Pythagorean Triples:

A set of 3 positive integers *a*, *b* and *c* that satisfy the equation $a^2 + b^2 = c^2$

Common Pythagorean Triples

	3, 4, 5	5, 12, 13	8, 15, 17	7, 24, 25
x 2	6, 8, 10	10, 24, 26	16, 30, 34	14, 48, 50
x 5	15, 20, 25	25, 60, 65	40, 75, 85	35, 120, 130
x 10	30, 40, 50	50, 120, 130	80, 150, 170	70, 240, 250
x	3x, 4x, 5x	5x, 12x, 13x	8x, 15x, 17x	7x, 24x, 25x

Example #5: Find the unknown side length using a Pythagorean Triple.

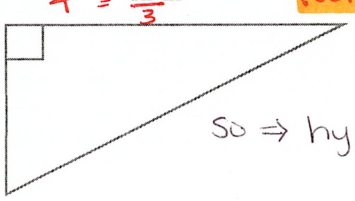
both #'s (÷3)

a.)

$4 = \frac{12 \text{ in}}{3}$

(what factor do they have in common)

$3 = \frac{9 \text{ in}}{3}$

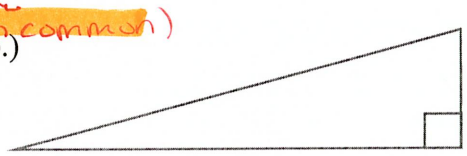


So ⇒ hypotenuse = 5(3)
= 15 in

★ this is a 3, 4, 5 Δ ★

both #'s (÷2)

b.)



$\frac{14 \text{ cm}}{2} = 7$

$\frac{48 \text{ cm}}{2} = 24$

★ this is a 7, 24, 25 Δ ★

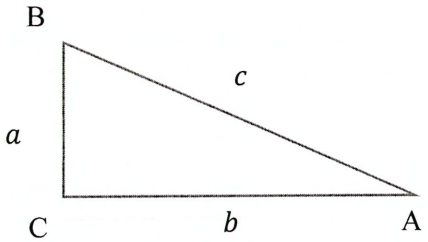
So ⇒ hypotenuse = 25(2)
= 50 cm

Chapter 7.2: Use the Converse of the Pythagorean Theorem

Converse of the Pythagorean Theorem (Theorem 7.2):

If the square of the length of the longest side of a triangle is equal to the sum of the squares of the lengths of the other two sides, then the triangle is a right triangle.

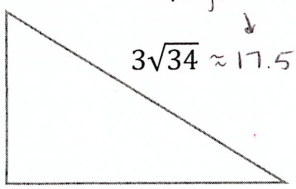
If $c^2 = a^2 + b^2$, then ΔABC is a right triangle



Example #1: Tell whether the given triangle is a right triangle.

a.)

longest side is c value

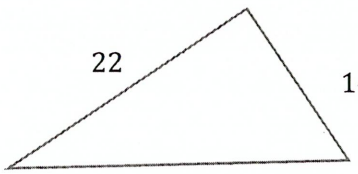


$9^2 + 15^2 \stackrel{?}{=} (3\sqrt{34})^2$

$306 = 306$ ✓

Right Triangle

b.)



26 ← longest side is c value

$22^2 + 14^2 \stackrel{?}{=} 26^2$

$680 \neq 676$

Not a Right Triangle

c.) 10, 11 and 14 ← longest side is c-value

$10^2 + 11^2 \stackrel{?}{=} 14^2$

$221 \neq 196$

Not a Right Triangle

d.) $\sqrt{10}, \sqrt{8}$ and $3\sqrt{2}$ (3.2, 2.8, 4.2) ← longest side is c-value

$(\sqrt{10})^2 + (\sqrt{8})^2 \stackrel{?}{=} (3\sqrt{2})^2$

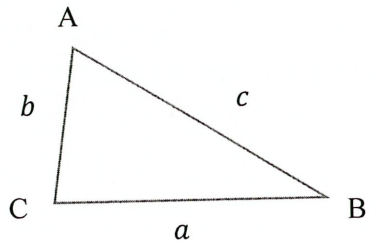
$18 = 18$ ✓

Right Triangle

Theorem for Acute Triangle:

If the square of the length of the longest side of a triangle is less than the sum of the squares of the lengths of the other two sides, then the triangle is an acute triangle

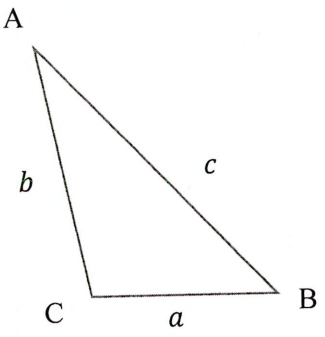
If $a^2 + b^2 > c^2$, then the triangle is Acute Triangle



Theorem for Obtuse Triangle:

If the square of the length of the longest side of a triangle is greater than the sum of the squares of the lengths of the other two sides, then the triangle is an Obtuse Triangle

If $a^2 + b^2 < c^2$, then the triangle is obtuse triangle



Example #2: Decide if the segment lengths form a triangle. If so, would the triangle be acute, right or obtuse?

a.) 14, 21 and 25 ← longest side is c-value

$14^2 + 21^2 \stackrel{?}{=} 25^2$

$637 > 625$

Acute Triangle

$14 + 21 > 25$

$35 > 25$ ✓

Triangle

b.) 32, 60 and 68 ← longest side is c-value

$32^2 + 60^2 \stackrel{?}{=} 68^2$

$4624 = 4624$

Right Triangle

$32 + 60 > 68$

$92 > 68$ ✓

Triangle

c.) 11, 19 and 32

$11 + 19 > 32$

$30 \not> 32$ ✗

Not a Triangle

d.) 3, 9 and $3\sqrt{11}$ (9.95) ← longest side is c-value

$3^2 + 9^2 \stackrel{?}{=} (3\sqrt{11})^2$

$90 < 99$

Obtuse Triangle

$3 + 9 > 9.95$

$12 > 9.95$ ✓

Triangle