Name:_____

SM3 10.2: Graphing Cosecant & Secant

Problems:

Identify the period and relative max/min values of each function.

1) $y = \csc(3x)$
per: $\frac{2\pi}{3}$, min: 1, max: -1

2) $f(x) = 4\csc(x)$
per: 2π, min: 4, max: -4

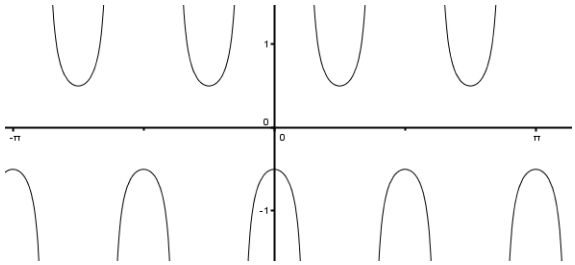
3) $g(x) = 1 + \sec(x)$
per: 2π, min: 2, max: 0

4) $y = 3\sec\left(\frac{1}{2}x\right)$
per: $\frac{2\pi}{1/2} = 4\pi$, min: 3, max: -3

5) $y = .5\csc\left(x - \frac{\pi}{2}\right)$
per: 2π, min: $.5$, max: $-.5$

6) $h(x) = 3\csc\left(2x - \frac{3\pi}{4}\right) - 3$
per: $\frac{2\pi}{2} = \pi$, min: 0, max: -6

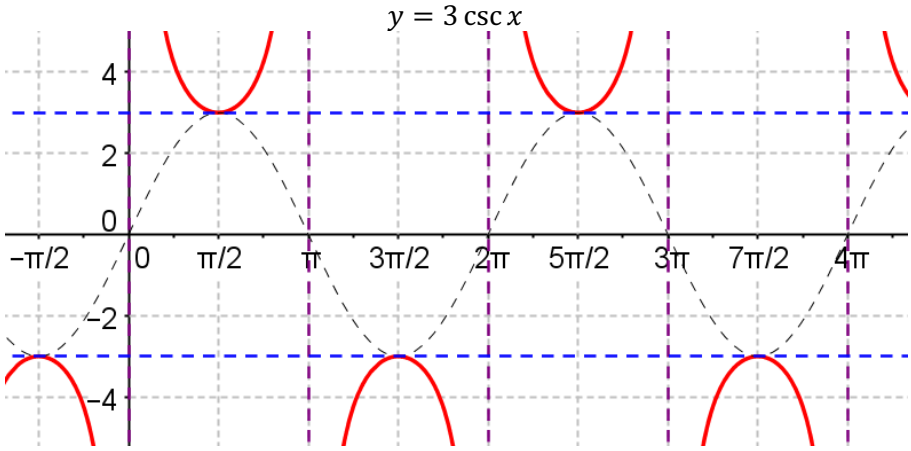
7)



per: $\pi/2$, min: $.5$, max: $-.5$

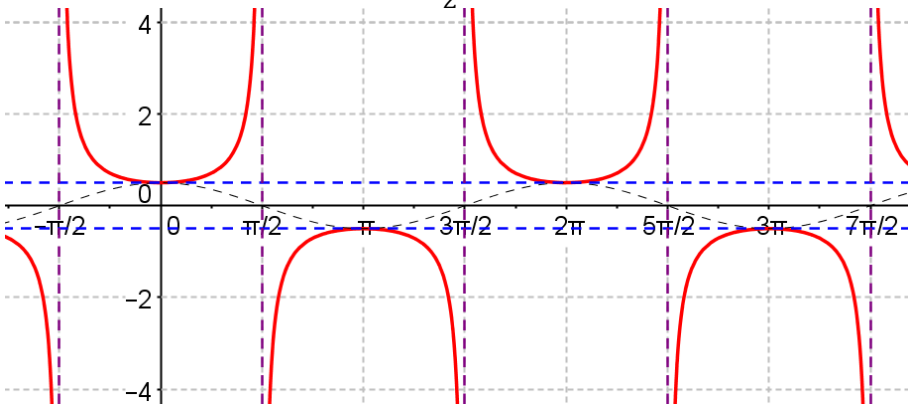
Sketch an appropriate coordinate axis and graph two periods of the function.

