Section Overview

Professional Development

Indirect Proof

Lesson 5-5

Why? Indirect proof uses indirect reasoning and is often used to prove statements that cannot be proved directly.

Indirect Proof of a Conjecture

1. Conjecture: $p \rightarrow q$
2. Assume: $\sim q$
3. Show: $\sim q \rightarrow \sim p$
4. Conclude: $p \rightarrow q$ (logically equivalent to $\sim q \rightarrow \sim p$)

Indirect proof is also known as **proof by contradiction.**

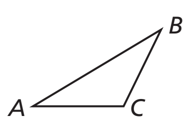
Inequalities in One and Two Triangles

Lessons 5-5, 5-6

Why? Inequalities in one and two triangles can be used to find a reasonable range of values for an unknown distance.

Inequalities in One Triangle

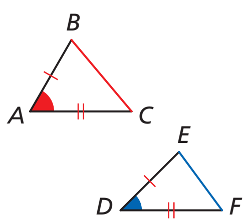
Triangle Inequality Theorem



$AB + BC > AC$
$BC + AC > AB$
$AC + AB > BC$

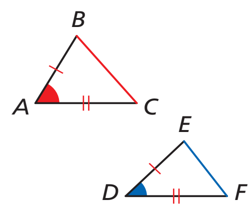
Inequalities in Two Triangles

Hinge Theorem



$m\angle A > m\angle D \rightarrow BC > EF$

Converse to the Hinge Theorem

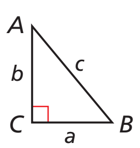


$BC > EF \rightarrow m\angle A > m\angle D$

Pythagorean Theorem and Special Right Triangles

Lessons 5-7, 5-8

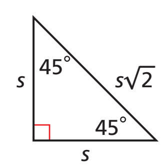
Why? The Pythagorean Theorem and special right triangles have many applications in real-world situations.



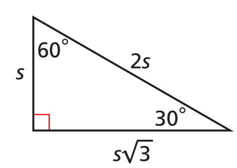
The Pythagorean Theorem

If $c^2 = a^2 + b^2$,
then $\triangle ABC$ is a **right triangle**

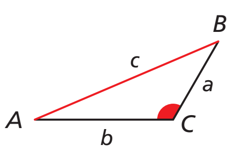
45°-45°-90° Triangle Theorem



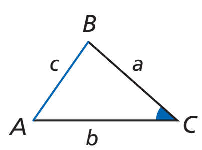
30°-60°-90° Triangle Theorem



Pythagorean Inequalities



If $c^2 > a^2 + b^2$
then $\triangle ABC$ is an
obtuse triangle.



If $c^2 < a^2 + b^2$
then $\triangle ABC$ is an
acute triangle.

Pythagorean triple: a set of three nonzero whole numbers a, b, c such that $a^2 + b^2 = c^2$

Examples: 3, 4, 5; 5, 12, 13; 8, 15, 17; and 7, 24, 25