

# 1/31/20 - Warm Up Problem

Would a triangle with the given side lengths be right, acute, or obtuse?

1. 9, 12, 19

Obtuse

$$9^2 + 12^2 = 19^2$$

$$225 < 361$$

2.  $\sqrt{60}$ , 14, 16

right

$$\sqrt{60}^2 + 14^2 = 16^2$$

$$60 + 196 = 256$$

$$256 = 256$$

3. 5, 6,  $\sqrt{58}$

obtuse

$$5^2 + 6^2 = \sqrt{58}^2$$

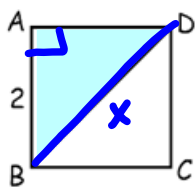
$$61 > 58$$

## Section 8.2 - Special Right Triangles

**Goal:** Investigate special right triangle relationships and use them to find missing side measures

### SPECIAL RIGHT TRIANGLE #1

ABCD is a square. Answer each question about Triangle ABD.



$$m\angle A = \underline{90^\circ}$$

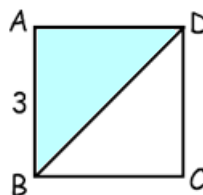
$$m\angle ABD = \underline{45^\circ}$$

$$m\angle ADB = \underline{45^\circ}$$

$$AB = \underline{2} \quad AD = \underline{2}$$

USE PYTHAGOREAN THEOREM TO FIND BD.

$$BD = \underline{2\sqrt{2}}$$



$$m\angle A = \underline{\quad}$$

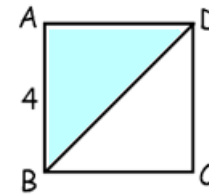
$$m\angle ABD = \underline{\quad}$$

$$m\angle ADB = \underline{\quad}$$

$$AB = \underline{\quad} \quad AD = \underline{\quad}$$

USE PYTHAGOREAN THEOREM TO FIND BD.

$$BD = \underline{\quad}$$



$$m\angle A = \underline{\quad}$$

$$m\angle ABD = \underline{\quad}$$

$$m\angle ADB = \underline{\quad}$$

$$AB = \underline{\quad} \quad AD = \underline{\quad}$$

USE PYTHAGOREAN THEOREM TO FIND BD.

$$BD = \underline{\quad}$$

Summarize your results from above.

In a triangle whose angles are  $45^\circ$ ,  $45^\circ$ , and  $90^\circ$ ,

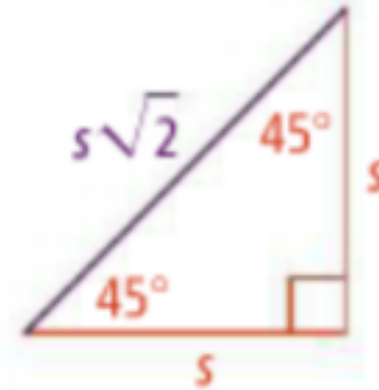
- The legs of the triangle are congruent
- The hypotenuse of the triangle equals leg  $\cdot \sqrt{2}$ .

**NOTES:****45°-45°-90° TRIANGLE THEOREM**

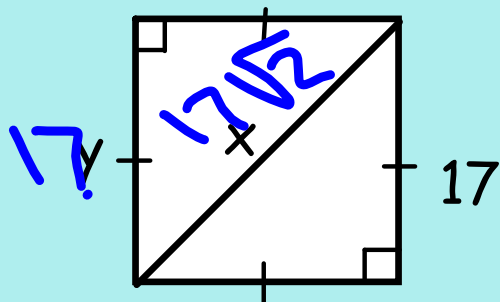
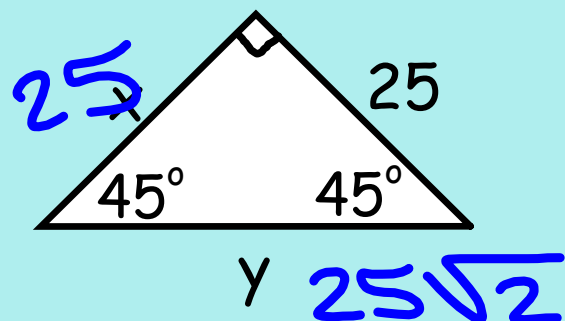
In a 45°-45°-90° triangle, both legs are congruent and the length of the hypotenuse is  $\sqrt{2}$  times the length of a leg.

$$\text{Hypotenuse} = \text{leg} \cdot \sqrt{2}$$

$$\text{Leg} = \frac{\text{hypotenuse}}{\sqrt{2}}$$



Find the value of  $x$  and  $y$  in each special triangle.

