LESSON 8-2

The Pythagorean Theorem and Its Converse

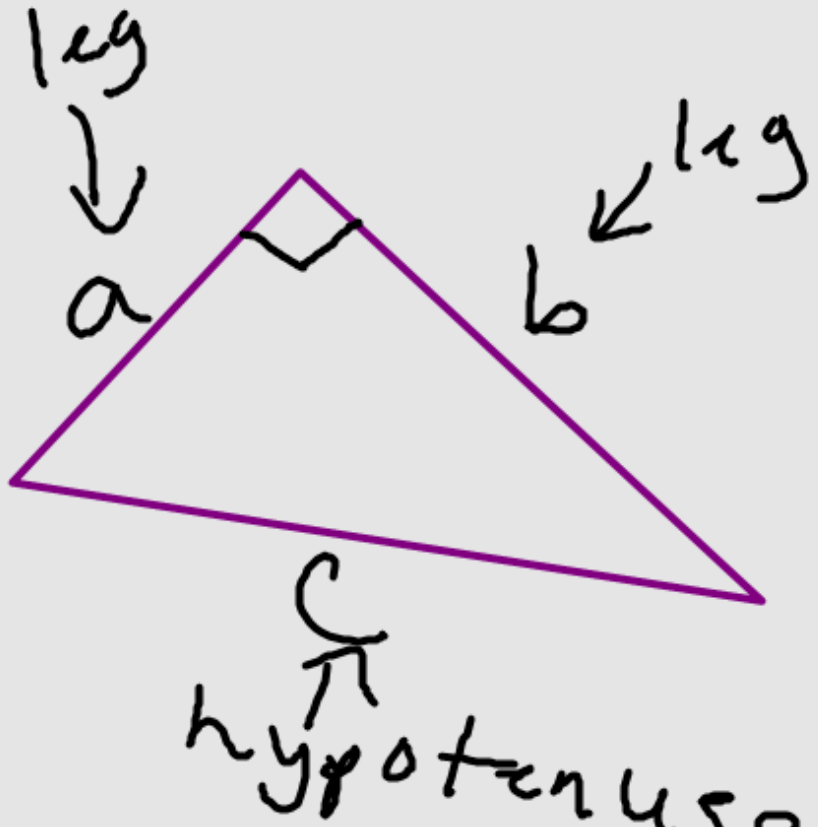
:· Then | :· Now | :· Why?

You will use the Pythagorean Theorem and it's converse

CCSS

Pythagorean Theorem

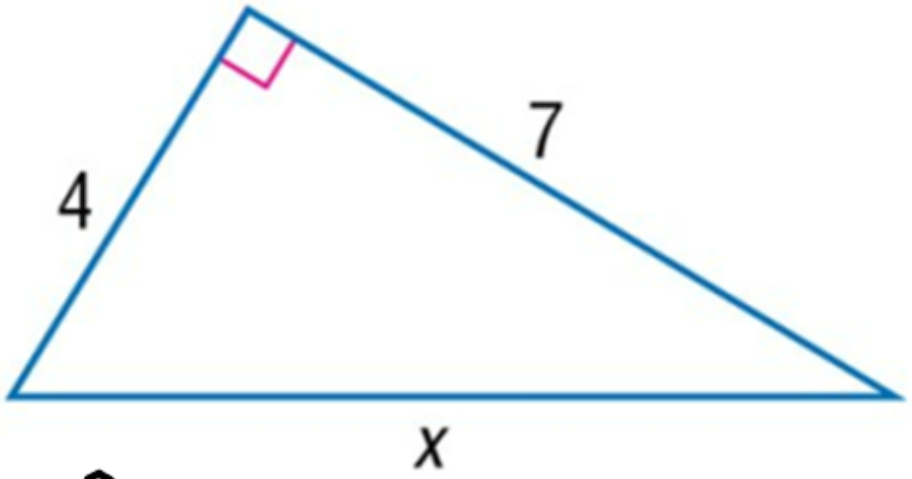
In a Right Δ the sum of squares of the legs equal the square of the hypotenuse



