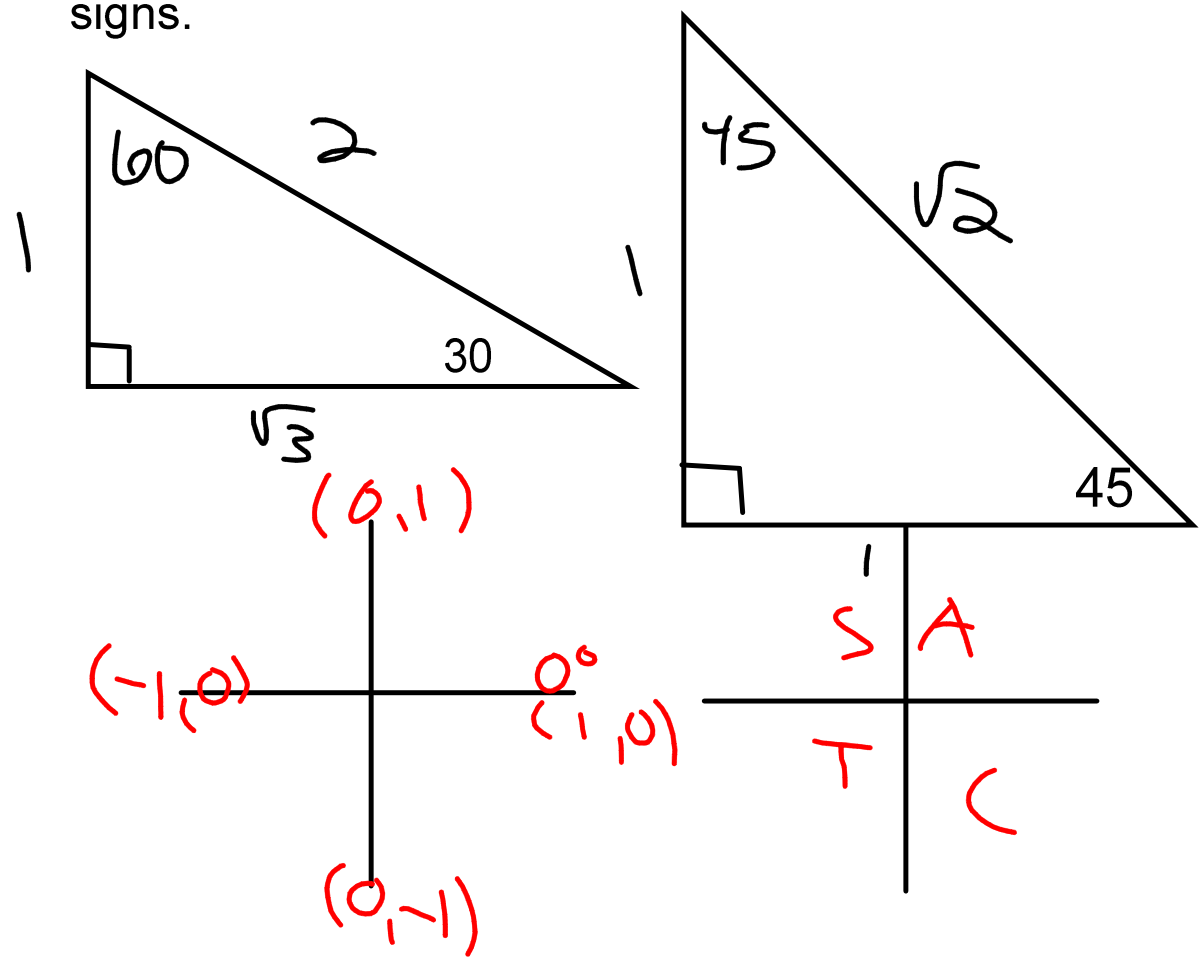
Warm-up

*Chart Quiz-Need to be turned in by

1.) Draw the special right triangles, quadrantals, and trig. signs.



http://teachhighschoolmath.blogspot.kr/2011/02/using-pipe-cleaners-for-transformations.html

http://themetapicture.com/this-should-be-the-first-thing-shown-in-all-trigonometry-classes/

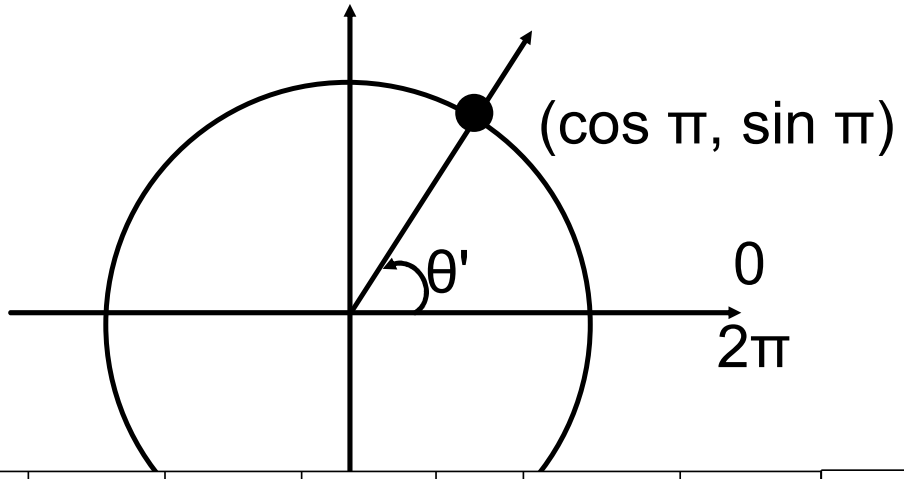
"I can" statements

*I can graph Sine and Cosine functions

*I can identify the amplitude and period and how it affects graphs.

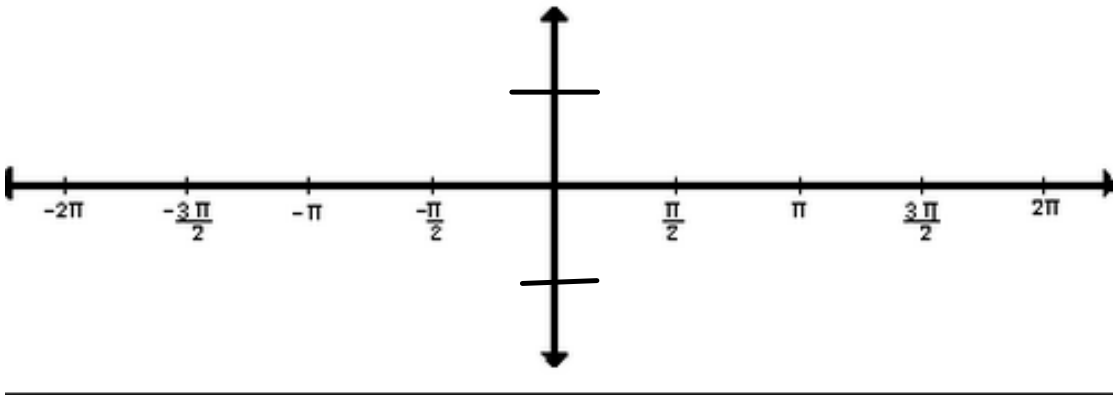
*I understand how transformations affect graphs.

