

Starter: Get out your NOTES...7.1 Graphing Sine & Cosine...Create & Fill in the following tables using your unit circle.

$$y = \sin x$$

x	y
0	0
$\frac{\pi}{2}$	1
π	0
$\frac{3\pi}{2}$	-1
2π	0

$$y = \cos x$$

x	y
0	1
$\frac{\pi}{2}$	0
π	-1
$\frac{3\pi}{2}$	0
2π	1

Next...Stamp
your notes
with 2 grids

7-1 Graphing Trigonometric Functions

Objectives:

7-1a: I can recognize the parent graph of basic sine and cosine functions.

7-1b: I can use transformations to graph sine and cosine functions.

7-1c: I can identify characteristics of trigonometric functions.

amplitude - the distance from the midline to the peaks or the valleys.

Phase shift (horizontal) (left or right)... we will not be doing these.

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

how many full graphs you will see between 0 to 2π . It also helps you find the period - the distance in which it takes to see just one graph before it starts to Repeat.

Vertical shift... moves graph up or down. (-) moves it down, (+) moves it up.

$$f(x) = 3\sin(2x - 0) + 1$$

using this example



a: Amplitude (vertical): 3 never negative
amplitude: $|a|$

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

h: Phase Shift(horizontal): no phase shift... this
also shows no phase shift. $f(x) = 3\sin(2x) + 1$

k: Vertical Shift(vertical): up 1

Video of sin graph and unit circle:

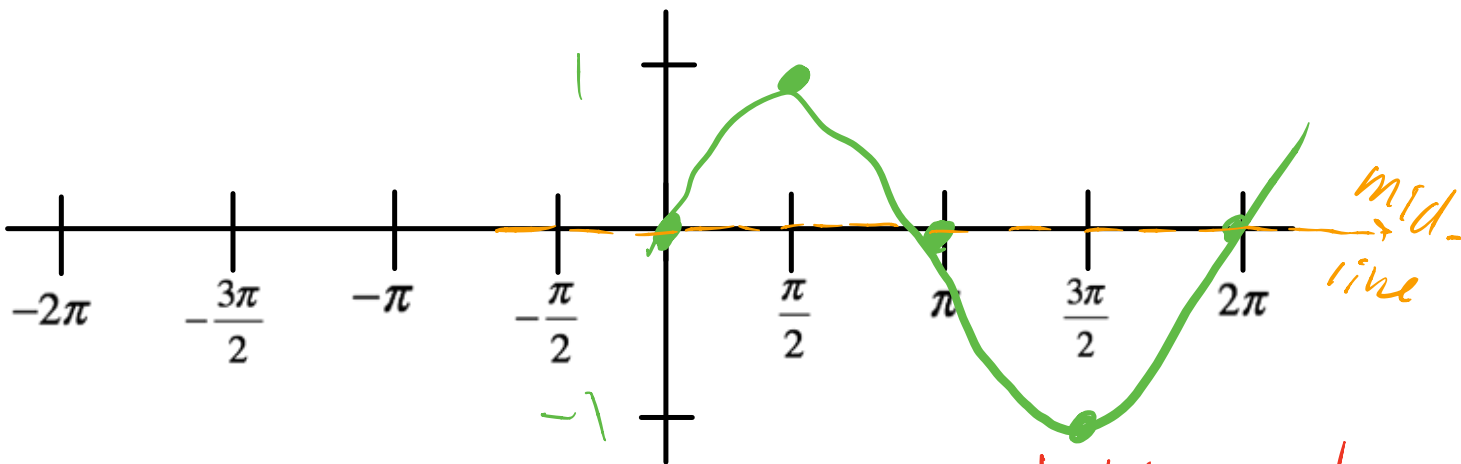
https://www.youtube.com/watch?v=Ohp6Okk_tww



this is a great website to see the
graph of the parent function for sine
and cosine.

$$y = 1 \sin(1x + 0) + 0 \rightarrow \begin{matrix} \swarrow \text{amplitude} \\ \nearrow \text{phase shift} \\ \uparrow \text{period finder} \\ \rightarrow \text{vertical shift} \end{matrix}$$

