"Using Trigonometry and Special Right Triangles to Create a UNIT CIRCLE"

Name____________________________

READ and PRECISELY follow the steps listed below. _Work as a group to make sure you all agree._ If you can't agree, raise your hand and share your ideas with Ms. Hale – I will listen to **your ideas** and let you know if you are making a mistake. If you follow the directions I have written below, you will have an accurate & VERY HELPFUL "Unit Circle". We will be using this every day over the next few weeks, and will refer back to it again and again as the semester progresses.

PART 1- Attach this to the next page in your notebook.

1.) Standard position means the vertex of the angle is at __________ and the initial side is on ____.

2.) Using a protractor, align the 0° marking with the initial side of the angle you are measuring (in order to draw). The protractor has measurements on the inside and outside of the arc – you will choose your measurement from the side that has the 0° where the initial side of your angle is located.

3.) Use the protractor to measure and draw each of the angles labeled on your "Unit Circle" worksheet.
   a. Use protractor to measure
   b. Make a small marking next to the angle measure that you are measuring.
   c. Use the straight-edge of the protractor to connect this mark to the vertex of your angle.
   d. The terminal side of every angle only needs to be drawn until it intersects the circle printed on the sheet.
   e. Repeat this process for all angles up to 180°.
   f. How will you use the protractor to measure angles for the bottom half of the Unit Circle if they are all greater than 180°? Talk with your group- this will take a bit of creativity. ☺ You can totally do it!
   g. Have Ms. Hale check your work so far to make sure there are no mistakes before you move on.

4.) Reference Angles – Fill in the following table with each angle, **θ**s corresponding reference angle, **θ'**.

θ	θ'	θ	θ'	θ	θ'	θ	θ'
0°		90°		180°		270°	
30°		120°		210°		300°	
45°		135°		225°		315°	
60°		150°		240°		330°	

   a. Have Ms. Hale check your work so far to make sure there are no mistakes before you move on.

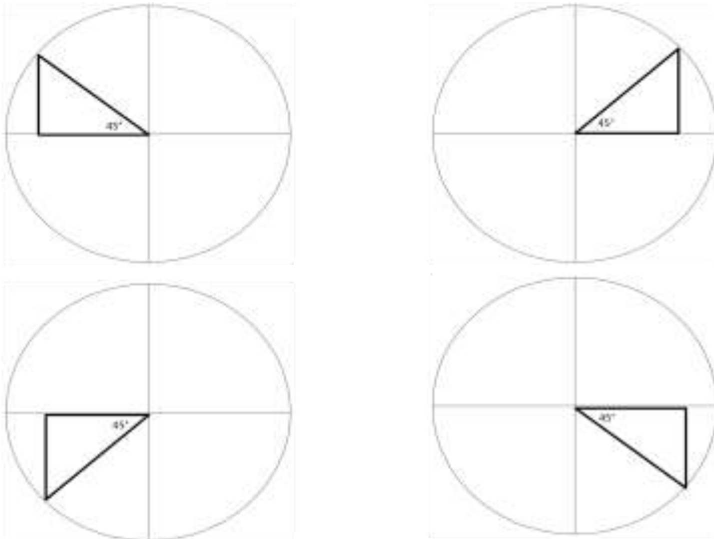
5.) Using a ruler or straight-edge, construct the reference triangle for each angle you have drawn on your unit circle.
   a. Use the intersection of the terminal side of each angle with the circle as the point which each triangle's vertical side must pass through and connect to the x-axis.
   b. If you measured and dew your angles accurately, a cool pattern should appear. ☺
   c. Mark every right angle you create with a ⌜.
   d. Have Ms. Hale check your work so far to make sure there are no mistakes before you move on.

6.) Using 3 markers or colored pencils, trace around each of the triangles you have created as follows:
   a. Color #1 – all triangles created from a 30° reference angle.
   b. Color #2 – all triangles created from a 45° reference angle.
   c. Color #3 – all triangles created from a 60° reference angle.
   d. Once again… if you have done this correctly, you should see a cool pattern! ☺
   e. Have Ms. Hale check your work so far to make sure there are no mistakes before you move on.