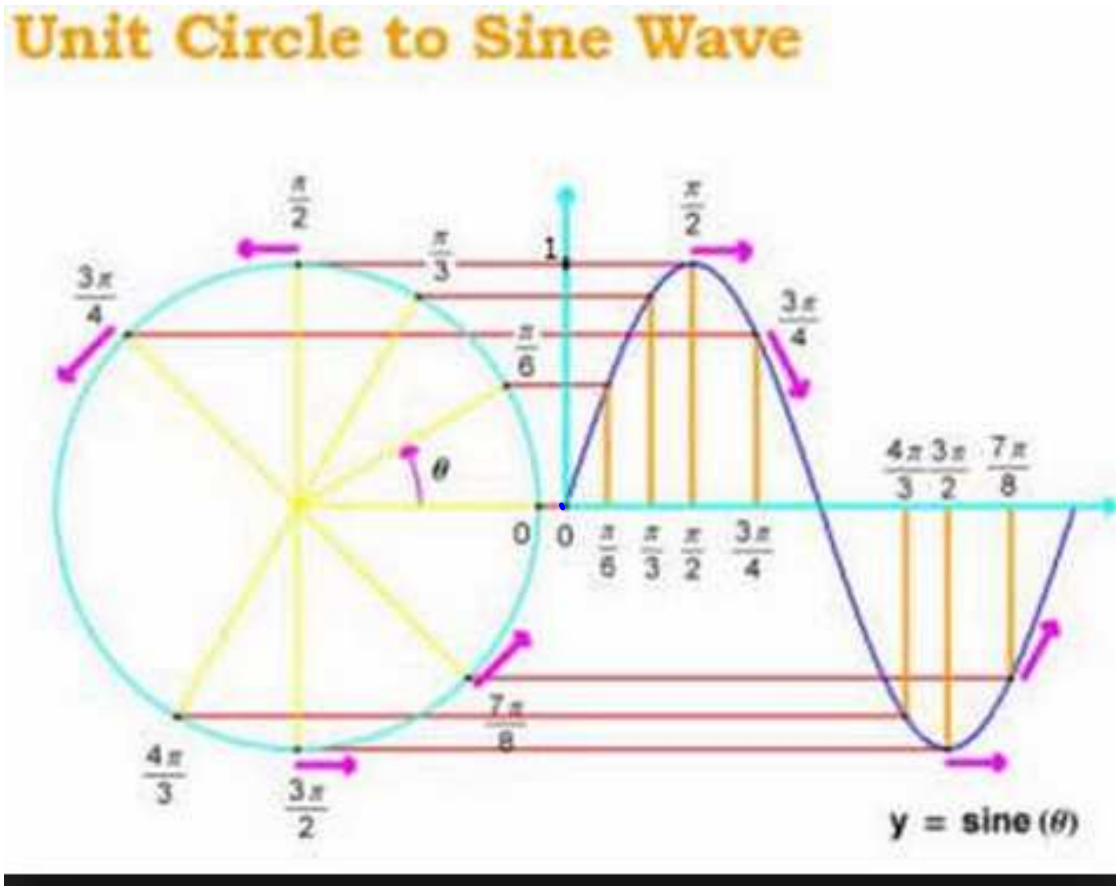
14.1-Graphing Cosine & Sine Functions

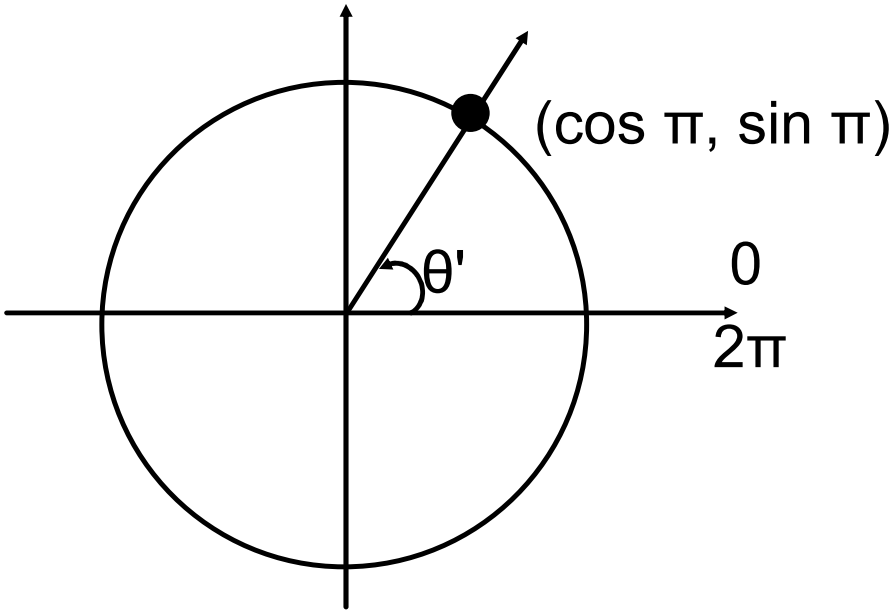


θ	0	π/6	π/2	5π/6	π	7π/6	3π/2	$\frac{11\pi}{6}$	2π
sin θ									

Sine Graph $y = \sin x$

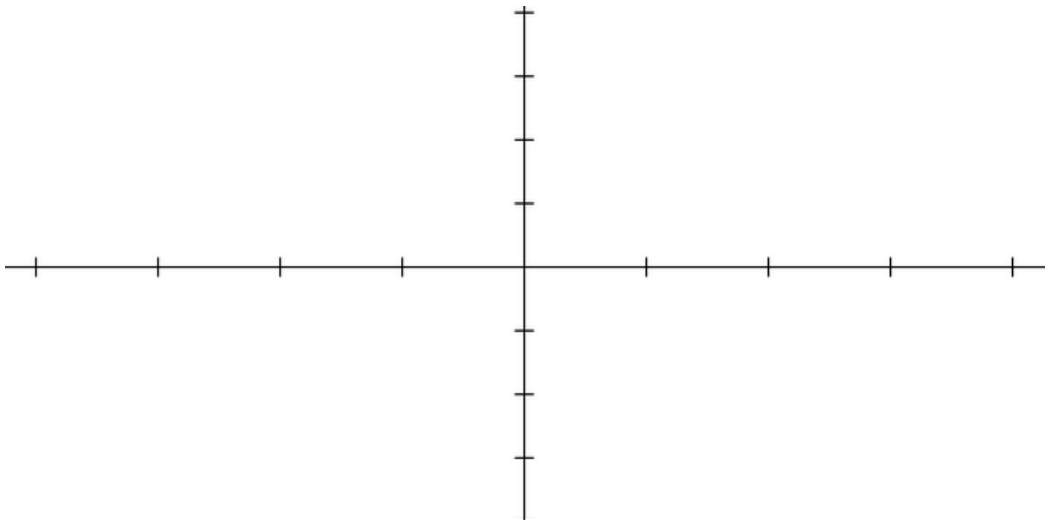


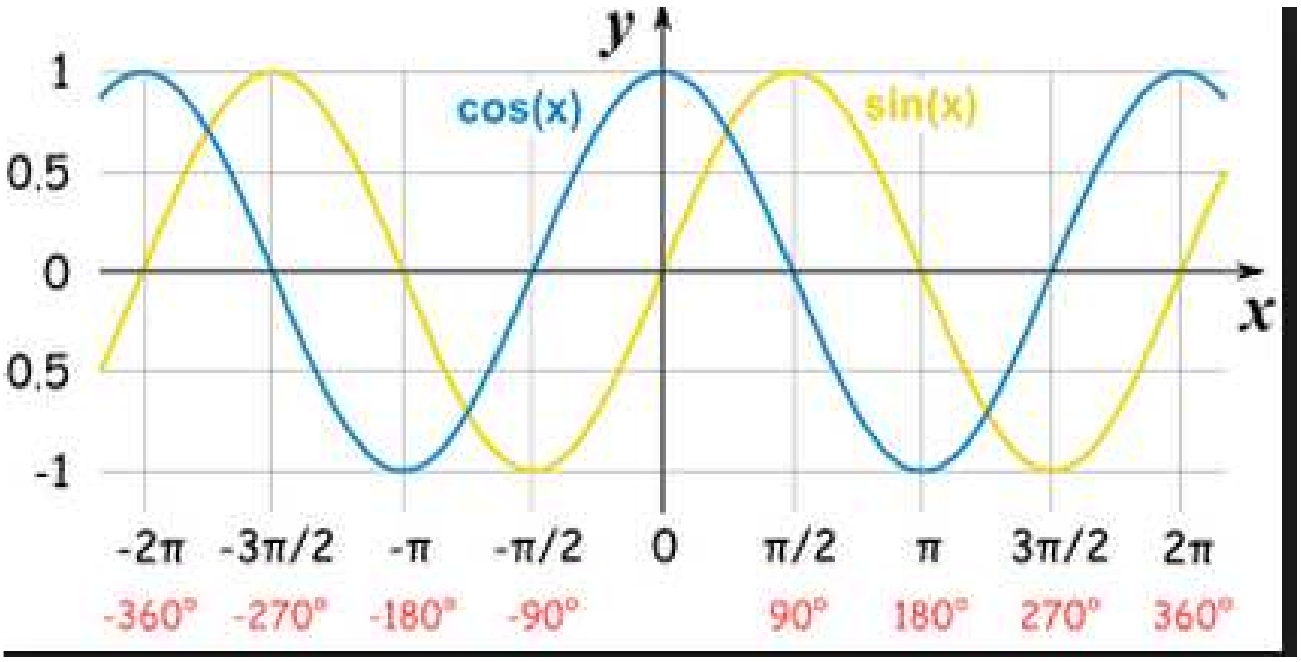

Unit Circle to Sine Wave
π/2
π/3
1
π/2
3π/4
3π/4
π/6
θ