8)



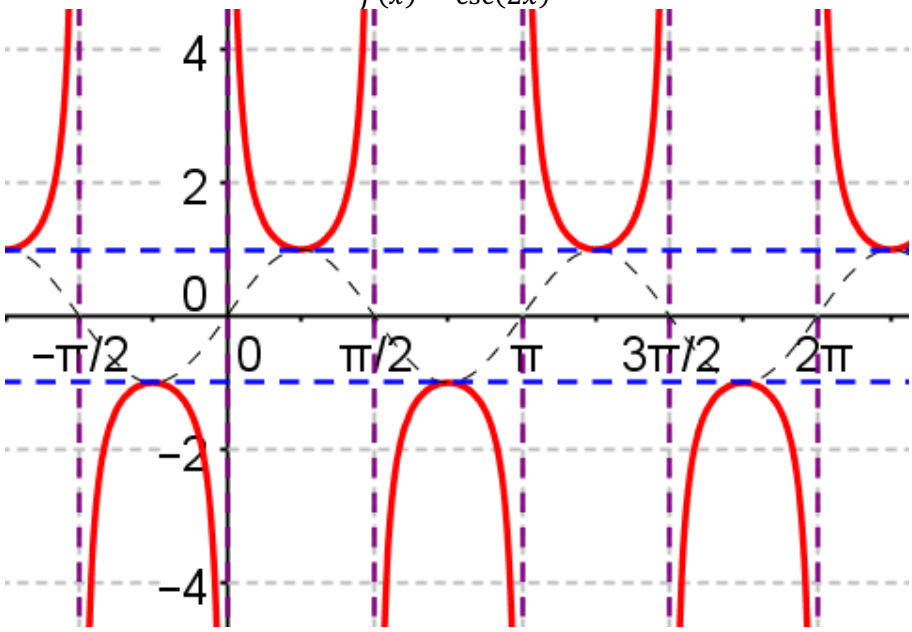
Max/ Min:	-3 3
Per:	2π
P.S.:	0
V.S.:	0
Scale:	$\frac{\pi}{2}$

9) $y = \frac{1}{2}\sec x$



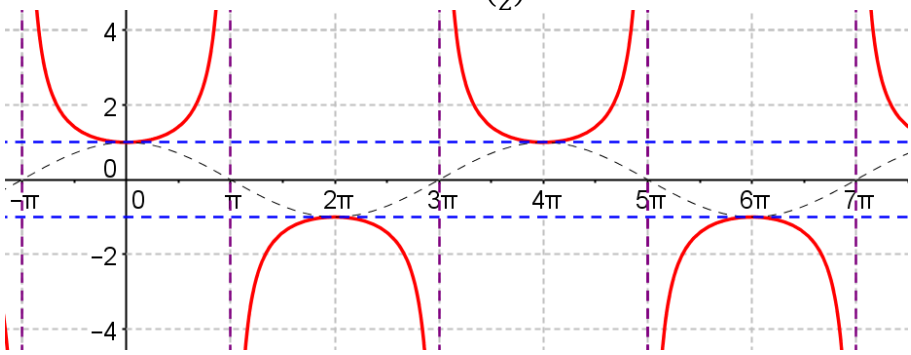
Max/ Min:	$-\frac{1}{2}$ $\frac{1}{2}$
Per:	2π
P.S.:	0
V.S.:	0
Scale:	$\frac{\pi}{2}$