Graph $y = \sin x$



Amplitude: 1

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

if x	y
0	0
$\pi/2$	1
π	0
$3\pi/2$	-1
2π	0

using a table and your unit circle...

if $x = 0$
 $y = \sin 0$

$y = 0$

if $x = \pi/2$
 $y = \sin \pi/2$

$y = 1$

if $x = \pi$
 $y = \sin \pi$

$y = 0$

if $x = 3\pi/2$
 $y = \sin 3\pi/2$

$y = -1$

if $x = 2\pi$
 $y = \sin 2\pi$

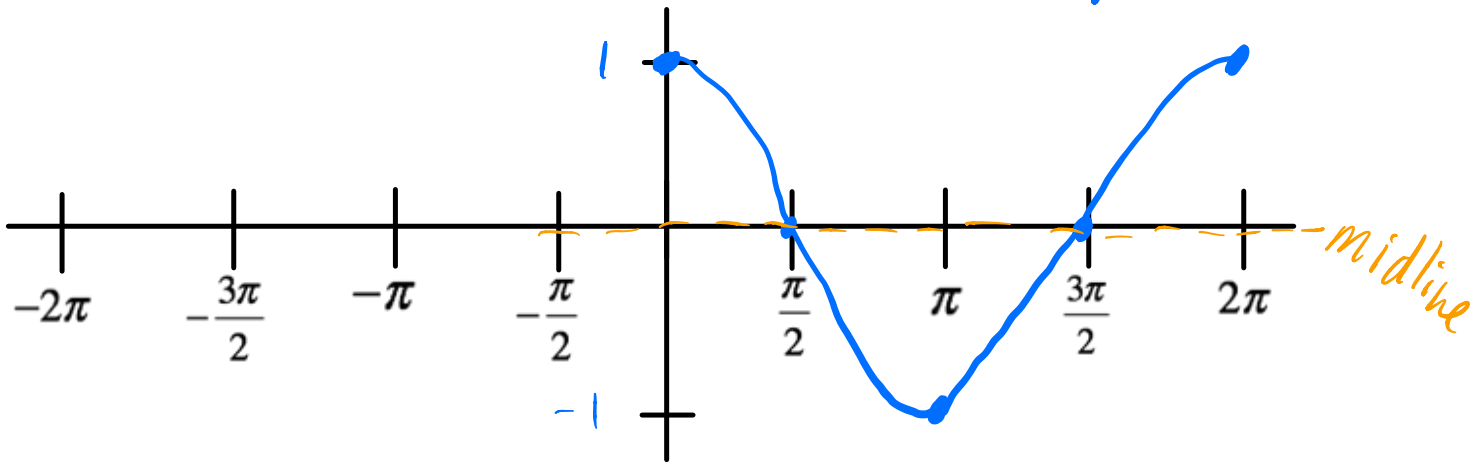
$y = 0$

then plot the points above.

Do the same as sine with cosine. I will just do the table and then plot the points to graph.