4π/3 3π/2 7π/8
0 0 π/6 π/3 π/2 3π/4
7π/8
4π/3
3π/2
y = sine (θ)

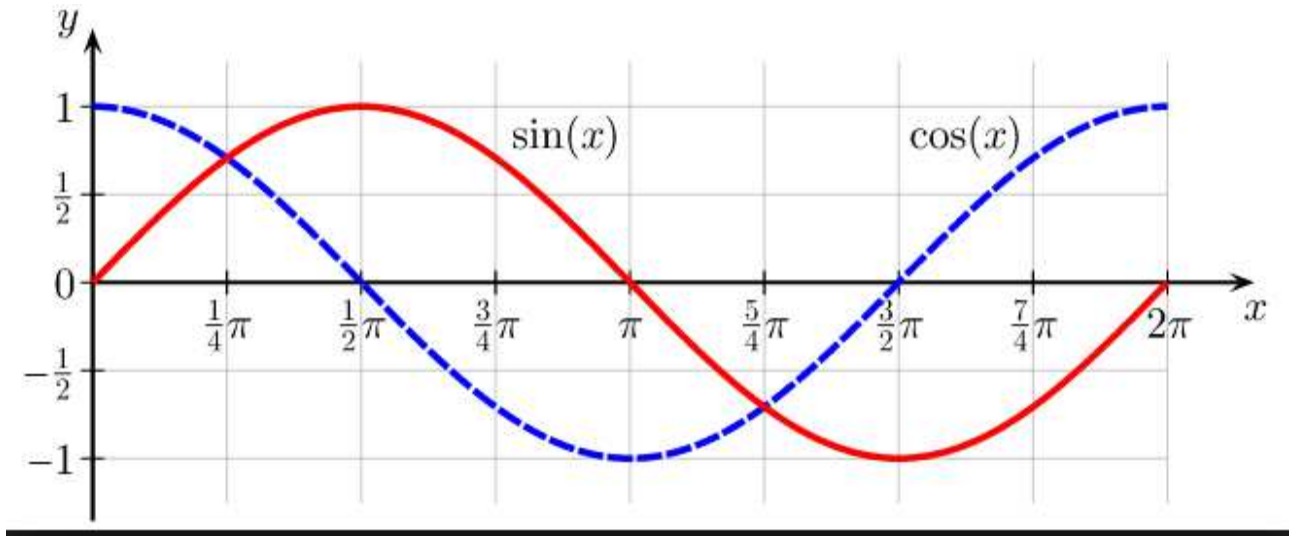


θ	0	π/6	π/2	5π/6	π	7π/6	3π/2	$\frac{11\pi}{6}$	2π
cos θ									

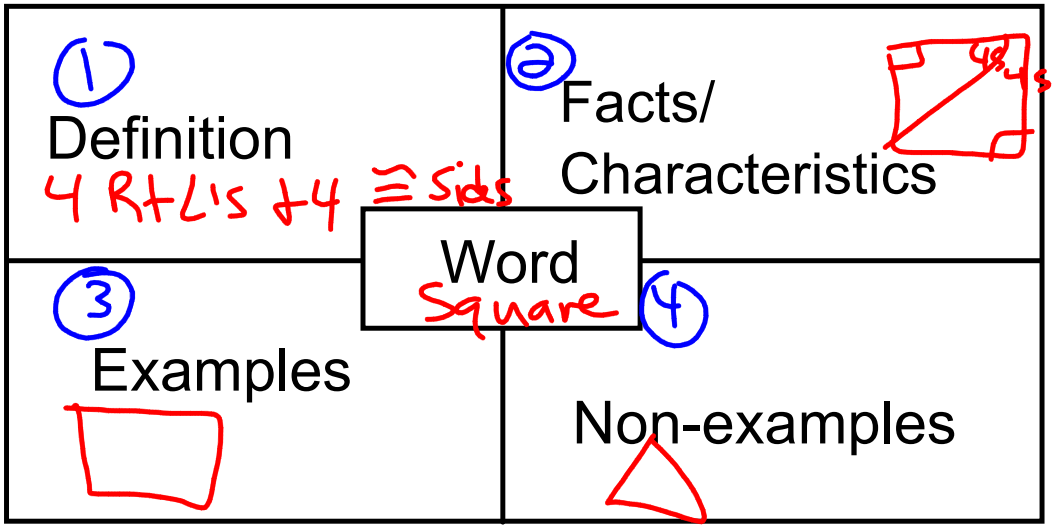
Cosine Graph $y=\cos x$




y
x
1
0.5
0
0.5
-1
cos(x)
sin(x)
-2π
-3π/2
-π
-π/2
0
π/2
π
3π/2
2π
-360°
-270°
-180°
-90°
90°
180°
270°
360°


