Pre-Calculus A Name:________________________

4.5 Graphing Sine and Cosine - the **b and c** values

Period of Sine and Cosine Functions:

Let b be a positive real number. The period of $f(x) = d + a\sin(bx - c)$ and $g(x) = d + a\cos(bx - c)$ is given by $P = \frac{2\pi}{b}$.

Example: Determine the fundamental period of $f(x) = -1 + \frac{1}{2}\sin\left(2x + \frac{\pi}{3}\right)$

Transformations from the b and c values:

If $0 < b < 1$, the period is greater than 2π, and there is a horizontal stretch.

If $b > 1$, the period is less than 2π and represents a horizontal shrink.

Example: Determine the horizontal transformation of $f(x) = -1 + \frac{1}{2}\sin\left(2x + \frac{\pi}{3}\right)$.

A horizontal shift is called a phase shift. It is determined by calculating $\left|\frac{c}{b}\right|$. Indicate direction.

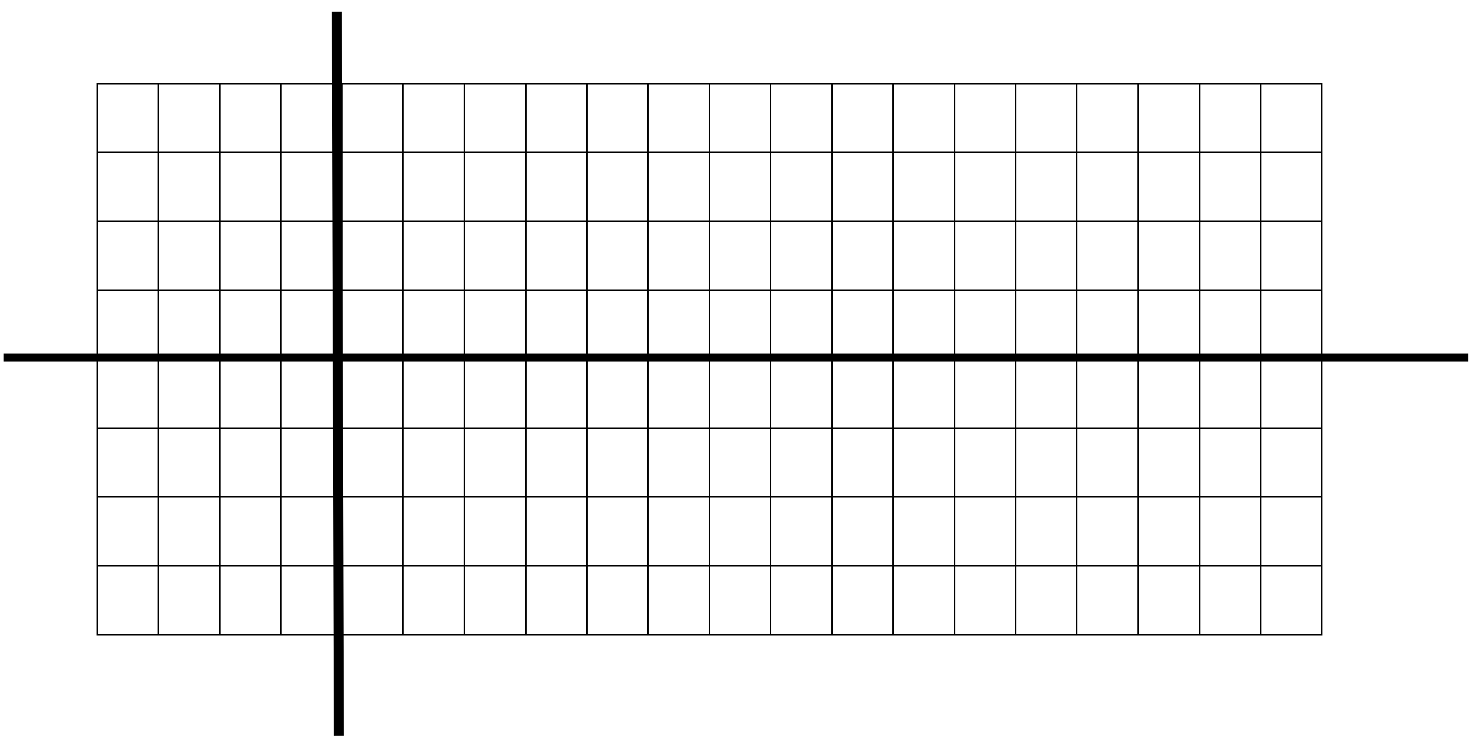
Example: Determine the phase shift of $f(x) = -1 + \frac{1}{2}\sin\left(2x + \frac{\pi}{3}\right)$.

