

Before we begin, are there any questions from last day's work?

## Today's Learning Goal(s):

By the end of the class, I will be able to:

- a) sketch a trig functions that has undergone various tranformation:
- b) determine **an equation** of a trig function when given the graph.

Discuss the last Quiz (SWYK 4.1)

Discuss the advantages of:

- a) actually doing the homework questions
- b) having done a) above, then being prepared with a list of questions that need clarification when I ask, "Are there any questions from the homework?"
- c) reading over the lesson examples before a quiz or test

You had **8** nights to complete the homework from 4.1.1, and to ask for clarification before the quiz.

4.7.1 Reviewing Combined Transformations of Trigonometric Functions

$y = a \sin(k(x-d)) + c$  and  $y = a \cos(k(x-d)) + c$

Date: NOV-1/19

Ex.1 Sketch  $y = 2 \sin(4(x+45^\circ)) - 3$  by hand.

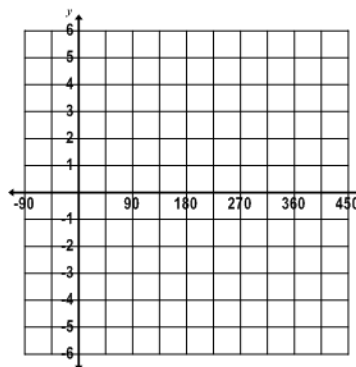
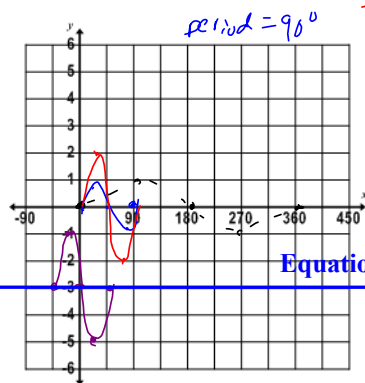
- Method: 1. sketch the base function [ $y = \sin x$  or  $y = \cos x$ ]  
 2. apply any compressions and stretches and then sketch again.

[use the key points:  $0^\circ, 90^\circ, 180^\circ, 270^\circ, 360^\circ$ ]

3. apply any translations and sketch the final curve

$y = \sin(x)$     $y = \sin(4x)$ , and  $y = 2\sin(4x)$

$y = 2\sin(4(x+45^\circ)) - 3$



Key Properties:

Amplitude 2 (always positive)

Period  $90^\circ$

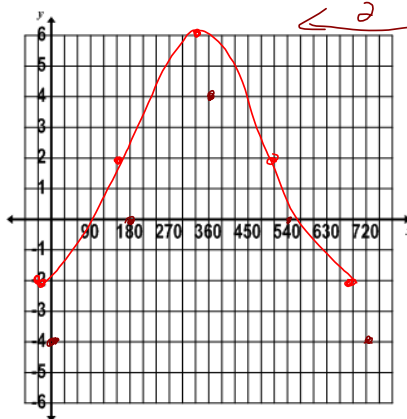
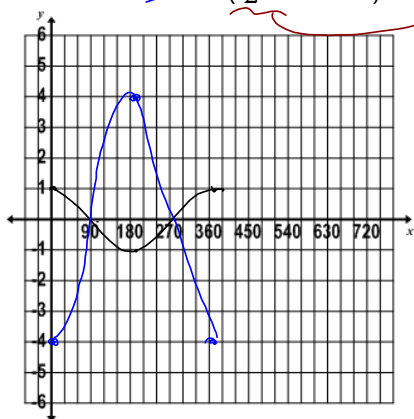
Phase Shift  $45^\circ$  to the left

Domain  $\{x \in \mathbb{R}\}$    Range  $\{y \in \mathbb{R} \mid -5 \leq y \leq -1\}$

# 4.7.1 Reviewing Combined Transformations of Trig Functions (Spring 2018) November 7, 2019

Ex.2 Sketch  $y = -4\cos\left(\frac{1}{2}(x+30^\circ)\right) + 2$  by hand.

