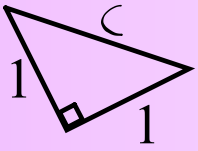
Warm Up

Find the exact value of the missing side lengths in the following right triangles.



$1^2+1^2=c^2$

$1+1=c^2$

$2=c^2$

$c=\sqrt{2}$

$(2\sqrt{2})^2+b^2=4^2$

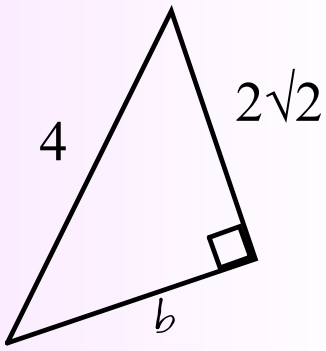
$4\cdot 2+b^2=16$

$8+b^2=16$

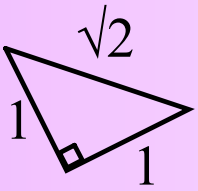
$b^2=8$

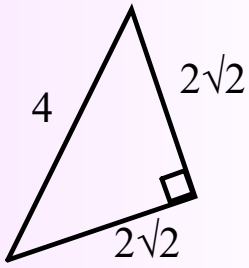
$b=\sqrt{8}=\sqrt{4}\sqrt{2}$

$=2\sqrt{2}$



Let's Analyze: What do you notice about the two triangles?





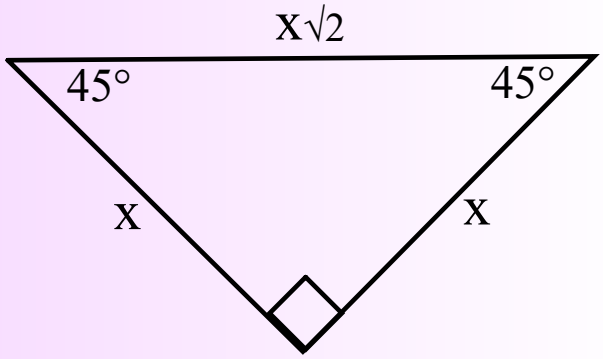
1. The two triangles are similar to each other.
2. The legs of the same triangle are congruent to each other.
3. The length of the hypotenuse $\sqrt{2}$ is times as long as the shorter leg.

The First Special Right Triangle

1. The 45°-45°-90° Triangle

In a 45°-45°-90°, the length of the hypotenuse is √2 longer than the legs of the same triangle, and the measures of the legs are equivalent.

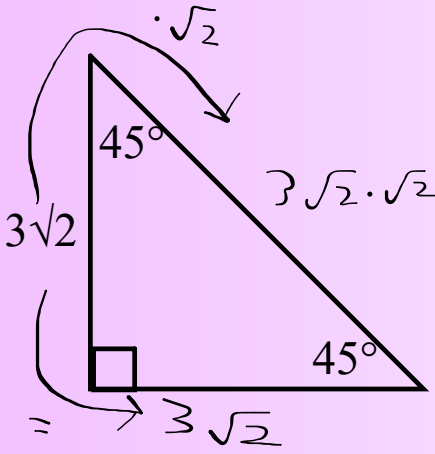
In other words, the sides form the ratio $x : x : x\sqrt{2}$



Why do we care?

Now, for specific right triangles, we can find missing side lengths when given only one measure.

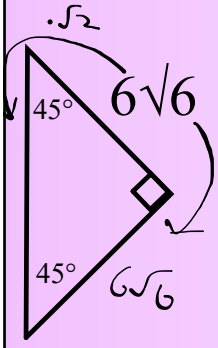
Find the exact values of the missing side lengths.



$3\sqrt{2} \cdot \sqrt{2} = 3 \cdot \sqrt{4} = 3 \cdot 2 = 6$

Now it's your turn!

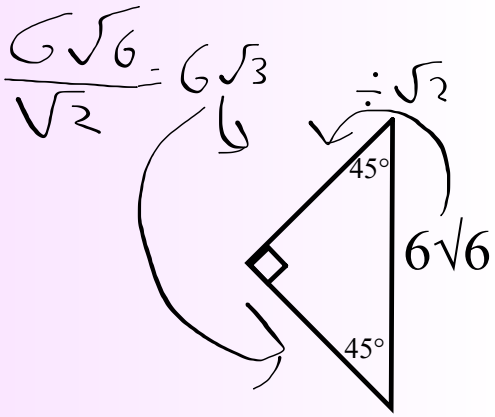
Find the missing side lengths in the following right triangles. Be sure to fully simplify your answers.



