Warm Up

(3) (3) (3)

$$\frac{y+5}{3} = \cos(2\theta + 90°) + 6$$

Sketch the equation:

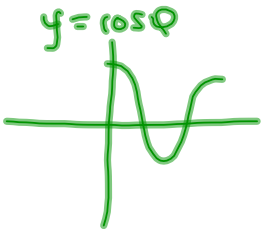
$y+5 = 3\cos[2(\theta+45°)] + 18 - 5$

$y = 3\cos[2(\theta+45°)] + 13$

DOMAIN	$\theta \in R$
RANGE	$10 \leq y \leq 16$
AMPLITUDE	3
PERIOD	180°
PHASE SHIFT	45° left
VERTICAL TRANSLATION	Up 13
EQUATION OF SINUSOIDAL AXIS	$y = 13$

Mapping:

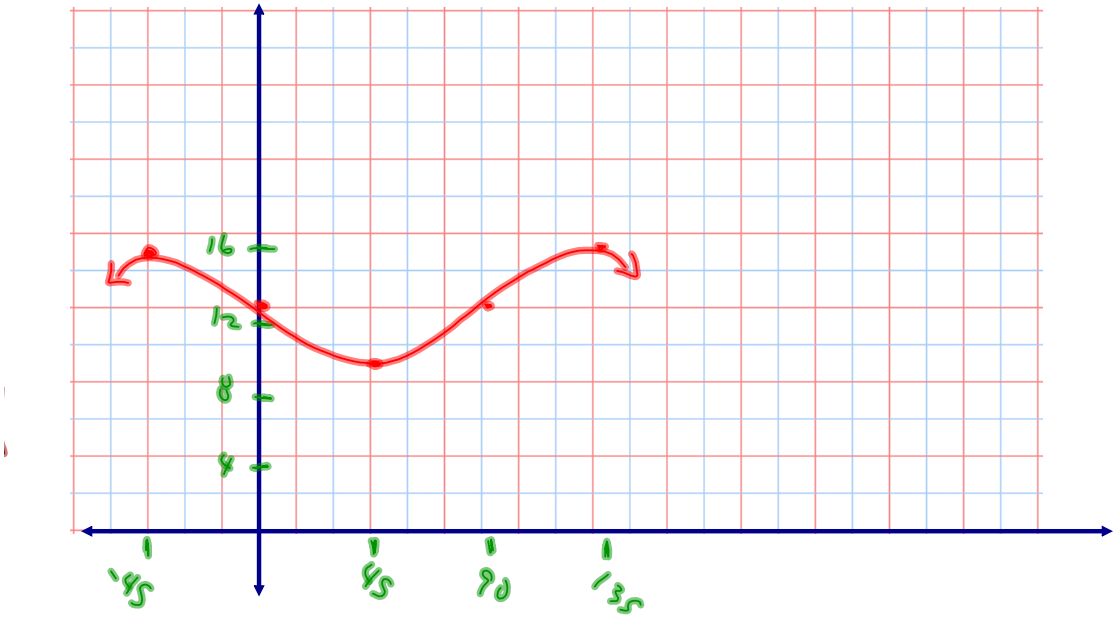
$(x, y) \rightarrow (\frac{1}{2}\theta - 45°,\ 3y + 13)$



θ	y
0	1
90	0
180	-1
270	0
360	1

New points after mapping

θ	y
-45°	16
0°	13
45°	10
90°	13
135°	16



Developing Trigonometric Functions from Properties...

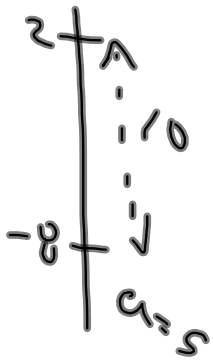
Develop a trigonometric function that fits the following description...

- **Models a sine function**
- **Period is 120°** ⟹ $K=3$
- **Graph is reflected in x-axis**
- **Wave has a range of -8 ≤ y ≤ 2**
- **Graph has a phase shift of 60° right**
- **Graph has a vertical translation of 3 units down**

$\frac{360°}{K} = \text{Period}(K)$

$K = \frac{360°}{\text{Period}}$

$\text{Amp} = \frac{\text{Max} - \text{Min}}{2}$



$y = a\sin(K(\theta + c)) + d$

$y = -5\sin(3(\theta - 60°)) - 3$

...Now we must learn how to identify all of the above information from a graph.

