

10-4 Graphing Trigonometric Functions

Objectives:

- I can graph basic sine, cosine, and tangent functions
- I can use transformations to graph sine and cosine functions
- I can identify characteristics of trigonometric functions

Sinusoid: Word to describe a sine or cosine graph

$$f(x) = a \sin(b(x - h)) + k$$

a: Amplitude (vertical): **STRETCH**

b: Period Finder (horizontal): **STRETCH** Period: $\frac{2\pi}{|b|}$

h: Phase Shift(horizontal): **OR R, x's lie (in Radians)**

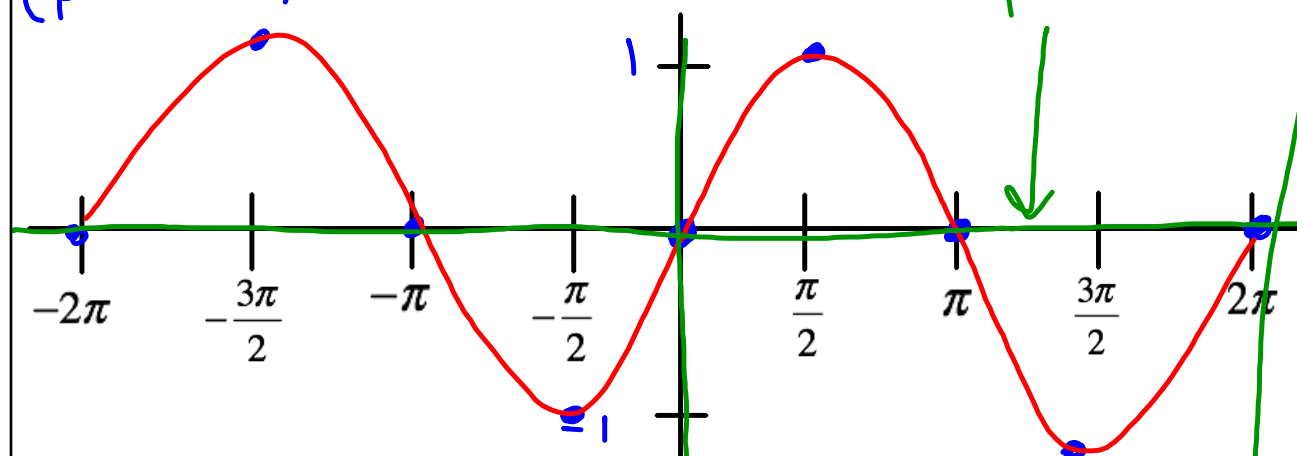
k: Vertical Shift(vertical):

changes MIDLINE

Video of sin graph and unit circle:

 https://www.youtube.com/watch?v=Ohp6Okk_tww

Graph $y = \sin x$
(radians, $\sin(y)$)

