

**Topic: Pythagorean Theorem**

Name: \_\_\_\_\_

Class: Math 9

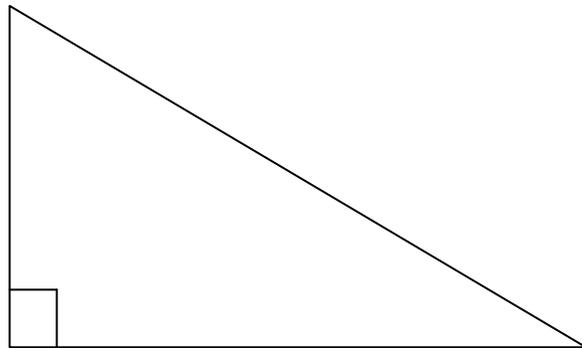
Date: \_\_\_\_\_

**Questions/Main Ideas:**

**Notes:**

Right Triangles:

1. A right triangle is a triangle that contains a  $90^\circ$  angle.
2. The **hypotenuse** of a right triangle is the longest side of a right triangle and is always found opposite the right angle.
3. The two remaining sides of the right triangle are called the **legs** of the triangle.



Note: The arrow always points to the hypotenuse.

The Pythagorean Theorem shows a relationship between all sides of a right angle triangle that states if we square the length of the two legs and add them the result is the same as the square of the hypotenuse.

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

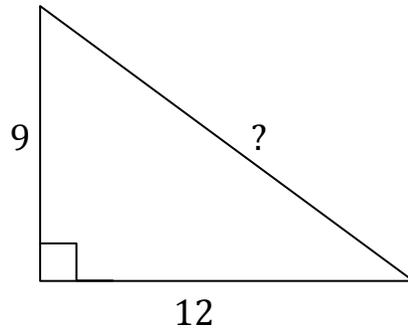
When solving for c:  $c^2 = a^2 + b^2$

When solving for a:  $a^2 = c^2 - b^2$

When solving for b:  $b^2 = c^2 - a^2$

The Pythagorean Theorem can help us find the length of one side any right triangle is we are given the length of the other two sides.

Example #1: Find the length of the hypotenuse.



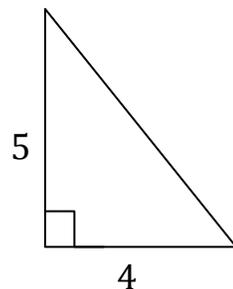
Step 1: Label your sides.

Step 2: Organize your information.

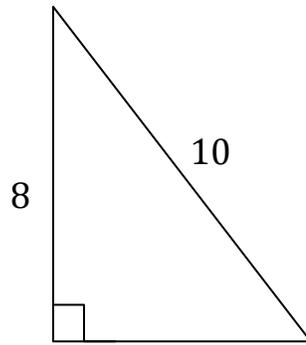
Step 3: Substitute the variables with their given values.

Step 4: Solve for the missing side.

Example #2: Find the length of the hypotenuse.



Example #3: Find the missing side of the triangle.



Example #4: Determine how far up a wall a 7m ladder reaches if its base is 2m from the base of the wall.

The Pythagorean Theorem can also be used to determine if a triangle is a right triangle or not when we know all three sides. If it is a right triangle then the three sides are referred to as a Pythagorean triple.

Pythagorean Triples are a set of whole number that satisfies the Pythagorean Theorem.

3, 4, 5 are a Pythagorean Triple because:

$$\begin{aligned} 3^2 + 4^2 &= 5^2 \\ 9 + 16 &= 25 \\ 25 &= 25 \end{aligned}$$

1. Are the following sets Pythagorean Triples?

a. 6, 13, 14

b. 18, 24, 30