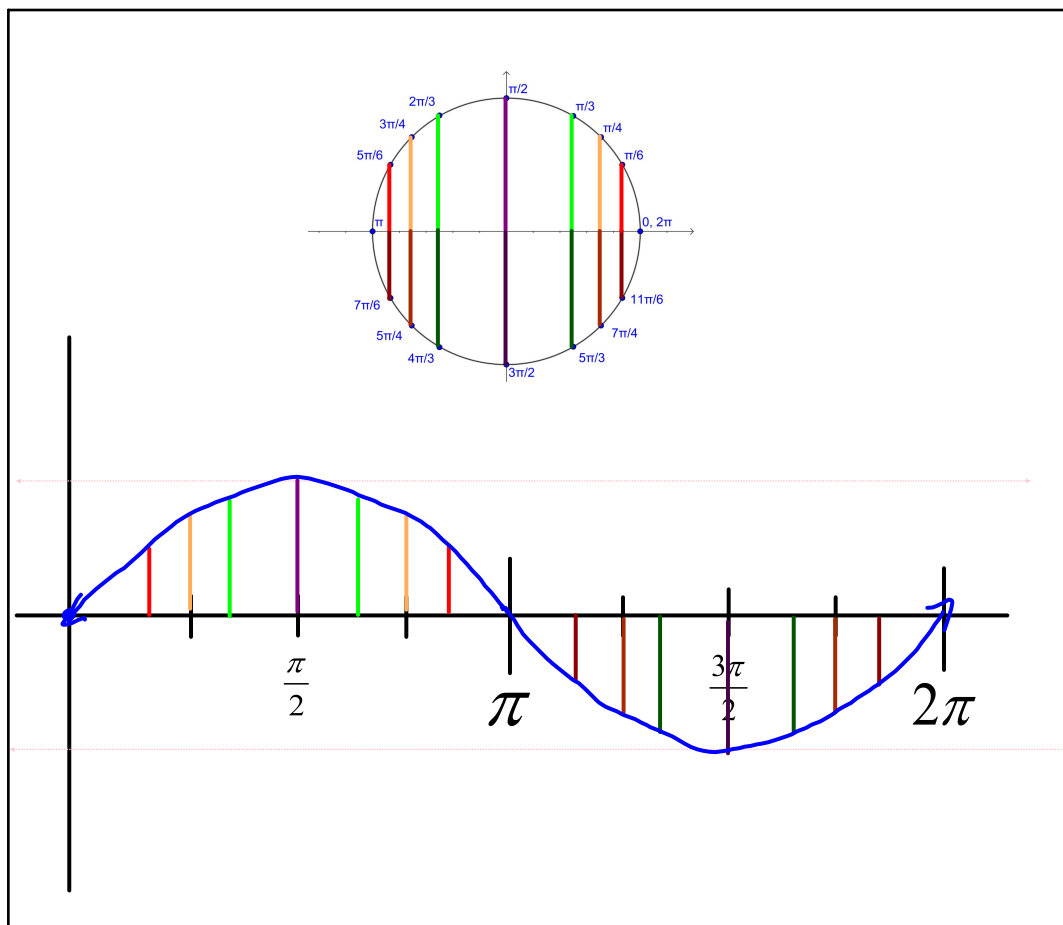# 9-4 Graphing Trigonometric Functions

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

https://youtu.be/oLjHyJgQwxw?
list=PLh5WsirnSoLDRxz2WQcEZFvG4XVXWRUWa

Feb 9-10:44 AM

Mar 29-9:25 AM

Sinusoid: Word to describe a sine or cosine graph

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

a: Amplitude: V. stretch

b: Period Finder: length of one repition   Period: $\dfrac{2\pi}{|b|}$

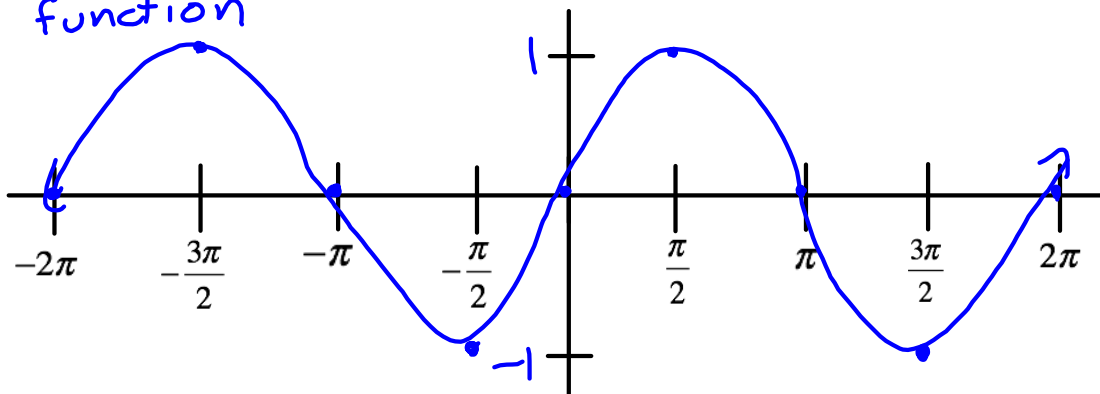h: Phase Shift: horizontal shift