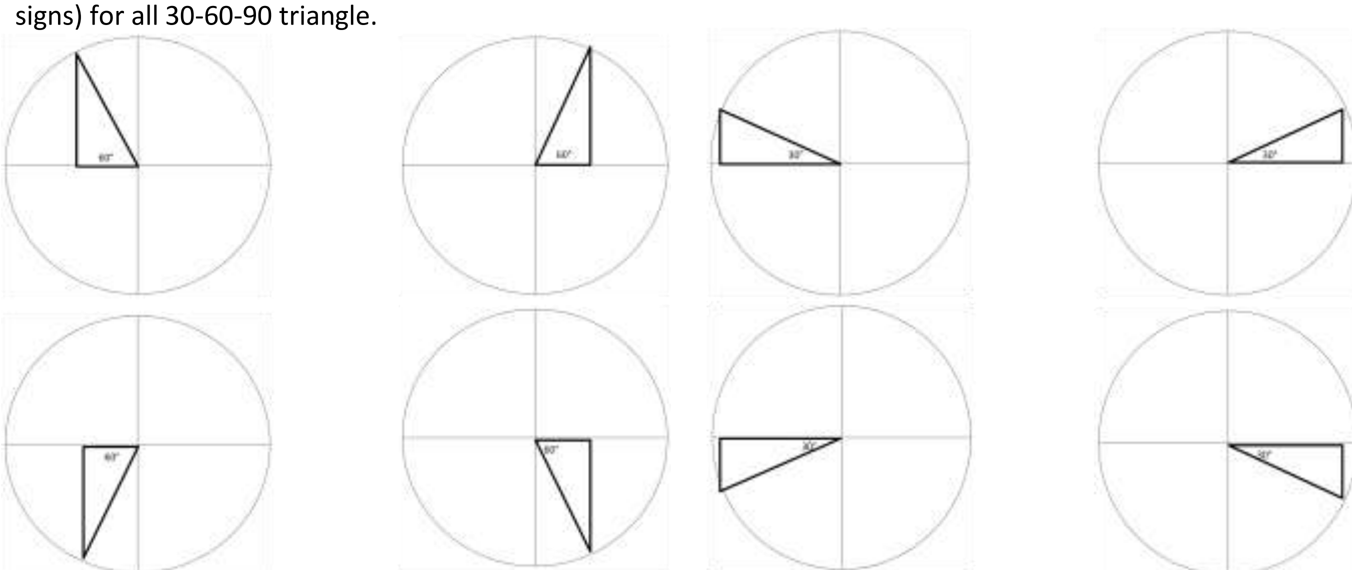
7.) This concludes Part 1. You are now ready to get Part 2 from Ms. Hale.

Part 2 – Attach this to the next page in your notebook.

8.) At this point in the assignment, you should see that you have one 45-45-90 triangle in each quadrant. If I tell you that the length of the radius of this circle is 1 unit, find the lengths of the sides (with the correct +/- signs) for all 45-45-90 triangles.



9.) Next, we will solve for the side lengths of each 30-60-90 triangle (you'll notice that there are 2 in each quadrant). Given that the radius of the circle is still 1 unit, find the lengths of the sides (with the correct +/- signs) for all 30-60-90 triangle.



Have Ms. Hale check your work so far to make sure there are no mistakes before you move on.

10.) Now, take the side lengths you found for each triangle and record them on the Unit Circle as the coordinate (x,y) where the terminal side of your original angle, θ, intersects the circle.

11.) Using the side lengths you found in steps 8 & 9, (and any patterns you've seen building in the circle – this will save you time on this step ☺) and SohCahToa, calculate EXACT sine, cosine, and tangent function values (in *simplest form*) for every triangle on the unit circle. Record your final answers in the table. Show work as needed in the space below the table.