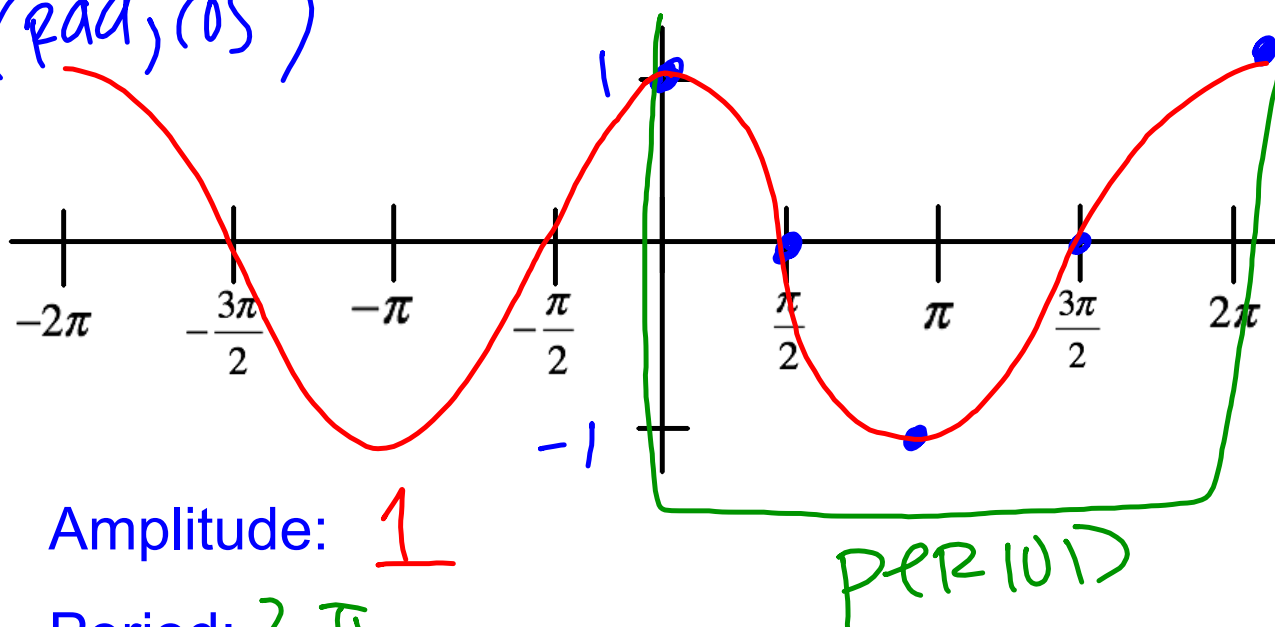


Amplitude: 1

Period: 2π

~~Frequency:~~ 1

Graph $y = \cos x$
(rad, cos)

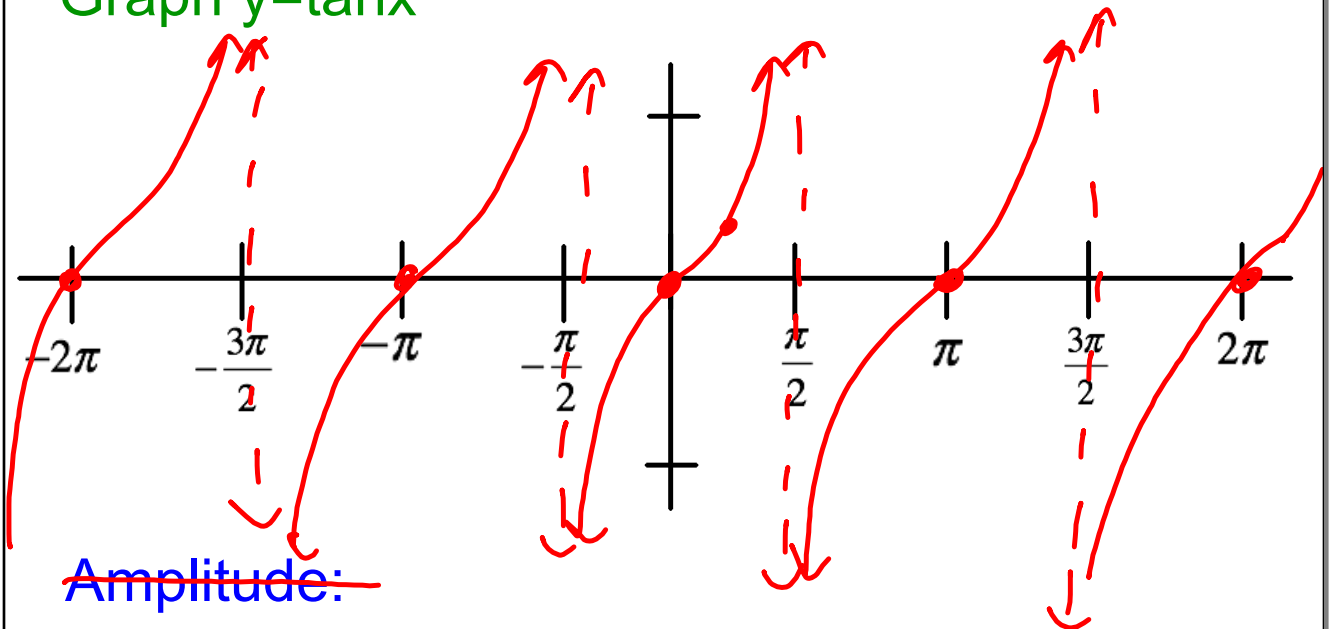


Amplitude: 1

Period: 2π

Frequency: 1

Graph $y = \tan x$



~~Amplitude:~~

~~Period:~~

~~Frequency:~~

State the amplitude, period, frequency, phase shift, and vertical shift of each function.