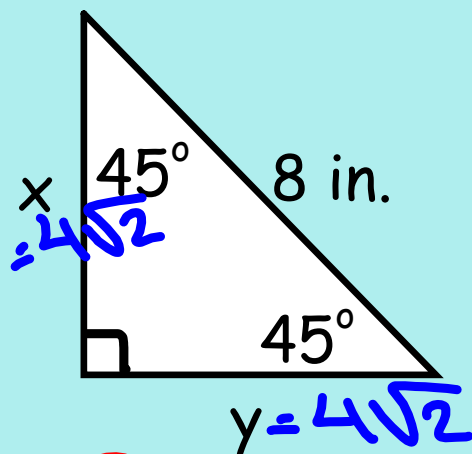


$$\text{Hypotenuse} = \text{leg} * \sqrt{2}$$

$$\text{Leg} = \frac{\text{hypotenuse}}{\sqrt{2}}$$

**\*Legs are always congruent**

Find the value of  $x$  and  $y$  in each special triangle.



A fraction is not in simplest form if there is a radical in the denominator.

You need to *rationalize the denominator*

Steps to rationalize:

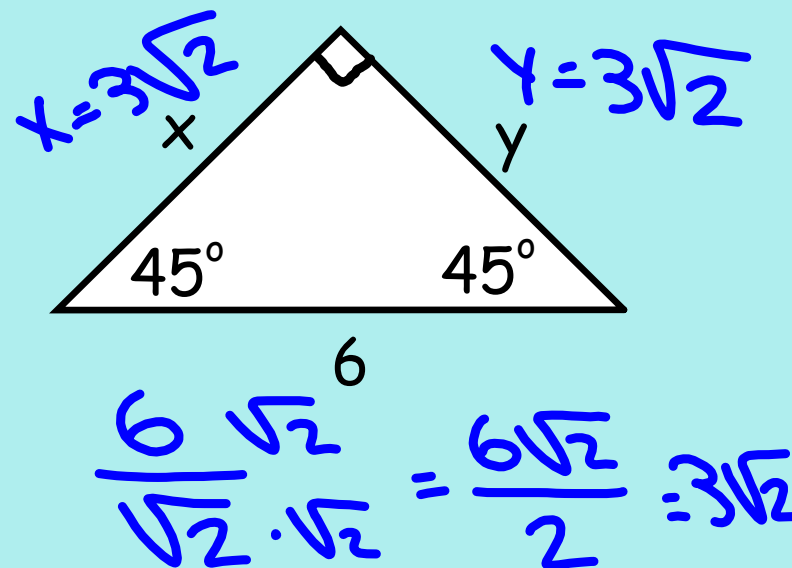
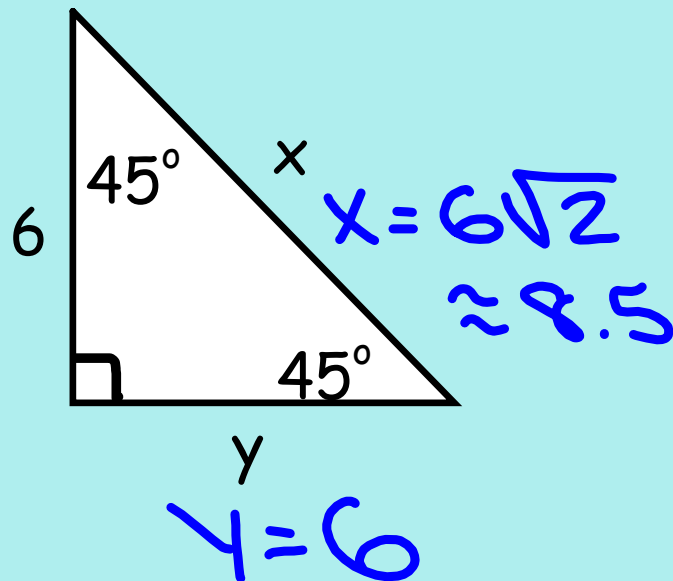
- 1) multiply the denominator by itself
- 2) multiply numerator by same thing
- 3) simplify

$$\frac{8 \cdot \sqrt{2}}{\sqrt{2} \cdot \sqrt{2}} = \frac{8\sqrt{2}}{2}$$

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

Try it on your own...