θ	**θ'**	**Fn. Values**		**θ**	**θ'**	**Fn. Values**		**θ**	**θ'**	**Fn. Values**		**θ**	**θ'**	**Fn. Values**	
0°	0°	sinθ=		**90°**	90°	sinθ=		**180°**	0°	sinθ=		**270°**	90°	sinθ=	
		cosθ=				cosθ=				cosθ=				cosθ=	
		tanθ=				tanθ=				tanθ=				tanθ=	
30°	30°	sinθ=		**120°**	60°	sinθ=		**210°**	30°	sinθ=		**300°**	60°	sinθ=	
		cosθ=				cosθ=				cosθ=				cosθ=	
		tanθ=				tanθ=				tanθ=				tanθ=	
45°	45°	sinθ=		**135°**	45°	sinθ=		**225°**	45°	sinθ=		**315°**	45°	sinθ=	
		cosθ=				cosθ=				cosθ=				cosθ=	
		tanθ=				tanθ=				tanθ=				tanθ=	
60°	60°	sinθ=		**150°**	30°	sinθ=		**240°**	60°	sinθ=		**330°**	30°	sinθ=	
		cosθ=				cosθ=				cosθ=				cosθ=	
		tanθ=				tanθ=				tanθ=				tanθ=	

Have Ms. Hale check your work so far to make sure there are no mistakes before you move on.

12.) How do your sin, cos, and tan compare to the coordinates you recorded on your Unit Circle. Describe the pattern below in 2 complete sentences. OR express this pattern as a formula.

____

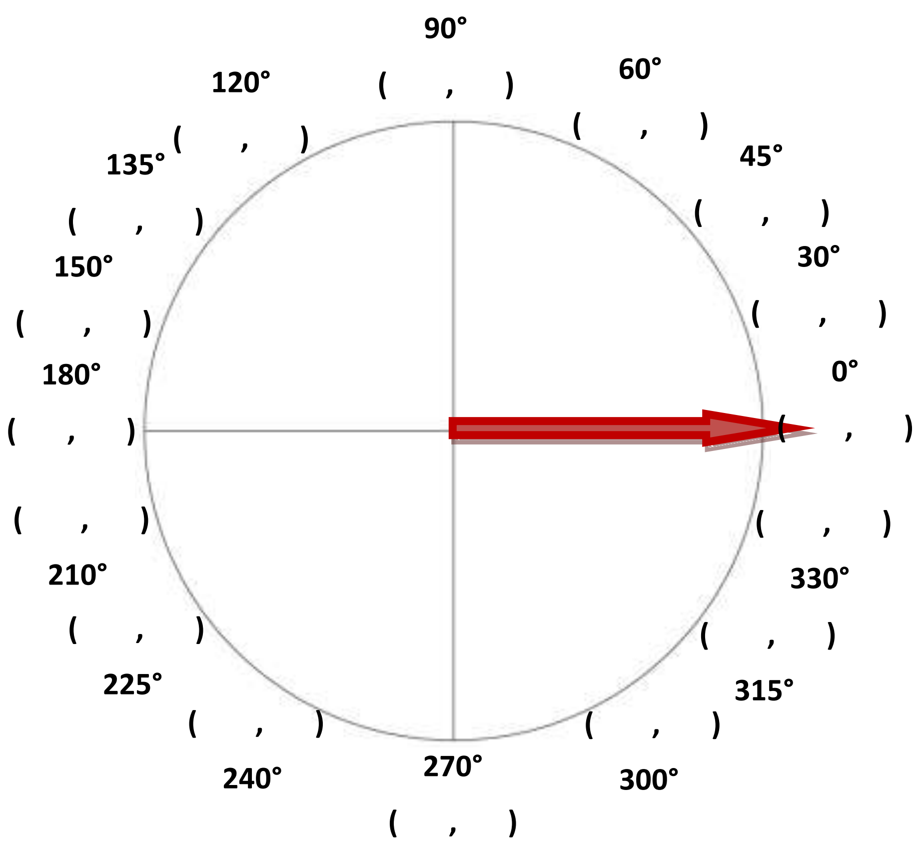
____

____

13.) Somewhere inside each quadrant of your Unit Circle, label each quadrant "A, S, T, C" as we learned last class.

a. Look back over your answers to step 11 to verify that the signs (+ or -) of your trig values are correct.

The Unit Circle



The Unit Circle