

Name:

Period:

Date:

Math Lab: Explore the Parent Graphs of the Trigonometric Functions

QUESTION

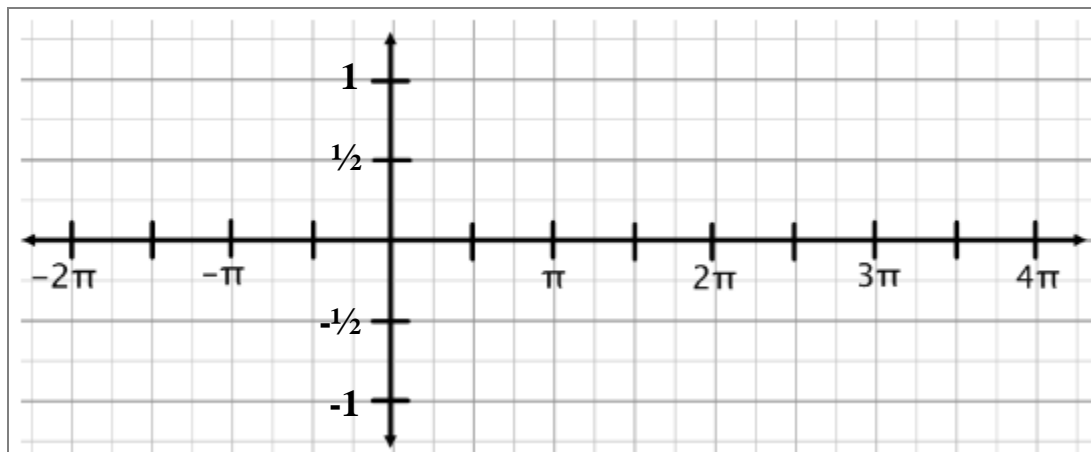
What are the properties and characteristics of the parent graphs of the trigonometric functions?

EXPLORE THE SINE FUNCTION

1. Set your graphing calculator to radian mode.
2. Set the viewing window to $-2\pi < x < 4\pi$ and $-2 < y < 2$, x-scale = $\frac{\pi}{2}$ and y-scale = $\frac{1}{2}$.

```
WINDOW
Xmin=-6.283185...
Xmax=12.566370...
Xscl=1.5707963...
Ymin=-2
Ymax=2
Yscl=.5
↓Xres=■
```

3. Graph the function $y = \sin x$.
4. Sketch the graph in pink.
Plot the critical points only (zeros & maximums/minimums) and connect with a smooth curve.



5. The **amplitude** of a trig function's graph is half the difference of the y – maximum and the y – minimum. Find the amplitude of $y = \sin x$. Label it on your graph.
6. What are the domain, range, and zeros of the function?

Domain:

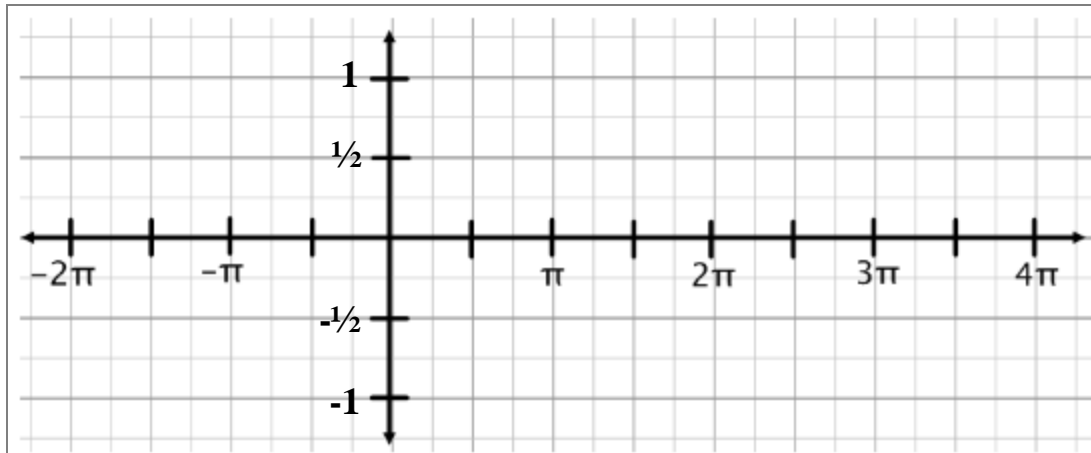
Range:

Zeros:

7. Notice how the graph of the sine function repeats. Trig functions are **periodic**, which means that their graphs have a repeating (or cyclic) pattern. The shortest repeating portion of the graph is called a **cycle**. The horizontal length of each cycle is called the **period**. If you start at $x = 0$, at what x -value does the graph begin to repeat itself; that is, what is the period of $y = \sin x$? Label it on your graph.