Find the value of  $x$  and  $y$  in each special triangle.



SPECIAL RIGHT TRIANGLE #2

$\triangle ABC$  is an equilateral triangle.  $\overline{AD}$  is an altitude. Answer each question about  $\triangle ABD$ .

$m\angle A = \underline{\hspace{1cm}}$   
 $m\angle ABD = \underline{30^\circ}$   
 $m\angle ADB = \underline{90^\circ}$   
  
 $AB = \underline{\hspace{1cm}}$   $AD = \underline{\hspace{1cm}}$   
  
 USE PYTHAGOREAN THEOREM  
 TO FIND  $BD$ .  
  
 $BD = \underline{\hspace{1cm}}$

$m\angle A = \underline{\hspace{1cm}}$   
 $m\angle ABD = \underline{\hspace{1cm}}$   
 $m\angle ADB = \underline{\hspace{1cm}}$   
  
 $AB = \underline{\hspace{1cm}}$   $AD = \underline{\hspace{1cm}}$   
  
 USE PYTHAGOREAN THEOREM  
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$m\angle A = \underline{\hspace{1cm}}$   
 $m\angle ABD = \underline{\hspace{1cm}}$   
 $m\angle ADB = \underline{\hspace{1cm}}$   
  
 $AB = \underline{\hspace{1cm}}$   $AD = \underline{\hspace{1cm}}$   
  
 USE PYTHAGOREAN THEOREM  
 TO FIND  $BD$ .  
  
 $BD = \underline{\hspace{1cm}}$

**Summarize your results from above.**

In a triangle whose angles are  $30^\circ$ ,  $60^\circ$ , and  $90^\circ$ ,

- The longer leg equals  $\underline{\sqrt{3}}$  times the shorter leg.
- The hypotenuse equals  $\underline{2}$  times the shorter leg.

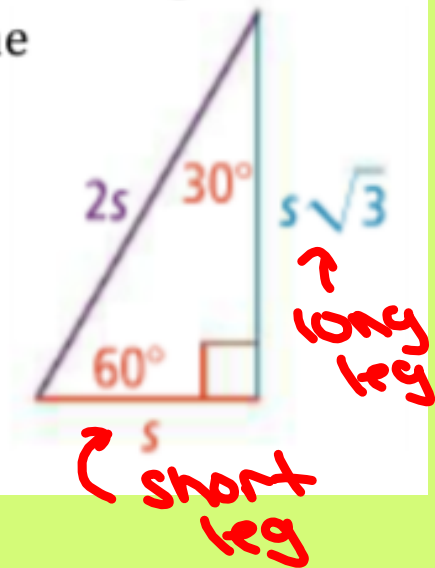
**NOTES:****30°-60°-90° TRIANGLE THEOREM**

In a 30-60-90 triangle, the length of the hypotenuse is 2 times the length of the short leg.

The length of the long leg is  $\sqrt{3}$  times the length of the short leg.

Hypotenuse =  $2 \cdot \text{short leg}$

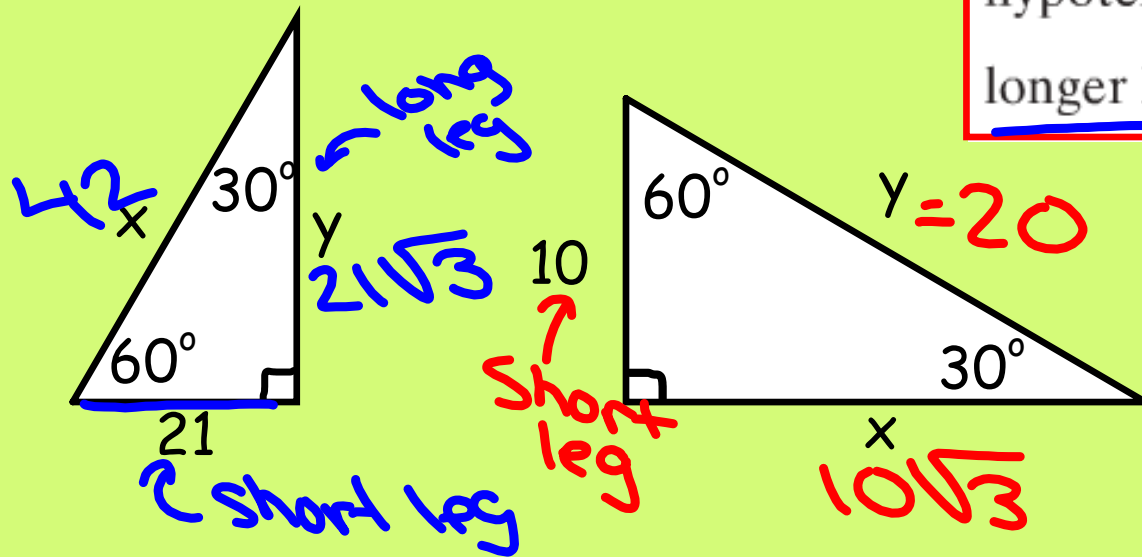
Long Leg =  $\text{short leg} \cdot \sqrt{3}$