$\cdot\sqrt{2}$

$6\sqrt{6}\cdot\sqrt{2} = 6\sqrt{12}$

$= 6\cdot 2\sqrt{3} = 12\sqrt{3}$



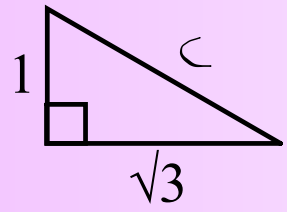
$\frac{6\sqrt{6}}{\sqrt{2}} = 6\sqrt{3}$

$\div\sqrt{2}$

6

How about another?

Find the exact values of the missing sides in the following triangles.

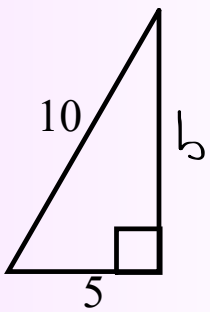


$1^2+\sqrt{3}^2=c^2$

$1+3=c^2$

$4=c^2$

$2=c$



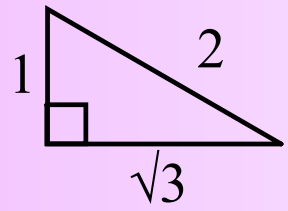
$10^2=5^2+b^2$

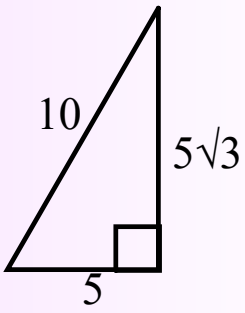
$100=25+b^2$

$b^2=75$

$b=\sqrt{75}=\sqrt{25}\cdot\sqrt{3}=5\sqrt{3}$

Let's Analyze: What do you notice about the two triangles?





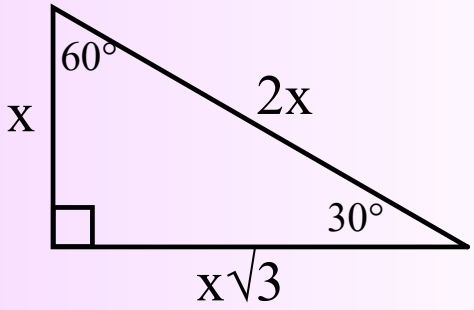
1. The two triangles are similar to each other.
2. The length of the hypotenuse is twice as long as the shorter leg.
3. The longer leg is √3 longer than the shorter leg.

Now Let's Generalize: The Second Special Right Triangle

2. The 30°-60°-90° Triangle

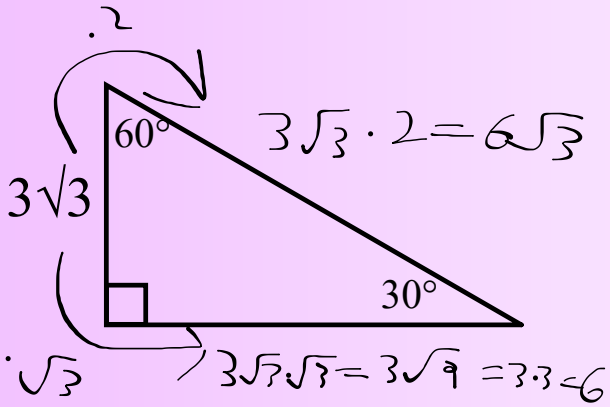
In a 30°-60°-90°, the length of the hypotenuse is double the length of the shorter leg, while the length of the longer leg is √3 longer than the length of the shorter leg.

In other words, the sides form the ratio $x : x\sqrt{3} : 2x$



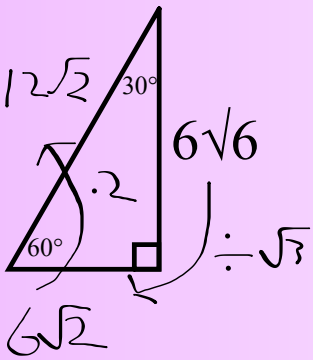
Together now...

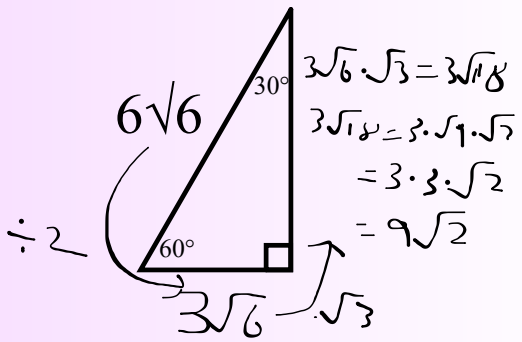
Find the exact values of the missing side lengths.



Now it's your turn 2, Electric Boogaloo-ist!

Find the missing side lengths in the following right triangles.
Be sure to fully simplify your answers.





Homework:

#3-10, 14, (#22 is optional, but makes good practice)