Math 3 - Graphing Shifts of Sine and Cosine Notes

Horizontal Shift (Phase Shift)

VOCABULARY

When a horizontal shift is performed on a trigonometric function it is called a **phase shift**. The general equations are $f(x)=a\sin\left[b(x-h)\right]+k$ or $f(x)=a\cos\left[b(x-h)\right]+k$, where h is the number of units the graph is shifted horizontally.

*****Check if there is a number in front of x. If so, factoring out b is required to determine the shift**

k is the vertical shift/midline: **+ goes up** **- goes down**

h is the horizontal shift: **+ in parentheses goes to the left** **- in parentheses goes to the right**

*****Pay attention to Sine vs. Cosine*****

- **From 0, sin(x) starts at midline, then goes up to maximum**
- **From 0, cos(x) starts at the maximum, then goes down**

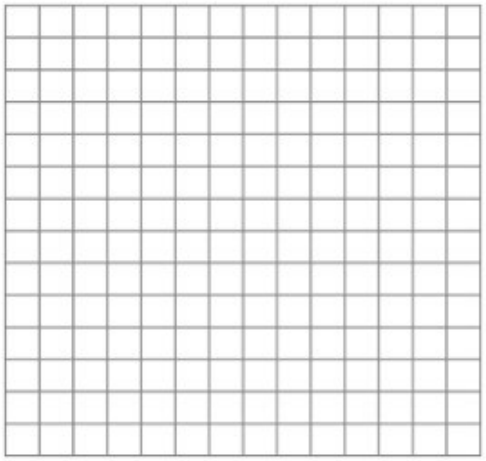
*****Pay attention to reflections*****

- **From 0, -sin(x) starts at midline, then goes down to minimum**
- **From 0, -cos(x) starts at minimum, then goes up**

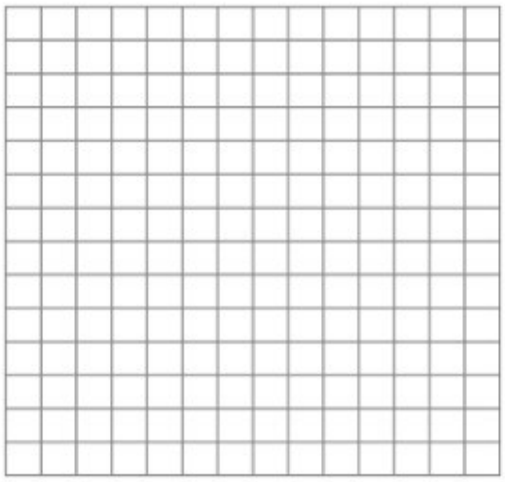
Examples:

Identify the amplitude, period, phase shift, vertical shift, maximum, and minimum. Then sketch one period of the graph

a. $f(x)=\sin\left(x-\frac{\pi}{2}\right)+3$



b. $f(x)=2\cos\left(2\left(x-\frac{\pi}{4}\right)\right)+1$



c. $f(x)=-\cos(\frac{1}{2}x+\frac{\pi}{2})$