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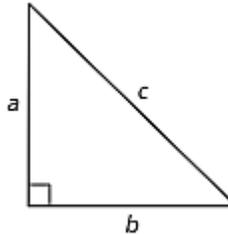
The Pythagorean Theorem Algebra (Grade 8)

One of the most important ideas in geometry is the **Pythagorean Theorem**. It was discovered by Pythagoras who died around 495 BC. The theorem gives us the relationship between the sides of a **right triangle**. A **right triangle** has **two legs** and a **longest side called the hypotenuse**. Below is what the theorem says:

Study Tip

A *Pythagorean triple* is a set of three positive integers a , b , and c , where $a^2 + b^2 = c^2$.

In the right triangle pictured a and b are the **legs** and c is the **hypotenuse**. If the equation $a^2 + b^2 = c^2$ is true for the side lengths of a triangle, then the triangle is a right triangle.



Common Error

When using the converse of the Pythagorean Theorem, always substitute the length of the longest side for c .

The theorem says that the sum of the squares of the legs equals the square of the hypotenuse.

Exercise #1: Use the *Pythagorean Theorem* and decide if the given sides of the triangle form a right triangle.

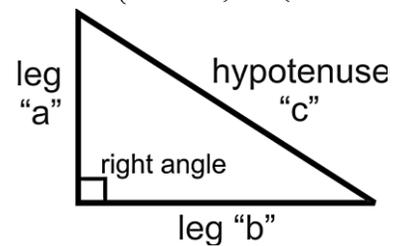
Sides	{3,4,5}	{1,2,3}	{5,12,13}	{18,24,30}	{2,4,6}	{7,24,25}
$a^2 + b^2 = c^2$						
Yes /No						

Pythagorean triples are sets of sides that make up a right triangle. Here is a list of some of them. Any triple that gets all of its values multiplied by the same number will also be a triple. For example $\{5,12,13\} \rightarrow \{20,48,52\}$

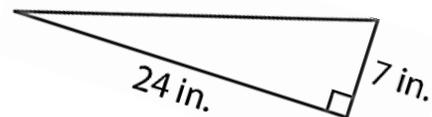
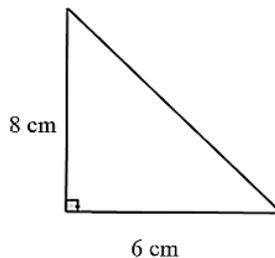
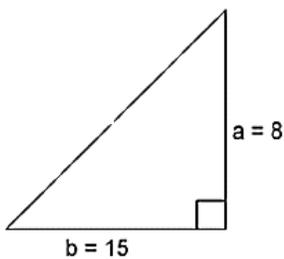
Pythagorean Theorem
 $c^2 = a^2 + b^2$

Common Pythagorean Triples

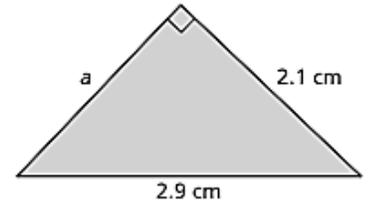
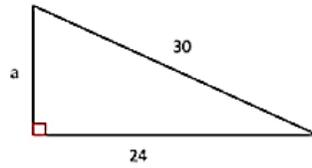
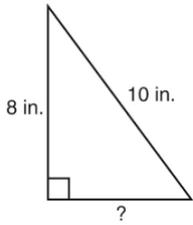
3, 4, 5	5, 12, 13	8, 15, 17
6, 8, 10	10, 24, 26	9, 40, 41
9, 12, 15	7, 24, 25	
12, 16, 20		



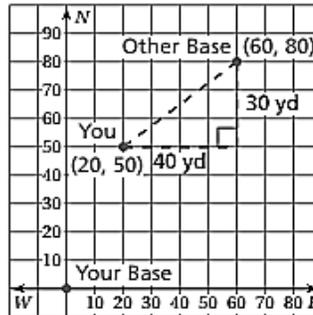
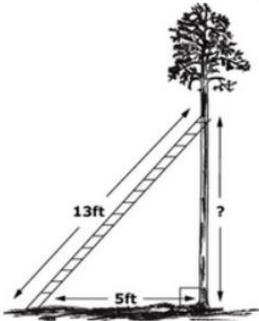
Exercise #2: Use the *Pythagorean Theorem* to find the missing hypotenuse of each triangle.



Exercise #4: Find the missing leg of each right triangle. Round your answer to the **nearest 10th** if necessary.



Exercise #5: Use the **Pythagorean Theorem** to find how high the ladder reaches up the tree.



You are playing capture the flag. You are 50 yards north and 20 yards east of your team's base. The other team's base is 80 yards north and 60 yards east of your base. How far are you from the other team's base?

Exercise #6: Often with the Pythagorean Theorem we can approximate using our calculators. Before we start use your calculator to find each of these square roots to the **nearest 100th**.

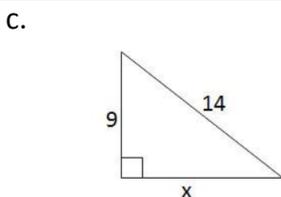
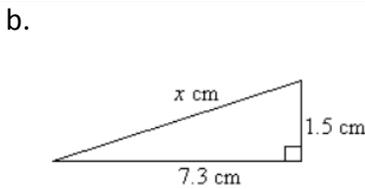
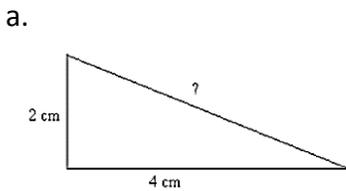
a. $\sqrt{10}$

b. $\sqrt{45}$

c. $\sqrt{200}$

d. $\sqrt{325}$

Exercise #7: Find the missing side of each triangle and round each answer to the **nearest 100th**.



Exercise #8: Find the **distance** between the two plotted points.

