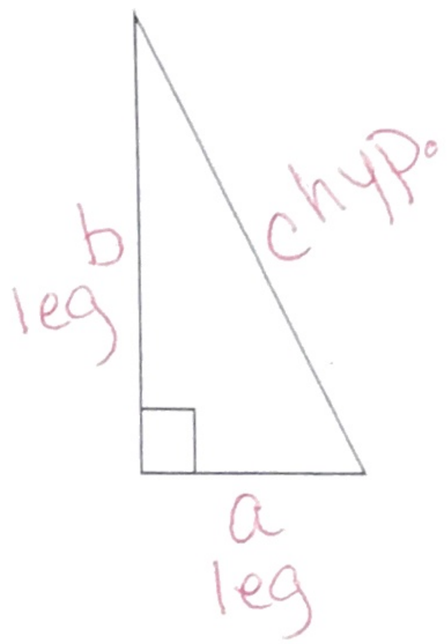
Name: _____ Date: Jan 22 Hour: __Alg 1___

Unit 5a Day 8: Finding the Length of a Leg or the Hypotenuse

Focus Question: How do I find the length of a side of a right triangle?

A. The "Real" Pythagorean Theorem

1. On the right triangle, label the sides with *a*, *b*, and *c*.



2. Back in the days of Pythagoras (550 BC), he did not use *a*, *b*, and *c*. Pythagoras stated his theorem as "**in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the legs.**" How do we state it today? Use it to label the triangle using the vocabulary of Pythagoras.

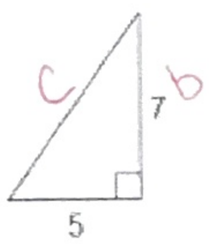
For right $\triangle$'s $a^2+b^2=c^2$

$leg^2+leg^2=hypotenuse^2$

B. Finding the hypotenuse.

When you found the distance between two points, you found the length of the hypotenuse of the right triangle. The following problems are even easier because the side lengths are given (no counting or subtraction required). Remember to label your triangle with *a*, *b*, and *c*. Then find the length of the hypotenuse. Give both an exact answer and an answer rounded to the nearest hundredth if necessary.

1)



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

$5^2+7^2=c^2$

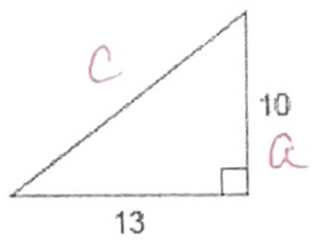
$25+49=c^2$

$\sqrt{74}=\sqrt{c^2}$

$C=\sqrt{74}$ units

$C\approx 8.60$

2)