k: Vertical Shift: also the midline

Frequency: b

usually number of times the graph repeats between 0 and 2π
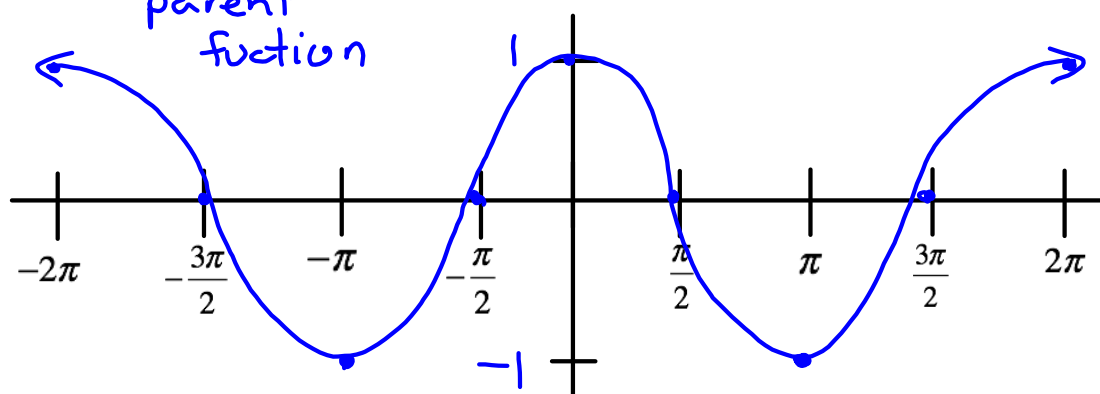
Jan 7-9:59 AM

Graph y=sinx

parent function

Amplitude: 1

Period: 2π

Frequency: 1

Starts @ (0,0)

Feb 9-10:45 AM

Graph y=cosx

parent
fuction

-2π $-\dfrac{3\pi}{2}$ $-\pi$ $-\dfrac{\pi}{2}$ $\dfrac{\pi}{2}$ π $\dfrac{3\pi}{2}$ 2π

1

-1

Amplitude: 1

Period: 2π

Frequency: 1

Starts @
(0,1)

