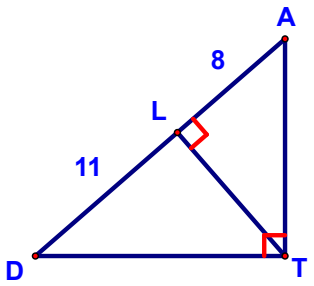
Lesson 9-4 - Geometry's Most Elegant Theorem

Here's your warmup!



Find AT^2, DT^2, and AD^2

Compare $AT^2 + DT^2$ and AD^2

Today, we're covering the most famous of geometric theorems:

Theorem 68:

The square of the measure of the hypotenuse of a right triangle is equal to the sum of the squares of the measures of the legs (The Pythagorean Theorem).

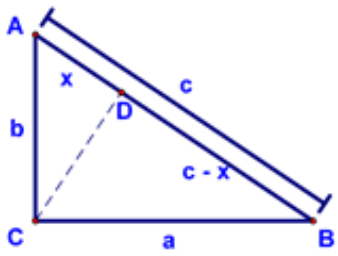
or

$$a^2 + b^2 = c^2$$

With the Altitude-on-Hypotenuse Theorem, the proof is pretty straight forward:

Given: ΔACB is a right Δ with right $\angle ACB$

Prove: $a^2 + b^2 = c^2$



Statements	Reasons
1. ΔACB is a right Δ with right $\angle ACB$	1. Given
2. Draw $\overline{CD} \perp \overline{AB}$	2. From a point not on a line, only one $\perp$ can be drawn to the line
3. $\overline{CD}$ is an altitude	3. Defn of altitude
4. $a^2 = (c - x)c$	4. Altitude-on-Hypotenuse Theorem
5. $a^2 = c^2 - cx$	5. Distributive Property
6. $b^2 = cx$	6. Same as 4
7. $a^2 + b^2 = c^2 - cx + cx$	7. Addition Property of Equality
8. $a^2 + b^2 = c^2$	8. Simplification using addition

The converse is also true, and is useful in terms of classifying triangles:

Theorem 69:

If the square of the measure of one side of a triangle equals the sum of the squares of the measure of the other two sides, then the angle opposite the longest side is a right angle.

Try these two example problems…one uses the Pythagorean Theorem and one uses the converse!

Find the perimeter of a rhombus with diagonals of 8 and 12.

Classify the triangle shown as right, obtuse, or acute.