10) $f(x) = \csc(2x)$



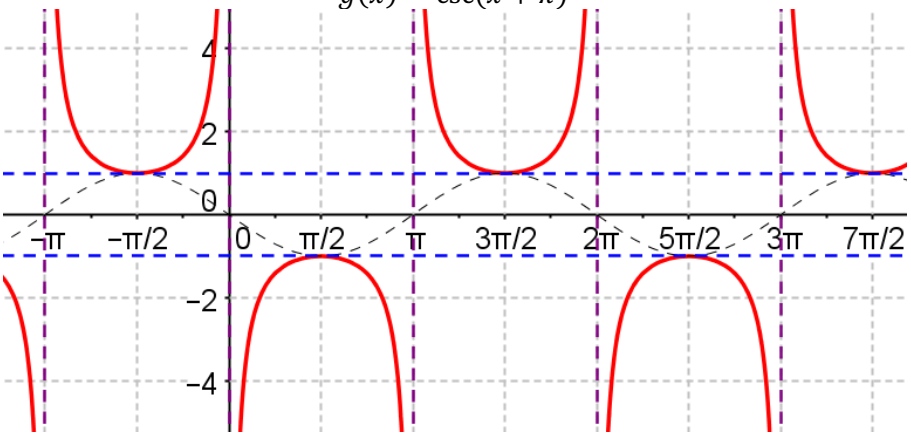
Max/ Min:	-1 1
Per:	π
P.S.:	0
V.S.:	0
Scale:	$\frac{\pi}{4}$

11) $y = \sec\left(\frac{x}{2}\right)$



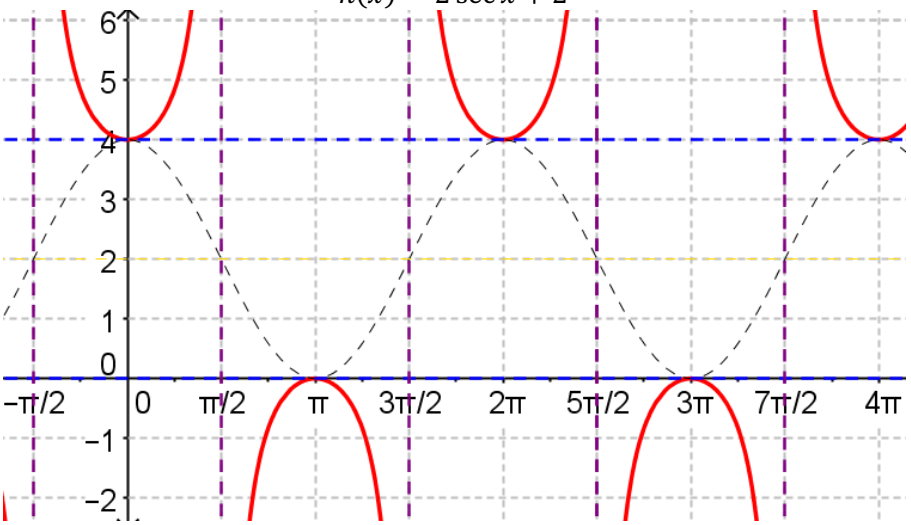
Max/ Min:	-1 1
Per:	4π
P.S.:	0
V.S.:	0
Scale:	π

