In this section we’re going to learn about two special cases of right triangles. One of these special cases is when we have what is called a 30-60-90 triangle. The other special case is when we have a 45-45-90 triangle. As you can probably guess these numbers are the angles of the triangles.

*What is so special about these two different types of triangles?*

Well in the previous section we had to know two of the three sides in the triangle in order to solve for the remaining side. This is not the case with these special triangles. In each case we only have to know **one** side of the triangle and we can find all the rest of them.

***45-45-90 Right Triangle*** ***30-60-90 Right Triangle***



45°



*hypotenuse*

*hypotenuse*

60°

*leg*

*leg 1*

45°

30°

*leg*

*leg 2*

**Let’s work first with 45-45-90 triangles:**

1. For every problem like this, start with a labeled picture:



*leg* = 7

*leg* = 7

*hypotenuse*

2. Since we are given the leg of the triangle, what are we trying to solve for?

3. Hopefully you wrote the hypotenuse. Now we must actually do it. Always start by writing out the general equation first. Show your work below. (Make sure you get 7 as your answer. If you do not come see me.)

4. What if we had been given the hypotenuse instead of a leg? How would we solve it then?

*hypotenuse = 12*

*leg*

*leg*

5. In order to go from *leg* ⇒ *hypotenuse* we multiplied by thus,

in order to go from *hypotenuse* ⇒ *leg* we should ­\_\_\_\_\_\_\_\_\_\_\_ by .

6. If you did not put the word divide up in the blank space below, hit yourself on the head, write it in, and continue reading. Now we must actually solve the problem. Do so in the space below. (Remember we don’t like square roots in the bottom of our fractions.) You should get 6. If you did not please come see me and I will help you. ☺



**Now, let’s work with 30-60-90 triangles.**



The first thing that you should notice is that there

*hypotenuse*

are now two distinct legs. How can we tell the

60°

difference between them?

*leg 1*

30°

*leg 2*

I like to think of the three sides as: small, medium,

and large. This means I can label the picture and

write the equations like this:



*large*

60°

*small*

30°

*medium*

**To solve problems with 30-60-90 triangles:**

30°

32

*y*

*x*

1. Start with the picture that is given. (No picture? Draw one!)

2. Add the labels of *small*, *medium*, and *large* to the picture:

30°

32

*y*

*x*

*(large)*

*(medium)*

*(small)*

3. Write down the two equations:  and 

4. Now solve for x and y. Make sure to show all your work below in the space provided.

When you are done please check your answers and ask for help if your answers don’t match up.

**Assignment: Special Right Triangle Problems + Inverse Trig Functions Kuta Worksheet**

**Solve for x and y.**

1. 2.

45°

x

45°

x



45°

6

3.

x

12

22

4.

x

x

5.

x



6.

y

x

22

60°

30°

7.



x

y

60°

30°

8.

y

x

60°

18

9.

60°

12

x

y