$$y = -2 \sin\left(\frac{x}{3} + \frac{\pi}{4}\right)$$

Amp: - 2

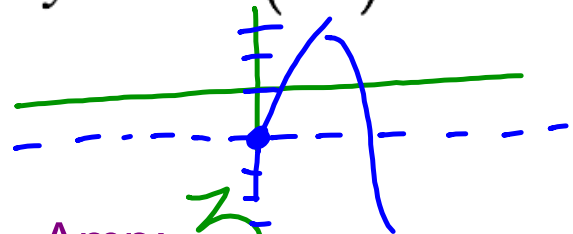
Period: $\frac{2\pi}{\frac{1}{3}} = 6\pi$

~~Frequency:~~

Phase Shift: left $\frac{\pi}{4}$

Vertical Shift: none

$$y = 3 \sin(2x) - 1$$



Amp: 3

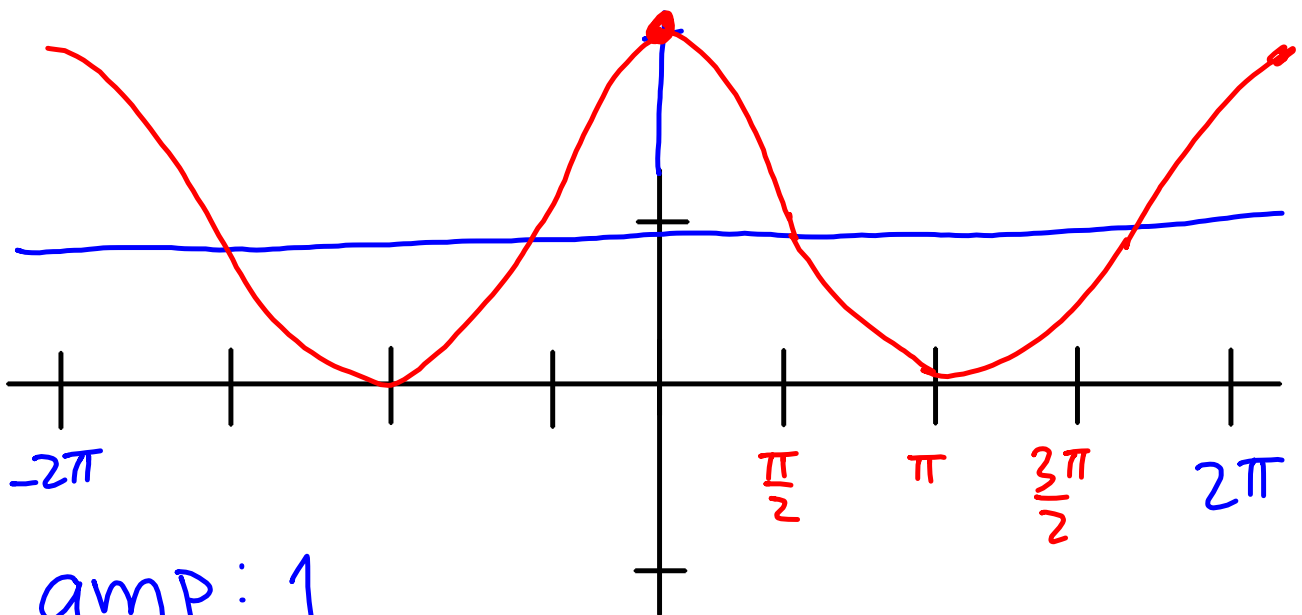
Period: $\frac{2\pi}{2} = \pi$

~~Frequency:~~

Phase Shift: NONE

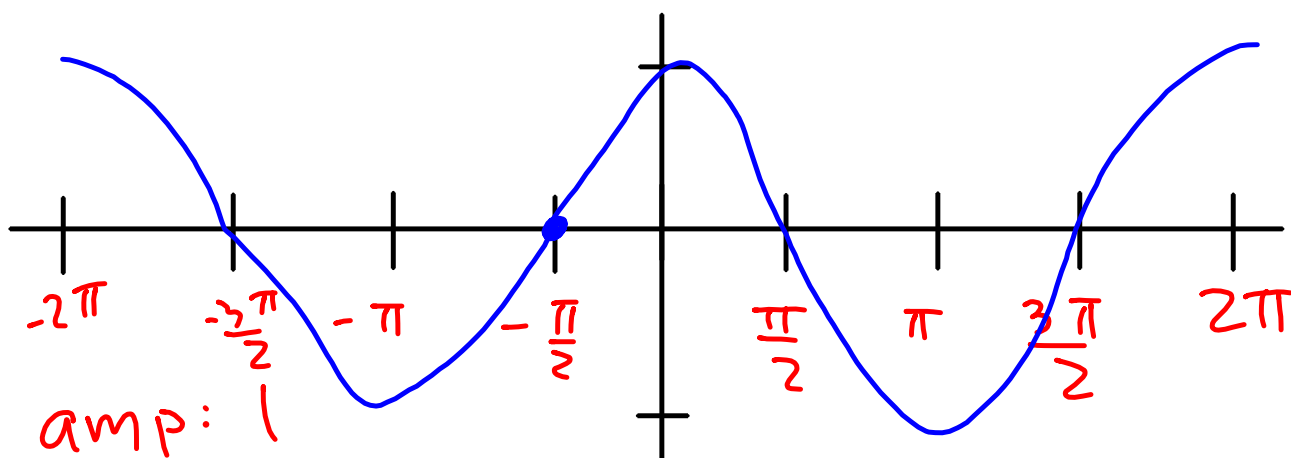
Vertical Shift: Down 1

Graph $y = \cos x + 1$



amp: 1
per: 2π
P.S.: none
V.S.: UPI

$$y = \sin\left(x + \frac{\pi}{2}\right) = \cos x$$



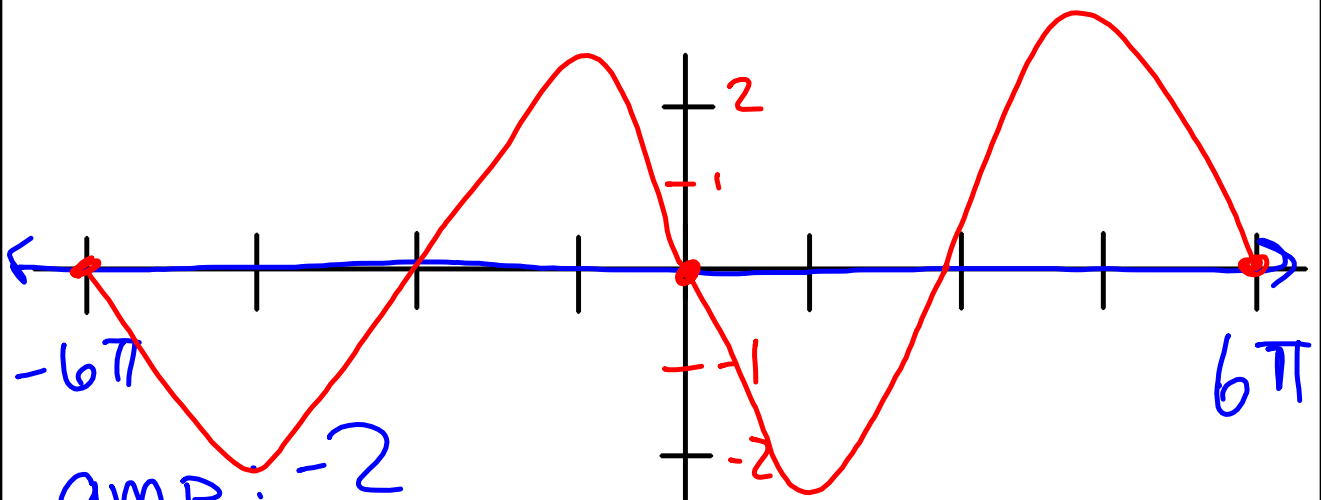
amp: 1

PER: 2π

P.S.: $\text{left} + \frac{\pi}{2}$

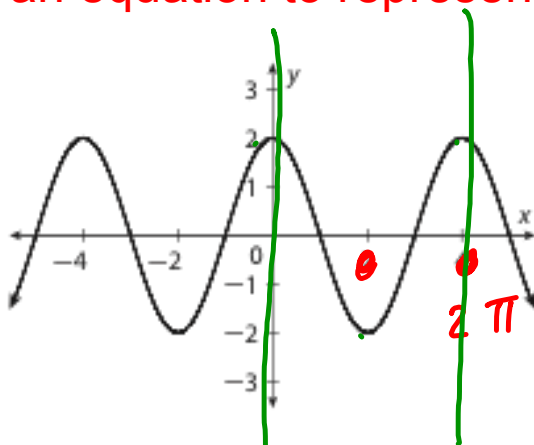
V.S.: none

$$y = -2 \sin\left(\frac{x}{3}\right)$$



