Using Parallel Lines in Proofs

Recall:

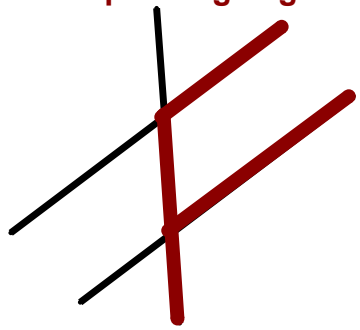
If two parallel (||) lines are cut by a transversal,

1) corresponding angles are in the same relative position. (They make an *F* shape.)

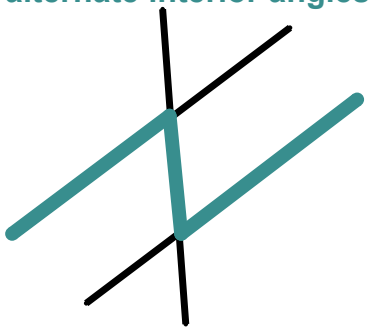
2) alternate interior angles are on opposite sides of the transversal, in between the two parallel lines. (They make a *Z* shape.)

3) alternate exterior angles are on opposite sides of the transversal, on the outsides of the parallel lines. (They make two *V* shapes.)

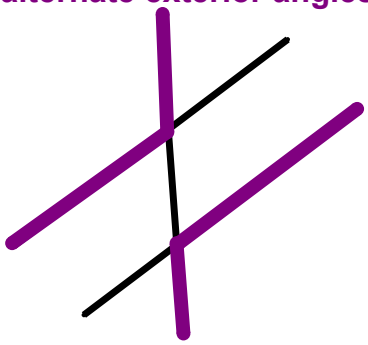
corresponding angles



alternate interior angles



alternate exterior angles

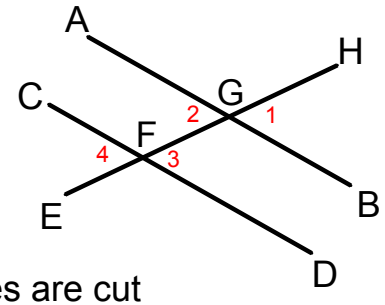


In proofs, if we know that two lines are parallel, there are 3 conclusions that we can draw:

1) corresponding angles are congruent.

2) alternate interior angles are congruent.

3) alternate exterior angles are congruent.



So, if we are Given: AB || CD, we can say

Statement	Reason
1) <1 ≅ <3	1) If two parallel lines are cut by a transversal, then corresponding <'s are ≅
2) <2 ≅ <3	2) If two parallel lines are cut by a transversal, then alternate interior <'s are ≅
3) <1 ≅ <4	3) If two parallel lines are cut by a transversal, then alternate exterior <'s are ≅

** Just make sure you use the right name for the pair of angles!!**

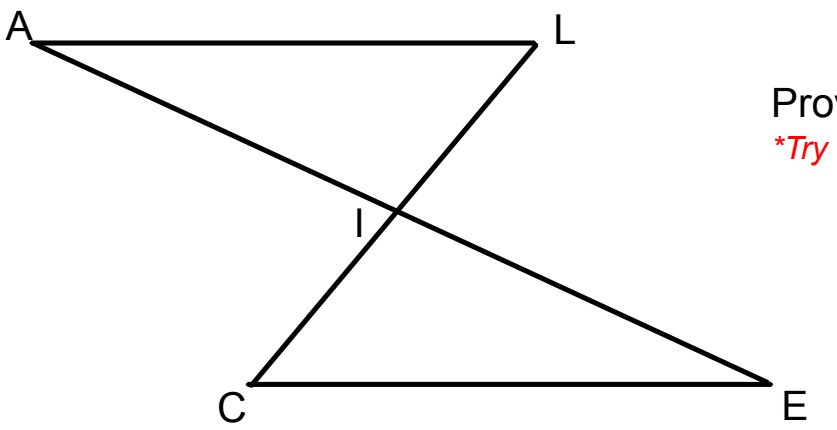
If we know that certain pairs of angles are congruent, we can also prove that two lines are parallel.