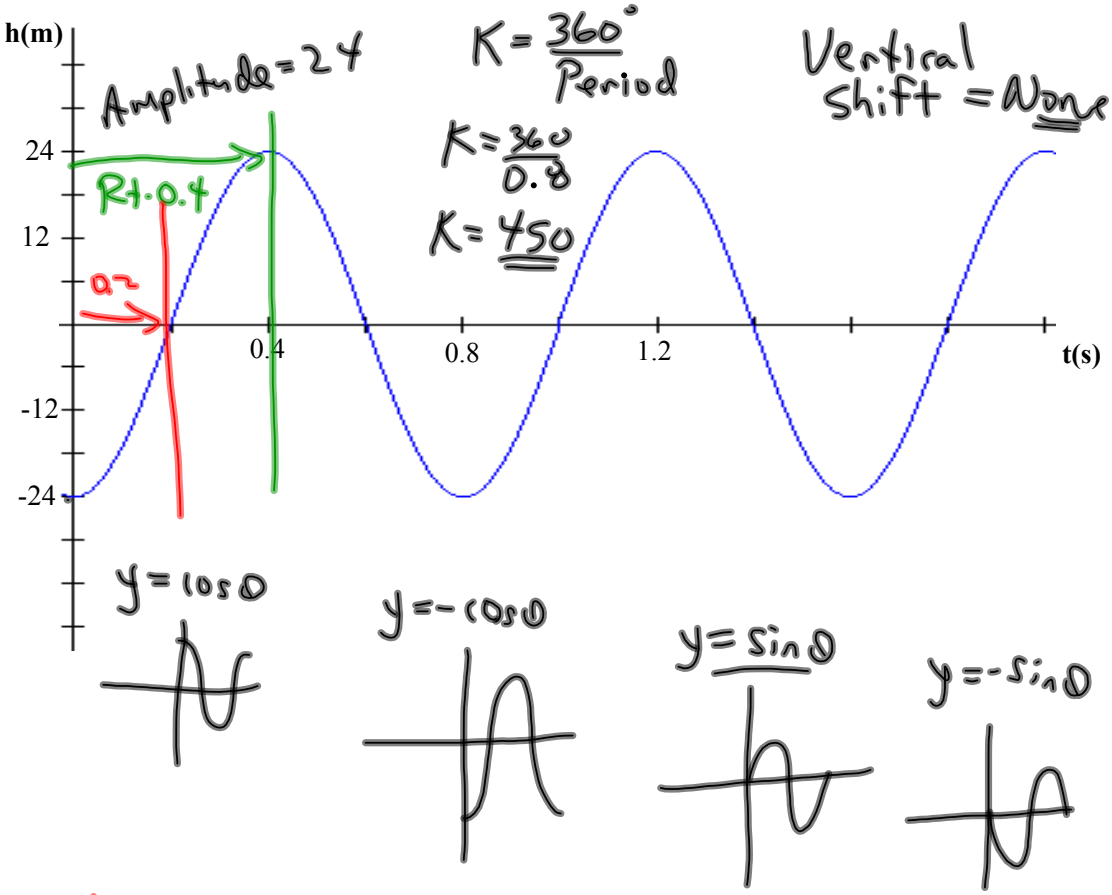
Developing the Equation of a Sinusoidal Function

STEPS: 1) Identify & label the sinusoidal axis.

2) Determine the amplitude, period & vertical translation.

3) Pick a trig function & determine the corresponding phase shift.

- the choices are: positive sine, positive cosine, negative sine, negative cosine



$y = \cos\theta$

$y = -\cos\theta$

$y = \sin\theta$

$y = -\sin\theta$

$y = -24\cos(450t)$

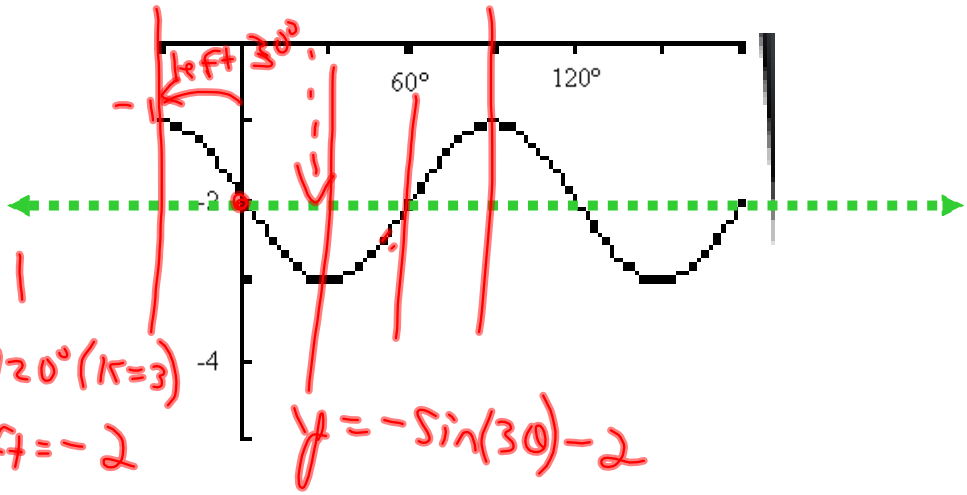
$y = 24\cos(450(t - 0.4))$ (-1.2)

