

# Pythagorean Theorem

## Objectives:

- ...to find the measure of a missing side of a right triangle.
- ...to use the Pythagorean Theorem to find solutions to word problems.

## Assessment Anchor:



8.C.1.2 – Compute measures of sides of right triangles using the Pythagorean Theorem.

## Vocabulary alert!!

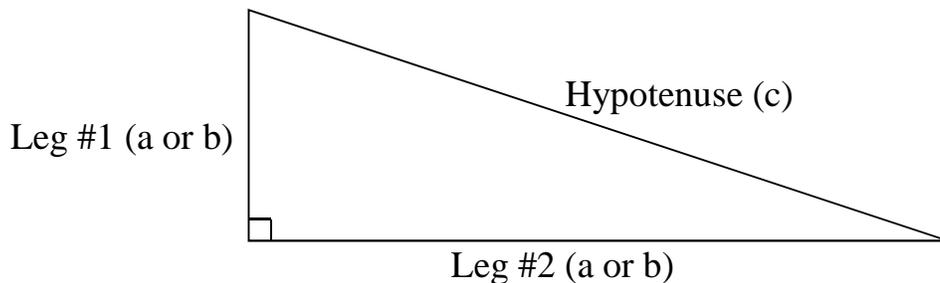
PYTHAGOREAN THEOREM – theorem that says in any right triangle, the sum of the squares of the legs is equal to the square of the hypotenuse

LEGS (of a right triangle) – the two shorter sides of a right  $\triangle$

HYPOTENUSE (of a right triangle) – the longest side of a right triangle...opposite of the right angle

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

\*\*where “a” and “b” are the legs, and “c” is the hypotenuse



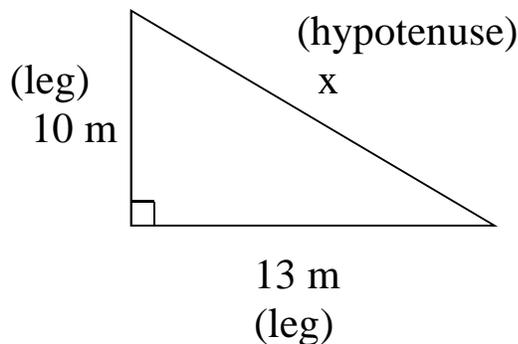
# Pythagorean Theorem

## NOTES and EXAMPLES

To solve an equation using the Pythagorean Theorem:

1. Draw a picture (if one isn't already provided for you)
2. Identify and label the legs and the hypotenuse
3. Substitute the known values into the Pythagorean Theorem
4. Square the two known values
5. IF a leg is unknown, isolate that variable part
6. Take a square root to find the value of the remaining variable  
(Round your answer when necessary.)

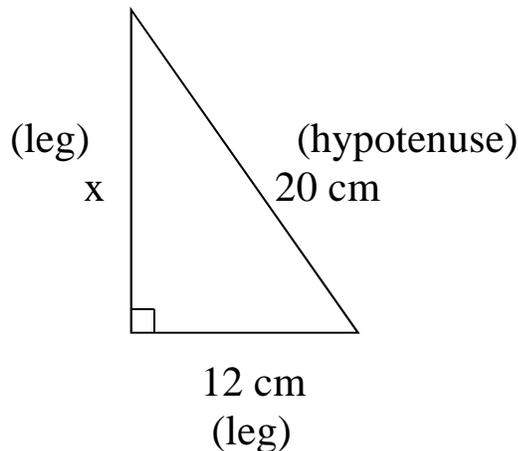
**Example #1)** Determine the measure of the missing side:



Write formula:  $a^2 + b^2 = c^2$   
Substitute:  $10^2 + 13^2 = c^2$   
Square it:  $100 + 169 = c^2$   
 $269 = c^2$   
Square root:  $16.4 \approx c$

**Missing side is approximately 16.4 m**

**Example #2)** Determine the measure of the missing side:

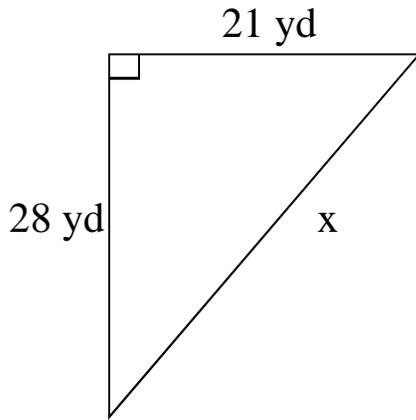


Write formula:  $a^2 + b^2 = c^2$   
Substitute:  $a^2 + 12^2 = 20^2$   
Square it:  $a^2 + 144 = 400$   
Isolate it:  $\frac{-144 - 144}{a^2} = 256$   
Square root:  $a = 16$

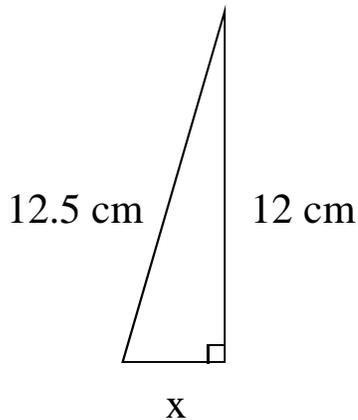
**Missing side is 16 cm**

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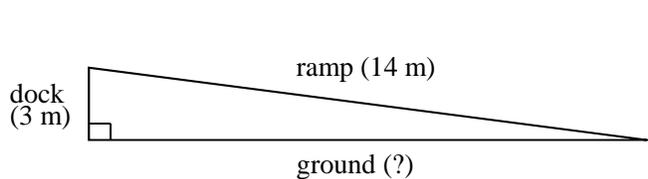
**Example #3)** Determine the measure of the missing side:



**Example #4)** Determine the measure of the missing side:



**Example #5)** If a 14-meter long ramp is put at a dock that is 3 meters high, how far is the bottom of the ramp from the dock? (HINT: draw a rough sketch!)



Write formula:	$a^2 + b^2 = c^2$
Substitute:	$a^2 + 3^2 = 14^2$
Square it:	$a^2 + 9 = 196$
Isolate it:	$\frac{-9}{a^2} = \frac{-9}{187}$
Square root:	$a \approx 13.7$

**The bottom of the ramp is approximately 13.7 meters from the dock.**

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**Example #6)** A ladder is leaned up against a wall. The bottom of the ladder is 5 feet from the wall. The top of the ladder reaches a spot on the wall that is 12 feet off the ground. How long is the ladder? (HINT: draw a rough sketch!)

**Example #7)** Erica drives 25 miles south, and then drives east. After a while, it is determined that she's 60 miles (diagonally) from where she started. How far east did she drive? (HINT: draw a rough sketch!)