

Today's Learning Goal(s):

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

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

4.7.1 Reviewing Combined Transformations of Trigonometric Functions

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

Date: Nov. 2/18

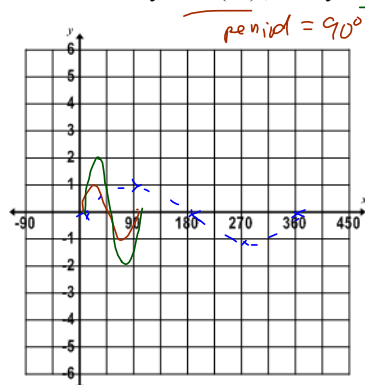
Ex.1 Sketch $y = 2\sin(4(x+45^\circ)) - 3$ by hand.

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

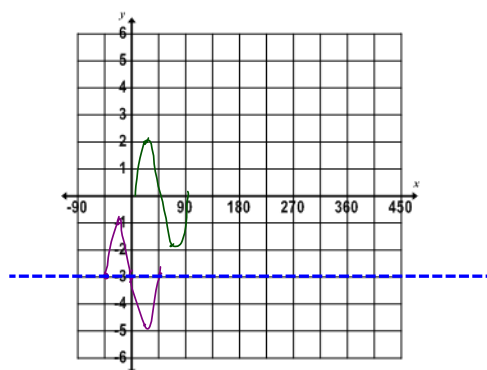
[use the key points: 0° , 90° , 180° , 270° , 360°]

- apply any translations and sketch the final curve

$$y = \sin(x) \quad y = \sin(4x), \quad \text{and} \quad y = 2\sin(4x)$$



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



Equation of the axis is $y = -3$

Key Properties:

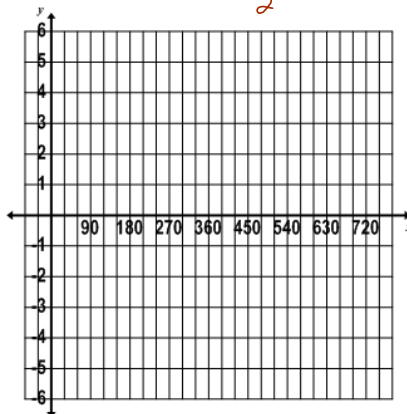
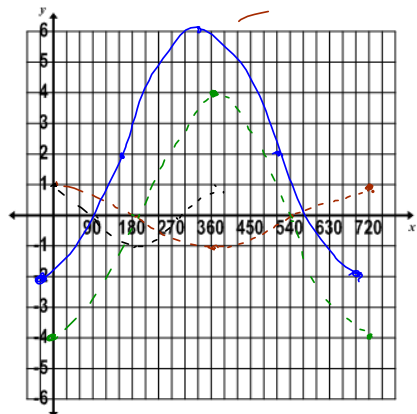
Amplitude 2

Period 90°

Phase Shift 45° to the left

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

Ex.2 Sketch $y = -4\cos\left(\frac{1}{2}(x+30^\circ)\right) + 2$ by hand. $\text{period} = \frac{360^\circ}{\frac{1}{2}} = 360^\circ \div \frac{1}{2}$



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

Key Properties:

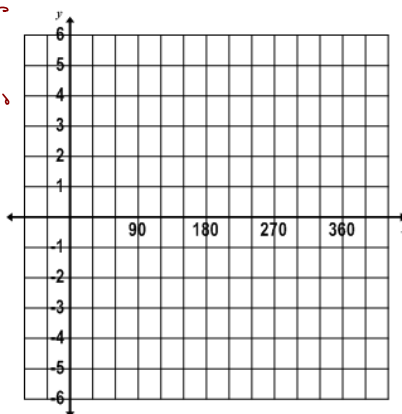
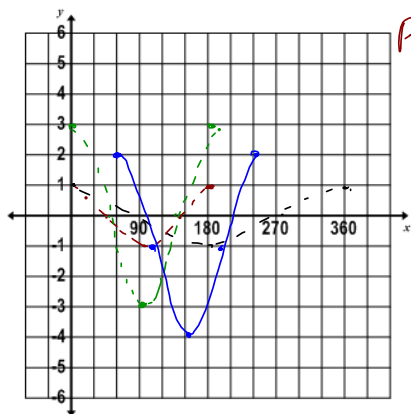
Amplitude 4

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.

