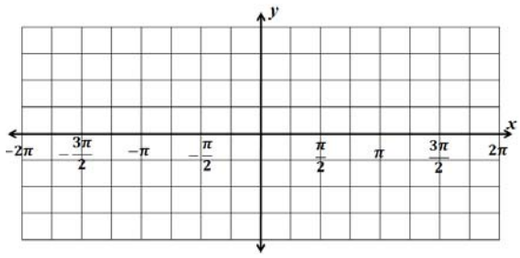
Name: _____ **Precalculus Unit 9, Lesson 6**

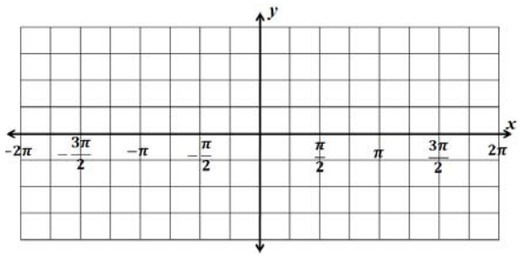
Aim: How do we graph horizontal translations (phase shifts) of sine and cosine curves?

I. Do Now:

1. Describe each transformation of the graph of $y = f(x)$:
   (a) $y = f(x+3)$ (b) $y = f(x-2)$ (c) $y = f(x)+1$ (d) $y = f(x-4)-5$

2. Use your graphing calculator to sketch each graph:
   (a) $y = \cos(x+\pi)$ (b) $y = \sin(2x-\pi)$





Solve each pair of equations for x. (Leave answers in terms of π.)
(c) $x+\pi = 0$ and $x+\pi = 2\pi$ (d) $2x-\pi = 0$ and $2x-\pi = 2\pi$

(e) What is the significance of the answers you found in #3?

II. Horizontal Translations (Phase Shifts) of Sine and Cosine Curves

Graphs of equations of the form
$y = a\sin(bx-c)+d$ or $y = a\cos(bx-c)+d$
have the following characteristics. (Assume $b > 0$.)

Amplitude =

Frequency =

Period =

Vertical Shift =

Phase Shift =

On your calculator, graph $y = \cos(x-\frac{\pi}{2})$.
What do you notice?
The graph of $y = \cos(x-\frac{\pi}{2})$ is _____
Any cosine function can be expressed using _____

III. Determine an appropriate scale and then sketch *two cycles* of the graph of each equation.

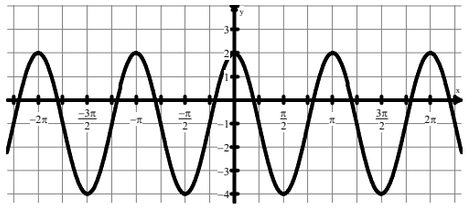
3. $y = 2\sin(x-\frac{\pi}{6})$

4. $y = -4\cos(x+\frac{\pi}{4})+1$

5. $y = 5\cos(2\pi x+4\pi)-2$

6. $y = 1-3\sin(\frac{2}{3}x-\frac{\pi}{3})$

7. Write equations of the following graph using both sine and cosine.



HW24
- p. 362: 50, 61, 63, 71
- p. 401: 14, 17, 30, 36, 46, 47