Find the value of  $x$  and  $y$  in each special triangle.

- Use the **short leg** to find the long leg and hypotenuse values



$$\text{hypotenuse} = 2 \cdot \text{shorter leg}$$

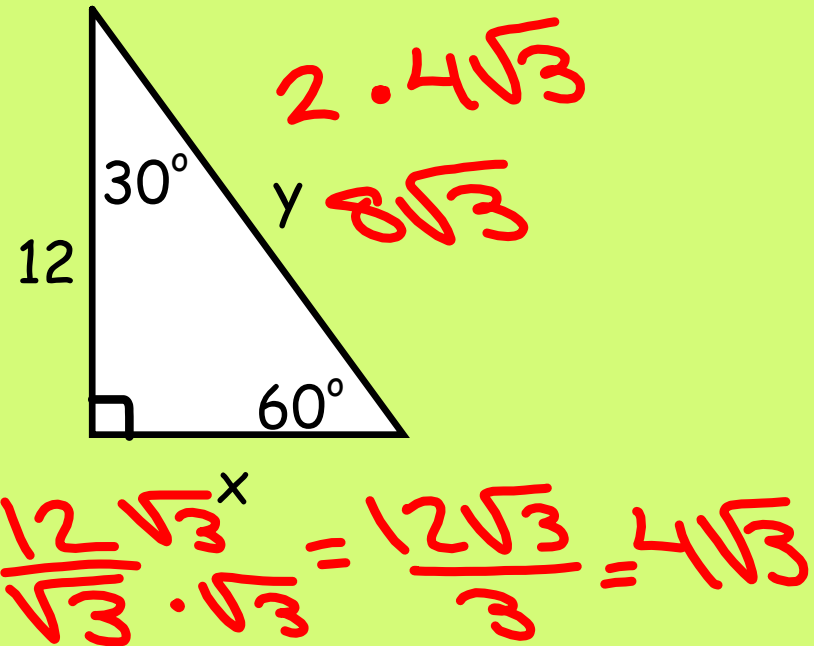
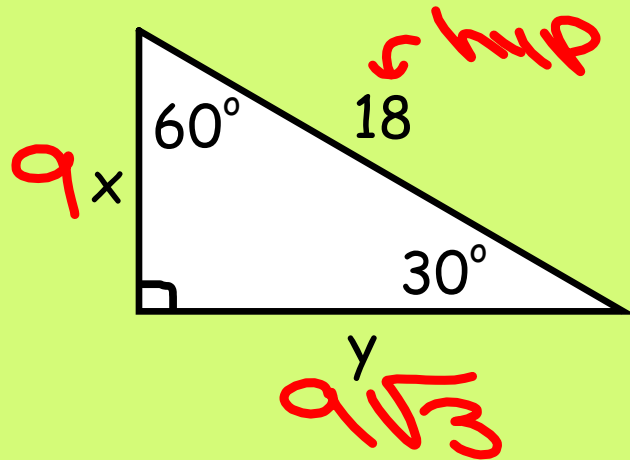
$$\text{longer leg} = \sqrt{3} \cdot \text{shorter leg}$$

If you do not know the short leg...

- find the short leg first
- use it to find the other missing side

$$\text{hypotenuse} = 2 \cdot \text{shorter leg}$$

$$\text{longer leg} = \sqrt{3} \cdot \text{shorter leg}$$



## Assignment:

### Math XL Concept 19

- YOU WILL BE ANSWERING IN SIMPLIFIED RADICAL FORM

*most of the time*