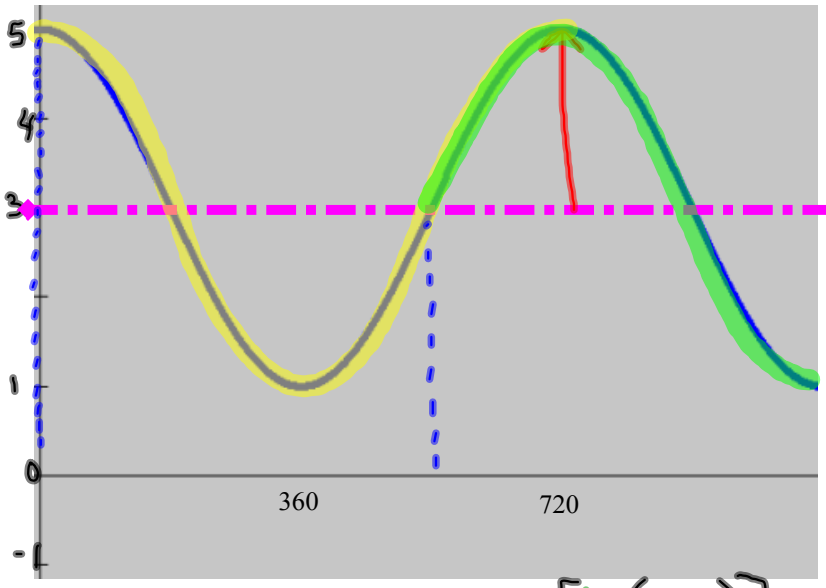
Warm-up



Find:

Local Max: 5

Local Min: 1

Equation of Sinusiodal Axis: $y = 3$

Period: 720

Amplitude: 2

Horizontal Translation (C): 0

Vertical Translation (D): 3

$k = \frac{360}{P} = \frac{360}{720} = \frac{1}{2}$

Equation of Graph: $y = 2\cos\left[\frac{1}{2}(x-0)\right]+3$

$y = 2\cos\left(\frac{1}{2}(x)\right)+3$

Questions from Homework

d) $y = 4\cos\left[\frac{3}{4}(x-90)\right] - 2$

$A = 4$ $\quad c = 90$ $\quad P = \frac{360}{k} = \frac{360}{3/4} = 480$

$k = \frac{3}{4}$ $\quad D = -2$ $\quad$ Equation of Sinusoidal Axis: $y = -2$

e) $y = \sin(2x - 60)$

$y = 1\sin\left[2(x-30)\right] + 0$

$A = 1$ $\quad c = 30$ $\quad P = \frac{360}{k} = \frac{360}{2} = 180$

$k = 2$ $\quad D = 0$

h) $2y + 2 = 4\cos(x-90) - 6$ $\quad -2$

$\frac{2y}{2} = \frac{4\cos(x-90)}{2} - \frac{8}{2}$

$y = 2\cos(x-90) - 4$

$A = 2$ $\quad c = 90$ $\quad P = \frac{360}{1} = 360$

$k = 1$ $\quad D = -4$

Equations in Standard Form

$$y = A\sin[k(x - C)] + D$$

A = ***Amplitude*** → influences how tall the sine curve is.

K = $\frac{360}{P}$ → influences how often the pattern repeats.

C = ***Horizontal Translation*** → Influences how far to the left or the right that the graph will shift.

- If C is positive → Shift Left
- If C is negative → Shift Right

D = ***Vertical Translation*** → influences how far up and down the graph will shift.

- If D is positive → Shift Up
- If D is negative → Shift Down

In which direction would these graphs be shifted?

$y = \sin(x) + 2$

D = 2

Shift up

$y = \sin(x - 30)$

C = 30

Shift Right

$y = -\cos(x) - 3$

D = -3

Shift Down

$y = \cos(x + 90)$

C = -90

Shift Left

$y = 2\cos(x - 90) - 3$

D = -3

C = 90

Down + Right

Sketching Sinusoidal Functions using Mapping

Development of a standard form for sinusoidal functions...