12) $g(x) = \csc(x + \pi)$



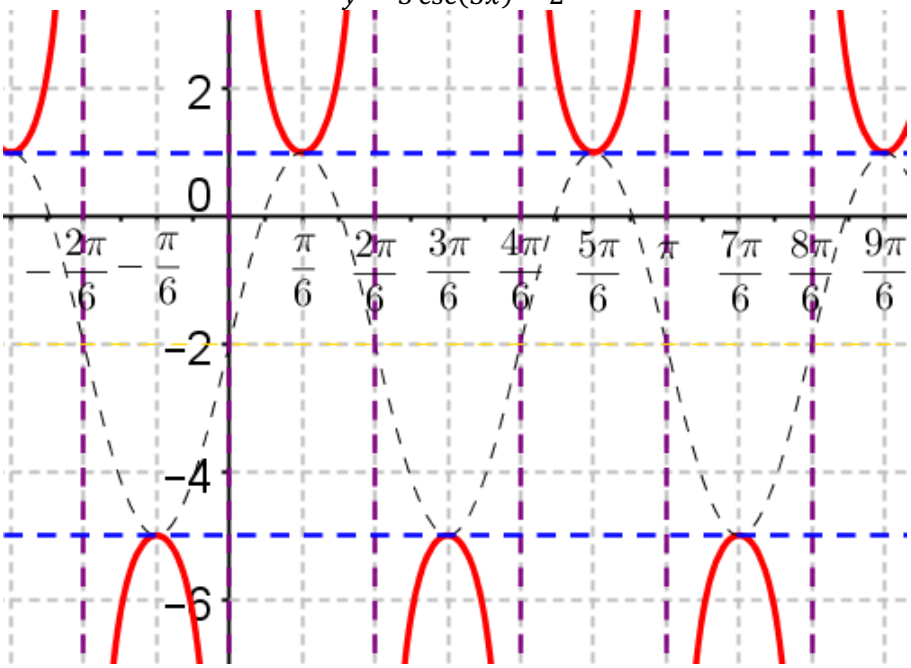
Max/ Min:	-1 1
Per:	2π
P.S.:	$\leftarrow \pi$
V.S.:	0
Scale:	$\frac{\pi}{2}$

13) $h(x) = 2\sec x + 2$



Max/ Min:	0 4
Per:	2π
P.S.:	0
V.S.:	2
Scale:	$\frac{\pi}{2}$

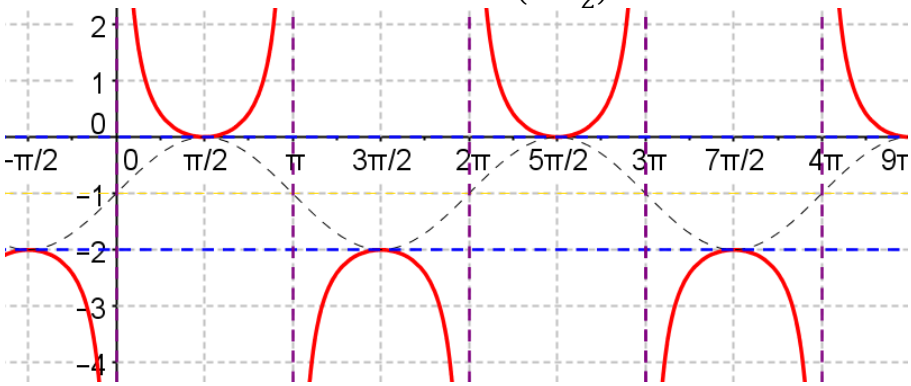
14) $y = 3\csc(3x) - 2$



Max/ Min:	-5 1
Per:	$\frac{2\pi}{3}$
P.S.:	0
V.S.:	-2
Scale:	$\frac{\pi}{6}$

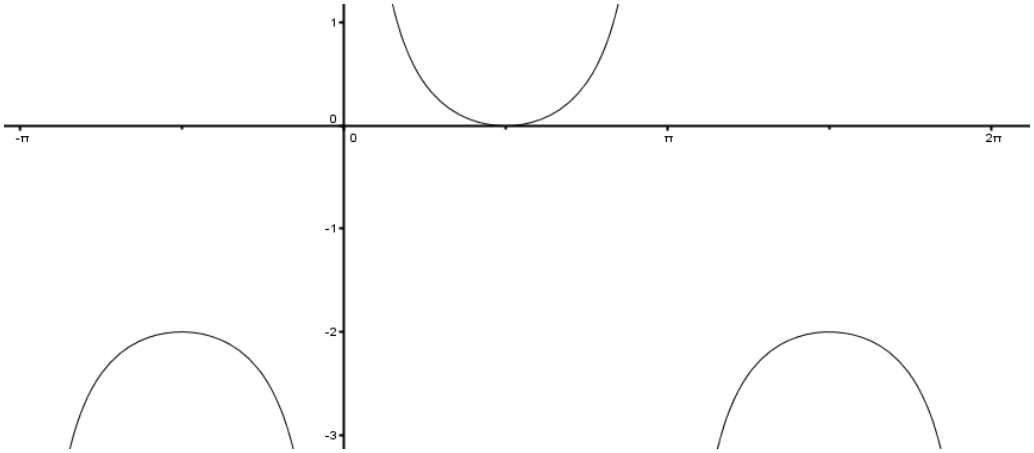
15)