x	y
0	1
$\pi/2$	0
π	-1
$3\pi/2$	0
2π	1

Graph $y = \cos x$



Amplitude: 1

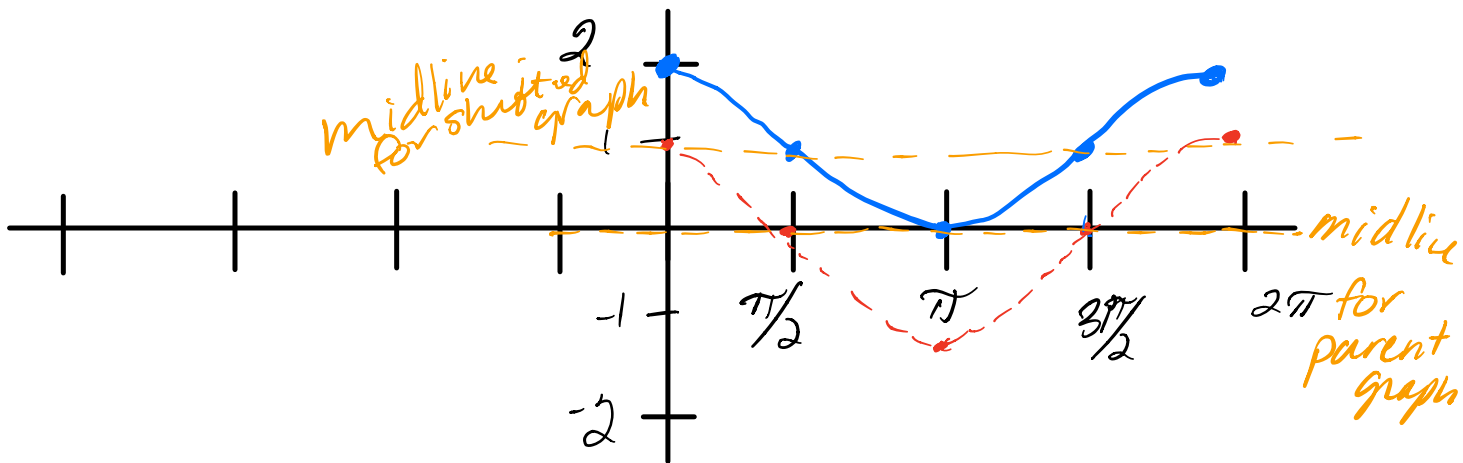
Period: 2π

Graph $y = \cos x + 1$

vertical shift up (1)

Blue shifted graph

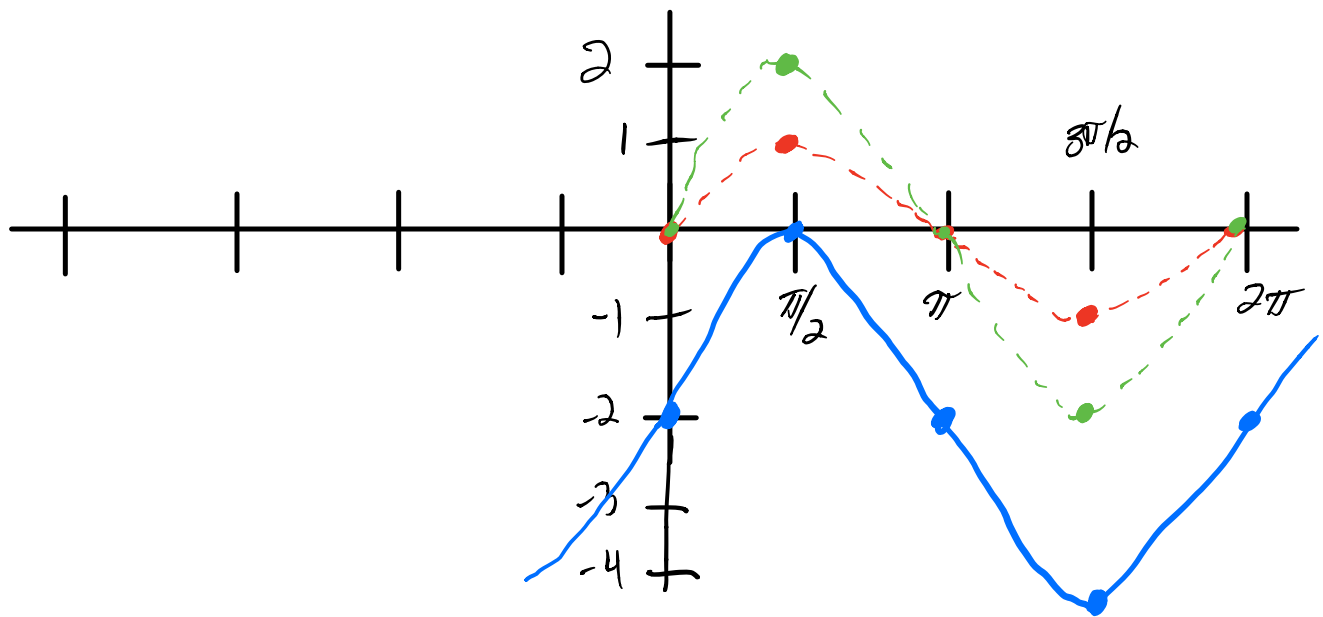
Red- parent graph



$y = 2\sin \theta - 2$

amplitude (pointing to the coefficient 2)
vertical shift down 2 (pointing to the constant term -2)

