

## Study Guide

**Integration: Geometry**  
**The Pythagorean Theorem**

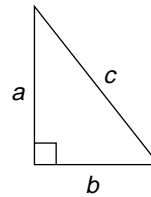
The side opposite the right angle in a right triangle is called the **hypotenuse**. This side is always the longest side of a right triangle. The other two sides are called the **legs** of the triangle. To find the length of any side of a right triangle, given the lengths of the other two sides, you can use the *Pythagorean theorem*.

**The Pythagorean Theorem**

In a right triangle, if  $a$  and  $b$  are the measures of the legs and  $c$  is the measure of the hypotenuse, then  $c^2 = a^2 + b^2$ .

**Example:** Find the length of a leg of a right triangle if  $a = 8$  and  $c = 10$ .

$$\begin{aligned}c^2 &= a^2 + b^2 \\10^2 &= 8^2 + b^2 \\100 &= 64 + b^2 \\b^2 &= 36 \\b &= 6\end{aligned}$$



The length of the leg is 6 units.

**If  $c$  is the measure of the hypotenuse of a right triangle, find each missing measure. Round answers to the nearest hundredth.**

1.  $a = 10, b = 12, c = \underline{\quad?}$       2.  $a = 9, b = 12, c = \underline{\quad?}$       3.  $a = 12, b = \underline{\quad?}, c = 16$

4.  $a = \underline{\quad?}, b = 6, c = 8$       5.  $a = \sqrt{5}, b = \sqrt{10}, c = \underline{\quad?}$       6.  $a = \underline{\quad?}, b = \sqrt{8}, c = \sqrt{18}$

**For each problem, make a drawing. Then use an equation to solve the problem. Round answers to the nearest hundredth.**

- How long is a pipeline that runs diagonally across a square field 6 kilometers on a side?
- A support wire on a television tower is 90 meters long and meets the ground 35 meters from the center of the base of the tower. What is the height of the tower?