Math Virtual Learning

Precalculus with Trigonometry

Students will graph transformations of trigonometric functions

April 22, 2020

Precalculus with Trigonometry
Lesson: April 22nd, 2020

Objective/Learning Target:
Students will graph transformations of trigonometric functions

Let's Get Started:
Watch Video: Graphing Cosine with Multiple Transformations

Example

Today's lesson will put together all that you have learned over the course of the past few weeks on graphing transformations of trigonometric functions.

The first step in graphing is to identify the key features of the trig function.

Identify the amplitude, period, phase shift, and vertical shift of the following function: $y = 3 \sin(2x + \pi) + 1$

$$y = a \sin(bx - c) + d$$

Example continued

Recall from previous lessons that the sine function can be modeled with the following general equation: $y = a\sin(bx - c) + d$

Identify the amplitude, period, phase shift, and vertical shift of the following function: $y = 3\sin(2x + \pi) + 1$

Amplitude = 3 **Period =** $\frac{2\pi}{b} = \frac{2\pi}{2} = \pi$

Vertical Shift = 1 **Phase Shift:** $\frac{-c}{b} = \frac{-\pi}{2}$

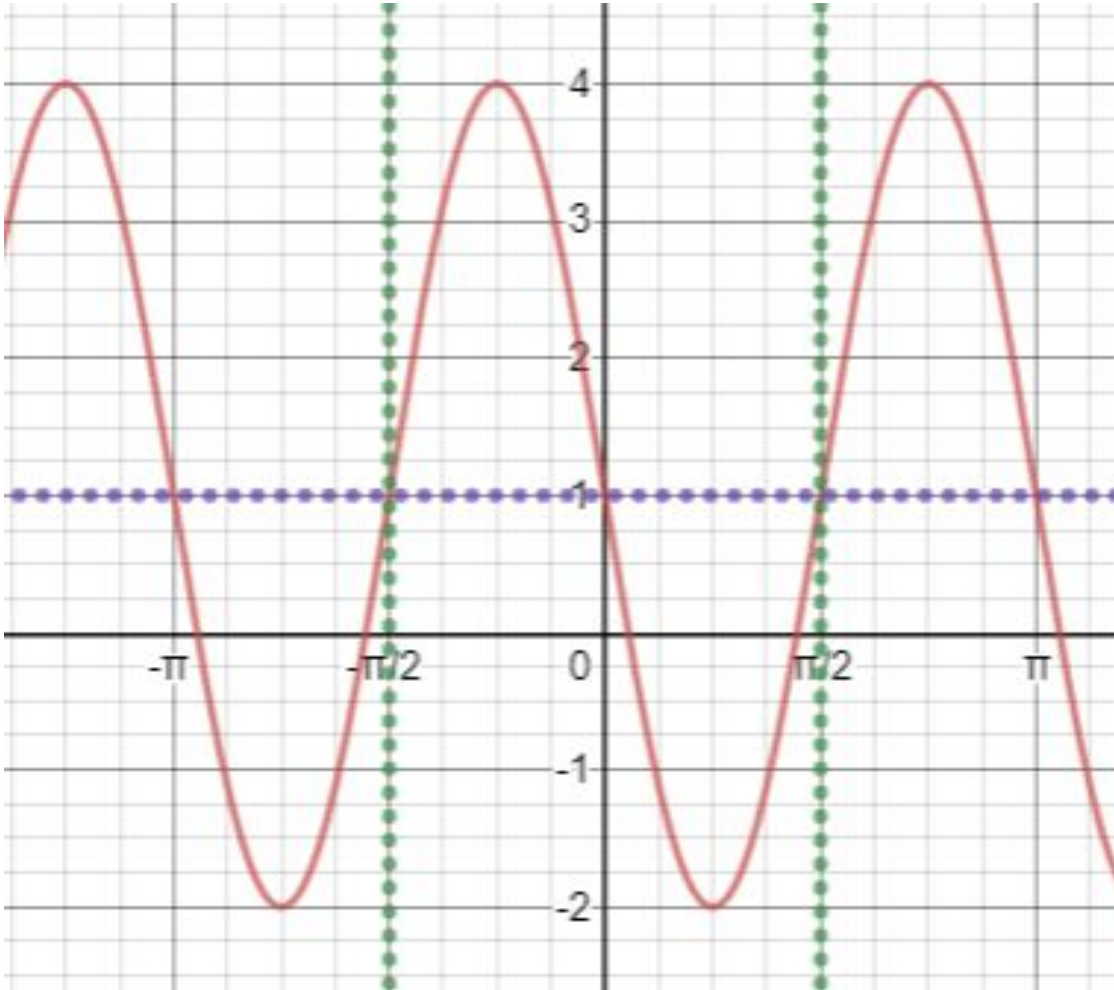
Now put it all together!