y
1
1/2
0
−1/2
−1
sin(x)
cos(x)
1/4π
1/2π
3/4π
π
5/4π
3/2π
7/4π
2π
x

Frayer Model



Key Vocab:

amplitude

periodic function

cycle/period

frequency

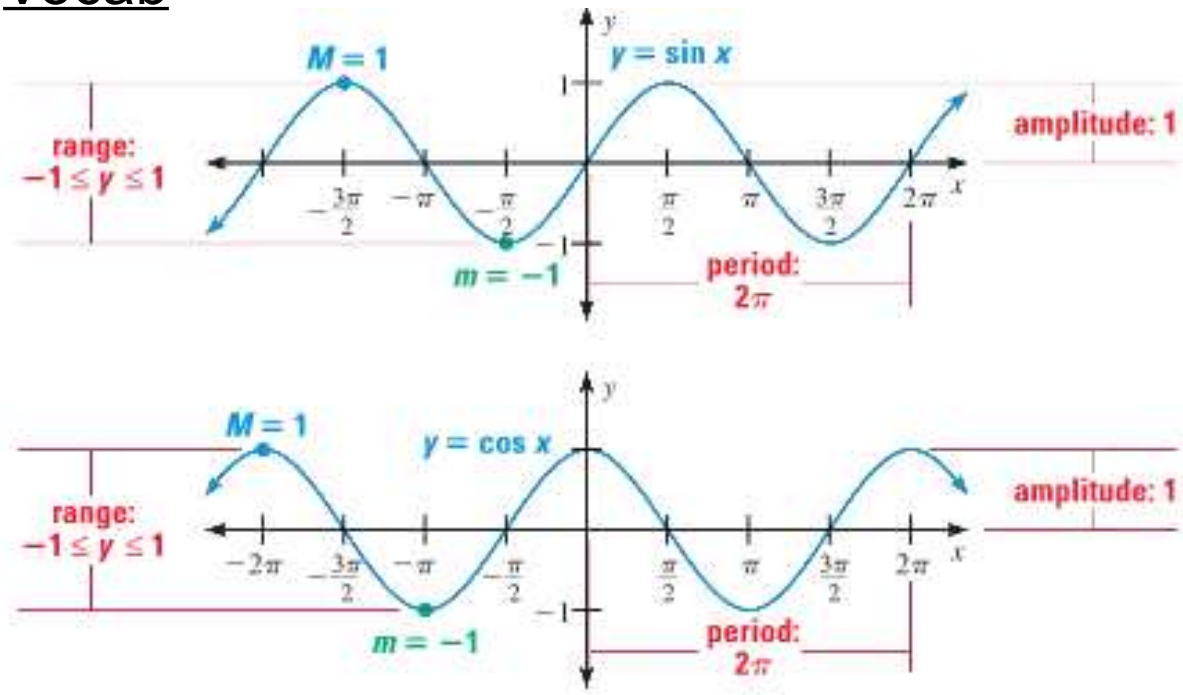
translation

reflection

Domain/Range

*use a book, chrome book, or your phone to complete the graphic organizer as a table

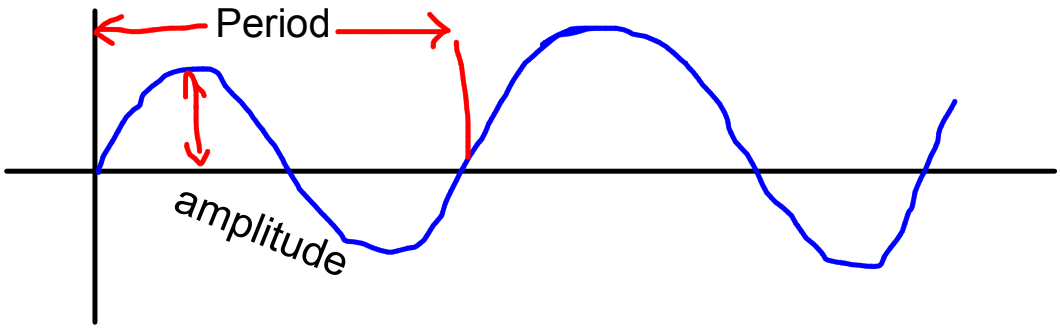
Vocab

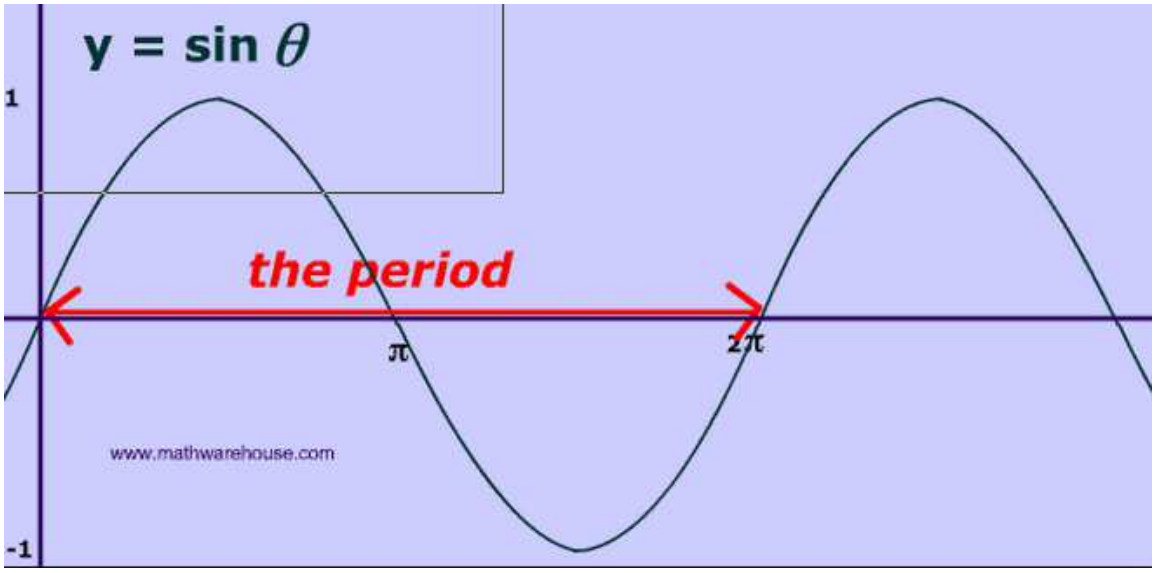

y
M = 1
y = sin x
range:
−1 ≤ y ≤ 1
amplitude: 1
x
m = −1
period:
2π
y
M = 1
y = cos x
range:
−1 ≤ y ≤ 1
amplitude: 1
x
m = −1
period:
2π

Periodic Functions- repeats over a regular intervals of its domain.

Period- length of the interval of the domain over which the graph repeats itself (one cycle). (Sin & cos $\Rightarrow 2\pi$)

Amplitude- Distance from the center axis to the maximum.