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

EXAMPLE 1 Find Missing Measures Using the Pythagorean Theorem

A. Find *x*.



$4^2 + 7^2 = x^2$

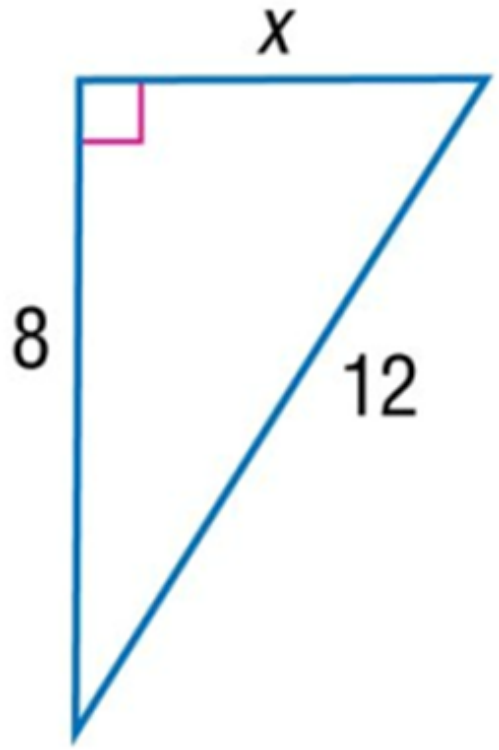
$16 + 49 = x^2$

$\sqrt{65} = \sqrt{x^2}$

$\sqrt{65} = x$

EXAMPLE 1 Find Missing Measures Using the Pythagorean Theorem

B. Find x.



$8^2 + x^2 = 12^2$

$64 + x^2 = 144$

$-64 \quad -64$

$x^2 = 80$

$x = \sqrt{80}$

$x = \sqrt{16}\sqrt{5}$

$x = 4\sqrt{5}$

$\sqrt{80}$

$\sqrt{4}\sqrt{20}$

$2\sqrt{4}\sqrt{5}$

$2 \cdot 2\sqrt{5}$

$4\sqrt{5}$

Common Pythagorean Triples

3 whole #'s that form Rt Δ's

3, 4, 5	5, 12, 13	8, 15, 17	7, 24, 25
any form	multiples of these right Δ's.		#'s will
Ex: 6, 8, 10	5x, 12x, 13x	8x, 15x, 17x	7x, 24x, 25x