Feb 9-4:13 PM

Graph y=tanx

-2π $-\dfrac{3\pi}{2}$ $-\pi$ $-\dfrac{\pi}{2}$ $\dfrac{\pi}{2}$ π $\dfrac{3\pi}{2}$ 2π
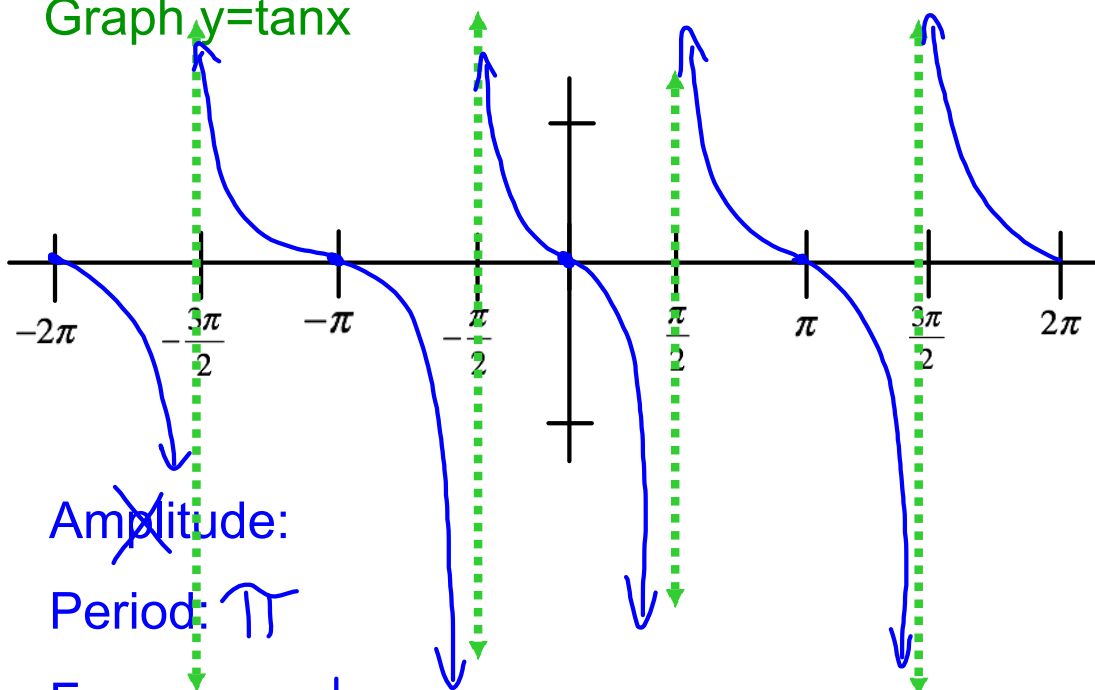
Amplitude:

Period: π

Frequency: 1

Feb 9-4:15 PM

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

$$y = -2\sin\left(\frac{1}{3}x + \frac{\pi}{3}\right)$$

a b h k

Amp: $|-2| = 2$

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

Frequency: $= b = \frac{1}{3}$

Phase Shift: left $\frac{\pi}{3}$

Vertical Shift: none

Jan 7-10:04 AM

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

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

a b h k

Amp: $|3| = 3$

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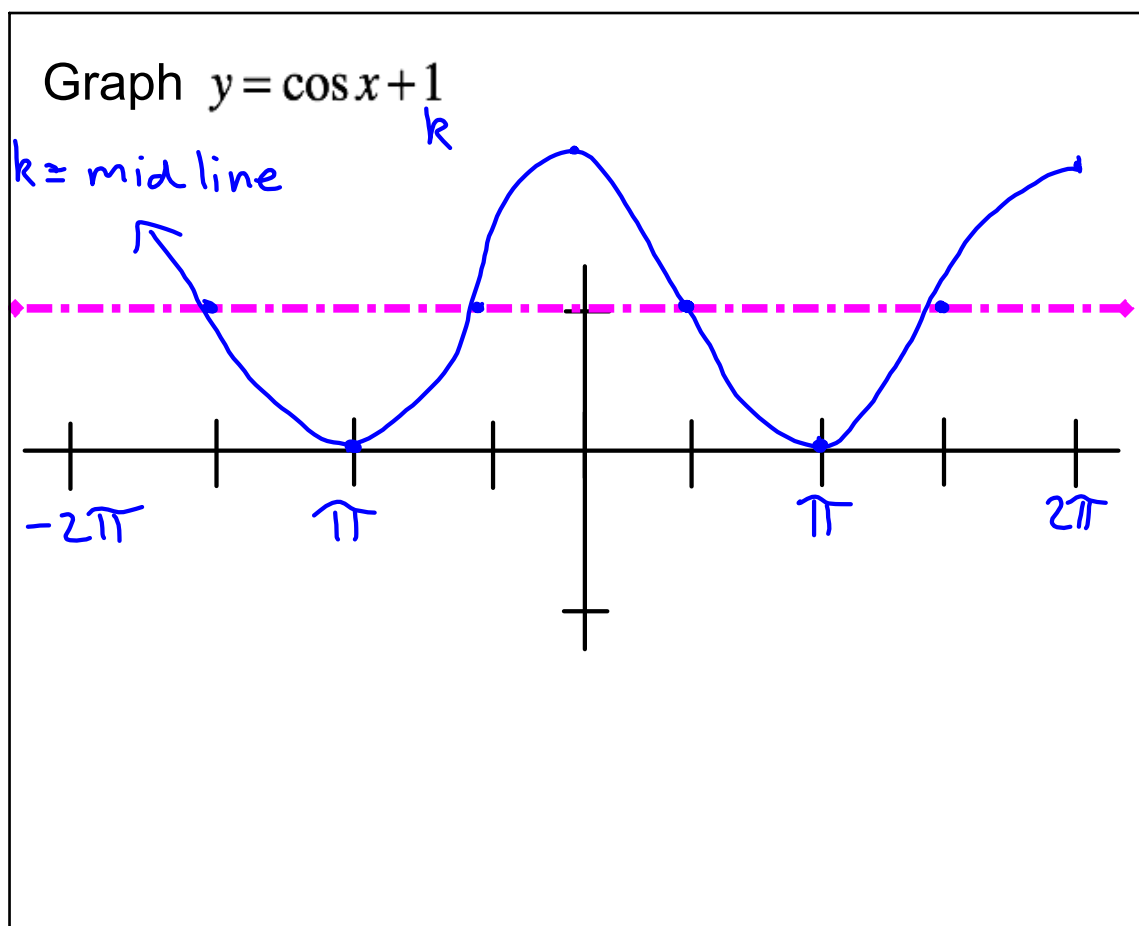
Frequency: $b = 2$