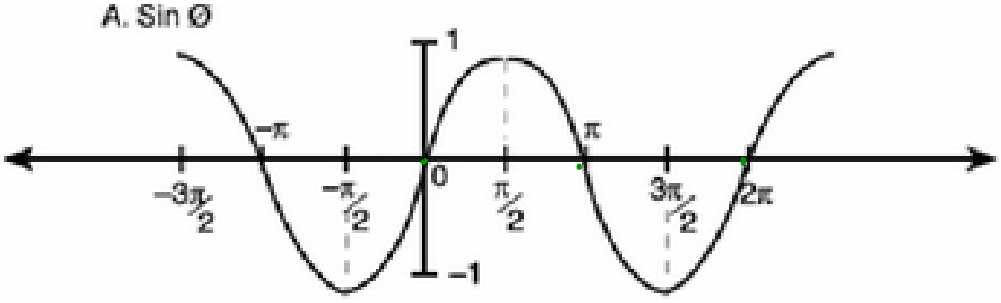

y = sin θ
1
the period
π
2π
www.mathwarehouse.com
-1

KEY CONCEPT *For Your Notebook*

Characteristics of $y = \sin x$ and $y = \cos x$

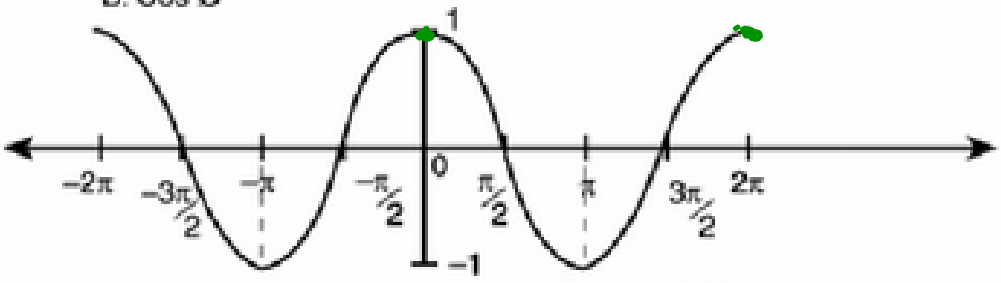
- The domain of each function is all real numbers.
- The range of each function is $-1 \leq y \leq 1$. Therefore, the minimum value of each function is $m = -1$ and the maximum value is $M = 1$.
- The **amplitude** of each function's graph is half the difference of the maximum M and the minimum m, or $\frac{1}{2}(M - m) = \frac{1}{2}[1 - (-1)] = 1$.
- Each function is **periodic**, which means that its graph has a repeating pattern. The shortest repeating portion of the graph is called a **cycle**. The horizontal length of each cycle is called the **period**. Each graph shown above has a period of 2π.
- The x-intercepts for $y = \sin x$ occur when $x = 0, \pm\pi, \pm 2\pi, \pm 3\pi, \ldots$.
- The x-intercepts for $y = \cos x$ occur when $x = \pm\frac{\pi}{2}, \pm\frac{3\pi}{2}, \pm\frac{5\pi}{2}, \pm\frac{7\pi}{2}, \ldots$.

A. Sin Ø

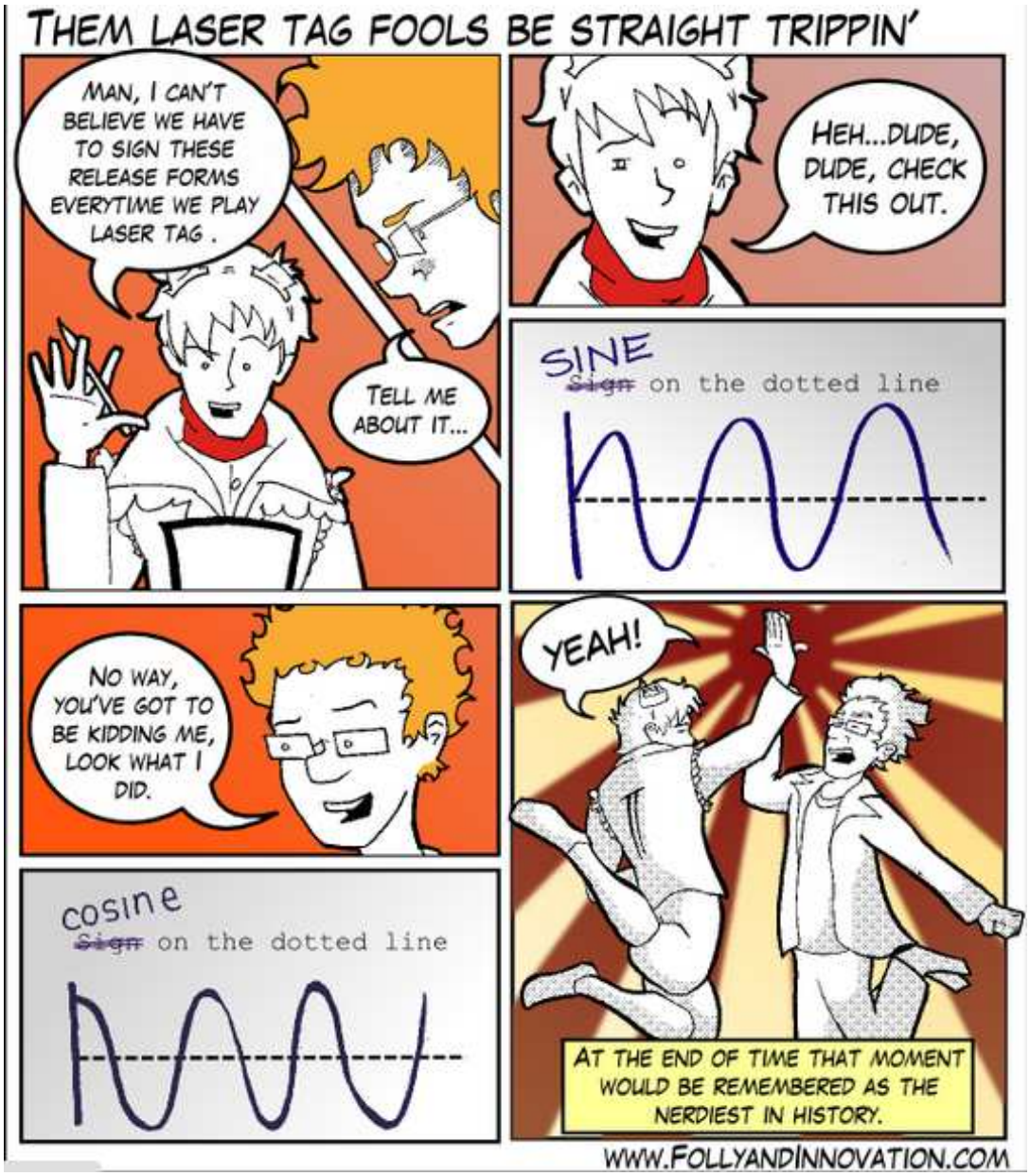


Domain: (−∞, ∞)
Range: [−1, 1]

B. Cos Ø



Domain: (−∞, ∞)
Range: [−1, 1]


