Bellwork: ACT Prep

Given that $a\begin{bmatrix} 2 & 6 \\ 1 & 4 \end{bmatrix} = \begin{bmatrix} x & 27 \\ y & z \end{bmatrix}$ for some real number a, what is $x + z$?

A. $\frac{4}{3}$

B. $\frac{27}{2}$

C. 26

D. 27

E. 48

Given $f(x) = x - \frac{1}{x}$ and $g(x) = \frac{1}{x}$, what is $f\left(g\left(\frac{1}{2}\right)\right)$?

F. -3

G. $-\frac{3}{2}$

H. $-\frac{2}{3}$

J. 0

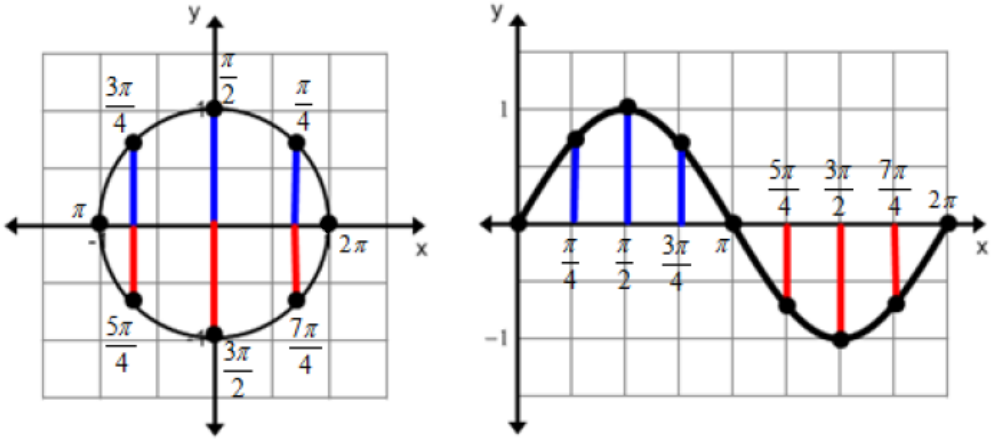
K. $\frac{3}{2}$

Today's Objectives:

I can graph sine and cosine functions

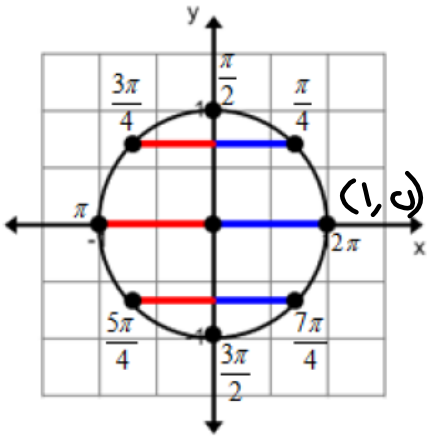
Graphing Sine Functions

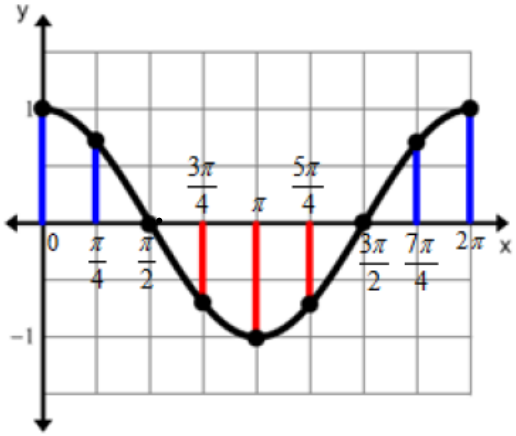
Plotting every angle and its corresponding sine value, which is the y-coordinate, for different angles on the unit circle, allows us to create the sine function where $x = \theta$ and $y = \sin\theta$.



