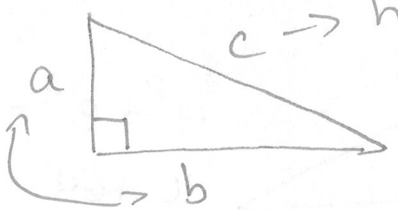
Pythagorean Theorem: "Pythagoras"

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

Def: the sum of the squares of the sides of a right Δ is equal to the square of the hypotenuse



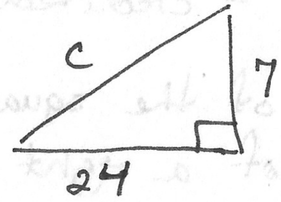
* only works with right Δ

Pythagorean Triples: any 3 positive integers that satisfy the $a^2+b^2=c^2$ formula

* 3, 4, 5 most common

if (a, b, c) is a pythag Trip, then (ka, kb, kc) is a pythag Trip

Given:



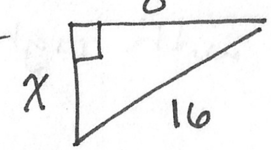
$7^2+24^2=c^2$

$49+576=c^2$

$\sqrt{625}=\sqrt{c^2}$

$25=c$

Missing a leg subtract



$x^2=16^2-8^2$

$x^2=256-64$

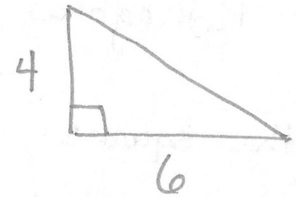
$x^2=\sqrt{192}$

16 12

4 3

$4\cdot 2\sqrt{3}$

$\boxed{8\sqrt{3}}$



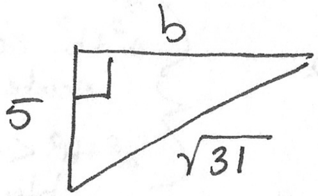
$4^2 + 6^2 = c^2$

$\underbrace{16 + 36}_{} = c^2$

$\sqrt{52} = \sqrt{c^2}$

$\sqrt{4 \cdot 13}$

$2\sqrt{13} = c$



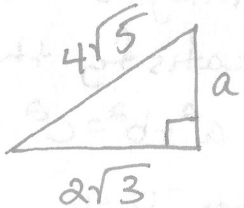
missing leg subtracting

$b^2 = (\sqrt{31})^2 - (5)^2$

$b^2 = 31 - 25$

$\sqrt{b^2} = \sqrt{6}$

$b = \sqrt{6}$



$a^2 = (4\sqrt{5})^2 - (2\sqrt{3})^2$

$a^2 = 16 \cdot 5 - 4 \cdot 3$

$a^2 = 80 - 12$

$\sqrt{a^2} = \sqrt{68}$

$\sqrt{4 \cdot 17}$

$a = 2\sqrt{17}$

Given: $a = 3$, $b = \sqrt{6}$, $c = ?$

$3^2 + (\sqrt{6})^2 = c^2$

$9 + 6 = c^2$

$15 = c^2$

$\sqrt{15} = c$

Given: $a = 2\sqrt{3}$, $b = ?$, $c = 16$

$b^2 = 16^2 - (2\sqrt{3})^2$

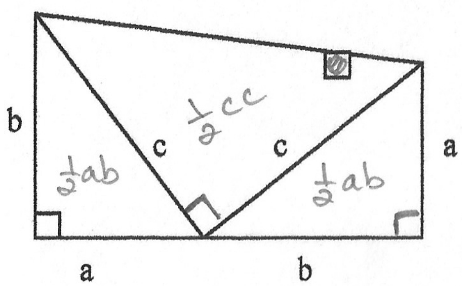
$b^2 = 256 - 4(3)$

$b^2 = \sqrt{244}$

$\sqrt{4 \cdot 61}$ $= 2\sqrt{61}$

1) Prove the Pythagorean Theorem using the proof President Garfield discovered. Write two different expressions that represent the area of the trapezoid and then set them equal to each other. Algebraically manipulate the equation to show $a^2 + b^2 = c^2$.

$\cancel{\frac{1}{2}}\ \frac{1}{2}h(b_1+b_2)$



$\Delta = \frac{1}{2}bh$

Area $\square$ = $3\Delta +$

$\frac{1}{2}(a+b)(a+b) = \frac{1}{2}ab + \frac{1}{2}ab + \frac{1}{2}c^2$

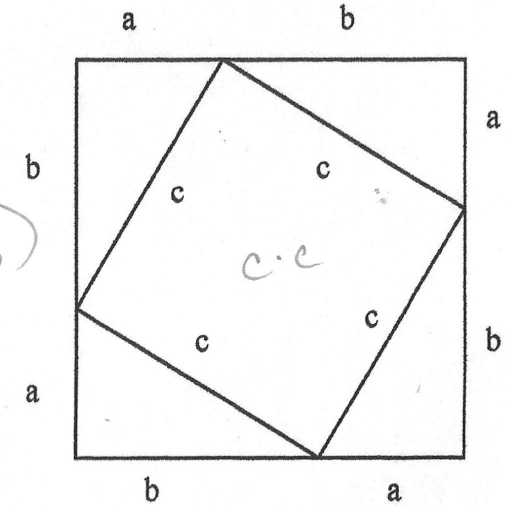
$\cancel{2}\cdot\frac{1}{\cancel{2}}(a^2+2ab+b^2) = 2\left(ab + \frac{1}{2}c^2\right)$

$a^2 \cancel{+2ab} + b^2 = \cancel{2ab} + c^2$

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

2) Prove the Pythagorean Theorem. Write two different expressions that represent the area of the large square and then set them equal to each other. Algebraically manipulate the equation to show $a^2 + b^2 = c^2$.

$(a+b)$



$\Delta = \frac{1}{2}bh$

$= \frac{1}{2}ab$

Area $\square$ = Area 5 ind

$(a+b)(a+b) = 4\left(\frac{1}{2}ab\right) + c^2$

$a^2 \cancel{+2ab} + b^2 = \cancel{2ab} + c^2$

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