

Inequalities and Indirect Proof

Objectives

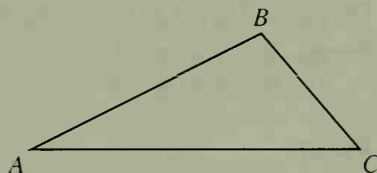
1. Apply properties of inequality to positive numbers, lengths of segments, and measures of angles.
2. State the contrapositive and inverse of an if-then statement.
3. Understand the relationship between logically equivalent statements.
4. Draw correct conclusions from given statements.
5. Write indirect proofs in paragraph form.

6-1 Inequalities

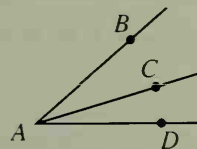
Our geometry up until now has emphasized congruent segments and angles, and the triangles and polygons they form. To deal with segments whose lengths are equal and angles whose measures are equal, you have used properties of equality taken from algebra. They are stated on page 37. In this chapter you will work with segments having unequal lengths and angles having unequal measures. You will use properties of inequality taken from algebra.

Example 1 Complete each conclusion by inserting one of the symbols $<$, $=$, or $>$.

- a. Given: $AC > AB$; $AB > BC$
Conclusion: AC ? BC



- b. Given: $m\angle BAC + m\angle CAD = m\angle BAD$
Conclusion: $m\angle BAD$? $m\angle BAC$;
 $m\angle BAD$? $m\angle CAD$



Solution a. $AC > BC$ (Equivalently, $BC < AC$.)

- b. $m\angle BAD > m\angle BAC$ (Equivalently, $m\angle BAC < m\angle BAD$.)
 $m\angle BAD > m\angle CAD$ (Equivalently, $m\angle CAD < m\angle BAD$.)

The properties of inequality you will use most often in geometry are stated on the following page. When you use any one of them in a proof, you can write as your reason *A Prop. of Ineq.* Can you see which properties were used in Example 1?