§5.6 Indirect Proof & Inequalities in Two Triangles

- Indirect Proof

  ○ Up until now, all our proofs have been direct.

  ○ With Indirect Proof things work a little differently.

    • Identify _____.

    • Begin by assuming it is _____; assume _____.

    • Obtain statements that logically follow from your assumption.

   • If you end at a _____, then the original statement must be true.

Example 1. Given a triangle. Prove that it has, at most, one obtuse angle.

Statement we are trying to prove:
A triangle has no more than one obtuse angle.
Assume the opposite is true:

Statements	Reasons

Example 2. Prove that there is at most one line through a point that is perpendicular to a given line.

Statement we are trying to prove:

Given a line and a point not on that line, there is only one line through that point that is perpendicular to the given line.
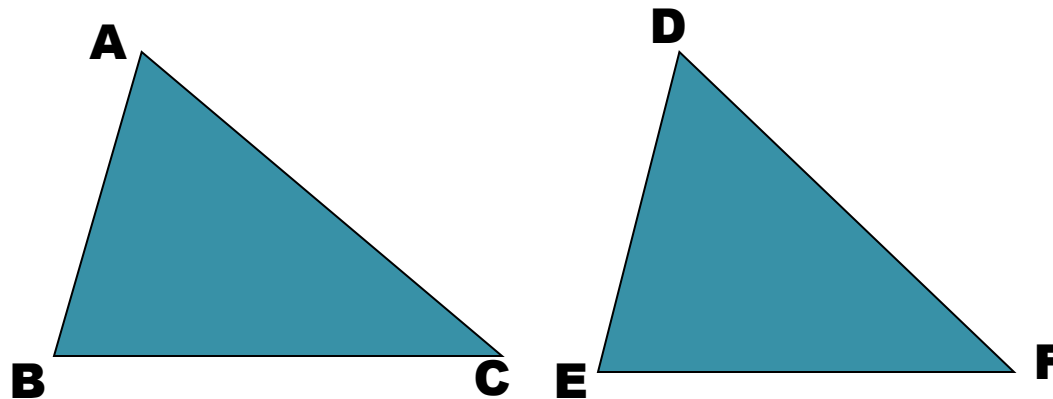
Assume the opposite is true:

| Statements	Reasons
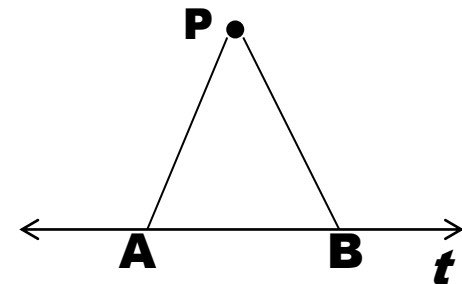
Theorems

- Hinge Theorem
  - If _____ of one triangle are congruent to _____ of another triangle,
  - and the _____ of the first triangle is _____ than the _____ of the second triangle,
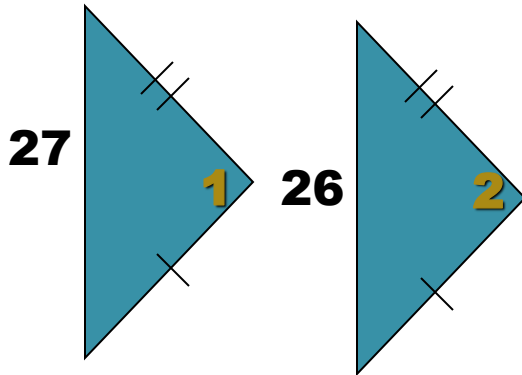 - then, the _____ of the first triangle is _____ than the _____ of the second triangle.
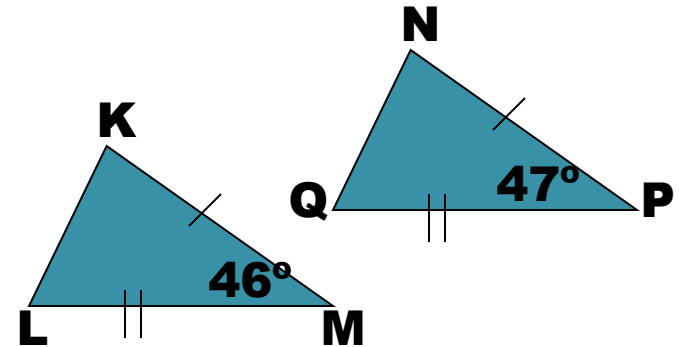
Theorems