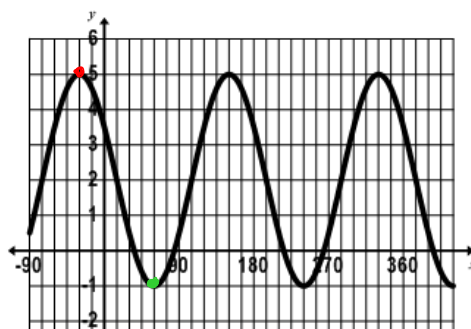
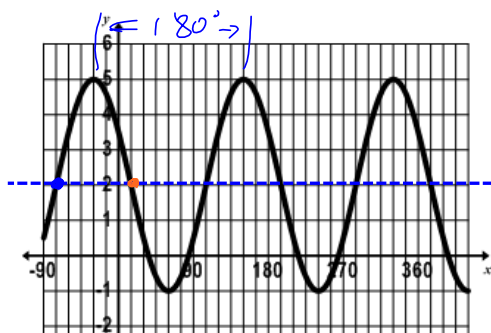


$\text{period} = \frac{360^\circ}{2}$
 $= 180^\circ$

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

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

$$a=3 \quad k=2 \quad d=-75^\circ \quad c=2$$



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

$$y = \underline{-3 \sin(2(x-15^\circ)) + 2}$$

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

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

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

$$= 2$$

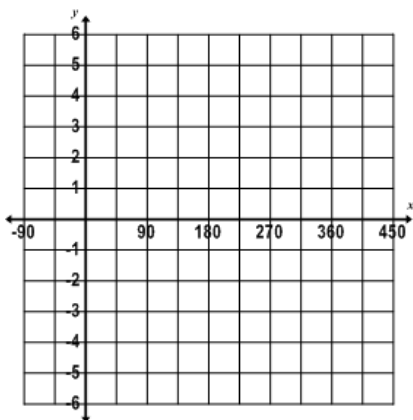
$$180 = \frac{360}{k}$$

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

$$= \underline{-3 \cos(2(x-60^\circ)) + 2}$$

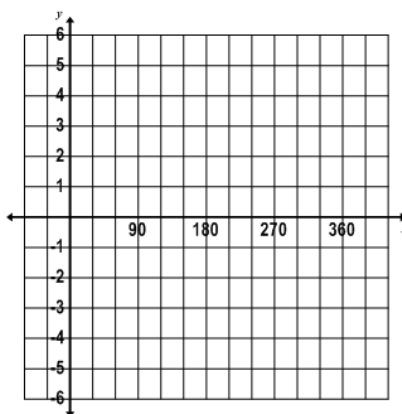
4.7.2 Practice Sketch by hand, then complete the key properties for each function.

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



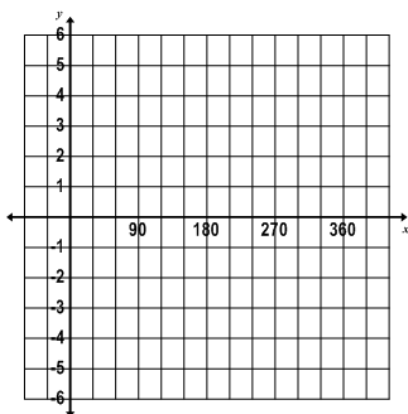
Amplitude _____ Period _____ Phase Shift _____
 Domain _____ Range _____

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



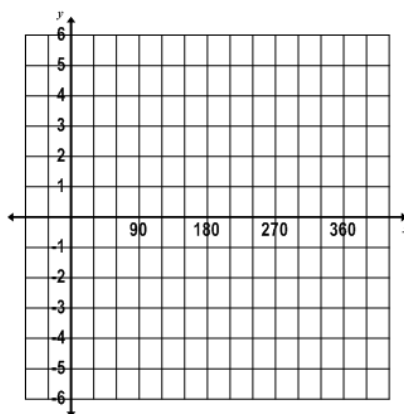
Amplitude _____ Period _____ Phase Shift _____
 Domain _____ Range _____

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



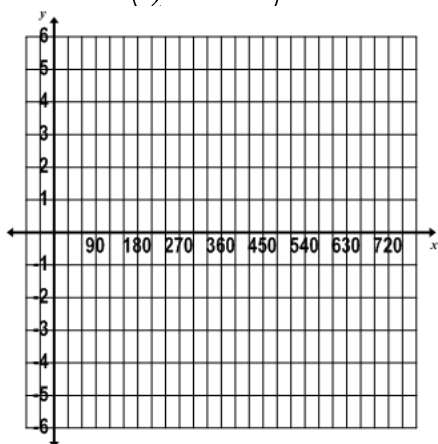
Amplitude _____ Period _____ Phase Shift _____
 Domain _____ Range _____