EXPLORE THE COSINE FUNCTION

1. Graph the function $y = \cos x$.
2. Sketch the graph in purple, plotting the critical points only and connecting with a smooth curve.



3. What are the domain, range, amplitude, period, and zeros of the function?

Domain:

Range:

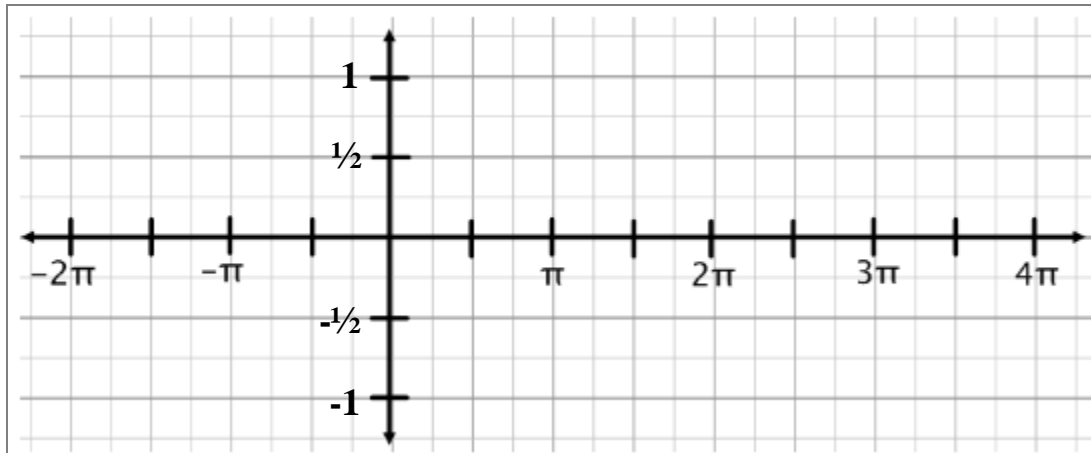
Zeros:

Amplitude:

Period:

EXPLORE SINE AND COSINE TOGETHER

Sketch the sine function in pink and the cosine function in purple on the same coordinate plane.



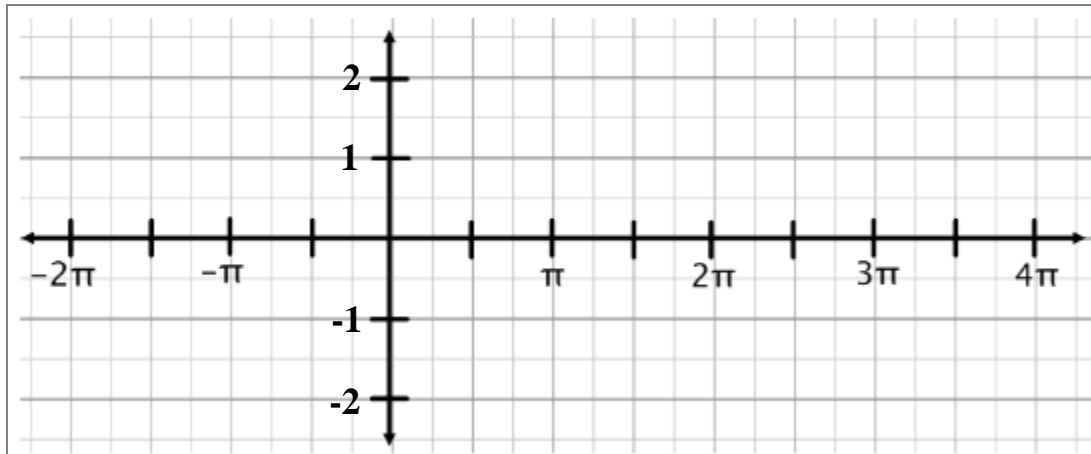
1. What do you observe from looking at the graphs of the functions $y = \sin x$ and $y = \cos x$? Compare the amplitude, period, domain, and range of both functions.