THEM LASER TAG FOOLS BE STRAIGHT TRIPPIN'
MAN, I CAN'T BELIEVE WE HAVE TO SIGN THESE RELEASE FORMS EVERYTIME WE PLAY LASER TAG .
TELL ME ABOUT IT...
HEH...DUDE, DUDE, CHECK THIS OUT.
SINE
~~Sign~~ on the dotted line
NO WAY, YOU'VE GOT TO BE KIDDING ME, LOOK WHAT I DID.
cosine
~~Sign~~ on the dotted line
YEAH!
AT THE END OF TIME THAT MOMENT WOULD BE REMEMBERED AS THE NERDIEST IN HISTORY.
WWW.FOLLYANDINNOVATION.COM

http://illuminations.nctm.org/Activity.aspx?id=3589

Find the amplitude and period.

y=a sin bx

Y=a cos bx

$$amplitude = |a| \qquad period = \frac{2\pi}{|b|}$$

Example 1:

A) $y = \sin \pi x$

B) $y = 3\cos x$

C) $y = -2\cos 3x$

D) $y = 4\sin \frac{1}{2}x$

a

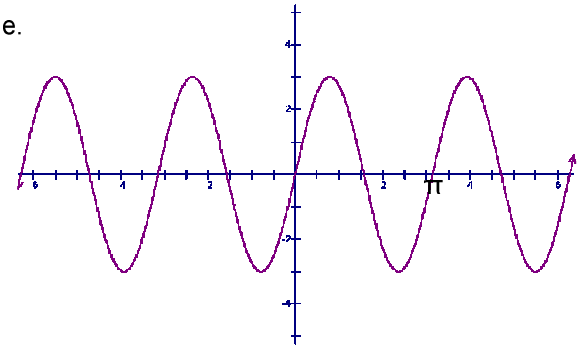
I. Identify amplitude and period

$$y = a \sin bx$$

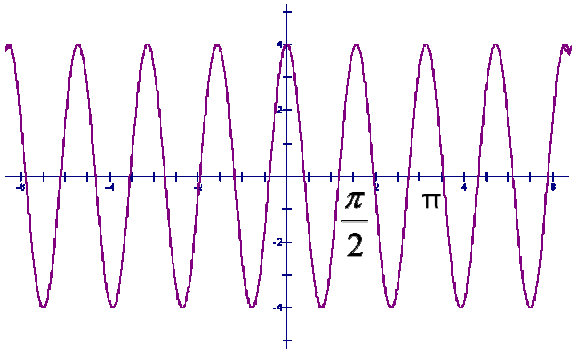
$$amplitude = |a| \qquad period = \frac{2\pi}{|b|}$$

Give the amplitude and period.

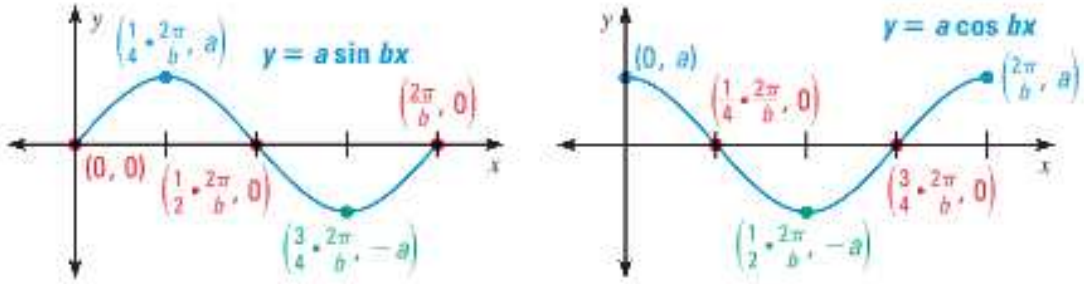
e.



f.



GRAPHING KEY POINTS Each graph below shows five key x-values on the interval $0 \le x \le \frac{2\pi}{b}$ that you can use to sketch the graphs of $y = a \sin bx$ and $y = a \cos bx$ for $a > 0$ and $b > 0$. These are the x-values where the **maximum** and **minimum** values occur and the ***x*-intercepts**.



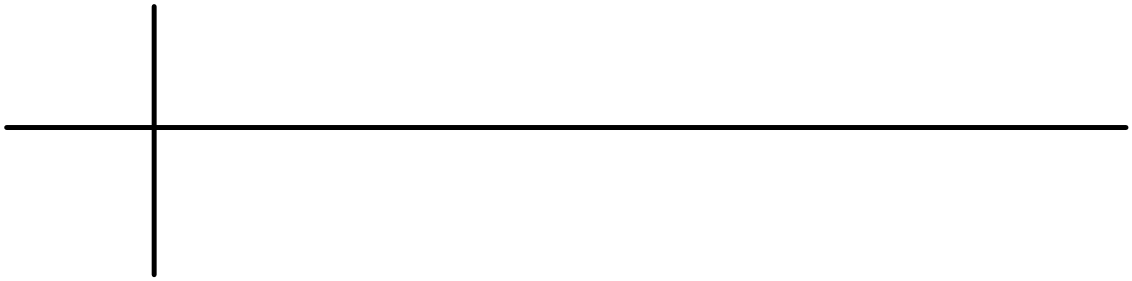
Graph

$$y = \sin\frac{1}{2}x$$

1)Label x and y axis

2) Find amplitude

3) Find period



GUIDED PRACTICE for Example 1

Graph the function.

1. $y = 2 \cos x$ **2.** $y = 5 \sin x$ **3.** $f(x) = \sin \pi x$ **4.** $g(x) = c$

GUIDED PRACTICE for Example 1

Graph the function.

1. $y = 2 \cos x$ **2.** $y = 5 \sin x$ **3.** $f(x) = \sin \pi x$ **4.** $g(x) = \cos 4\pi x$