Phase Shift: none
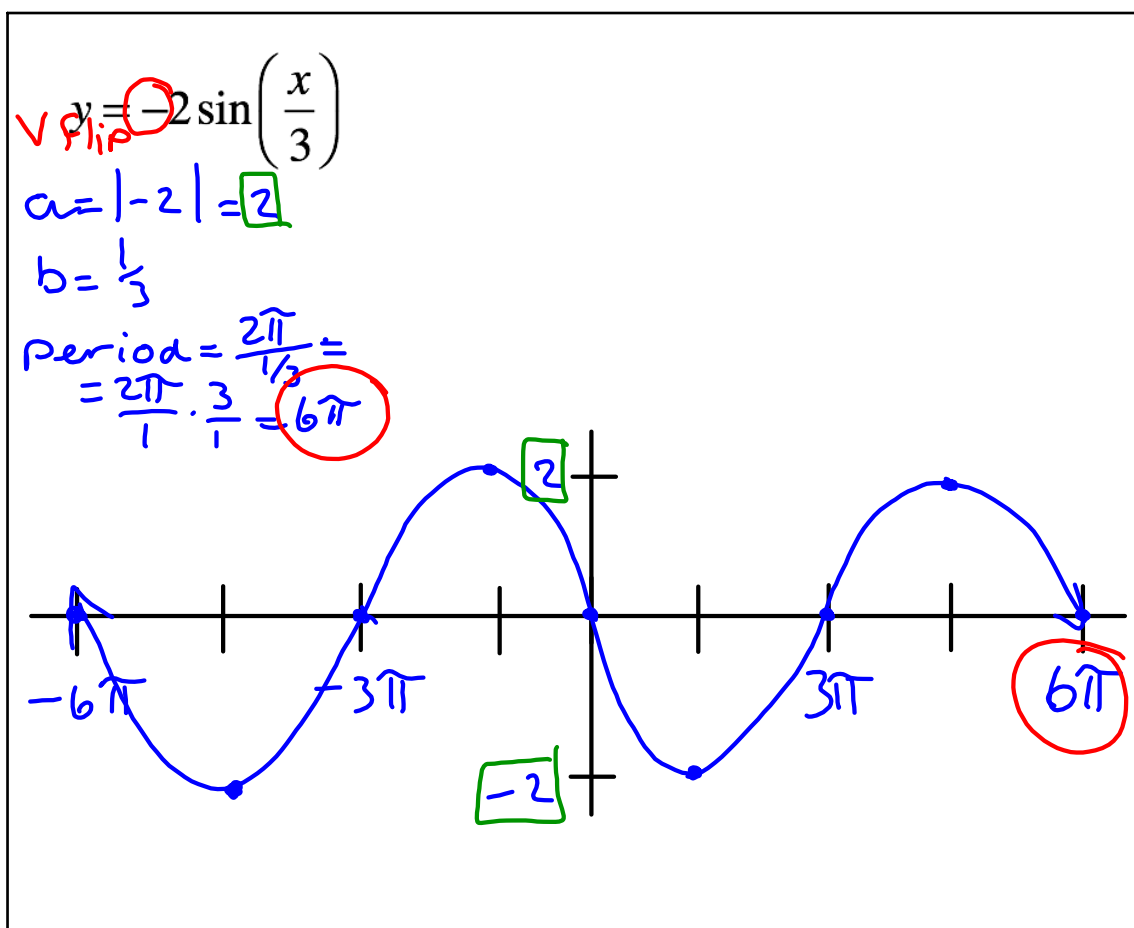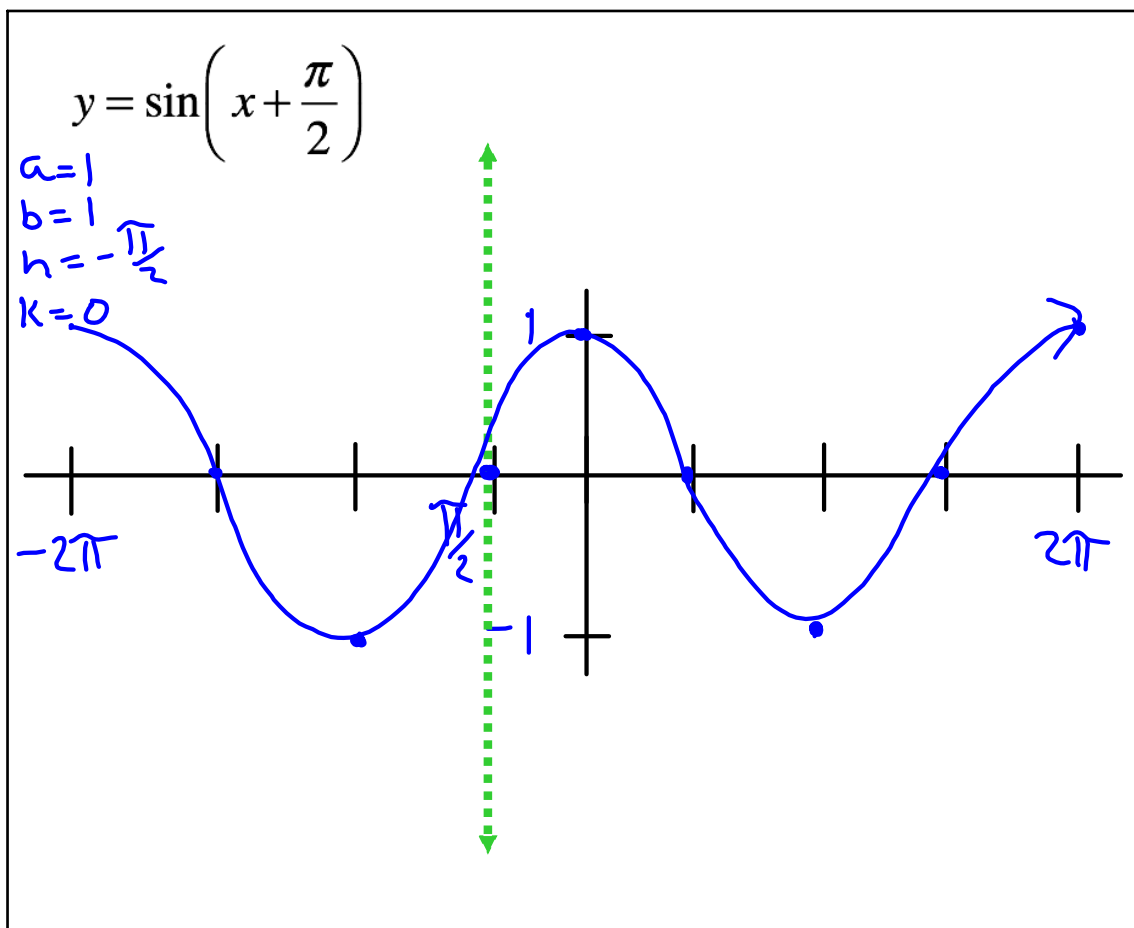
