

Study Guide

Integration: Geometry

The Pythagorean Theorem

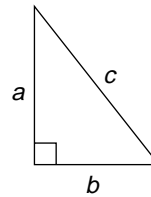
The side opposite the right angle in a right triangle is called the **hypotenuse**. This side is always the longest side of a right triangle. The other two sides are called the **legs** of the triangle. To find the length of any side of a right triangle, given the lengths of the other two sides, you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