Graphing Cosine Functions

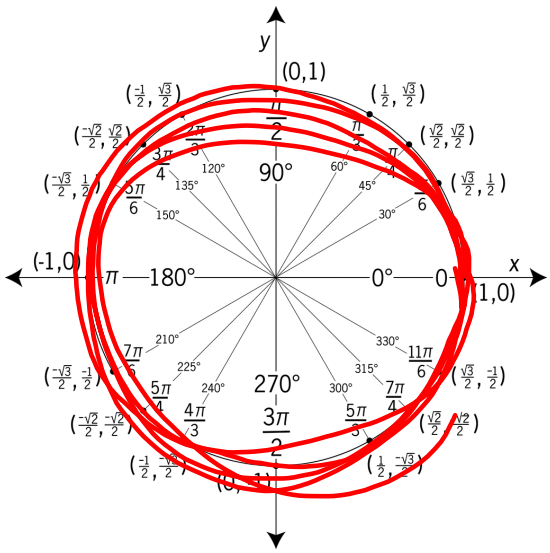
Plotting every angle and its corresponding cosine value, which is the x-coordinate, for different angles on the unit circle, allows us to create the cosine function where $x = \theta$ and $y = \cos\theta$.





Both sine and cosine graphs repeat forever in both directions, because as we rotate around the unit circle the new angles map onto existing angles. This type of function is called **periodic.**

360
360



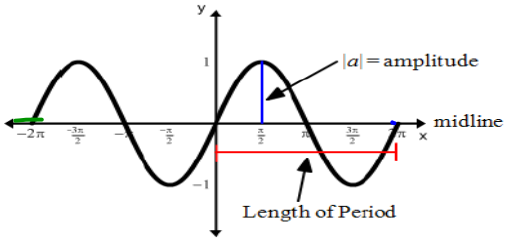
General Equations and Graphs

$f(x) = a\sin(bx) + k$ and $f(x) = a\cos(bx) + k$

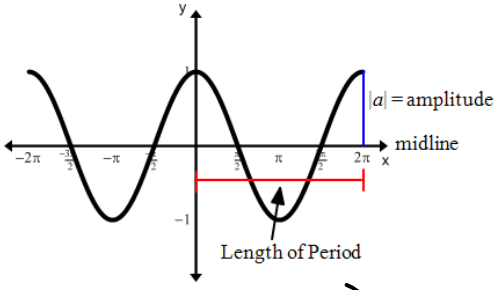
The domain of each function is the set of all real numbers, $(-\infty, \infty)$. The range of each function is $[-1,1]$.

Per: $\frac{2\pi}{b}$

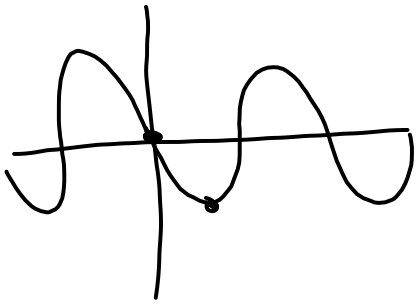
$f(x) = \sin(x)$



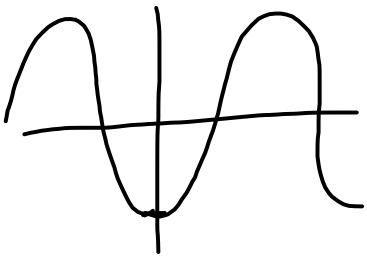
$f(x) = \cos(x)$



$-\sin(x)$



$-\cos(x)$



Vocabulary

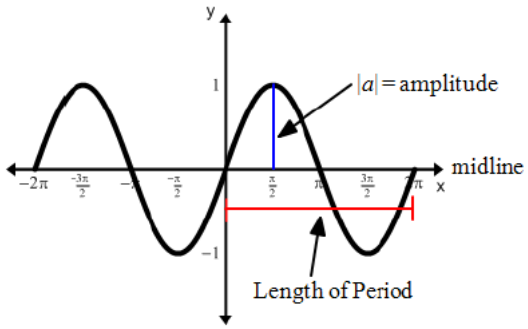
The **amplitude,** |a|, is half the difference between the maximum and minimum values of the function (the distance from the midline to the max or min)

The **period,** $\frac{2\pi}{|b|}$, is the interval length needed to complete one cycle.

The **frequency,** $\frac{|b|}{2\pi}$, is the number of complete cycles a periodic function makes in a specific interval.