*14.1 Recap ws

Homework

ws

* Page 912/ 3-5, 7-13 odd, 29, 30

Graph

Warm Up

$y = a \cos bx$

A) y=cos4x

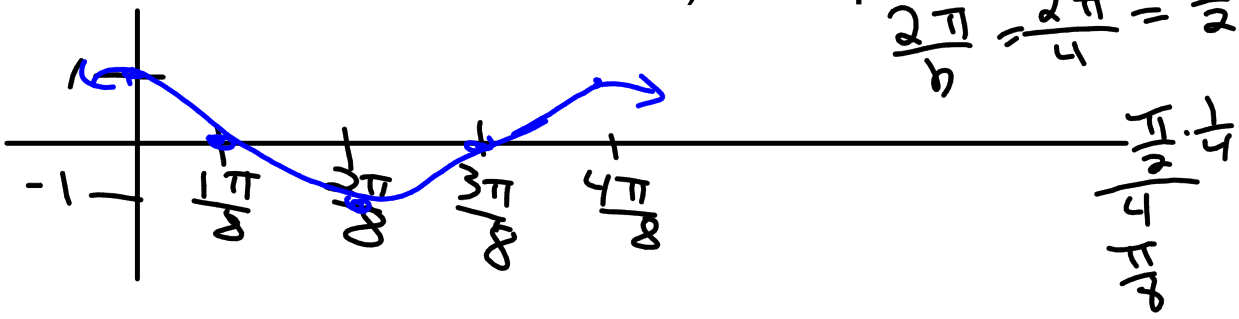
1)Label x and y axis

2) Find amplitude

AMP = 1

3) Find period

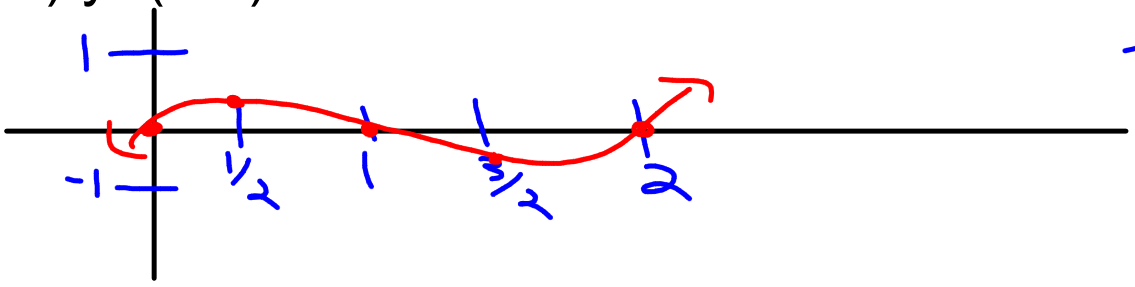
$\frac{2\pi}{b} = \frac{2\pi}{4} = \frac{\pi}{2}$



B) y=(1/4) sin π x

AMP = $\frac{1}{4}$ $P = \frac{2\pi}{\pi} = 2$

$\frac{2}{4} = \frac{1}{2}$



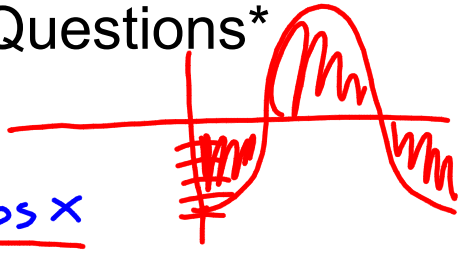
HW Questions

13 AMP = 5

$P = 2\pi$

Equation: $-5\cos x$

$y = a\cos bx$



$P = \frac{2\pi}{b}$

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

$b = \frac{2\pi}{2\pi} = 1$

*Go over chart quiz

(22) AMP = $\frac{3}{5}$ $P = \frac{3}{2}\pi$ $P = \frac{2\pi}{b}$

$y = a\cos bx$

$y = \frac{3}{5}\cos\frac{4}{3}x$

$\frac{3\pi}{2} = \frac{2\pi}{b}$

$\frac{4\pi}{3\pi} = \frac{3\pi \cdot b}{3\pi}$

(23) AMP = 5 $P = 3\pi$

$y = a\sin bx$

$y = 5\sin\frac{2}{3}x$

$P = \frac{2\pi}{b}$

$3\pi = \frac{2\pi}{b}$ $b = \frac{2\pi}{3\pi} = \frac{2}{3}$

Day 2 of Graphing

KEY CONCEPT *For Your Notebook*

Translations of Sine and Cosine Graphs

To graph $y = a \sin b(x - h) + k$ or $y = a \cos b(x - h) + k$ where $a > 0$ and $b > 0$, follow these steps:

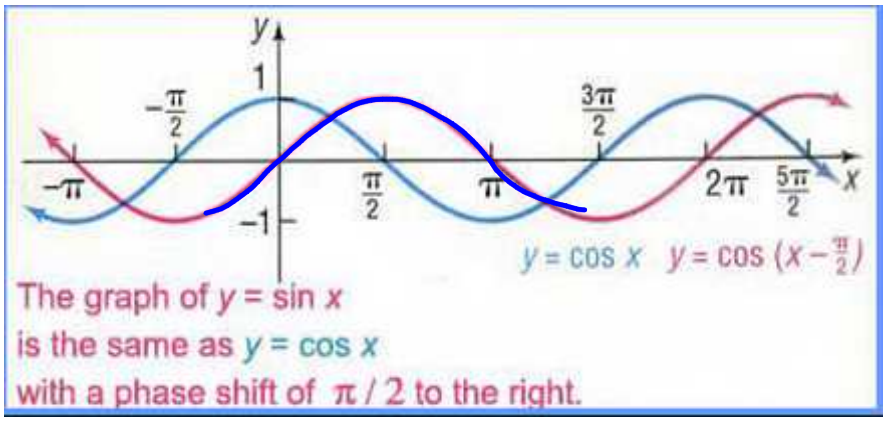
left/right up/down

STEP 1 **Identify** the amplitude a, the period $\frac{2\pi}{b}$, the horizontal shift h, and the vertical shift k of the graph.

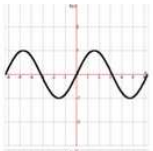
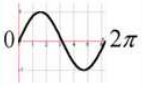
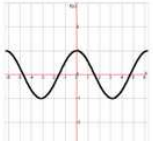
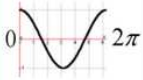
STEP 2 **Draw** the horizontal line $y = k$, called the *midline* of the graph.

STEP 3 **Find** the five key points by translating the key points of $y = a \sin bx$ or $y = a \cos bx$ horizontally h units and vertically k units.

STEP 4 **Draw** the graph through the five translated key points.



* You are going to need two different colored writing utensils.

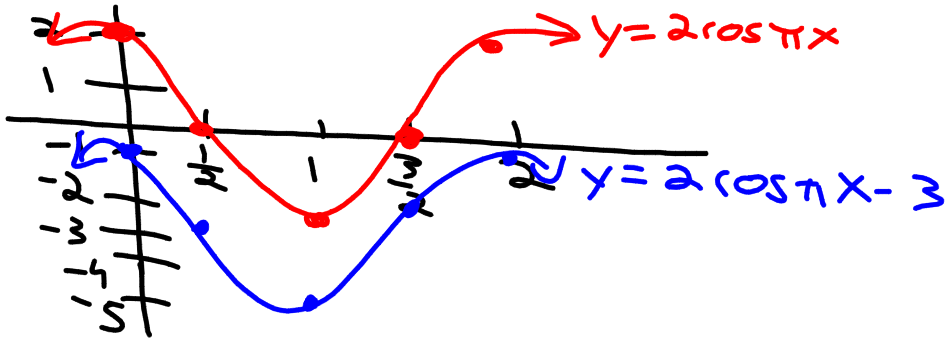
		Sketch	Period length
	sine		$2\pi \div b$
	cosine		$2\pi \div b$

Finish Practice WS (Blue)