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

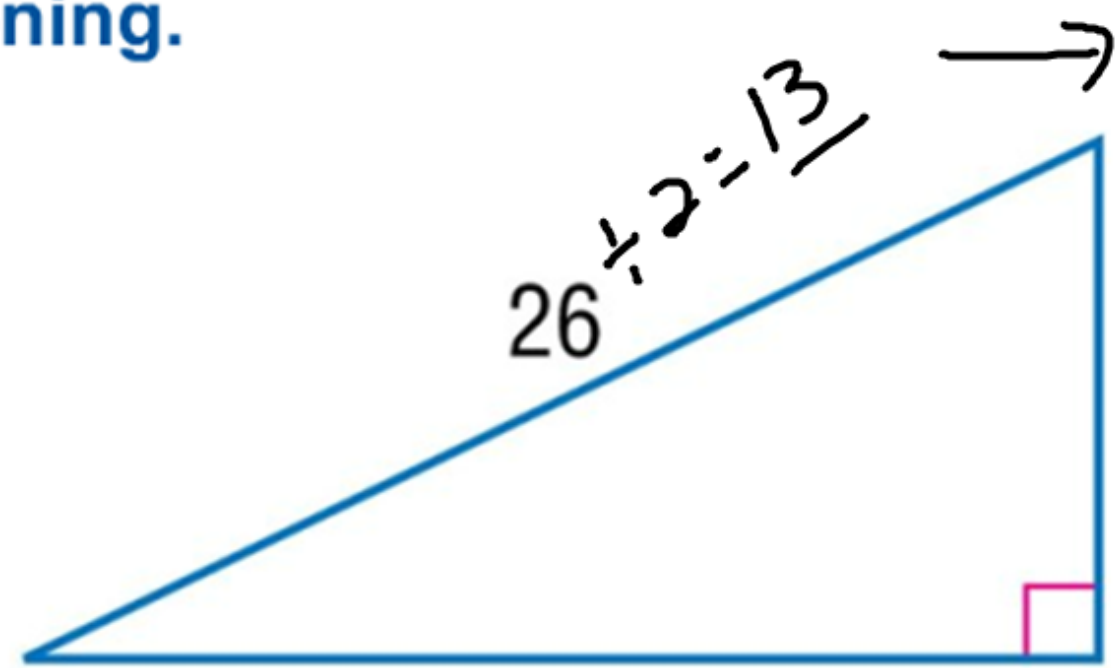
$9+16=25$ ✓

$6^2+8^2=10^2$

$36+64=100$ ✓

EXAMPLE 2 Use a Pythagorean Triple

Use a Pythagorean triple to find *x*. Explain your reasoning.



5, 12, 13 → Pyth Triple

$X = 5 \cdot 2 = 10$

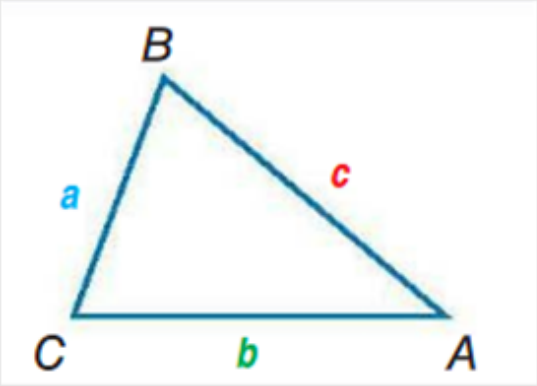
Converse of the Pythagorean Theorem

If the sum of squares of 2 shorter sides in a $\triangle$ equals the square of longer side, then it's a Right $\triangle$.

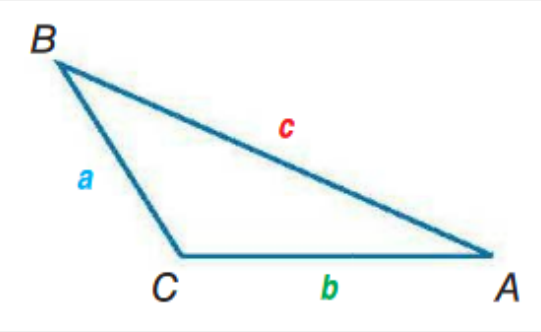
Pythagorean Inequalities

if $c^2 = a^2 + b^2$ Right $\triangle$

If $c^2 < a^2 + b^2$, then $\triangle ABC$ is acute.



If $c^2 > a^2 + b^2$, then $\triangle ABC$ is obtuse.



Determine whether each set of measures can be the sides of a triangle. If so, classify the triangle as *acute, obtuse or right.*

a) 9, 12, 15

$15^2 \stackrel{?}{=} 9^2 + 12^2$

$225 \stackrel{?}{=} 81 + 144$

$225 = 225$

21

yes Δ

Right Δ

b) 10, 11, 13

$13^2 \stackrel{?}{=} 10^2 + 11^2$

$169 \stackrel{?}{=} 100 + 121$

$169 < 221$

21 > 13

yes Δ

acute

Determine whether each set of measures can be the sides of a triangle. If so, classify the triangle as *acute, obtuse or right.*

c) 7, 8, 14

$14^2 \stackrel{?}{} 7^2 + 8^2$

$196 \stackrel{?}{} 49 + 64$

$196 > 113$ obtuse Δ

15 > 14

yes it is a Δ

d) 14, 18, 33

32 < 33

NOT a Δ

e) $4\sqrt{3}, 4, 8$

larger than 8

$8^2 \stackrel{?}{} (4\sqrt{3})^2 + 4^2$

$64 \stackrel{?}{} 48 + 16$

$64 = 64$ Rt Δ