Red - parent graph
green - graph with an amplitude of 2.
blue - graph shifted down 2.



$$y = \sin 4\theta - 2$$

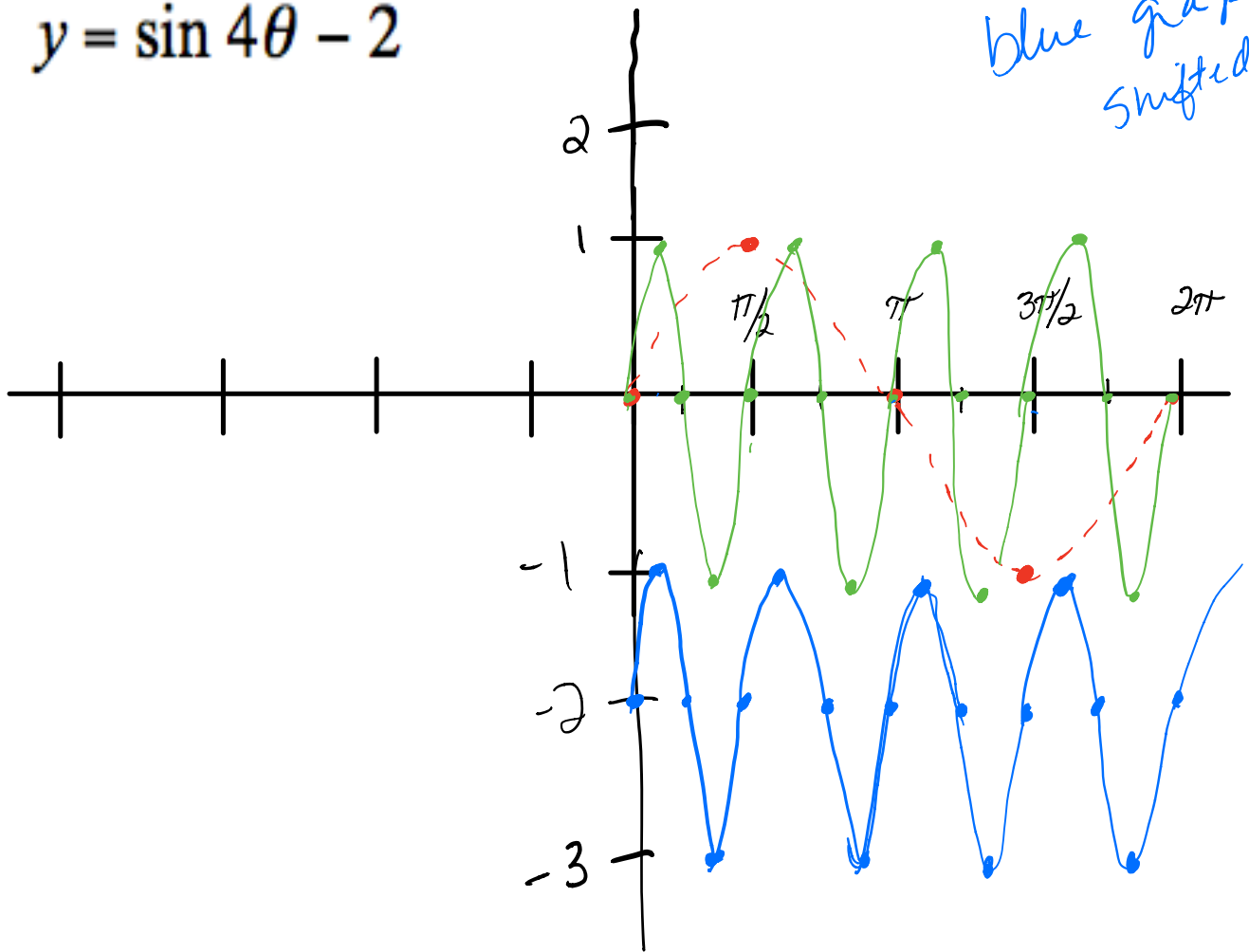
$\frac{2\pi}{4} = \pi/2$

vertical shift down

Red - parent graph

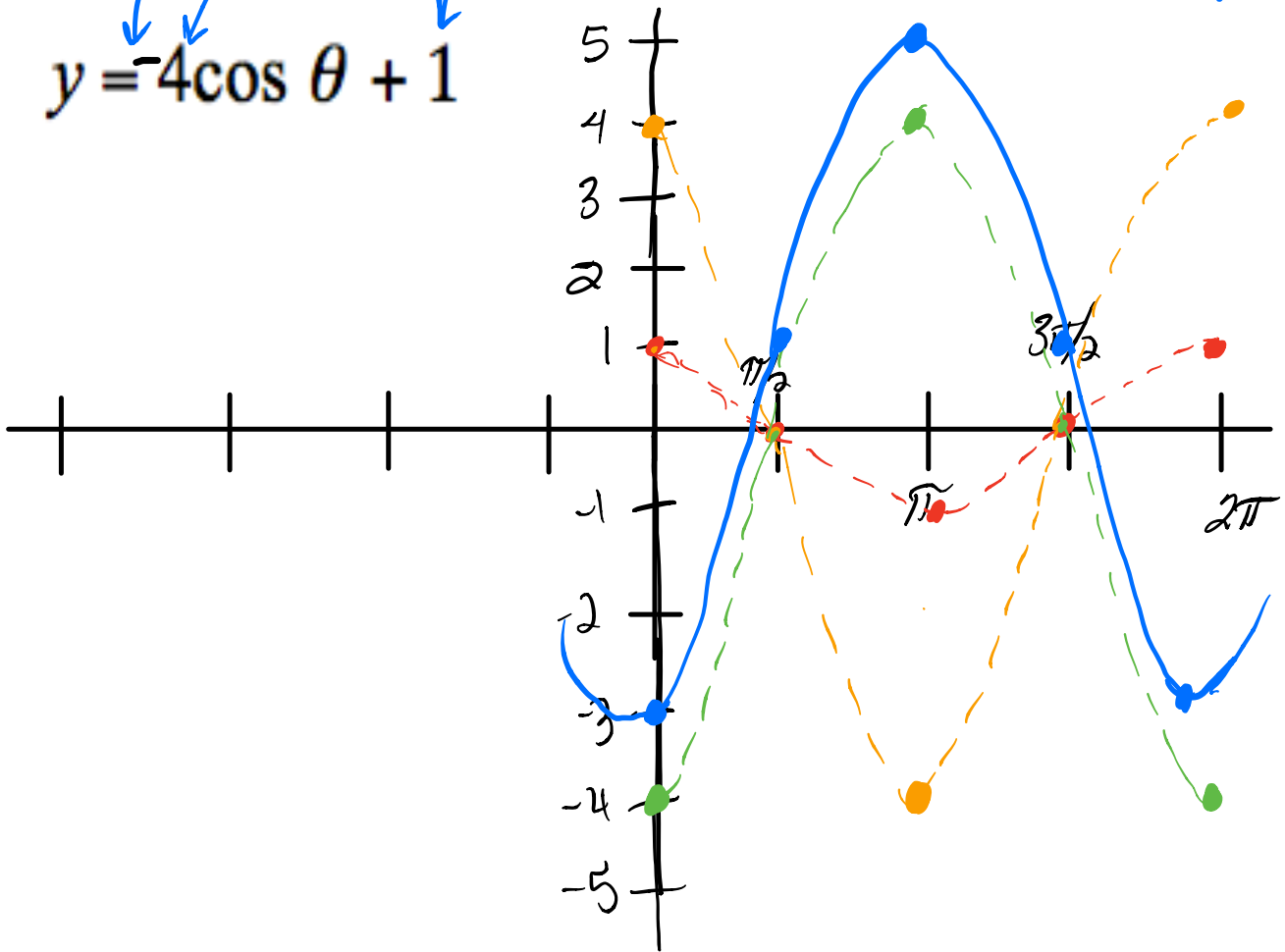
green - graph with a period of $\pi/2$

blue graph shifted down



$y = -4\cos \theta + 1$
 ← Reflection over x-axis
 ← Amplitude of 4
 ← Shifted up 1

Red - parent graph
 orange - amplitude of 4.
 green - reflection over x-axis
 Blue graph shifted up 1



$$y = a \sin(b\theta + c) + d$$

amplitude (blue arrow pointing to a)
 $\frac{2\pi}{b}$ = period (green arrow pointing to b)