$f(x) = -1 + \sec\left(x - \frac{\pi}{2}\right)$



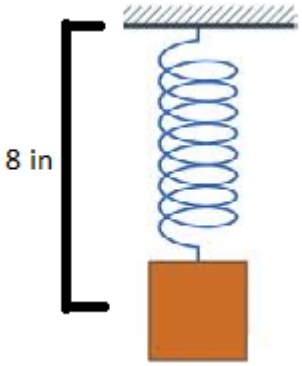
Max/ Min:	-2 0
Per:	2π
P.S.:	$\rightarrow \frac{\pi}{2}$
V.S.:	-1
Scale:	$\frac{\pi}{2}$

16) Write the simplest form of a) the cosecant function and b) the secant function for the given graph.



a) $y = \csc x - 1$

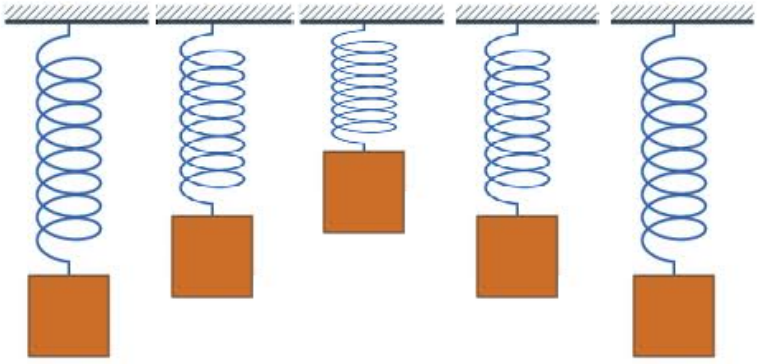
b) $y = \sec\left(x - \frac{\pi}{2}\right) - 1$ or $y = -\sec\left(x + \frac{\pi}{2}\right) - 1$



A spring with a weight attached to the end of the spring is hanging from a ledge. While at rest, the distance from the ledge to the middle of the weight is 8 inches.

Ian grabs the weight and tugs down on it, displacing it another 4 inches from the ledge and then (at time = 0) releases the spring so that it begins oscillating (it moves from being over-extended, to being at rest, to being under-extended, to being at rest, to being over-extended, etc.). It takes 4 seconds to complete the cycle of motion.

The diagram below shows snapshots of the weight's movement. Note that the spring is at rest in the second and fourth graphic.



17) Fill out the displacement values in the table, indicating how far the weight is from the ledge t seconds after Ian releases the weight (displacement below an object should be negative):

Time (t):	0	1	2	3	4	5	6	7	8	9
Displacement:	-12	-8	-4	-8	-12	-8	-4	-8	-12	-8

18) What is the amplitude of the motion of the weight (include units)?

$4\ inches$

19) As the weight moves, it follows the points of a trigonometric curve. The picture above shows the weight's first five positions along the curve. Which trigonometric function does the weight's displacement seem to follow: $\sin x$, $-\sin x$, $\cos x$, or $-\cos x$?

$-\cos x$

20) How long is the period the weight takes to complete one cycle of motion (include units)?

$4\ seconds$

21) Use the formula $Period = \frac{2\pi}{b}$ to determine an appropriate value for b.

$b = \frac{\pi}{2}$

22) How far is the weight from the ledge when the spring is at rest?

-8

23) Write a trigonometric function that accurately describes the displacement of the weight as a function of time.

$h(t) = -4\cos\left(\frac{\pi}{2}t\right) - 8$