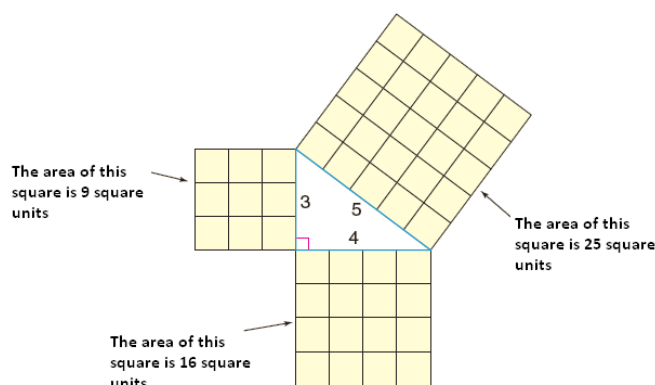


The Pythagorean Theorem and Its Converse

The sides of the right triangle below have lengths of 3, 4, and 5 units.

The relationship among these lengths forms the basis for one of the most famous theorems in mathematics.



The two sides that form the right angle are called the **legs**. In the triangle above, the lengths of the legs are 3 units and 4 units. The side opposite the right angle is called the **hypotenuse**. The hypotenuse of this triangle has a length of 5 units.

The squares drawn along each side of the triangle illustrate the Pythagorean Theorem geometrically. Study the areas of the squares. Do you notice a relationship between them? The area of the larger square is equal to the total area of the two smaller squares.

$$25 = 16 + 9$$

$$5^2 = 4^2 + 3^2$$

This relationship is true for *any* right triangle and is called the **Pythagorean Theorem**.

Pythagorean Theorem: In a right triangle, the square of the length of the hypotenuse, c , is equal to the sum of the squares of the lengths of the legs, a and b .



Converse of the Pythagorean Theorem: If c is the measure of the longest side of a triangle and $c^2 = a^2 + b^2$, then the triangle is a right triangle.