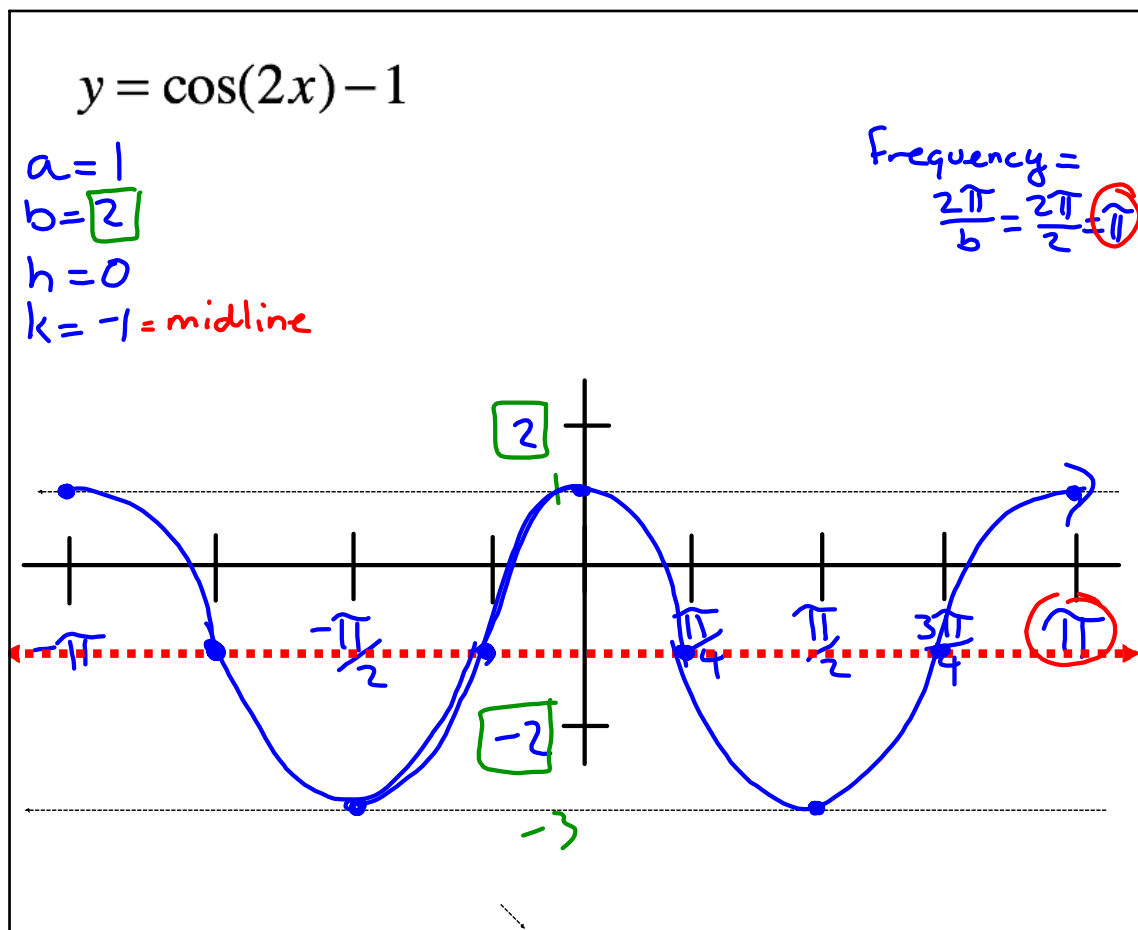Vertical Shift: down 1