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



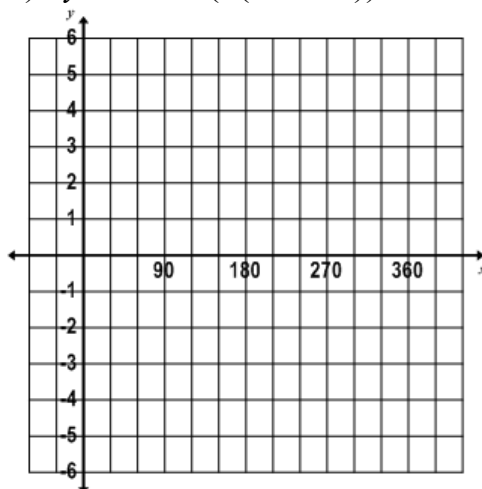
Amplitude _____ Period _____ Phase Shift _____
 Domain _____ Range _____

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



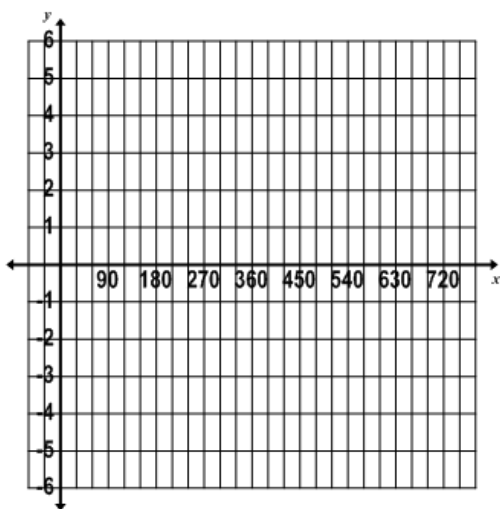
Amplitude _____ Period _____ Phase Shift _____
 Domain _____ Range _____

f) $y = -3 \cos(4(x - 120^\circ)) + 3$



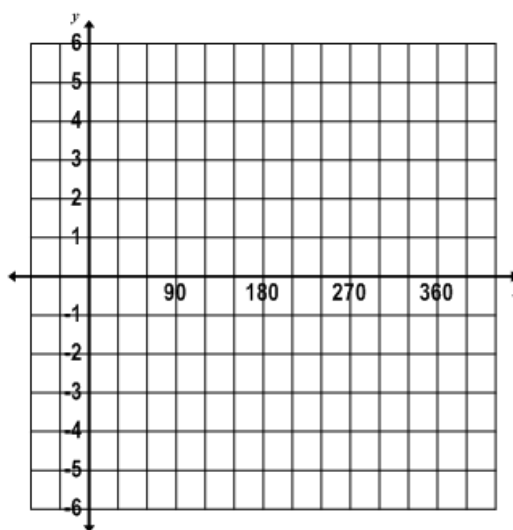
Amplitude _____ Period _____ Phase Shift _____
 Domain _____ Range _____

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



Amplitude _____ Period _____ Phase Shift _____
 Domain _____ Range _____

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

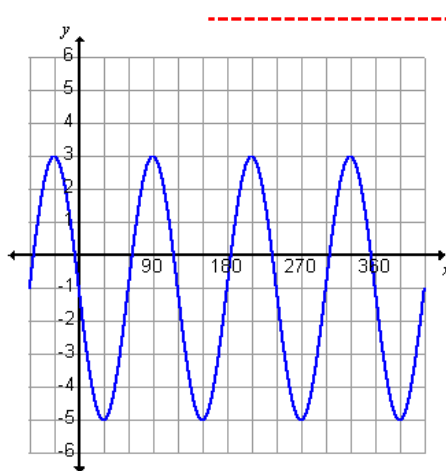
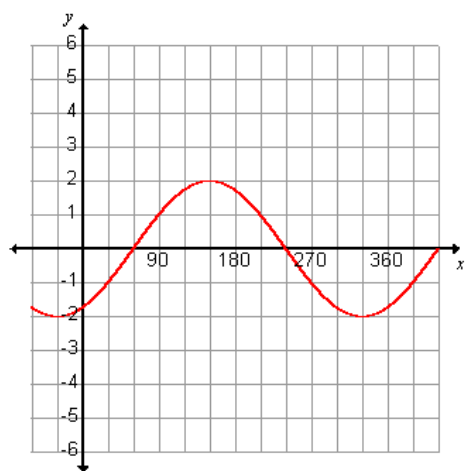


Amplitude _____ Period _____ Phase Shift _____
 Domain _____ Range _____

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 = _____

y = _____

or

or

y = _____

y = _____