The **midline,** k, is the horizontal line that cuts the trigonometric function in half

$f(x) = \sin(x)$



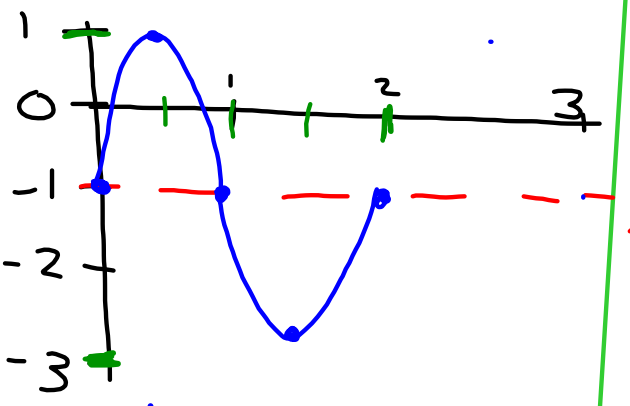
Example 1:
Identify the amplitude and period, and midline, then sketch one period of the graph.

$f(x) = a\sin(bx)+k$

a. $f(x) = 2\sin(\pi x) - 1$

$a=2 \quad b=\pi \quad per=\frac{2\pi}{\pi}$

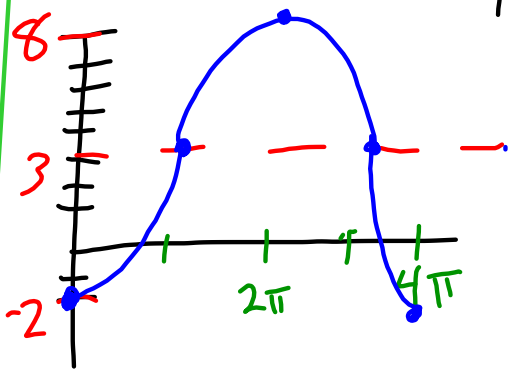
$k=-1 \quad per=2$



b. $f(x) = -5\cos\left(\frac{1}{2}x\right)+3$

$a=-5 \quad k=3 \quad b=\frac{1}{2}$

$per: \frac{2\pi}{\frac{1}{2}} = 2\pi\cdot\frac{2}{1} = 4\pi$



Example 2:
Identify the amplitude and period, and determine where the midline is located. Then write the equation for the function. $a\sin(bx)+k$

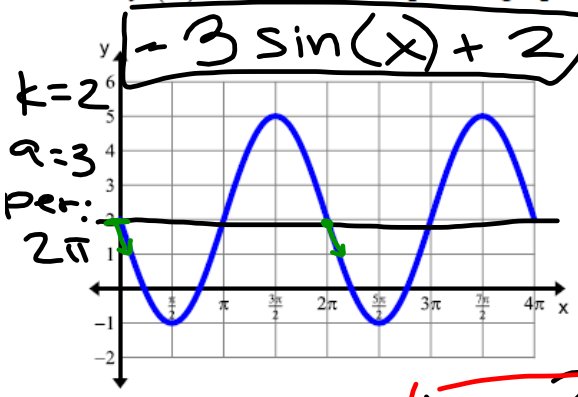
a. Use $f(x) = \sin x$ for your parent graph.

$-3\sin(x)+2$

$k=2$

$a=3$

$per: 2\pi$



b. Use $f(x) = \cos x$ for your parent graph.

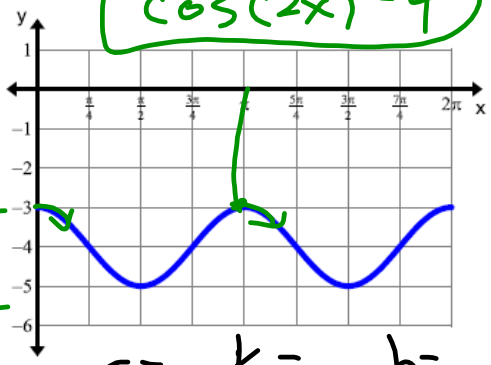
$\cos(2x)-4$

$k=-4$

$a=1$

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

$b=2$



$a= \quad k= \quad b=$

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

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

per

$\frac{\pi}{3}, \frac{2\pi}{3}, \pi$