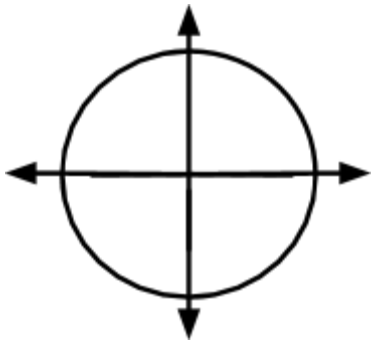
CW#___ Name:_____

2.3.1 A never-ending story.

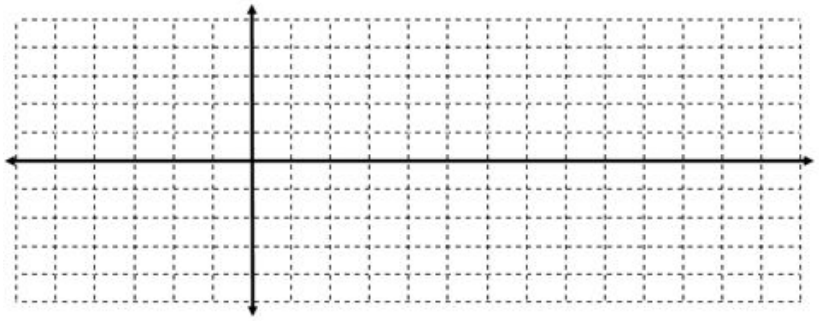
Solving Trigonometric Equations

#121 Consider the equation $\sin(x) = \frac{1}{2}$.

a. Use the diagram of the unit circle to solve the equation.



b. Now use a graph to solve the equation.



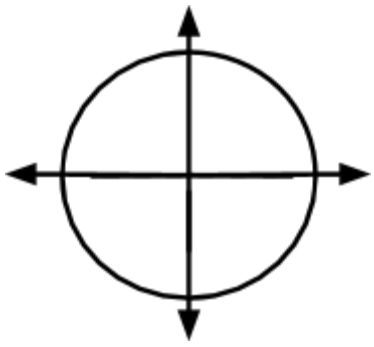
c. How many solutions does the equation have?

d. It is necessary to have a way to express *all* of the solutions to the equation. A multiple of what value can be added or subtracted from the solutions in part (a) to get all of the other solutions? Why does this value work? Be prepared to share your answer with the class.

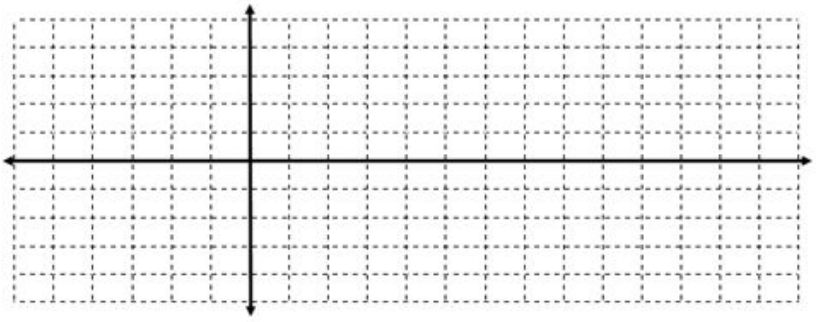
e. Work with your team to concisely express all of the solutions to the equation $\sin(x) = \frac{1}{2}$.

#122 What about the equation cos(x) = $\frac{1}{2}$? Solve the equation twice; first using the unit circle and next using a graph.

Unit Circle:



Graph



#123 How many solutions does the equation sin(x) = 2 have? Explain.

Solving a trigonometric equation is like solving any equation: the goal is to get the variable by itself on one side of the equal sign. The goal is to determine the value(s) of the variable that will make the equation a true statement. The number of solutions often depends on the domain given in the problem.

#124 With your team, solve each of the following equations over the given domains.	
a. $\cos(x) = -\frac{\sqrt{2}}{2}$ for all x	b. $2\cos(x) = 1$ for all x
c. $\sin(x) + 1 = 0$ for $0 \le x < 2\pi$	d. $2\sin(x) - \sqrt{3} = 0$ for $0 \le x < 2\pi$

#125 Algebraically solve each of the following equations for all x. Write your answers as concisely as possible. Verify your solutions with a graphing calculator.

a. $4\sin^2(x) - 3 = 0$

b. $\sin(x)\cos(x) = 0$

c. $\frac{\cos(x)+1}{\sin(x)} = 0$

d. $\tan(x)(2\cos(x) + 1) = 0$