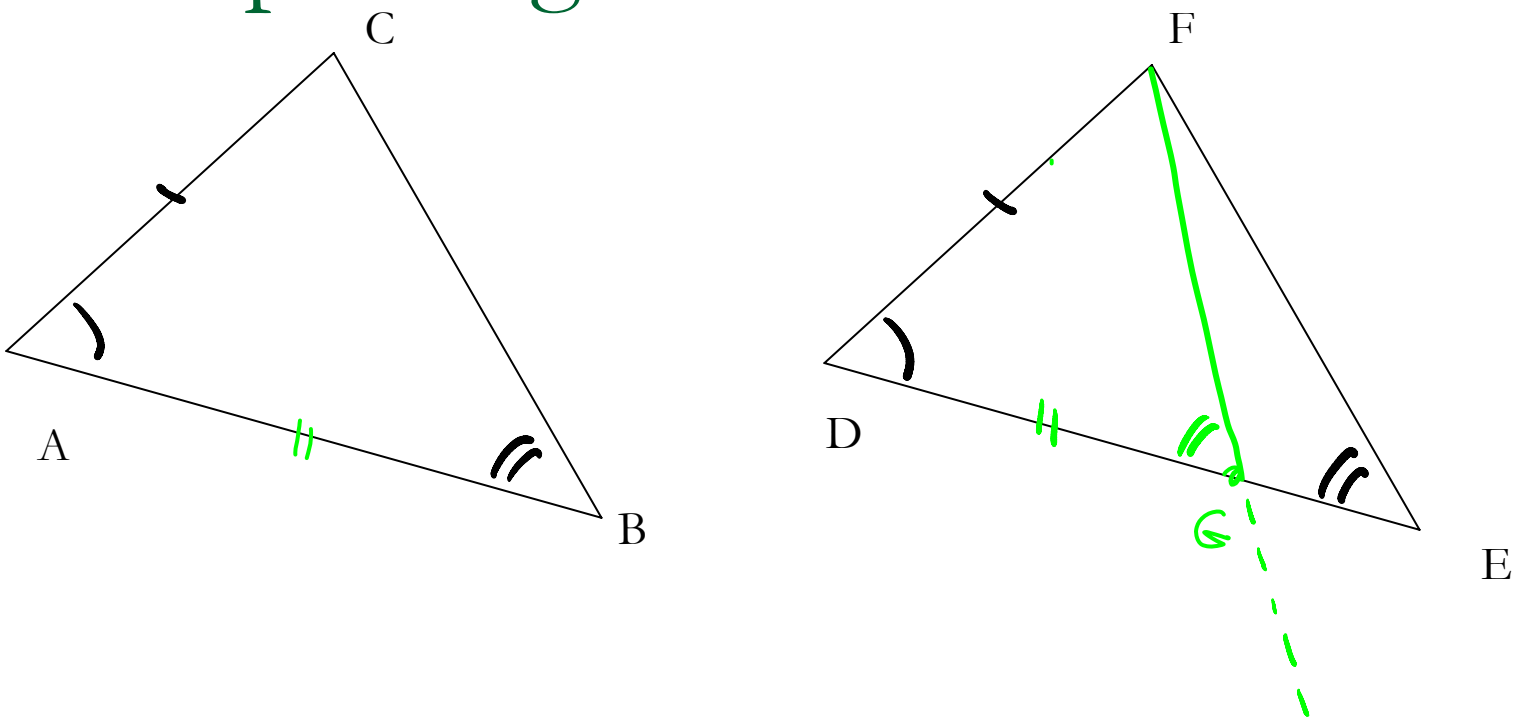
Class 29 – 1pm class

Medians, bisectors, …

While proving SAA



How would instead of using vertical angles use:

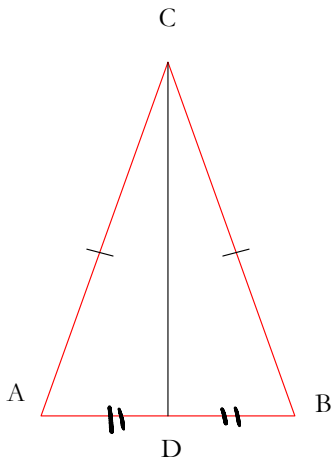
Exterior angle theorem: In a triangle exterior angle is greater than either remote interior angle.

to show that the above diagram is impossible, that is that the assumption AB<DE leads to contradiction?

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

What else can we conclude?

Let ΔABC be a triangle with AC ≅ BC. Let D be a midpoint of AB. In triangles ΔACD and ΔBCD, AC ≅ BC by hypothesis. AD ≅ BD by definition of a midpoint. Therefore, triangles ΔACD and ΔBCD are congruent by SSS. Hence, ◁ A ≅ ◁ B.



Conclusions:

- ◁A ≅ ◁B
- ◁ACD ≅ ◁BCD
- $\overrightarrow{CD}$ is angle bisector of ◁ACB
- ◁ADC > ◁BCD
- ◁ADC is a right angle

New definitions

A ray AD is an *angle bisector* of angle ◁BAC if it is between rays AB and AC and ◁BAD ≅ ◁DAC.

A line *l* is a perpendicular bisector of AB if *l* is incident with midpoint of AB and is perpendicular to line *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 ΔABC if CD is perpendicular to AB and D lies on AB.

List all the theorems we just proved

1. Given a triangle ΔABC in which a median is an angle bisector, then ΔABC is isosceles.
2. In an isosceles triangle ΔABC with $AC \cong BC$ and D a midpoint of AB than CD is an altitude.
3. In an equilateral triangle all altitudes are perpendicular bisectors.
4. If in a triangle an altitude is a median then the triangle is isosceles.
5. Every angle has a bisector.

HOMEWORK: For Monday, 11/27, prove the fifth statement (which did not come up in class, so I had to add it) and restate the others so that they are precise and unambiguous and grammatically correct. First two people to enter the classroom, except for me ☺, are to write their versions on the board.

Note card task – if you haven't done you still may

- 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.