



## Mathematics for Every Teacher with Jake Tawney

### Lecture 3: Triangle Angle Sum Theorem

#### Outline:

Triangle Angle Sum Theorem (The first proof one ought to know)

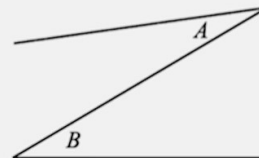
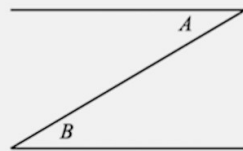
- The angles in a triangle adding to  $180^\circ$  is an interesting fact, but Euclid's words are:
  - **Triangle Angle Sum Theorem:** In any triangle, the three angles can be rearranged to form a straight line.
  - Students can cut apart the triangle and rearrange the angles to form a straight line.

#### Proof

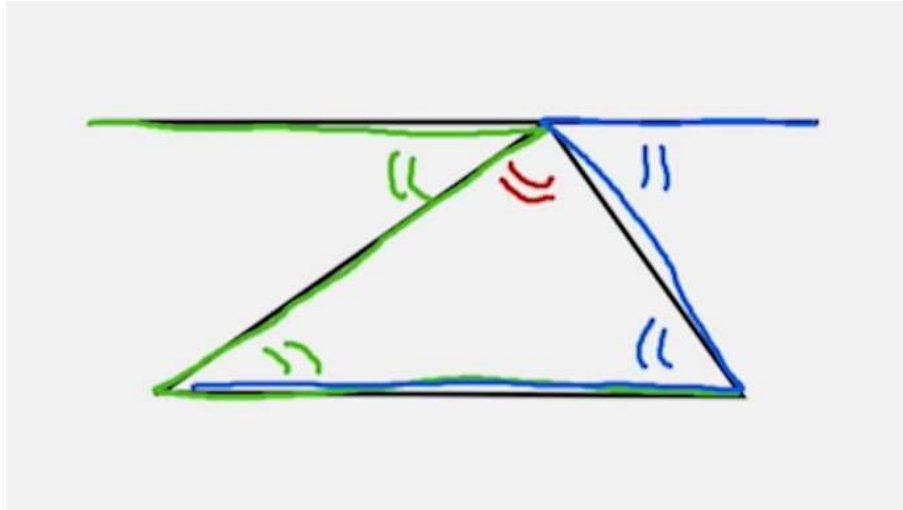
- We have to find a way to generalize. We want to be sure that any claim we make is true of any triangle.
- We can work with an ideal triangle, and we can do so for an entire infinite collection of these ideals.
- The mathematical process is fundamentally creative.
- The Z-Lemma: Whenever we see lines that form a Z, with the top and bottom being parallel, the angles formed are identical.

#### *The Z-Lemma.*

Whenever we see lines that form a Z, with the top and bottom being parallel, the angles formed are identical.



- Using the Z-Lemma shows how the angles can be rearranged to form a straight line.



- No argument was spoiled by the fact that this is a particular triangle.