Notice the midline of the graph occurs at y =1 (the vertical shift)

The amplitude is 3 (distance from midline)

The period is pi (one sine wave is completed within the green lines, which add together to be pi radians)

The phase shift is $\frac{-\pi}{2}$ (the sine function is shifted left horizontally by pi/2 units.



Practice

Identify the amplitude, period, phase shift, and vertical shift of the following. Then graph.

1. $y = 2\cos(4x - \frac{\pi}{2})$

2. $y = \tan(x + \frac{\pi}{4}) + 1$

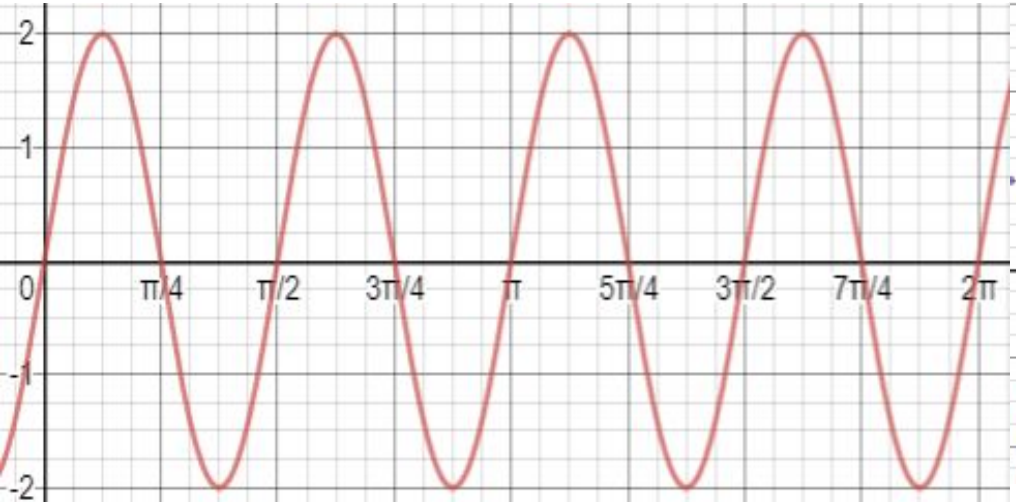
3. $y = -3\sin(3x) + 2$

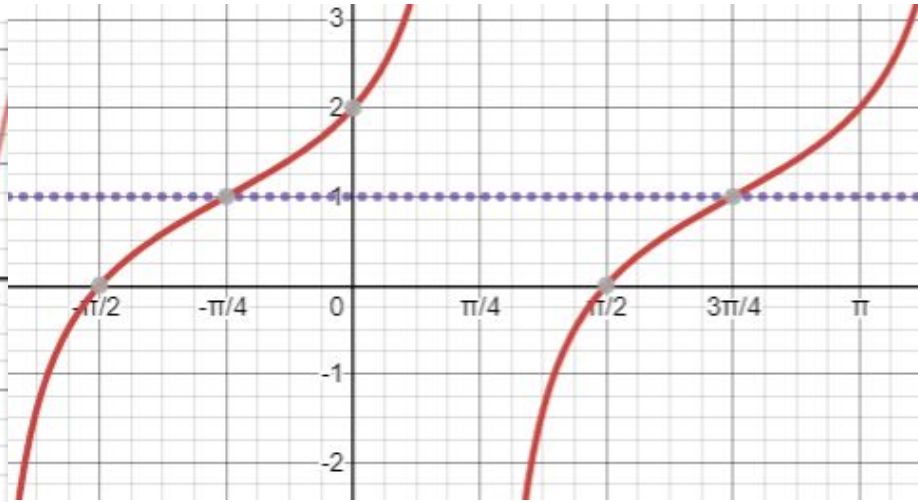
4. $y = \csc(2x) - 1$

Answers to Practice