*period =  $\frac{360^\circ}{\frac{1}{2}} = 720^\circ$*



Key Properties:

Amplitude 4

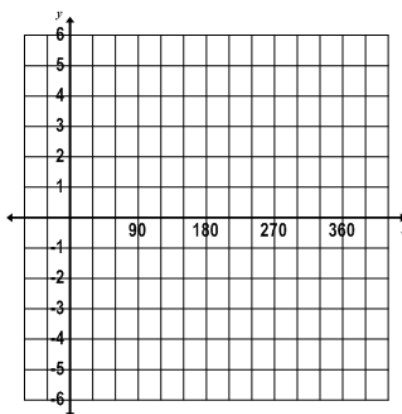
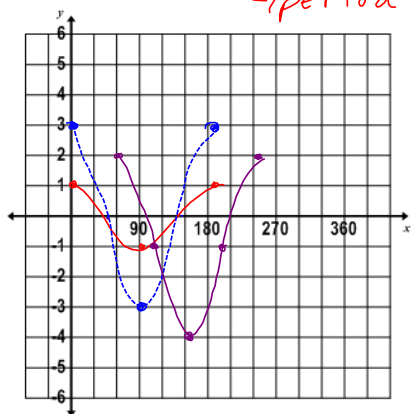
Period 720°

Phase Shift 30° to the left

Domain  $\{x \in \mathbb{R}\}$  Range  $\{y \in \mathbb{R} \mid -2 \leq y \leq 6\}$

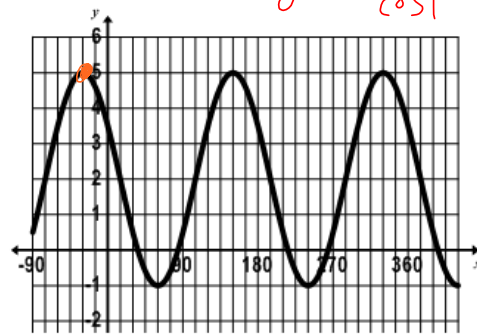
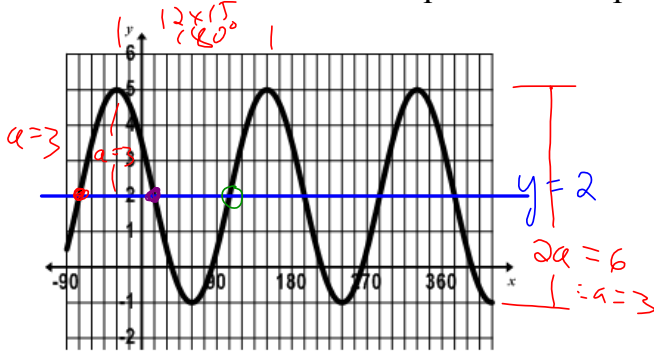
Ex.3 Sketch  $y = 3\cos(2(x-60^\circ)) - 1$  by hand.

*period =  $\frac{360^\circ}{2} = 180^\circ$*



Ex.4 Write 2 different equations to represent this function.

$$y = a \begin{matrix} \sin \\ \cos \end{matrix} (k(x-d)) + c$$



$$y = 3 \sin(2(x+75^\circ)) + 2$$

$$y = 3 \sin(2(x-105^\circ)) + 2$$

$$= -3 \sin(2(x-15^\circ)) + 2$$

$$\text{period} = \frac{360^\circ}{k}$$

$$k = \frac{360^\circ}{\text{period}}$$

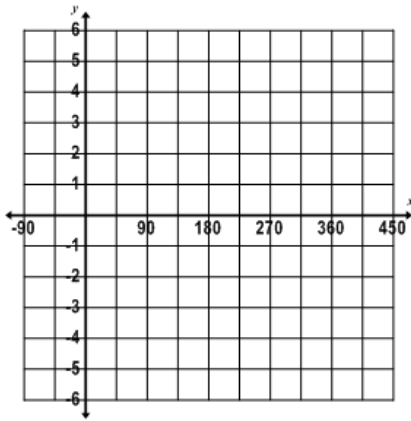
$$= \frac{360^\circ}{180^\circ}$$

$$k = 2$$

$$y = 3 \cos(2(x+30^\circ)) + 2$$

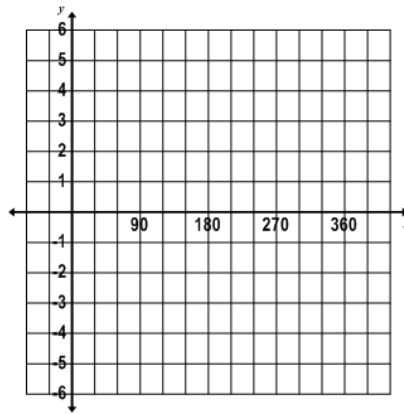
4.7.2 Practice Sketch by hand, then complete the key properties for each function.

