Secondary 2
lesson 11.1

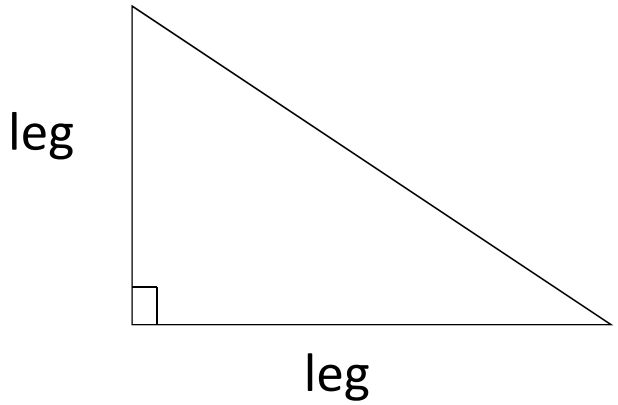
Pythagorean Theorem

Objectives:

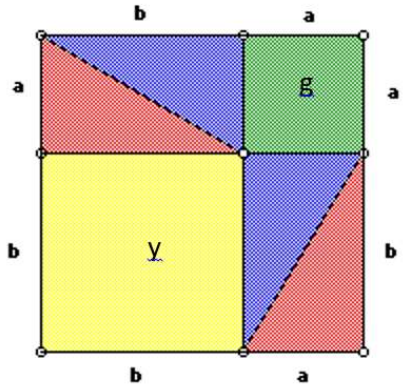
Use the Pythagorean Theorem to find the lengths of sides of a right triangle.
Use the converse of Pythagorean to show a triangle is a right triangle
Understand Pythagorean triples

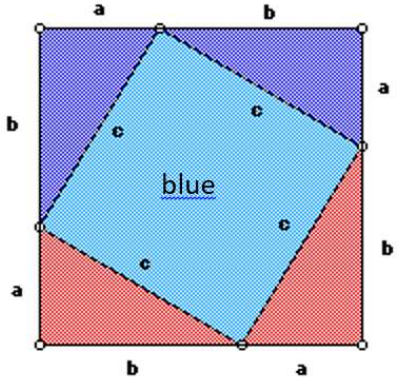
The Pythagorean Theorem

In a RIGHT triangle, the sum of the squares of the lengths of the legs is equal to the square of the length of the hypotenuse



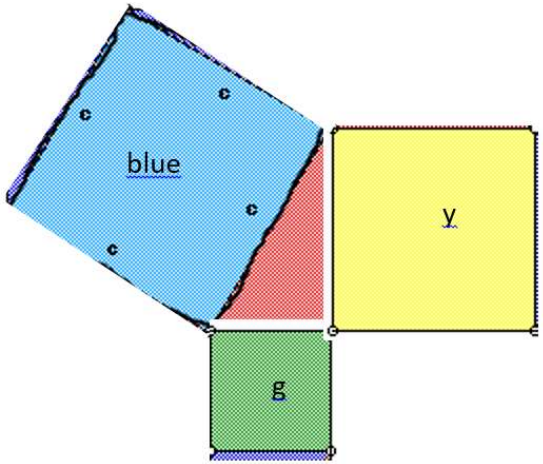
Showing Pythagorean Theorem





These squares have the same area. Cancel out the matching purple and red and we see the green plus the yellow must equal the blue.

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

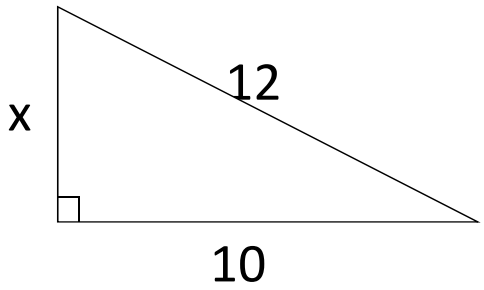


This is the Pythagorean Theorem.

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

Example 1: A right triangle has legs of length 16 and 30. Find the length of the hypotenuse.

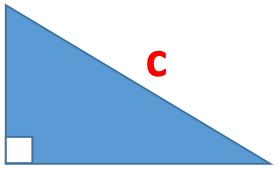
Example 2: Find the value of x.



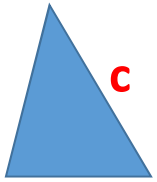
Sometimes you can solve for the side of a right triangle very quickly, using PYTHAGOREAN TRIPLES. This is a set of three numbers that always satisfy the Pythagorean Theorem. Multiples (each number of the triple is multiplied by the same number) of Pythagorean triples also work.

Common Pythagorean Triples:

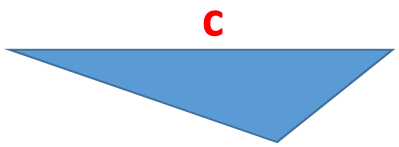
XL tip: XL will ask if a triangle is a right triangle, an acute triangle, or an obtuse triangle. To check this we use the Converse of Pythagorean. In other words, we work backwards and see which of the following applys.



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



Acute Triangles $c^2 < a^2 + b^2$



Obtuse Triangles $c^2 > a^2 + b^2$

Remember 'c' is ALWAYS the longest side!

Right, Obtuse, Acute, or *No Such Triangle Exists?

1. $5, 8, 9$

2. $12, 16, 20$

3. $3, 4, 9$

(Using Converse of Pythagorean Theorem)

Landing our Big Ideas:

- ***The Pythagorean Theorem***: Know the formula and when/how to use it.

- ***Pythagorean Triples***: Know the most common triples

Assignment:

Handout 11.1 and XL11.1