(4) $y = 2\cos \pi x - 3$ ← down 3

shift: down 3

AMP = 2 P = $\frac{2}{\frac{2\pi}{\pi}} = \frac{2}{2} = \frac{1}{2}$



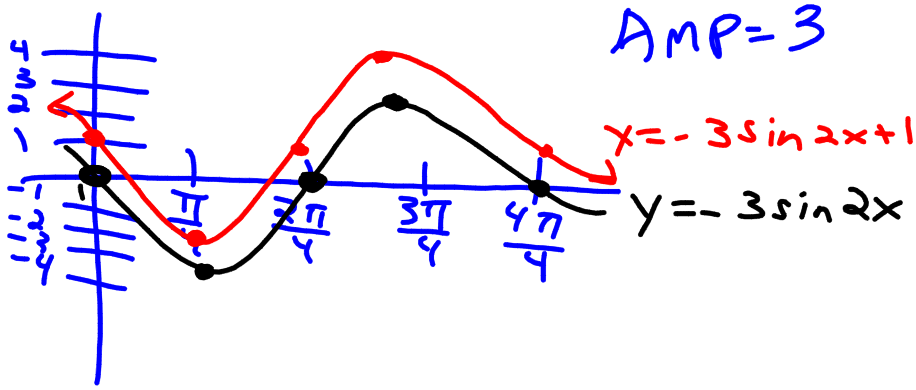
(5) $y = -3\sin 2x + 1$

Shift: up 1
Reflection: Yes

AMP = 3

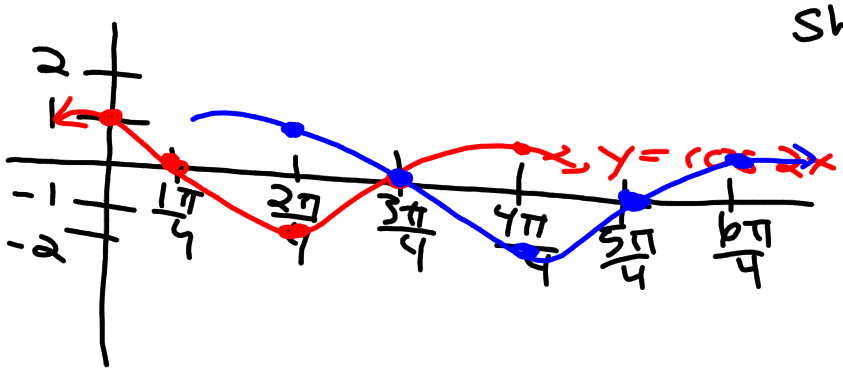
$P = \frac{2\pi}{2} = \pi$

$\frac{\pi}{4}$



(7) $y = \cos(2x - \frac{\pi}{2})$ Amp: 1 P: $\frac{2\pi}{2} = \pi$

Shift: Right $\frac{\pi}{4}$



1. $y=\cos(x-\pi/2)+3$ $y=a\cos b(x-h)+k$

Amplitude- 1

Period- $\frac{2\pi}{1}=2\pi$ $\frac{2}{4}\pi=\frac{\pi}{2}$

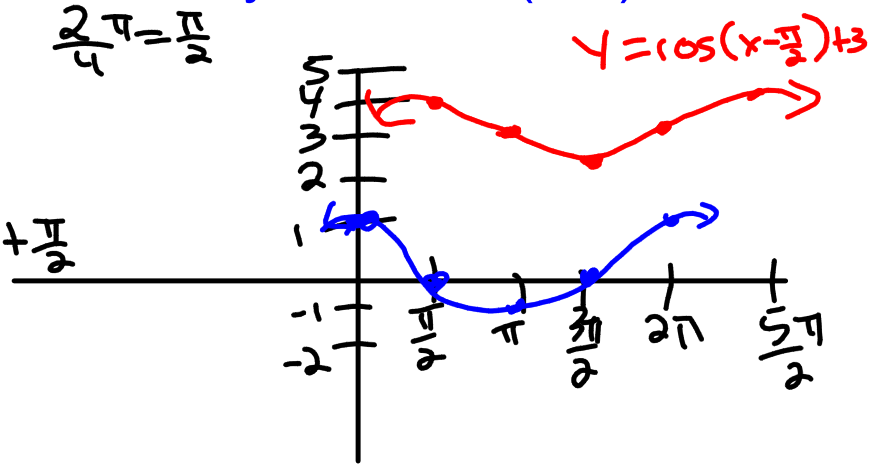
Vertical Shift- up 3

Horizontal Shift- right $\frac{\pi}{2}$

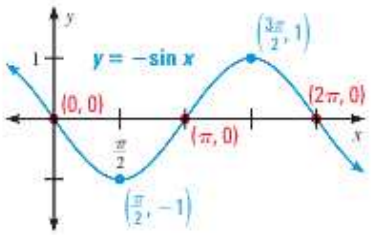
Maximum-

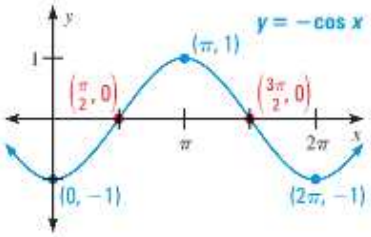
Minimum-

~~x-intercepts-~~



REFLECTIONS You have graphed functions of the form $y = a \sin b(x - h) + k$ and $y = a \cos b(x - h) + k$ where $a > 0$. To see what happens when $a < 0$, consider the graphs of $y = -\sin x$ and $y = -\cos x$.





Notice that the graphs are reflections of the graphs of $y = \sin x$ and $y = \cos x$ in the x-axis. In general, when $a < 0$ the graphs of $y = a \sin b(x - h) + k$ and $y = a \cos b(x - h) + k$ are reflections of the graphs of $y = |a| \sin b(x - h) + k$ and $y = |a| \cos b(x - h) + k$, respectively, in the midline $y = k$.

4) -3 sin x

Amplitude-

Period-

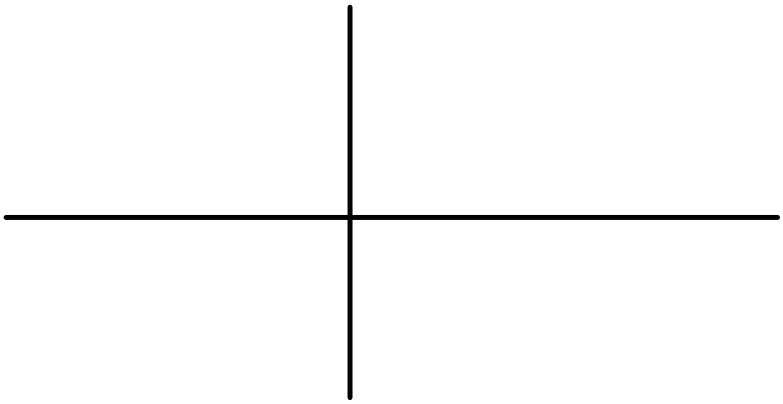
Vertical Shift-

Horizontal Shift-

Maximum-

Minimum-

x-intercepts-



GUIDED PRACTICE for Examples 2 and 3

Graph the function.

5. $y = \frac{1}{4}\sin \pi x$ **6.** $y = \frac{1}{3}\cos \pi x$ **7.** $f(x) = 2\sin 3x$ **8.** $g(x) = 3\cos 4x$

15 mins at each station

1)Work time

2) **student.desmos.com**

CODE- Y6QS8C

Intro to Amplitude and Vertical Shift

https://teacher.desmos.com/activitybuilder/custom/583f4544575b0ce408f7ae68

3) **student.desmos.com**

CODE- 2R5FQG

Graphing the Sine Function using Amplitude, Period, and Vertical Translation

https://teacher.desmos.com/activitybuilder/custom/56b3e682b884dbd81be6ed09

Homework

- Graphing WS
- Quiz next class over graphing trig functions!