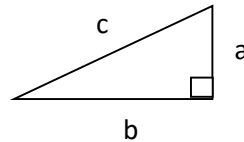


Pythagorean Theorem

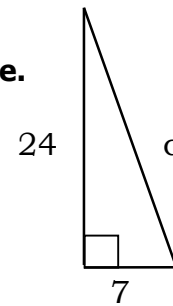
Pythagoras, a highly regarded Greek scholar and mathematician, lived in the 6th century B.C. and is credited with authoring one of the most famous math theorems: The *Pythagorean Theorem*. The theorem states: *In a right triangle, the square of the measure of the hypotenuse equals the sum of the squares of the measures of the two legs.* This theorem is normally represented by the following equation: $a^2 + b^2 = c^2$, where **c always represents the hypotenuse**. The equation uses a and b to represent the other two sides, called the legs (it does not matter which is called a or b).

With this theorem, if you are given the measures of two sides of a right triangle, you can easily find the measure of the third side.



Example: In the triangle at right, find the value of c, the hypotenuse.

To solve, use: $a^2 + b^2 = c^2$ where 'c' represents the hypotenuse. The letters a and b represent the legs, which in this example measure 7 and 24 units.



Write the Pythagorean Theorem and then use substitution for any given information.

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

The given information is plugged in.

$$(24)^2 + (7)^2 = c^2$$

Square both values.

$$576 + 49 = c^2$$

Add.

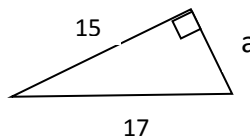
$$625 = c^2$$

Take the square root of both sides to solve for c.

$$\sqrt{625} = c = 25$$

Sometimes you will be given a value for the hypotenuse, c, and asked to solve for one of the legs.

Example: Find the value of a.



If you have to solve for one of the legs, use $a^2 + b^2 = c^2$, but solve for a instead of c.

$$a^2 + 15^2 = 17^2$$

$$a^2 + 225 = 289$$

The rest of the work is left to you...