Jan 7-10:04 AM

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Graphing Tips

- Always graph <u>2 periods</u> (One in each direction)
- Make 4 tick marks in each direction
-The last tick mark is the period
- Find a, h and k and graph

Feb 9-4:27 PM

Graph $y = \cos x + 1$

k = mid line

-2π π π 2π

Feb 9-10:46 AM

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

$a = 1$
$b = 1$
$h = -\frac{\pi}{2}$
$K = 0$

-2π $\frac{\pi}{2}$ 2π

1

-1

Feb 9-10:47 AM

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

$a = |-2| = \boxed{2}$

$b = \frac{1}{3}$

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

$\boxed{2}$

-6π -3π 3π 6π

$\boxed{-2}$

Feb 9-10:47 AM

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$$y = \cos(2x) - 1$$

a = 1
b = 2
h = 0
k = -1 = midline

frequency =
$\dfrac{2\pi}{b} = \dfrac{2\pi}{2} = \pi$

2

-2

-3

$-\pi$ $-\dfrac{\pi}{2}$ $\dfrac{\pi}{4}$ $\dfrac{\pi}{2}$ $\dfrac{3\pi}{4}$ π

Jan 16-3:10 PM

Write an equation to represent the graph

one cycle is 4
so period = 4
period = $\dfrac{2\pi}{b}$

$4 = \dfrac{2\pi}{b}$

$b = \dfrac{2\pi}{4} = \pi/2$

$y = 2\cos\left(\dfrac{\pi}{2}x\right)$

amp = 2
cosine function

Feb 1-5:29 PM

Write an equation to represent the graph

amp = $\frac{1}{4}$

(V·flip)

