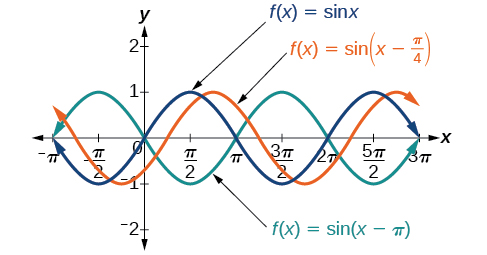
**Module 3 Lesson #6:**

**13.7 Phase Shifts**

**Translating Sine and**

**Cosine Functions**

**All functions in the sine and cosine family of functions can be completely described by their amplitude, period, vertical shift, and horizontal shift (phase shift).**



Recall the parent function y = x2

How is the graph of y = x2 + 5 moved?

How is the graph of y = (x – 4)2 + 5 moved?

We will use these same rules when shifting trig graphs. Today we will explore sine and cosine graphs and how they SHIFT!

Transformed functions are of the form:

Still Midline: how far up or down graph moves

OR

Still: Amplitude

If Negative: vertical flip

b is still: frequency

c: movement of graph left or right…however, it’s “–c/b”

PHASE SHIFT FORMULA (MEMORIZE):

Phase shifts and vertical translations do NOT change the period or amplitude of trig functions.

**Example 1:**

**Graph ONE cycle of:**

**Example 2:**

**Graph ONE cycle of:**

**Example 3:**

**Graph ONE cycle of:**

**Example 4:**

**Graph ONE cycle of:**

PRACTICE TIME! - HOMEWORK

1. Graph ONE cycle of

2. Graph ONE cycle of:

3. Graph ONE cycle of:

4. Graph ONE cycle of:

5. Graph ONE cycle of:

6. Graph ONE cycle of:

Multiple Choice Practice

1. What is the phase shift of the function
   1. b. c. d.
2. What is the range of the function ?
   1. [-6,6] b. [-4,8] c. [0,8] d. [-6,0]
3. State the amplitude, period, and phase shift of the function
   1. Amplitude: -2 Period: Phase Shift:
   2. Amplitude: -2 Period: Phase Shift:
   3. Amplitude: 2 Period: Phase Shift:
   4. Amplitude: 2 Period: Phase Shift:
4. What is the maximum value that the graph of will reach?
   1. 23 b. 13 c. 36 d. 10