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

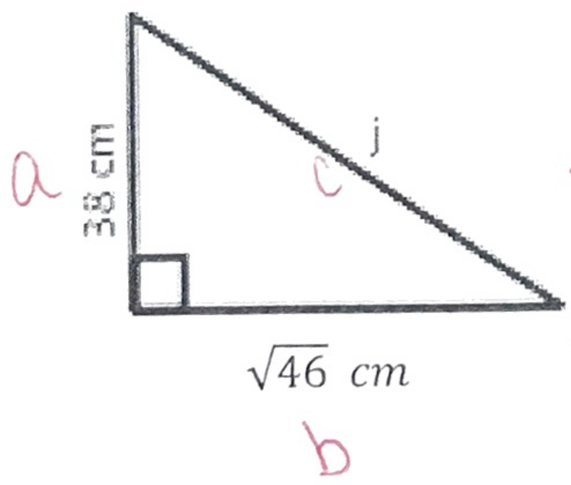
$10^2+13^2=c^2$

$100+169=c^2$

$\sqrt{269}=\sqrt{c^2}$

$C=\sqrt{269}$ units

$C\approx 16.40$



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

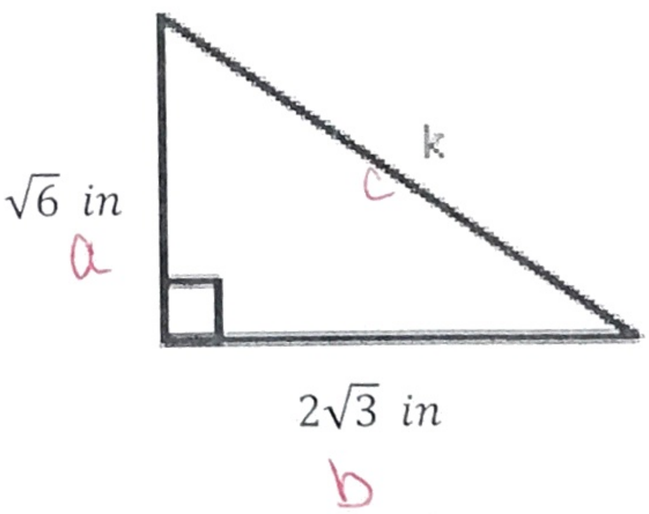
$38^2+(\sqrt{46})^2=j^2$

$1444+46=j^2$

$\sqrt{1490}=\sqrt{j^2}$

$j=\sqrt{1490}$ cm

$j\approx 38.60$



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

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

$6+2^2\cdot\sqrt{3}^2=k^2$

$6+4\cdot 3=k^2$

$6+12=k^2$

$\sqrt{18}=\sqrt{k^2}$

$K=\sqrt{18}$

$\sqrt{9\cdot 2}$

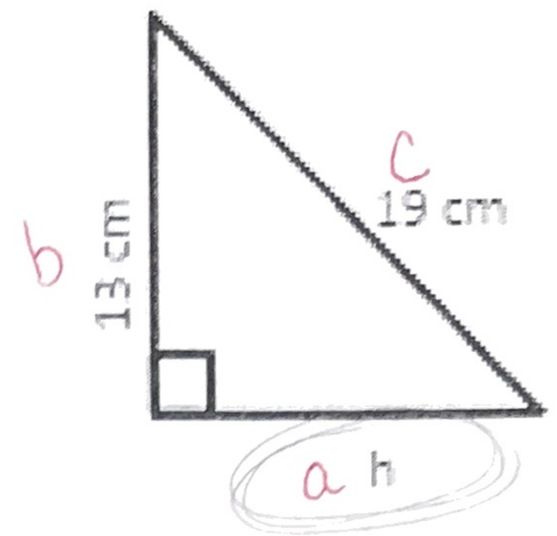
$K\approx 4.24$

$K=3\sqrt{2}$ in.

C. Length of a leg

1. How is the problem at right different from the front four problems?

a leg is missing!



2. Find the missing length.

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

$h^2+13^2=19^2$

$h^2+169=361$

$-169\ \ -169$

$\sqrt{h^2}=\sqrt{192}$

$h=\sqrt{192}$

$h=\sqrt{64\cdot3}$

$h=8\sqrt{3}$ cm

$h\approx13.86$

3. Find the length of each missing side.

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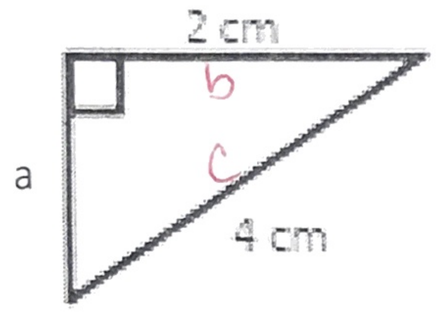


$a^2+b^2=c^2$

$a^2+2^2=4^2$

$a^2+4=16$

$-4\ \ -4$

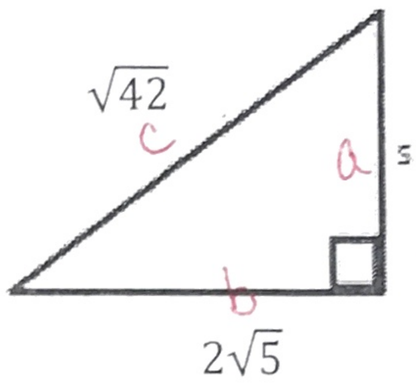
$\sqrt{a^2}=\sqrt{12}$

$a=\sqrt{12}$

$\sqrt{4\cdot3}$

$a=2\sqrt{3}$ cm

$a\approx3.46$



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

$5^2+(2\sqrt{5})^2=(\sqrt{42})^2$

$5^2+2^2\sqrt{5}^2=42$

$5^2+4\cdot5=42$

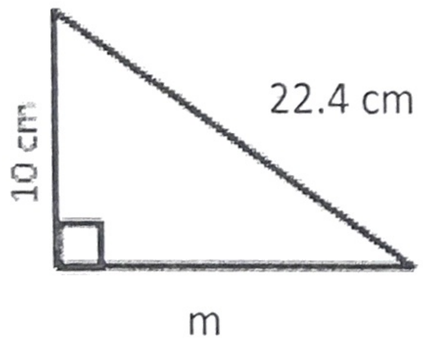
$5^2+20=42$

$-20\ \ -20$

$\sqrt{5^2}=\sqrt{22}$

$S=\sqrt{22}$ units

$S\approx4.69$



$10^2+m^2=22.4^2$

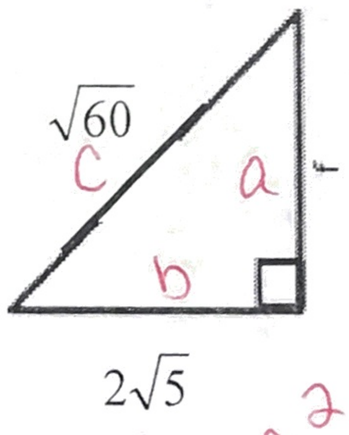
$100+m^2=501.76$

$-100\ \ -100$

$\sqrt{m^2}=\sqrt{401.76}$

$m=\sqrt{401.76}$ cm

$m\approx20.04$



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

$f^2+(2\sqrt{5})^2=(\sqrt{60})^2$

$f^2+20=60$

$-20\ \ -20$

$\sqrt{f^2}=\sqrt{40}$

$f=\sqrt{40}$

$\sqrt{4\cdot10}$

$f=2\sqrt{10}$ units

$f\approx6.32$