- Converse of the Hinge Theorem
  - If _____ of one triangle are _____ to _____ of another triangle,
  - and, the _____ of the first triangle is _____ than the _____ of the second triangle
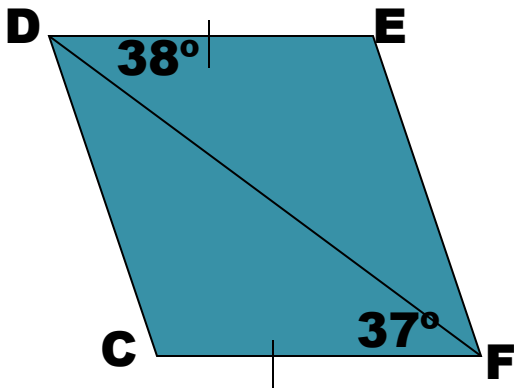 - then, the _____ of the first triangle is _____ than the _____ of the second triangle.
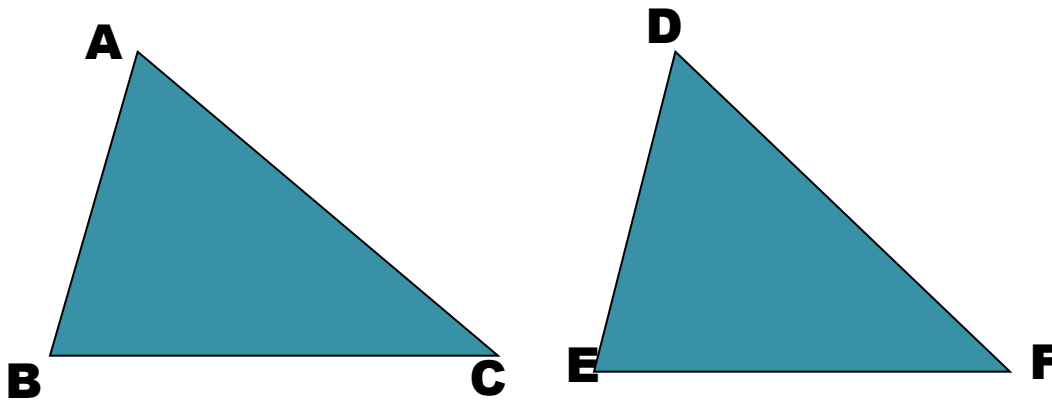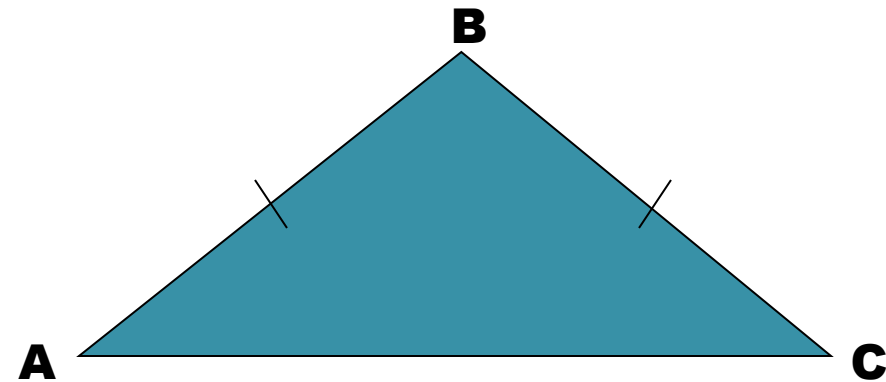
Examples. Complete each statement with <, >, or =.

$m\angle 1$ _____ $m\angle 2$

KL _____ NQ

DC _____ FE

$m\angle A$ _____ $m\angle C$

Given: ΔABC
Prove: $BC > AC$

What would you have to prove using an indirect proof?