When looking at a graph with a horizontal shift and/or a horizontal stretch/shrink, to determine the x-value of the "new" key points, we set the x-value of the parent graph's key points equal to the argument $(bx-c)$. There should be five key points.

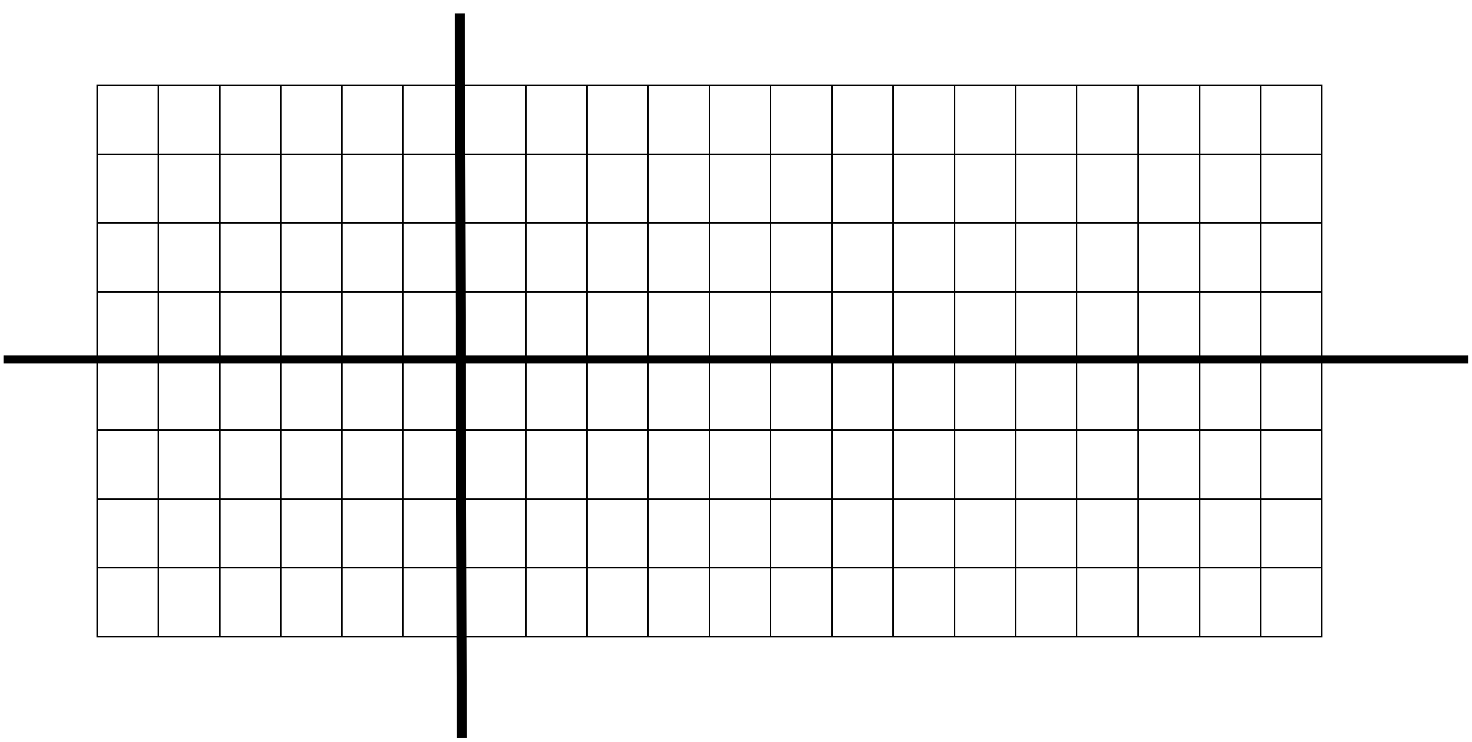
Example: Determine the x-values of the new key points of $f(x)=-1+\frac{1}{2}\sin\left(2x+\frac{\pi}{3}\right)$.