Depending on the information we are Given, we can use one of the following Reasons for why two lines are parallel:

- If two lines are cut by a transversal such that a pair of corresponding angles (<'s) are congruent (≅), then the lines are parallel (||).
- If 2 lines are cut by a transversal such that a pair of alternate interior <'s are ≅, then the lines are ||.
- If 2 lines are cut by a transversal such that a pair of alternate exterior <'s are ≅, then the lines are ||.
- If 2 lines are perpendicular (⊥) to the same line, then they are ||.
- If 2 lines are || to the same line, then they are ||.

You will need to pay attention to the picture to know which reason to use!

Example:



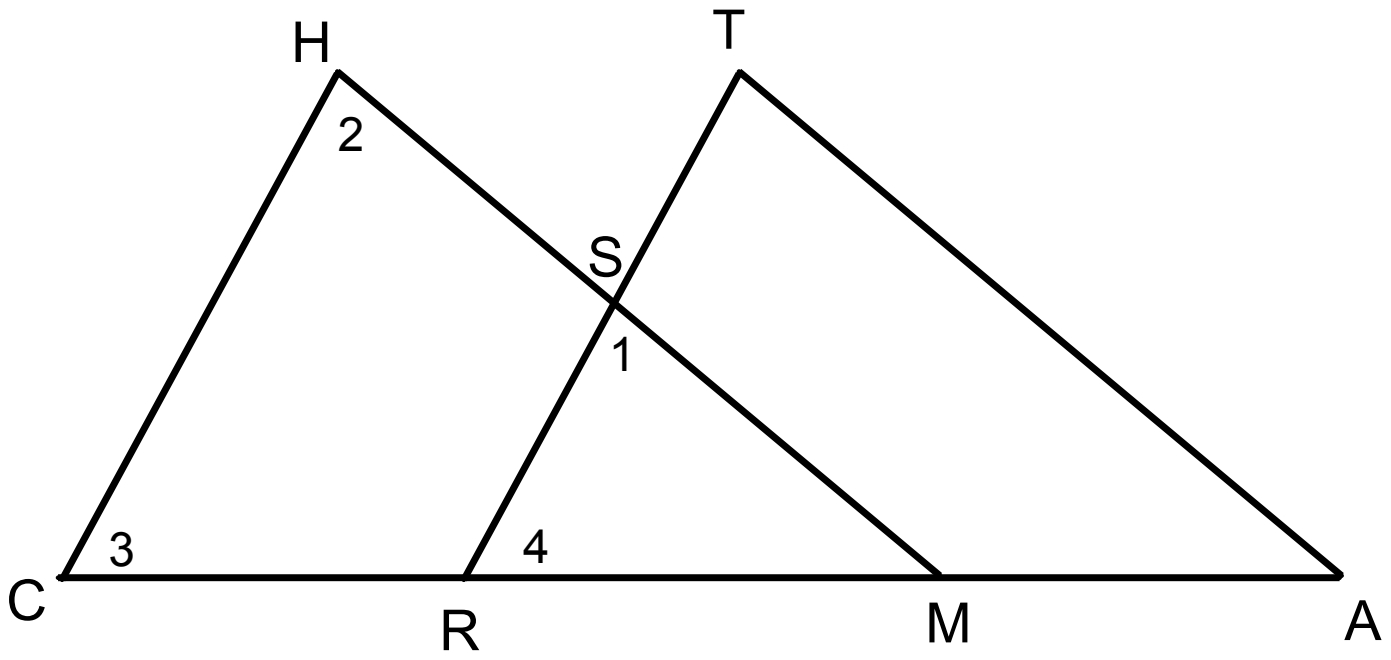
Given: AL || CE
AL ≅ CE

Prove: ΔALI ≅ ΔECI

Try it without the vertical <'s

Statement	Reason

Homework:



Given: $\angle 1 \cong \angle 2$

$CH \cong RT$

$CM \cong RA$

Hint: You will need to prove that $CH \parallel RT$.

Prove: $\Delta CHM \cong \Delta RTA$