1. Amplitude	2
Period	$\frac{\pi}{2}$
Phase Shift	$\frac{\pi}{8}$
Vertical Shift	none

2. Amplitude	none
Period	π
Phase Shift	$\frac{-\pi}{4}$
Vertical Shift	1



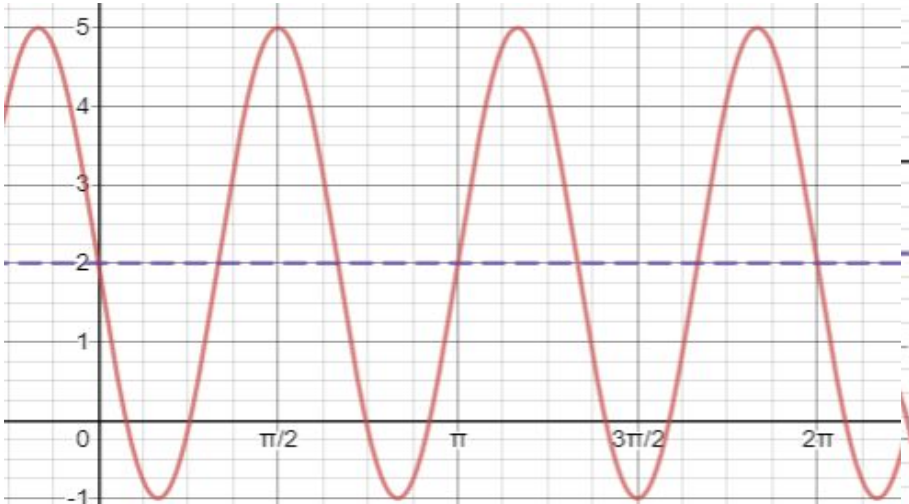


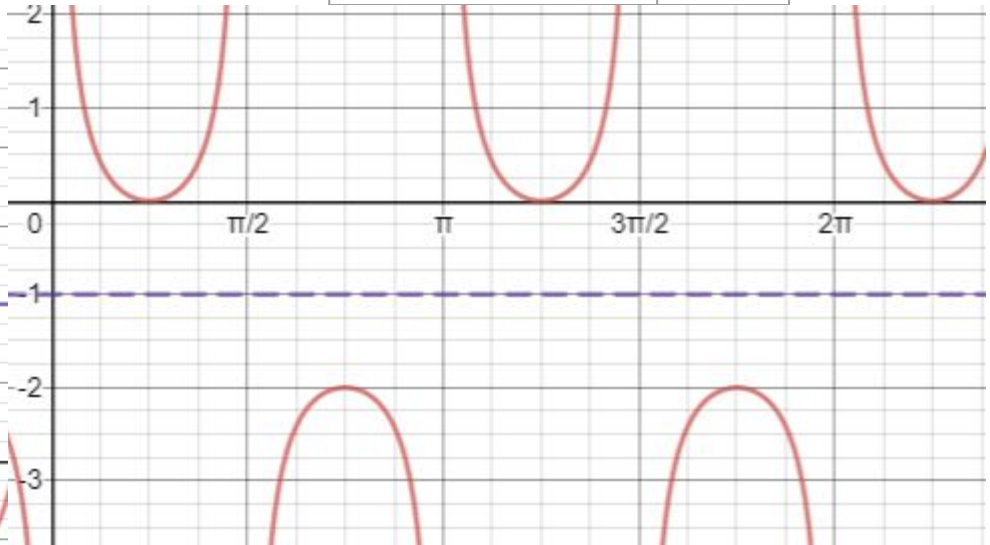
Answers to Practice Continued

3. Amplitude	3
Period	$\frac{2\pi}{3}$
Phase Shift	none
Vertical Shift	2

*Problem #3 also had a reflection

4. Amplitude	none
Period	π
Phase Shift	none
Vertical Shift	-1





Additional Resources:

Additional practice:

Transforming Trig Functions with answers

Additional resources:

Modeling annual temperature with Trig Functions

Transformations of Trig functions explained