a)  $y = 4.5\cos(x+90^\circ)$



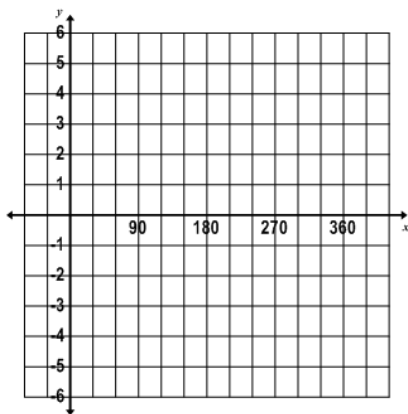
Amplitude \_\_\_\_\_ Period \_\_\_\_\_ Phase Shift \_\_\_\_\_  
 Domain \_\_\_\_\_ Range \_\_\_\_\_

b)  $y = \sin(2x) - 1$



Amplitude \_\_\_\_\_ Period \_\_\_\_\_ Phase Shift \_\_\_\_\_  
 Domain \_\_\_\_\_ Range \_\_\_\_\_

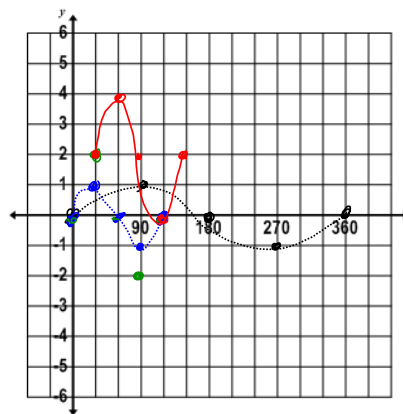
c)  $y = -2\cos(2(x)) + 1$



Amplitude \_\_\_\_\_ Period \_\_\_\_\_ Phase Shift \_\_\_\_\_  
 Domain \_\_\_\_\_ Range \_\_\_\_\_

d)  $y = 2\sin(3(x - 30^\circ)) + 2$

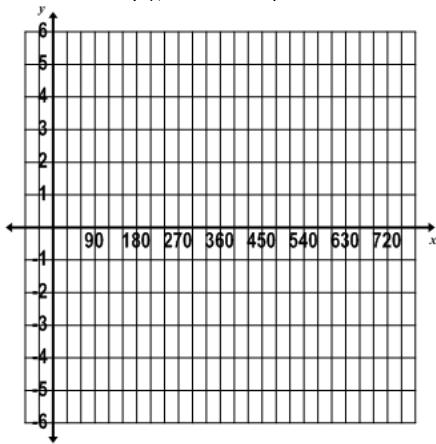
*period =  $\frac{360^\circ}{3} = 120^\circ$*



Amplitude 2 Period 120° Phase Shift 30° to the right  
 Domain {x ∈ ℝ} Range {y ∈ ℝ | 0 ≤ y ≤ 4}

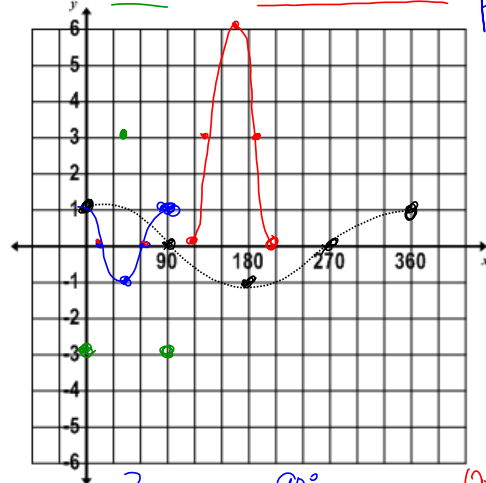
4.7.1 Reviewing Combined Transformations of Trig Functions (Spring 2018) November 7, 2019

e)  $y = 5 \sin\left(\frac{1}{2}(x - 60^\circ)\right) + 1$



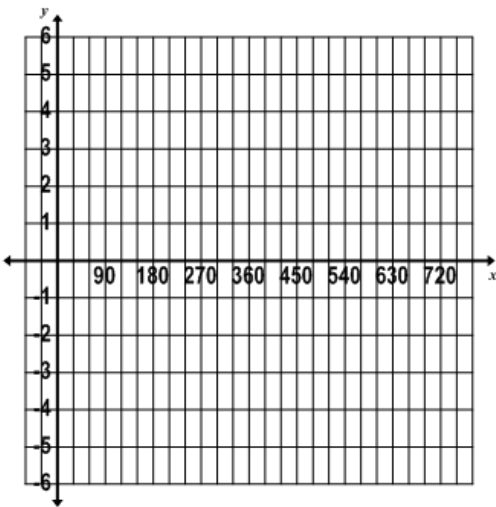
Amplitude \_\_\_\_\_ Period \_\_\_\_\_ Phase Shift \_\_\_\_\_  
 Domain \_\_\_\_\_ Range \_\_\_\_\_

f)  $y = -3 \cos(4(x - 120^\circ)) + 3$  period =  $\frac{360}{4}$   
=  $90^\circ$