amp : $\frac{-2}{2\pi}$
 per : $\frac{2\pi}{1/3} = 6\pi$
 p.s.: } none
 v.s.: }

Write an equation to represent the graph

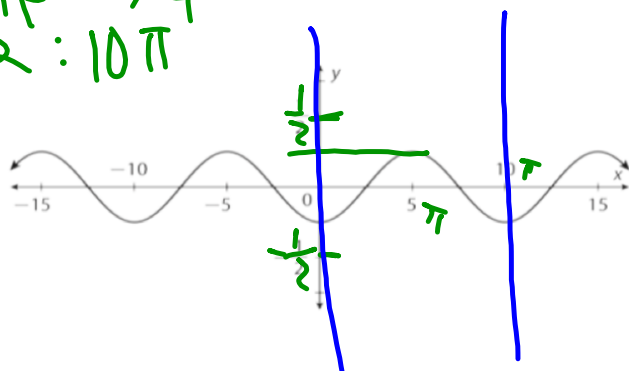


amp: 2
per: 2π

$$y = 2 \cos x$$

Write an equation to represent the graph

amp: $-\frac{1}{4}$
per: 10π



$$10\pi = \frac{2\pi}{?} = \frac{1}{5}$$

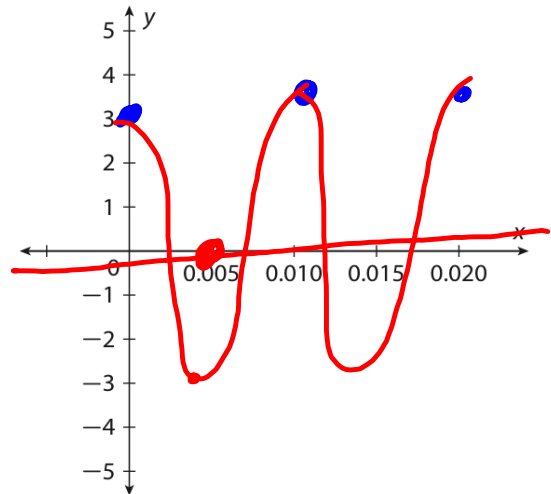
$$y = -\frac{1}{4} \cos\left(\frac{1}{5}x\right)$$

- B Physics** Use a cosine function to graph a sound wave with a period of 0.010 second and an amplitude of 3 pascals. Note that the recording of the sound wave started when the wave was at its maximum height.

Graph the function.

$$\text{frequency} = \frac{1}{\text{period}} = \frac{1}{\boxed{}} = \boxed{} \text{ Hz}$$

The frequency represents the number cycles of the sound wave every _____. The amplitude represents the maximum change in _____. The period represents the amount of time it takes for the sound wave to [end/repeat].



cos \rightarrow ABOVE MIDLINE
 per .01 \rightarrow 1 wave in .01
 amp 3

- 7. Amusement Parks** The height h in feet of a car on a different Ferris wheel can be modeled by $h(t) = -16\cos\frac{\pi}{45}t + 24$, where t is the time in seconds. Identify the period, midline, amplitude, and maximum and minimum values of the graph. For one cycle starting from $t = 0$, find all points where the graph intersects its midline and the coordinates of any local maxima and minima. Interpret these points in the context of the problem, and graph one cycle.

