Learning Objectives for Trigonometric Functions

Objective 2.02
Use trigonometric and inverse trigonometric functions to model and solve problems; justify results.

- Solve using graphs and algebraic properties.
- Create and identify transformations with respect to period, amplitude, and vertical and horizontal shifts.

This objective, like many others, covers a broad range of material. So lets break down this objective and see how it relates to our classroom today and the days ahead of us in the near future... as well as the not so near future.

In order to "Use trigonometric and inverse trigonometric functions to solve problems and justify results" we need to first fully understand the statements that follow.

I. Create and identify transformations with respect to period, amplitude, and vertical and horizontal shifts. Vocabulary Terms

- We will be comparing, analyzing, graphing, transforming, and interpreting different types of trigonometric function. As we improve our knowledge we will progress to creating, modeling, solving, and drawing conclusions about real world applications.

$y=sinx$ $y=cosx$ $y=tanx$ $y=cscx$ $y=secx$ $y=cotx$

$y=\sin^{-1}x$ $y=\cos^{-1}x$ $y=\tan^{-1}x$ $y=csc^{-1}x$ $y=sec^{-1}x$ $y=\cot^{-1}x$

Lesson 1
In order to be successful at graphing more complex trigonometric functions we must first understand how the simplest forms of the functions are created.

1) As with any function we first need to take a look at what makes it work. For our most basic trig functions we are going to us a combination of our Trigonometric function definition along with the Unit Circle to create the graphs.(Blank Practice Unit Circle)

   Once we have an understanding of how to create the unit circle we can now use our new found knowledge to help us evaluate trig functions for the special angles that appear on the unit circle. We will later use these concepts to create tables for graphing our 6 basic trigonometric functions.

Lesson Materials: Notes and practice.

Videos: Creating the Unit Circle

Worksheets: Using the Unit Circle
\ Trig Functions of Any Angle
Trig Functions of Any Angle

2) Lets start with graphing $y=sinx$. Video We typically use similar tactics while graphing the other five basic trigonometric functions. There are major similarities in the structure of these function algebraically, but the outputs have very noticeable differences in appearance when approached graphically.

$y=cosx$	$y=tanx$	$y=cscx$	$y=secx$	$y=cotx$
Video	Video	Video	Video	Video

- Now that we know how to graph the six basic trig functions we are going look at a few of the many variations of these functions. These functions have relationships with one another that we need to investigate in detail. When we compare trigonometric functions we use terms such as; **amplitude**, **period**, **vertical shift**, and **horizontal shifts(phase shift)**. These are terms that are clearly listed in the learning objective 2.02 above. Variations of our trigonometric functions will take on many different appearances, but their similarities and differences help us to understand how they are created as well as how they can actually be applied in real world scenarios.

- Variations of the sine function are called sinusoidal functions. For a better understanding what it means to be a sinusoidal function, take a look at this video.

- These variations look similar to the following functions:

  $y=d+a\sin(bx-c)$, $y=d+a\cos(bx-c)$, etc.

- Many conclusions can be drawn about about the graphs of these functions by simply understanding the vocabulary terms and how they relate to the constants a , b , c , and d . We use this new information in combination with our understanding of parent functions along with transformations to graph and model these trigonometric functions.

Worksheets: Graphing Trig and Inverse Trig Function

- When we are presented with a function that is a variation of one of our "Parent Functions," also known as "base" or "Mother Functions," such as:

  $$y=4\cos\left(x+\frac{\pi}{4}\right)-1$$

Objective 2.03

For sets of data, create and use calculator-generated models of linear, polynomial, exponential, trigonometric, power, logistic, and logarithmic functions.

- Interpret the constants, coefficients, and bases in the context of the data.
- Check models for goodness-of-fit; use the most appropriate model to draw conclusions or make predictions.