EXPLORE THE TANGENT FUNCTION

1. Under the TBLSET (Table Setup) menu, change the TblStart to 0 and the ΔTbl increments to $\pi/4$

```
TABLE SETUP
TblStart=0
 $\Delta\text{Tbl}=\pi/4$ 
Indent: Auto Ask
Depend: Auto Ask
```

2. Graph the function $y = \tan x$. (Use the calculator's table to approximate points for the graph.)
3. Sketch the graph in pink, plotting the critical points only and connecting with smooth curves.



4. What are the domain, range, amplitude, period, and zeros of the function?

Domain:

Range:

Zeros:

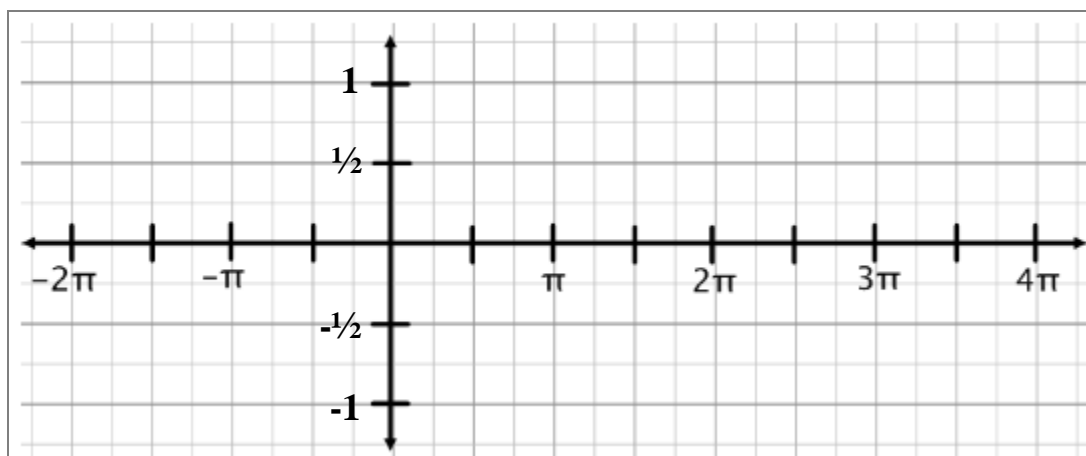
Amplitude:

Period:

5. Describe what occurs at $\frac{\pi}{2} + k\pi$ where k is any integer. Why is this occurring? Mark these in using dashed lines on your graph.

EXPLORE THE COSECANT FUNCTION

1. Graph the function $y = \csc x$. (Hint: cosecant is the reciprocal of which basic trig function?)
2. Sketch the graph in purple, plotting the critical points only and connecting with smooth curves.



3. What are the domain, range, amplitude, period, and zeros of the function?

Domain:

Range:

Zeros:

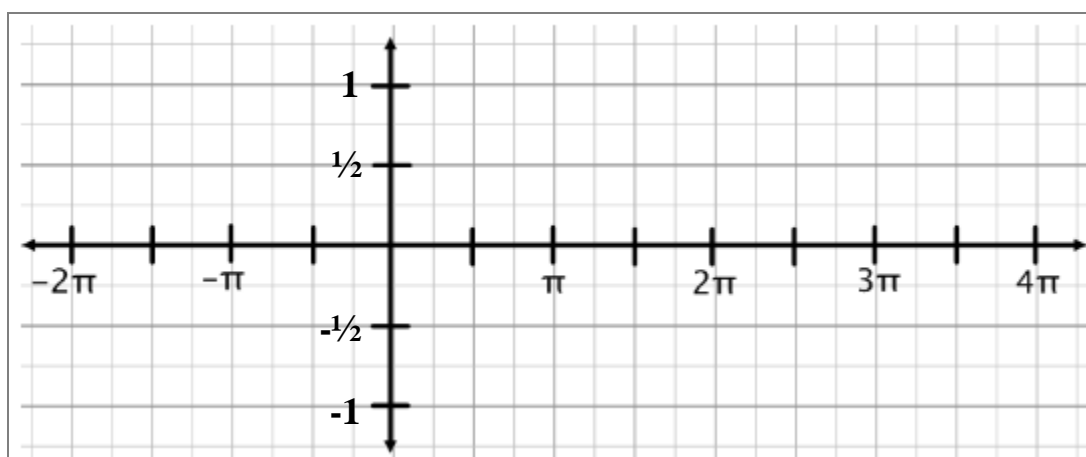
Amplitude:

Period:

4. What do the graphs of tangent and cosecant have in common?

EXPLORE SINE AND COSECANT TOGETHER

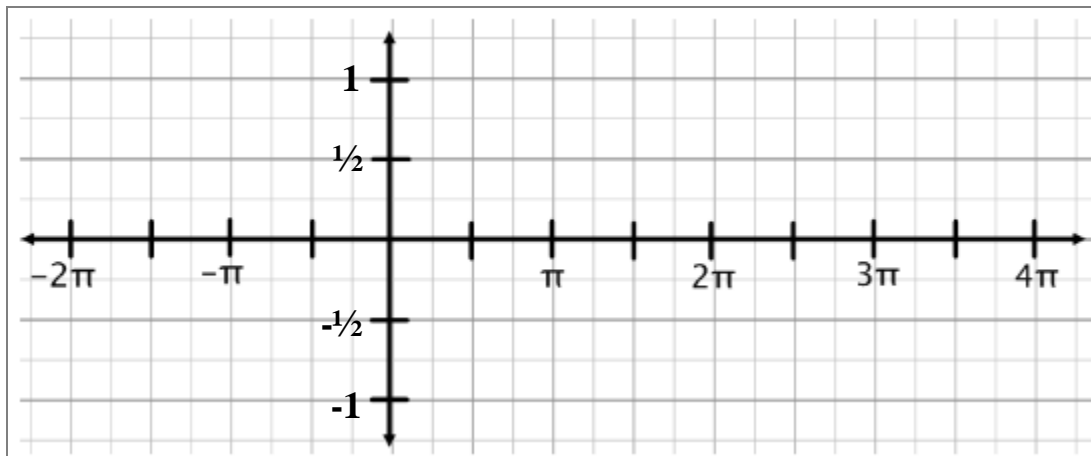
Sketch the sine function in pink and the cosecant function in purple on the same coordinate plane.



1. What do you observe from looking at the graphs of the functions $y = \sin x$ and $y = \csc x$? Compare the amplitude, period, domain, and range of both functions.

EXPLORE THE SECANT FUNCTION

1. Graph the function $y = \sec x$. (Hint: secant is the reciprocal of which basic trig function?)
2. Sketch the graph in purple, plotting the critical points only and connecting with smooth curves.



3. What are the domain, range, amplitude, period, and zeros of the function?

Domain:

Range:

Zeros:

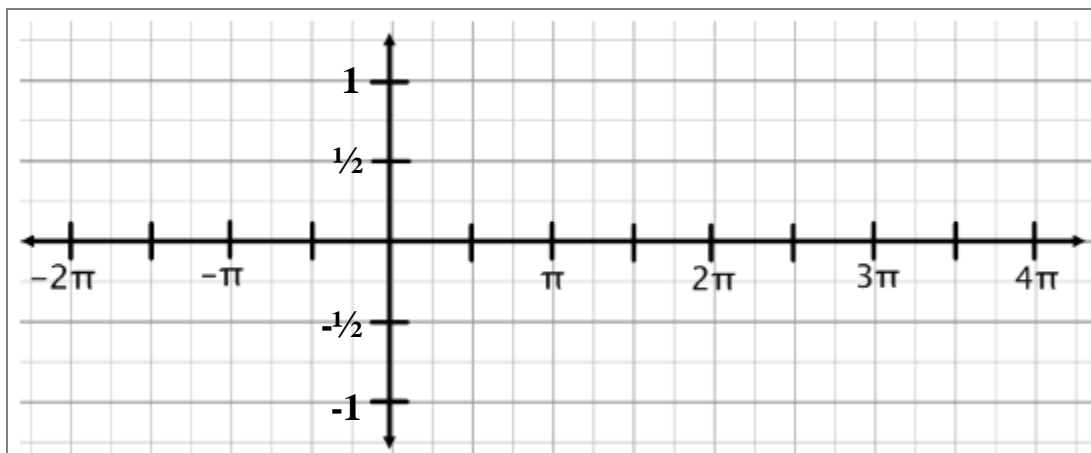
Amplitude:

Period:

4. What do the graphs of secant and cosecant have in common?

EXPLORE COSINE AND SECANT TOGETHER

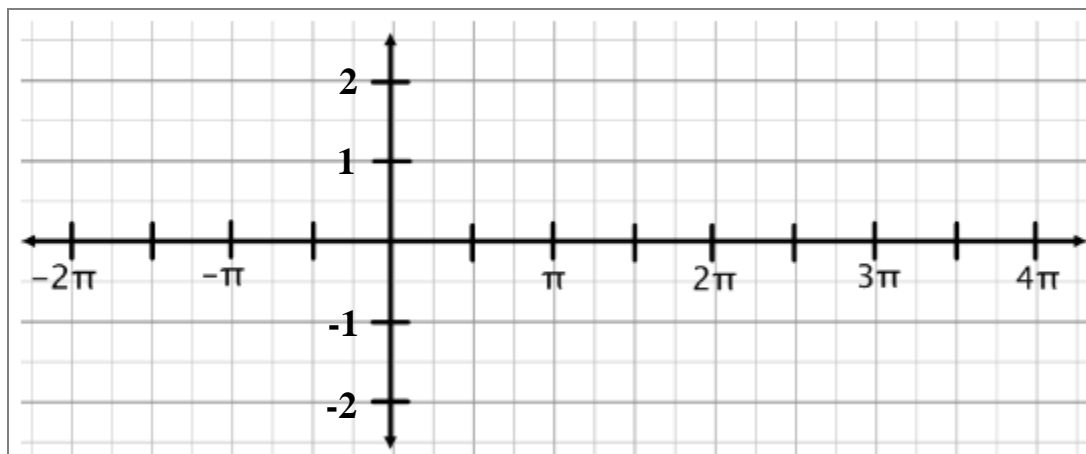
Sketch the cosine function in pink and the secant function in purple on the same coordinate plane.



1. What do you observe from looking at the graphs of the functions $y = \cos x$ and $y = \sec x$? Compare the amplitude, period, domain, and range of both functions.

EXPLORE THE COTANGENT FUNCTION

1. Graph the function $y = \cot x$. (Hint: cotangent is the reciprocal of which basic trig function?)
2. Sketch the graph in purple, plotting the critical points only and connecting with smooth curves.



3. What are the domain, range, amplitude, period, and zeros of the function?

Domain:

Range:

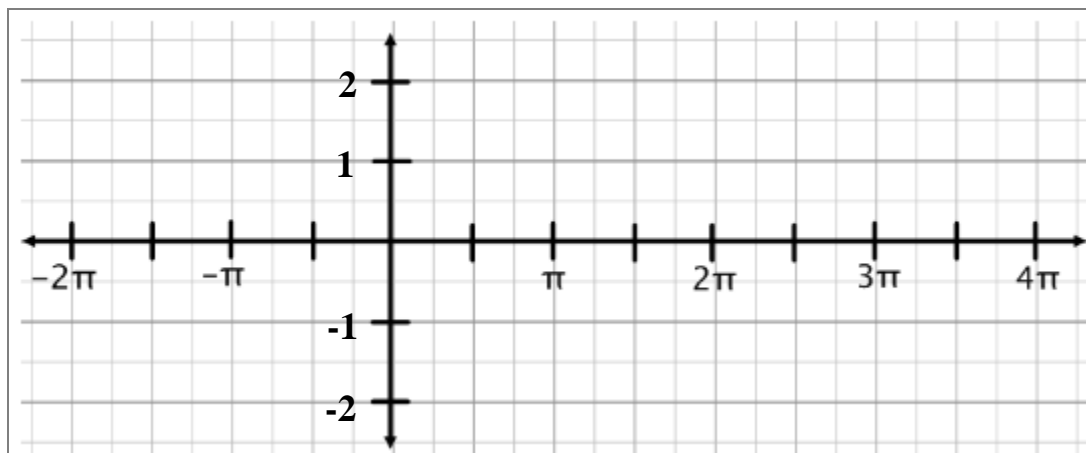
Zeros:

Amplitude:

Period:

EXPLORE TANGENT AND COTANGENT TOGETHER

Sketch the tangent function in pink and the cotangent function in purple on the same coordinate plane.



1. What do you observe from looking at the graphs of the functions $y = \tan x$ and $y = \cot x$? Compare the amplitude, period, domain, and range of both functions.