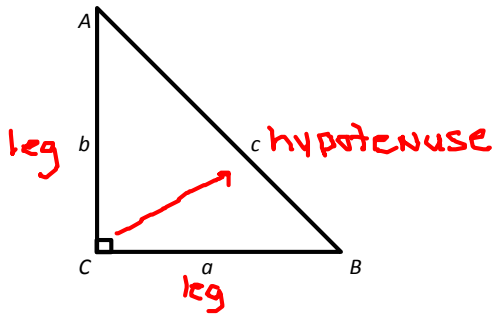
The Pythagorean Theorem

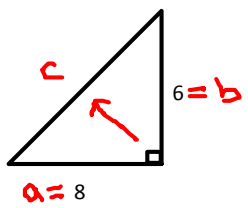
<u>The Pythagorean Theorem</u> - Used to find the third side of a right triangle when two sides are given.

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



1. Find the length of the missing side of the right triangle.

a)



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

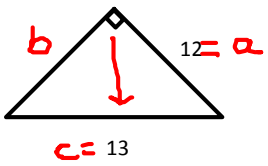
$8^2 + 6^2 = c^2$

$64 + 36 = c^2$

$\sqrt{100} = \sqrt{c^2}$

$\boxed{10 = c}$

b)



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

$12^2 + b^2 = 13^2$

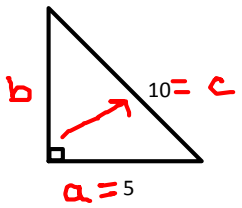
$\cancel{144} + b^2 = 169$

$-\cancel{144} \qquad -144$

$\sqrt{b^2} = \sqrt{25}$

$\boxed{b = 5}$

c)



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

$5^2 + b^2 = 10^2$

$25 + b^2 = 100$

$-25 \qquad -25$

$\sqrt{b^2} = \sqrt{75}$

$\boxed{b = 8.7 \text{ OR } 5\sqrt{3}}$

$\sqrt{75}$

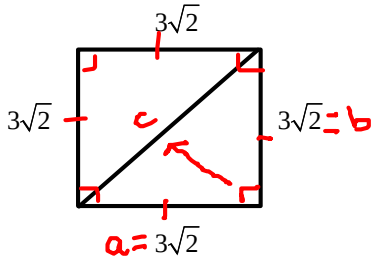
$3 \quad 25$

$5 \quad 5$

$\sqrt{3 \cdot 5 \cdot 5}$

$5\sqrt{3}$

2. Find the length of the diagonal of the square.



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

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

$9\sqrt{4} + 9\sqrt{4} = c^2$

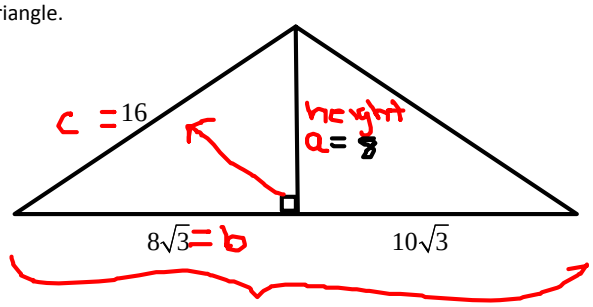
$9 \cdot 2 + 9 \cdot 2 = c^2$

$18 + 18 = c^2$

$\sqrt{36} = \sqrt{c^2}$

$\boxed{6 = c}$

3. Find the area of the triangle.



$8\sqrt{3} + 10\sqrt{3} = 18\sqrt{3}$

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

$b = 18\sqrt{3}$

$h = 8$

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

$A = \frac{1}{\cancel{2}_{1}} \cdot \frac{\cancel{18}^{9}\sqrt{3}}{1} \cdot \frac{8}{1}$

$\boxed{A = 72\sqrt{3}}$

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

$a^2 + (8\sqrt{3})^2 = 16^2$

$a^2 + 64\sqrt{9} = 256$

$a^2 + 64 \cdot 3 = 256$

$a^2 + 192 = 256$

$\quad -192 \quad -192$

$\sqrt{a^2} = \sqrt{64}$ $\quad a = 8$