Pre Calculus

Date:

Items Needed: .Book,

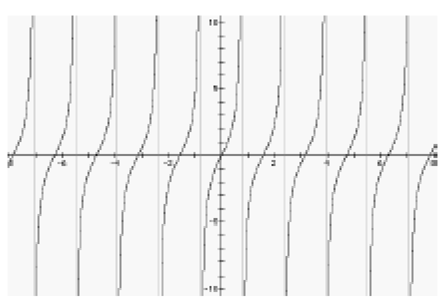
Objective: The students will be able to sketch the graph of the basic tangent, cotangent, secant, and cosecant function and any of their translations.

PA Common Core: cc.2.2.hs.c.8

Lesson:

- Graph $y = \tan x$
- What is happening with the graph?
- Remember that $\tan x = \frac{\sin x}{\cos x}$ so the function is undefined when cos x = 0.
- When does the graph repeat itself, every π ,so that is its period.
- See if the students can determine the domain and range, refer to the Library of functions – Tangent and all of its characteristics, p. 304.
- Graphing $y = a\tan(bx - c)$ is very similar to graphing $y = a\sin(bx - c)$.
- Two consecutive asymptotes can be found by solving the equations $bx - c = -\frac{\pi}{2}$ and $bx - c = \frac{\pi}{2}$. The midpoint between those to points is an *x*-intercept of the graph. The period is the distance between the two vertical asymptotes.
- Graph the following example.

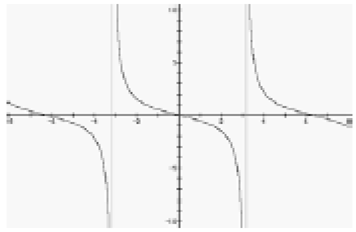
$y = 2\tan 2x$
Asymptotes at $x = \pm\pi/4$ and intercept at (0, 0).



- Graph this example

c) $y = -\tan(x/2)$

Asymptotes at $x = \pm\pi$ and intercept at (0, 0).



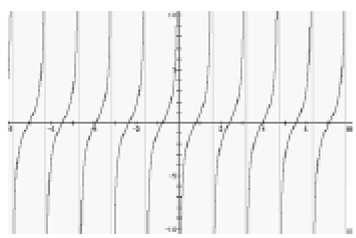
- What does the negative sign in front of the tangent do to the graph? Pick two other points in the period to find their *y* value before you graph the shape of the graph.

- From this information if you are given $y = a\tan(bx - c)$, when *a>0* the function will increase between the asymptotes, when *a<0* the function will decrease between the asymptotes.

- Graph the $y = \cot x$ and remember that $\cot x = \dfrac{\cos x}{\sin x}$.
- See if the students can determine the domain and range, refer to the Library of functions – Tangent and all of its characteristics, p. 306.
- Do example 3 and if needed, do example b.

b) $y = -2\cot 2x$

Asymptotes at $x = 0$ and $x = \pi/2$, and intercept at ($\pi/4$, 0).



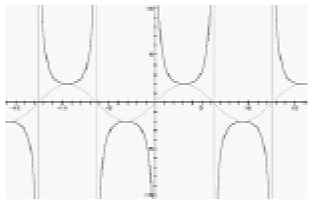
- Graph $y = \csc x$ and $y = \sin x$ remember that the cosecant and the sine functions are reciprocals of each other. Looking at the graphs what this means basically is that each function will have the same *x* value but the difference between the y values is $\dfrac{1}{\sin x}$.
- Make sure your calculator is zoomed in trig mode and then look at the graphs of each function. Move the right arrow and can you determine what value of x is being added every time you click the right arrow? ($\dfrac{\pi}{12}$).
- Go to the table function to determine the reciprocal functions. Look at the y value of the sine function and take one divided by that value to see if y2's value shows up.
- Look at library of functions – Cosecant and secant functions to determine their characteristics.

- So how do we go about graphing the secant and cosecant functions? We know how to graph the sine and cosine function and based upon our graphs that we did before the secant and cosecant functions are nothing more than parabolas from the peaks and valleys from the sine or cosine function.

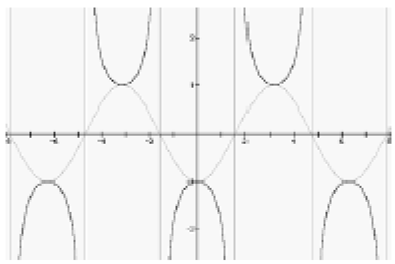
- The asymptotes are where the sine or cosine functions are 0.

- Graph these examples.

a) $y = 2\csc(x/2)$



b) $y = \sec(x + \pi)$



- Take a look at some of the screwy looking functions when you have multiple x values combined with a trig function.
- Graph f(x)=xsinx
- The sine function is trapped between the lines y=x and y=-x functions.
- In figure 4.65 the sin3x function is trapped between the e^{-x} and $-e^{-x}$ function.
- Refer to the notes in the book

Assignment: .Have students do 11, 16, 20, 28, p. 311.
Have students do 51, 52, 53, 54, 55, p. 312.
Have students do 64 after doing #63 as an example, 65, p. 312

Evaluation: (Could be from any one/several of the following)

Responses from classroom questions
Results of classroom sample problems
Homework responses
Check answer with Calculator
End of the section exam

Enrichment: