8.2 Pythagorean Theorem and Its Converse

Pythagorean Theorem: In a right Δ

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

legs — hypotenuse

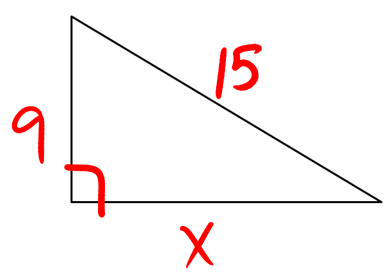
$9^2 + x^2 = 15^2$

$81 + x^2 = 225$

$-81 \quad -81$

$\sqrt{x^2} = \sqrt{144}$

$x = 12$



Converse of Pythagorean Theorem:

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

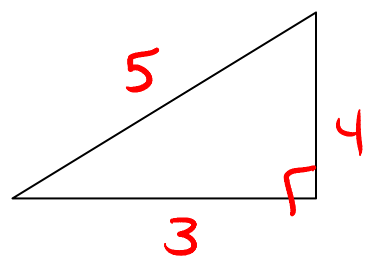
right?

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

$9 + 16 = 25$

$25 = 25$

yes



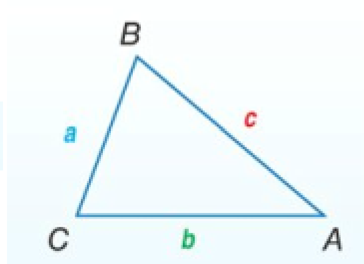
Pythagorean Triple:

Non-zero whole numbers which satisfies $a^2 + b^2 = c^2$.

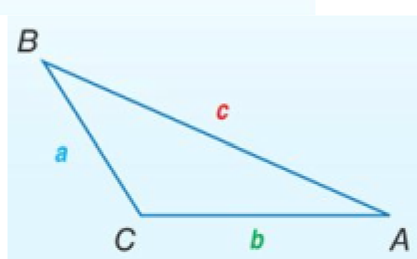
3, 4, 5	5, 12, 13	8, 15, 17	7, 24, 25
6, 8, 10	10, 24, 26	16, 30, 34	14, 48, 50
9, 12, 15	15, 36, 39	24, 45, 51	21, 72, 75
3x, 4x, 5x	5x, 12x, 13x	8x, 15x, 17x	7x, 24x, 25x

Pythagorean Inequality Theorems

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 it is classify it as obtuse, acute, or right.

a.) 9, 12, 15 $9+12>15$ yes $9^2+12^2=15^2$? $81+144=225$ $225=225$ yes — pyth. triple — right

b.) 10, 11, 13 $10+11>13$ yes $10^2+11^2=13^2$? $100+121=169$ $221>169$ — acute

c.) 7, 8, 14 → obtuse

d.) 14, 18, 33 not △ $14+18 \not> 33$

~~e.)21, 42, 54~~

f.) $4\sqrt{3}, 4, \textit{and } 8$ 6.9 yes, $(4\sqrt{3})^2+4^2=8^2$ $4^2\sqrt{3}^2+16=64$ $16\cdot3+16=64$ $48+16=64$ yes — right — not pyth. thm

Go back and label the Pythagorean triples.