Example: Describe how the graph of $f(x)=-1+\frac{1}{2}\sin\left(2x+\frac{\pi}{3}\right)$ is different from the parent graph.

Example: Graph the function $f(x) = -1 + \frac{1}{2}\sin\left(2x + \frac{\pi}{3}\right)$.

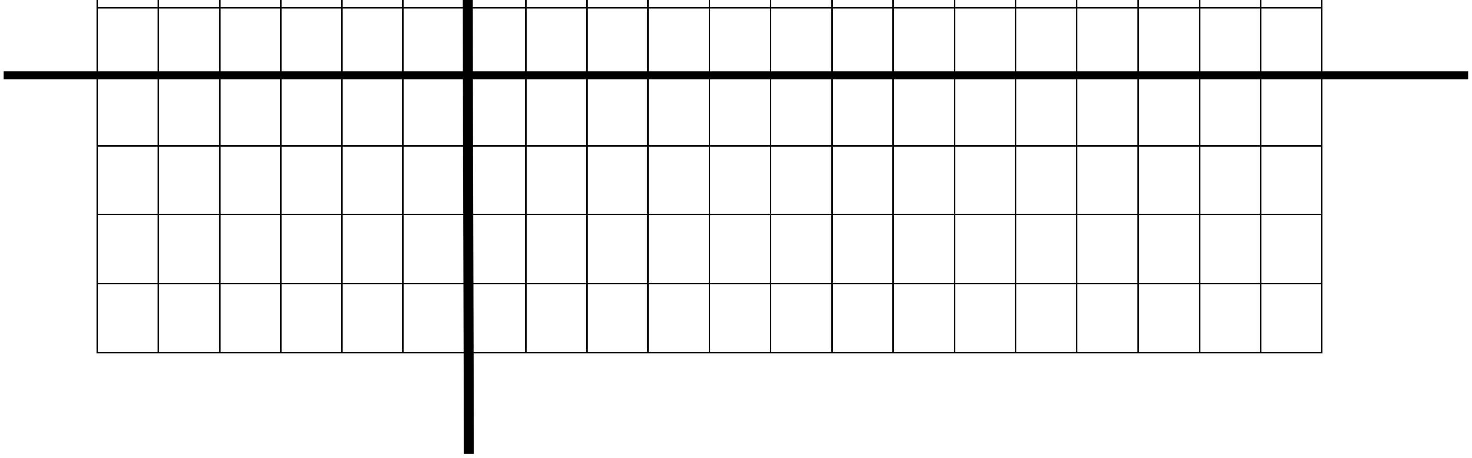


1. Graph the function $n(x) = \sin\left(2x - \frac{\pi}{2}\right)$



Pre-Calculus Homework **Name:**______________________________

1. Graph the function $f(x) = -3\sin\left(\frac{1}{2}x + \pi\right) + 1$. Show all steps .



2. Describe how the graph of $f(x) = -3\sin\left(\frac{1}{2}x + \pi\right) + 1$ is different from the parent.