Standard Form ⟶ $y = A\sin[k(x - C)] + D$

1. Reflection: If A < 0 the graph will be reflected in the *x*-axis.

2. Amplitude: The amplitude of the graph will be equal to | A | .

3. Period: The period of the graph will be equal to $\frac{360°}{k}$

4. Horizontal Phase Shift: The graph will shift "C" units to the left./ right

5. Vertical Translation: The graph will shift "D" units up/ down

Mapping Notation: $(x, y) \rightarrow \left(\frac{x}{k} + C, Ay + D\right)$

Using Mapping to Graph!

$f(\theta) = -2\sin[3(\theta + 30°)] - 2$

$y = -2\sin[3(x+30°)] - 2$

$(x, y) \rightarrow \left(\frac{x}{k} + C, Ay + D\right)$

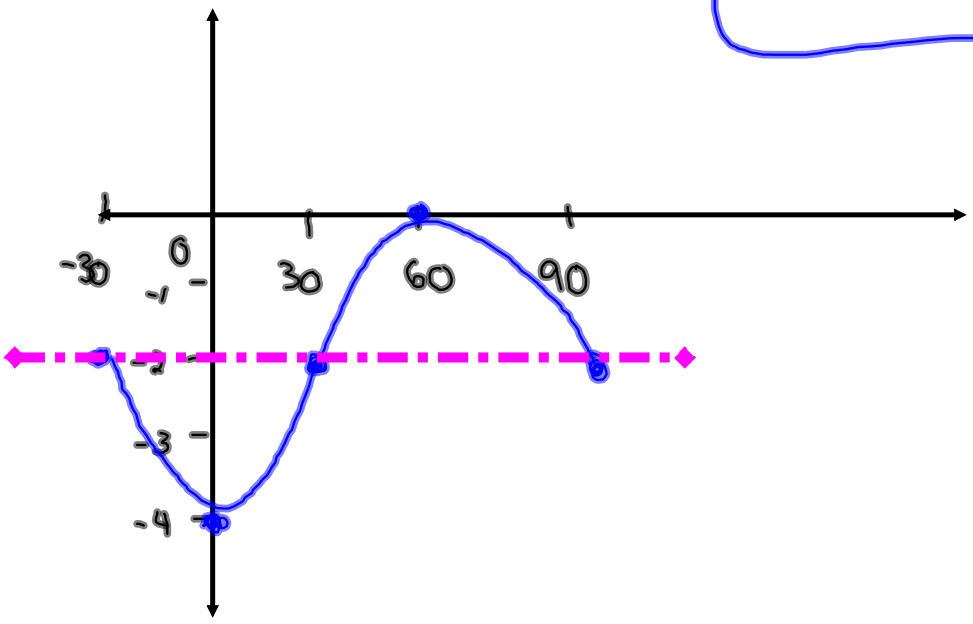
A = 2 k = 3 C = -30 D = -2 P = 120°

$y = -\sin\theta$

θ	y
0	0
90	-1
180	0
270	1
360	0

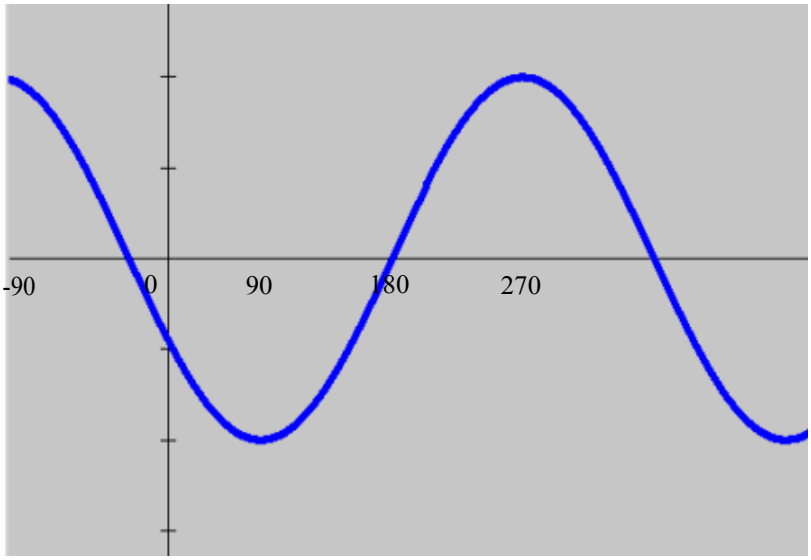
New points after mapping

θ	y
-30	-2
0	-4
30	-2
60	0
90	-2



Homework

What does Horizontal Translation look like?



