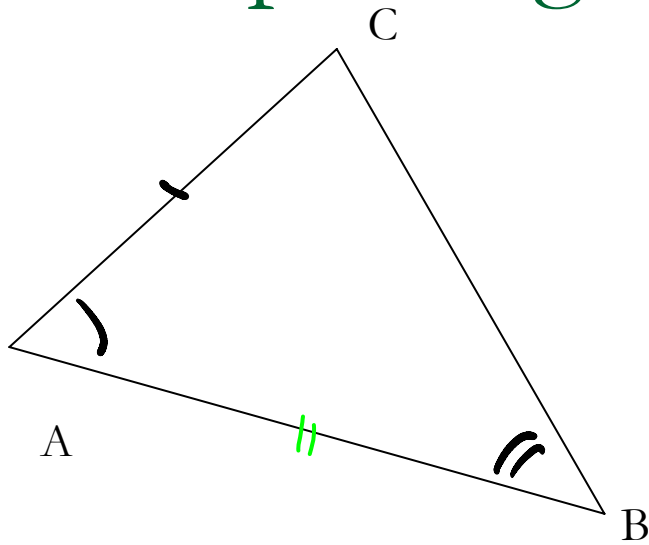

Class 29 – noon class

Medians, bisectors, ...

While proving SAA



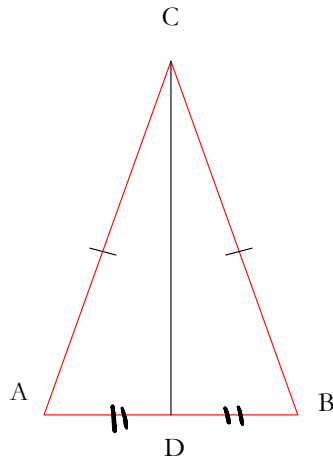
How would instead of using vertical angles use:

Exterior angle theorem: In a triangle exterior angle is greater than either remote interior angle.
to show that the above diagram is impossible, that is that the assumption $AB < DE$ leads to contradiction?

Angle $\angle FGD$ is an exterior angle to the triangle $\triangle EFG$, and is congruent to a remote interior angle, which contradicts the Exterior Angle Theorem.

What else can we conclude?

Let $\triangle ABC$ be a triangle with $AC \cong BC$. Let D be a midpoint of AB . In triangles $\triangle ACD$ and $\triangle BCD$, $AC \cong BC$ by hypothesis. $AD \cong BD$ by definition of a midpoint. Therefore, triangles $\triangle ACD$ and $\triangle BCD$ are congruent by SSS. Hence, $\angle A \cong \angle B$.



Conclusions:

- $\angle A \cong \angle B$
- $\angle ACD \cong \angle BCD$
- CD is angle bisector of $\angle ACB$
- $\angle ADC$ is a right angle
(CD is perpendicular to AB)

New definitions

A ray \overrightarrow{AD} is an *angle bisector* of angle $\sphericalangle BAC$ if it is between rays \overrightarrow{AB} and \overrightarrow{AC} and $\sphericalangle BAD \cong \sphericalangle DAC$.

A line l is a perpendicular bisector of AB if l is incident with midpoint of AB and is perpendicular to line \overleftrightarrow{AB} .

A segment connecting a vertex of a triangle to the midpoint of the opposite side is called a median.

A segment CD is an *altitude* of a triangle $\triangle ABC$ if \overleftrightarrow{CD} is perpendicular to \overleftrightarrow{AB} and D lies on \overleftrightarrow{AB} .

List all the theorems we just proved

1. Every angle has a bisector.
2. Every segment has a perpendicular bisector.
3. In an isosceles triangle median (of a base???) is a perpendicular bisector (which median)(could be more explicit – use symbols)
4. If an altitude is a median then the triangle is isosceles.

HOMEWORK: For Monday, 11/27, prove the first theorem and restate 3. and 4. so that they are precise and unambiguous. First two people to enter the classroom, except for me 😊, are to write their versions on the board.

Note card task—you can still do this if you did not

- Yeepee side: List three things that you learned in this class so far that you think will be most valuable to you in your future life as _____ .

 - So saaad side: List three things that you think will be important to you in your future life as _____ that you wanted to see in this class, but you haven't seen it yet.
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