period = 10

period = $\frac{2\pi}{5}$

find b   10 = $\frac{2\pi}{b}$

b = $\frac{2\pi}{10}$ = $\frac{\pi}{5}$

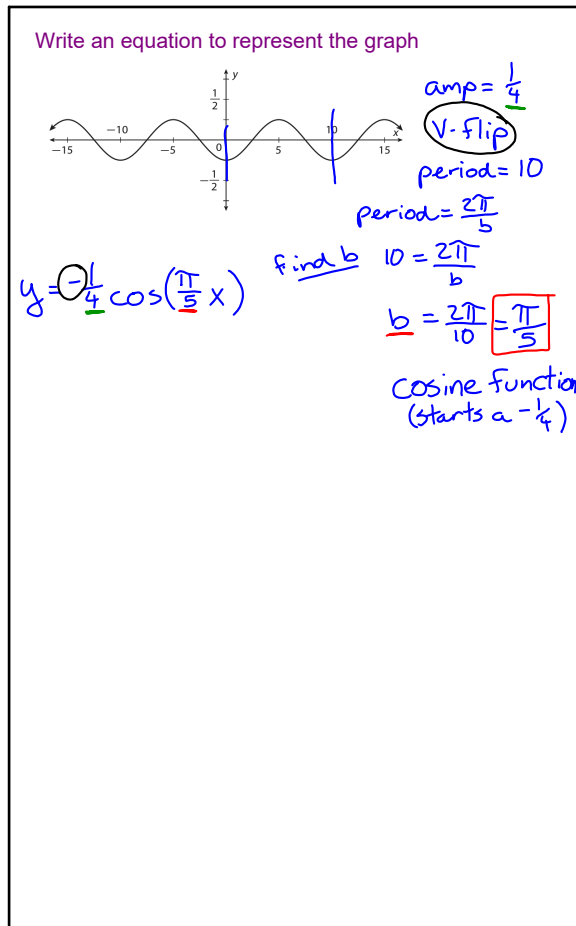$y = -\frac{1}{4} \cos\left(\frac{\pi}{5} x\right)$
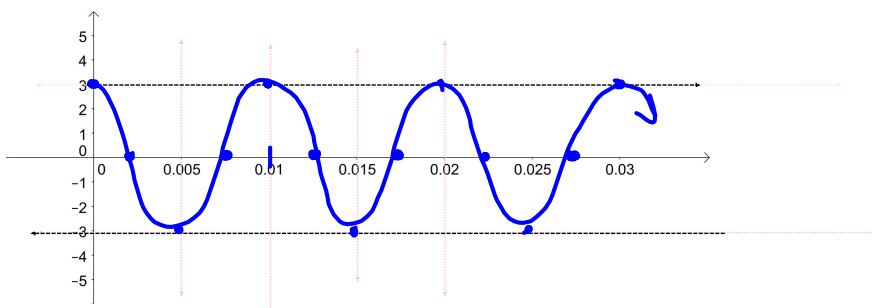
cosine function
(starts a $-\frac{1}{4}$)

Feb 1-5:28 PM

Physics: Use a cosine function to graph a sound wave
with a period of 0.010 seconds and an amplitude of 3 pascals.
Note that the recording of the sound wave started when the
wave was at it's maximum height.
Graph the function.

$$Frequency = \frac{1\,\text{sec}}{period} = \frac{1}{\boxed{}} = \boxed{}\,Hz$$

The frequency represents the number of 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].

Feb 1-5:31 PM

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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 it's midline and the coordinates of any local maxima and minima. Interpret these points in the context of the problem, and graph one cycle.

k is midline
24+16=40
24-16=8
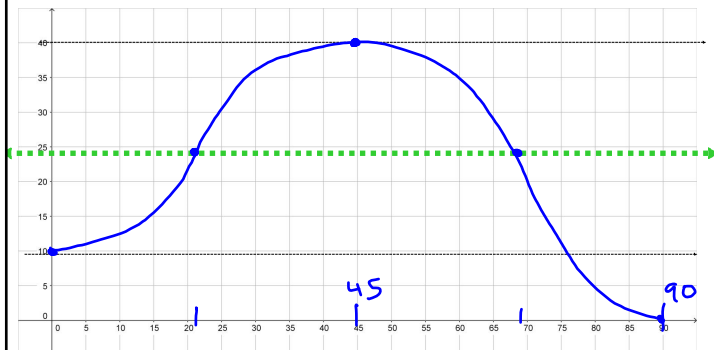
How tall is the Ferris Wheel?

How far off the ground is the Ferris wheel?

How long does it take to get to the top?

How long does it take to make one full resolution?

Describe where the rider is at the midpoint line.

Feb 1-5:34 PM