11.4 Apply the Pythagorean Theorem and Its Converse

TEKS a.6, A.10.A; 8.9.A

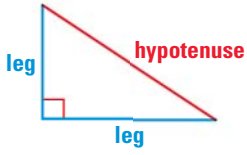
Before You solved radical equations.

Now You will use the Pythagorean theorem and its converse.

Why? So you can examine angles in architecture, as in Ex. 35.

Key Vocabulary
- **hypotenuse**
- **legs of a right triangle**
- **Pythagorean theorem**

The **hypotenuse** of a right triangle is the side opposite the right angle. It is the longest side of a right triangle. The **legs** are the two sides that form the right angle.



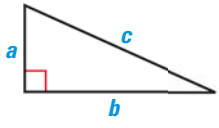
A *theorem* is a statement that can be proved true. The **Pythagorean theorem** states the relationship among the lengths of the sides of a right triangle.

KEY CONCEPT *For Your Notebook*

The Pythagorean Theorem

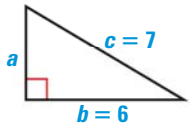
Words If a triangle is a right triangle, then the sum of the squares of the lengths of the legs equals the square of the length of the hypotenuse.

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



EXAMPLE 1 Use the Pythagorean theorem

Find the unknown length for the triangle shown.



Solution

$a^2 + b^2 = c^2$	Pythagorean theorem
$a^2 + 6^2 = 7^2$	Substitute 6 for b and 7 for c.
$a^2 + 36 = 49$	Simplify.
$a^2 = 13$	Subtract 36 from each side.
$a = \sqrt{13}$	Take positive square root of each side.

▶ The side length a is $\sqrt{13}$.

Animated Algebra at classzone.com

REVIEW QUADRATIC EQUATIONS
For help with solving quadratic equations by using square roots, see p. 652.

GUIDED PRACTICE for Example 1

1. The lengths of the legs of a right triangle are $a = 5$ and $b = 12$. Find c.