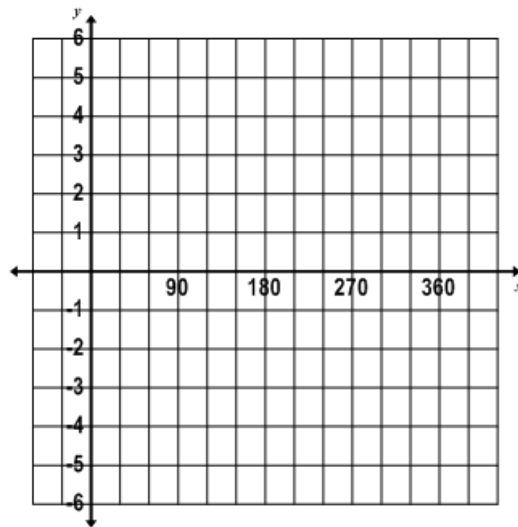
Amplitude 3 Period  $90^\circ$  Phase Shift  $120^\circ$  right  
 Domain  $\{x \in \mathbb{R}\}$  Range  $\{y \in \mathbb{R} \mid 0 \leq y \leq 6\}$

g)  $y = 3 \cos\left(\frac{1}{2}(x - 30^\circ)\right) - 1$



Amplitude \_\_\_\_\_ Period \_\_\_\_\_ Phase Shift \_\_\_\_\_  
 Domain \_\_\_\_\_ Range \_\_\_\_\_

h)  $y = -4 \sin(3(x + 30^\circ)) - 2$

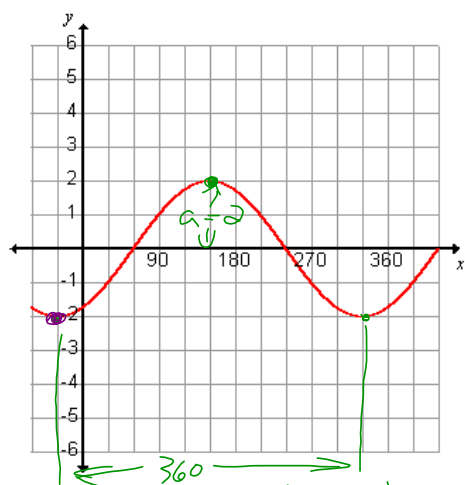


Amplitude \_\_\_\_\_ Period \_\_\_\_\_ Phase Shift \_\_\_\_\_  
 Domain \_\_\_\_\_ Range \_\_\_\_\_

i) For each trigonometric function shown below, write 2 different equations to represent each function.

I) using the cosine function

II) using the sine function  $y = a \sin(k(x-d^\circ)) + c$



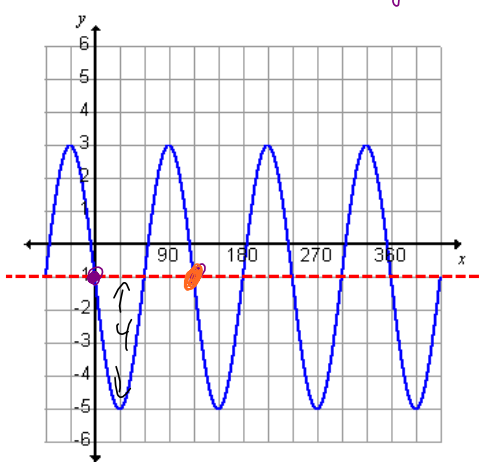
$$y = 2 \cos(1(x - 180^\circ)) + 0$$

or

$$y = -2 \cos(x + 30^\circ)$$

$$k = \frac{360^\circ}{360^\circ}$$

$$= 1$$



$$y = -4 \sin(3x) - 1$$

or

$$y = -4 \sin(3(x - 120^\circ)) - 1$$

$$k = \frac{360^\circ}{120^\circ} = 3$$