vertical shift (black arrow pointing to d)
phase shift (red arrow pointing to c)

$$y = a \cos(b\theta + c) + d$$

amplitude (blue arrow pointing to a)
 $\frac{2\pi}{b}$ = period (green arrow pointing to b)
phase shift (red arrow pointing to c)
vertical shift (black arrow pointing to d)

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

$$y = \underline{4} \cos \underline{2\theta} + \underline{2}$$

no phase shift (red text)

Amp: 4

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

Phase Shift: none

Vertical Shift: up 2

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

no phase shift (red text)

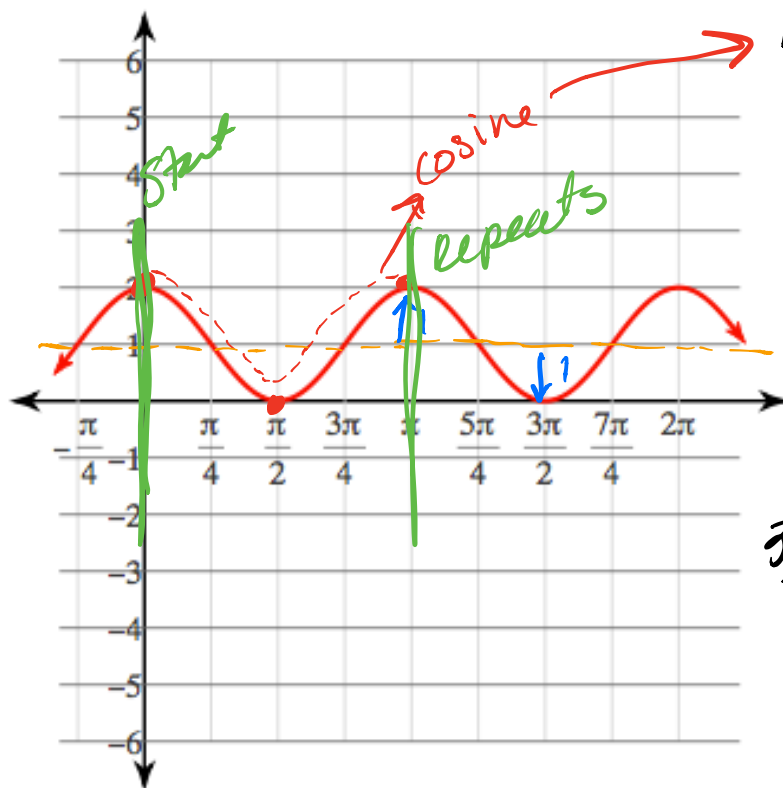
Amp: 3

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

Phase Shift: none

Vertical Shift: down 1

Write the equation for the following function



- 1.) look to see if it is cosine or sine
- 2.) find the mid-line and determine the amplitude.
amplitude(1).

- 3.) determine when the cosine graph begins to repeat itself.
at π . This means there are 2 cosine graphs between 0-2 π .

- 4.) check to see if the graph shifts up or down.
It shifts up one.

5.) Put it all together.

$$f(x) = 1 \cos(2x) + 1$$

Try this on your own.

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.