Find:

Local Max: _____

Local Min: _____

Equation of Sinusiodal Axis:

_____

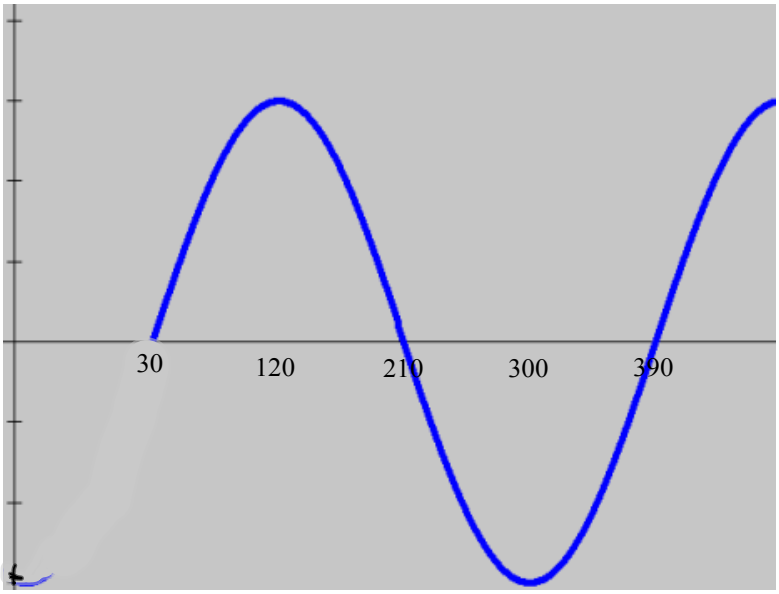
Period: _____

Amplitude: _____

Horizontal Translation (C): ____

Vertical Translation (D): _____

Equation of Graph: _____



Find:

Local Max: _____

Local Min: _____

Equation of Sinusiodal Axis:

_____

Period: _____

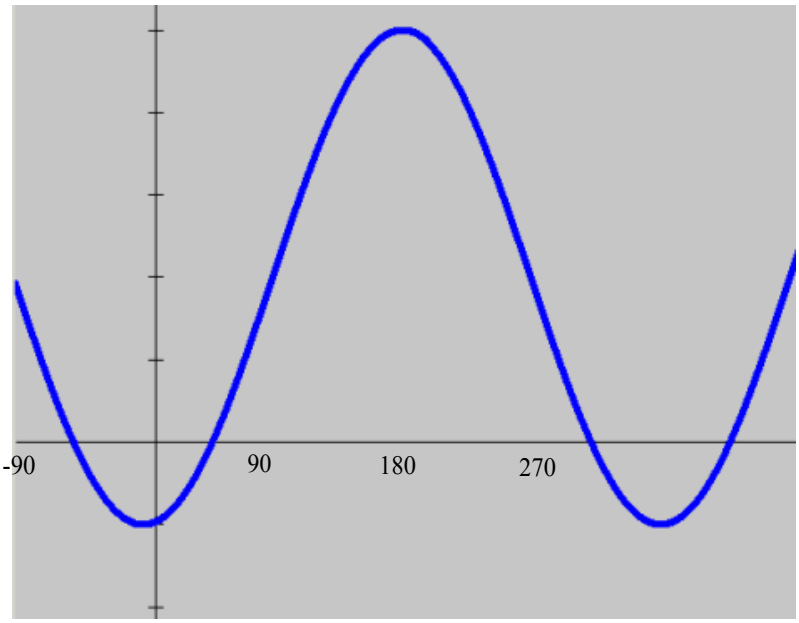
Amplitude: _____

Horizontal Translation (C): ____

Vertical Translation (D): _____

Equation of Graph: _____

A little "C" and "D"



Equation of Graph: _____

Find:

Local Max: _____

Local Min: _____

Equation of Sinusiodal Axis:

_____

Period: _____

Amplitude: _____

Horizontal Translation (C): ____

Vertical Translation (D): _____