Name: _____ Per: _____

Special Triangles Part 1

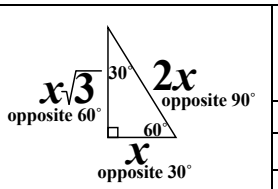
We already know that the sides and angles of a triangle are related. Further, we know that if you have two sides of a right triangle, then you can use the Pythagorean Theorem to solve for the third side. If you only have one side of a triangle, though, and want to find another side, then you'll need a right angle and the measure of at least one of the other angles to do it.

There are two ways to determine the sides of a **right** triangle with only one given side and an angle measure:

1. Trigonometry (which you'll be learning soon) &
2. Special Triangles

The two kinds of **special triangles** are **30-60-90** triangles and **45-45-90** triangles. These triangles are special, because the relationship of the angles creates a specific and easy to follow relationship between the sides. The tables below show those relationships.

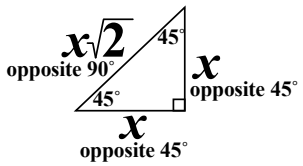
30-60-90



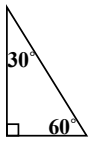
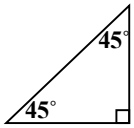
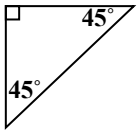
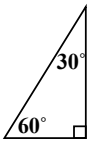
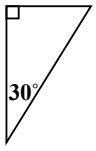
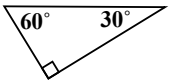
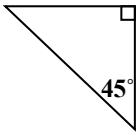
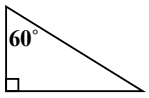
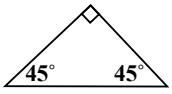
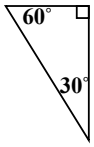
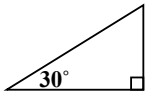
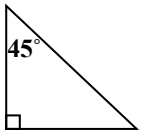
Angle Measure	Measure of Opposite Side
30° →	x
60° →	$x\sqrt{3}$
90° →	$2x$

45-45-90

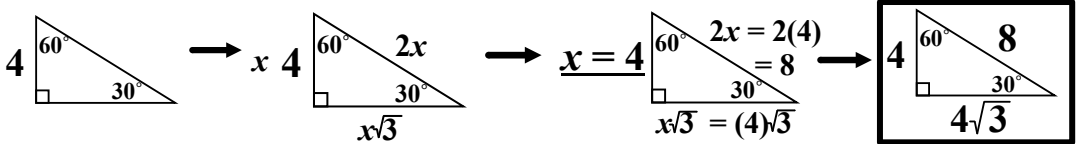
Angle Measure	Measure of Opposite Side
45° →	x
45° →	x
90° →	$x\sqrt{2}$



The first step to solving for sides on special triangles is being able to identify and label the side relationships (as shown in the table above). For each **30-60-90** triangle below, label the sides $x, x\sqrt{3}$, & $2x$. For each **45-45-90** triangle below, label the sides x, x, & $x\sqrt{2}$.

1. 	2. 	3. 	4. 
5. *Hint: If it's 30-__-90, the missing angle must be 60!* 	6. 	7. *Hint: If it's 45-__-90, the missing angle must be 45!* 	8. 
9. 	10. 	11. 	12. 

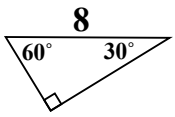
Once you know how to label the sides, you can use those labels to determine side lengths.
For example: Determine the missing sides of the triangle.



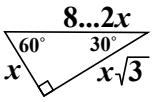
***30-60-90** triangle → label the sides $x, x\sqrt{3}$, & $2x$. Solve for x... $x = 4$. Plug x into the other sides & simplify.*

Use special triangles to determine the measure of each unmarked side. Beware: there are three triangles below that you cannot solve.

EXAMPLE



30-60-90→label the sides & solve for x.

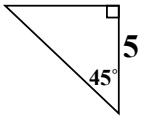


$8 = 2x$
$4 = x$
$x = 4$
plug that in...

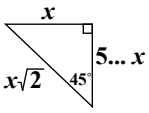
The other sides are:

$x = \boxed{4}$ & $x\sqrt{3} = \boxed{4\sqrt{3}}$

EXAMPLE



45-45-90→label the sides & solve for x.

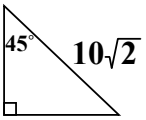


$5 = x$
$x = 5$
plug that in...

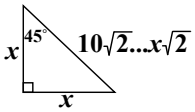
The other sides are:

$x = \boxed{5}$ & $x\sqrt{2} = \boxed{5\sqrt{2}}$

EXAMPLE



45-45-90→label the sides & solve for x.

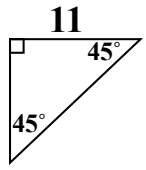


$10\sqrt{2} = x\sqrt{2}$
$10 = x$
$x = 10$
plug that in...

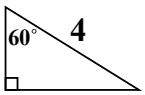
The other sides are:

$x = \boxed{10}$ & $x = \boxed{10}$

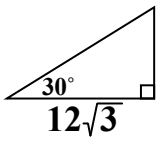
1.



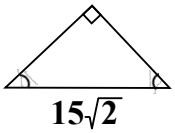
2.



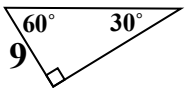
3.



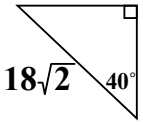
4.



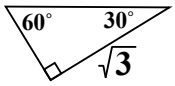
5.



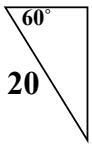
6.



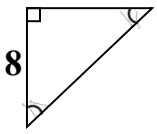
7.



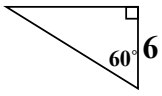
8.



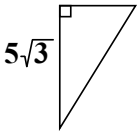
9.



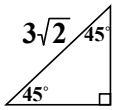
10.



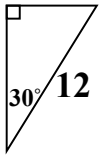
11.



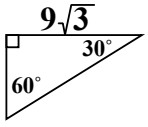
12.



13.



14.



15.