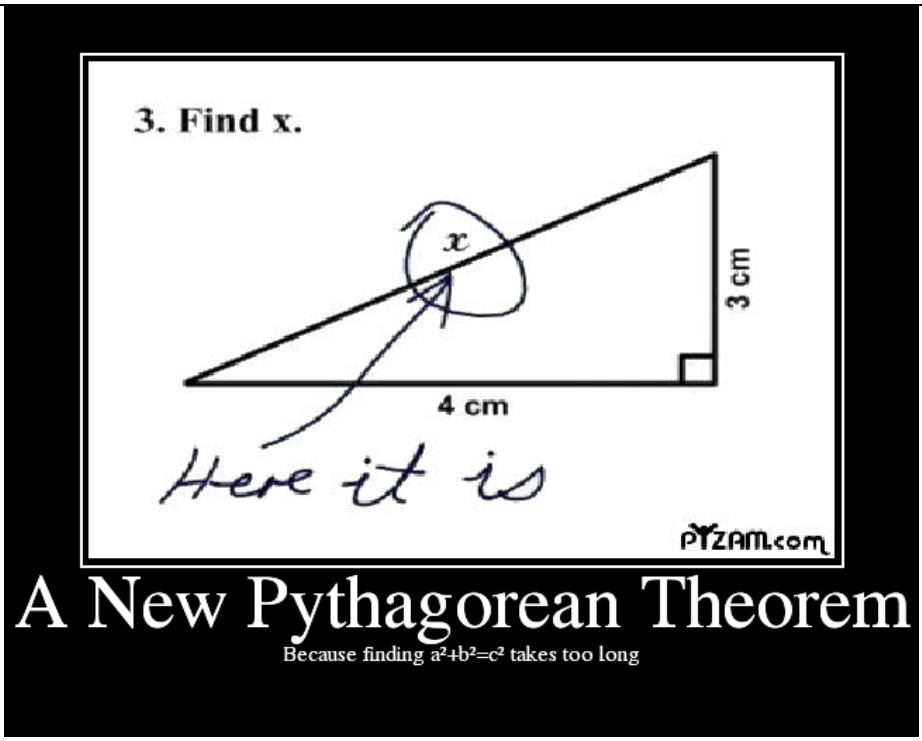
Notes Section R.1 – The Pythagorean Theorem

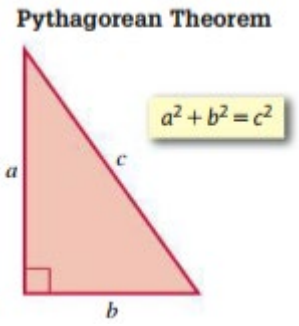


Lesson Objectives

1. Overview of The Pythagorean Theorem
2. Solve problems related to The Pythagorean Theorem

A. Overview of The Pythagorean Theorem

Do you recall how **The Pythagorean Theorem** goes?



But what does it mean? What are $a, b,$ and c?
What is needed for The Pythagorean Theorem to work?

This formula, $a^2 + b^2 = c^2$, makes little sense without some context.

The Pythagorean Theorem applies to _____**triangles** only, not all triangles.

Sides ***a*** and ***b*** are called _____, and they come together to form the right angle.
The legs *a* and *b* are arbitrary – either one could be the shorter side (or the same length).

Side ***c*** is called the _____, and it is always the _____
side, opposite the right angle.

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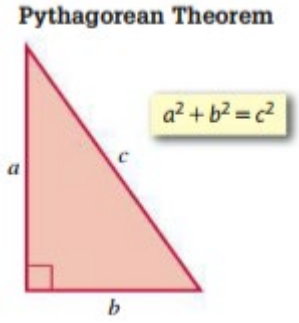
B. Solve Problems Related to The Pythagorean Theorem

- Hypotenuse is unknown

- **EXAMPLE:** The lengths of the legs of a right triangle are given. Find the hypotenuse.
  $a = 24$, $b = 45$ [R.1.27]



Using The Pythagorean Theorem, $a^2 + b^2 = c^2$ (easier to reverse it)

$c^2 = a^2 + b^2$ Plug in the values for *a* and *b*

$c^2 = (\quad)^2 + (\quad)^2$ Simplify

$c^2 = \quad + \quad$ Simplify

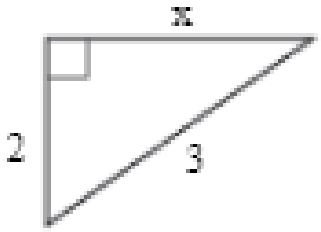
$c^2 =$ Square root both sides

Use calculator

$c =$

- One of the Legs is unknown

- **EXAMPLE:** Find the value of *x*. [*PHG 8.1.17]
  (Simplify your answer. Type exact answer, using radicals as needed.)



It may be very tempting to just glance at this triangle and say $x = 1$.
Try again…resist that temptation!

This is a right triangle, so we'll use The Pythagorean Theorem, $a^2 + b^2 = c^2$.

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

Common error is: $(2)^2 + (3)^2 = x^2$

Subtract _____ from both sides

Combine like terms and simplify

Square root both sides

Simplify the square root, if needed.

Common error is: $x = 5$

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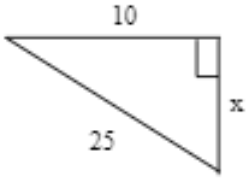
- **EXAMPLE:** Find the value of *x*. If necessary, write your answer in simplest radical form.

[*Martin-Gay 9.1.9]



This is a right triangle, so we'll use
The Pythagorean Theorem, $a^2 + b^2 = c^2$.

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

Common error is $(10)^2 + (25)^2 = x^2$
Subtract 100 from both sides
Combine like terms and simplify
Square root both sides
Simplify the square root

Sources Used:

1. MyLab Math for *Geometry*, Martin-Gay, Pearson Education Inc.
2. MyLab Math for *Prentice Hall Geometry*, ©2011, Pearson Education Inc.
3. MyLab Math for *College Algebra with Modeling and Visualization*, 6th Edition, Rockswold, Pearson Education Inc.
4. Wabbitemu calculator emulator version 1.9.5.21 by Revolution Software, BootFree ©2006-2014 Ben Moody, Rom8x ©2005-2014 Andree Chea. Website https://archive.codeplex.com/?p=wabbit