$y = 24\sin(450(t - 0.2))$

$y = -24\sin(450(t - 0.6))$

Finding an Equation from a Graph:

What is the equation that describes this graph?



Amp = 1

Per = 120° (k=3)

Ver. shift = −2

left 30°

$y = -\sin(3\theta) - 2$

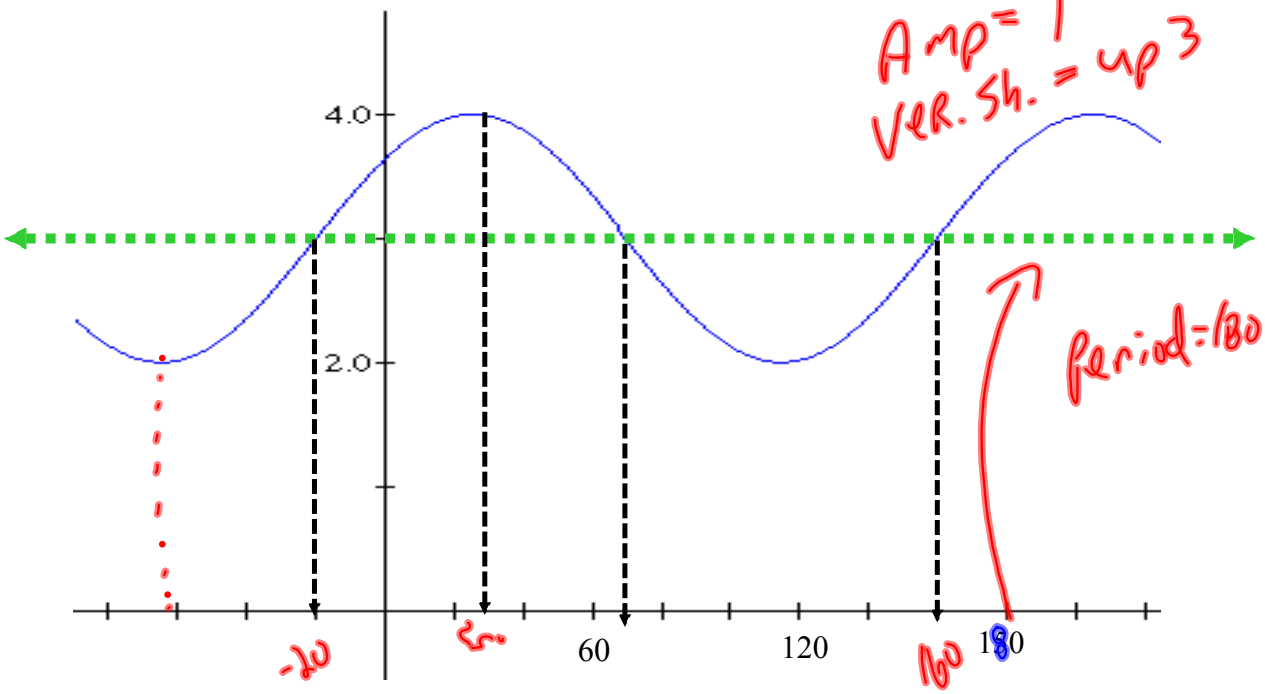
$y = \cos\left(3\left(\theta + 30°\right)\right) - 2$

$y = \cos\left(3\left(\theta + \frac{-90°}{30°}\right)\right) - 2$

$y = \sin\left(3\left(\theta - 60°\right)\right) - 2$

$y = -\cos\left(3\left(\theta - 30°\right)\right) - 2$

Determine a sine and a cosine equation for this graph



$y = \sin(2(\theta + 20^\circ)) + 3$

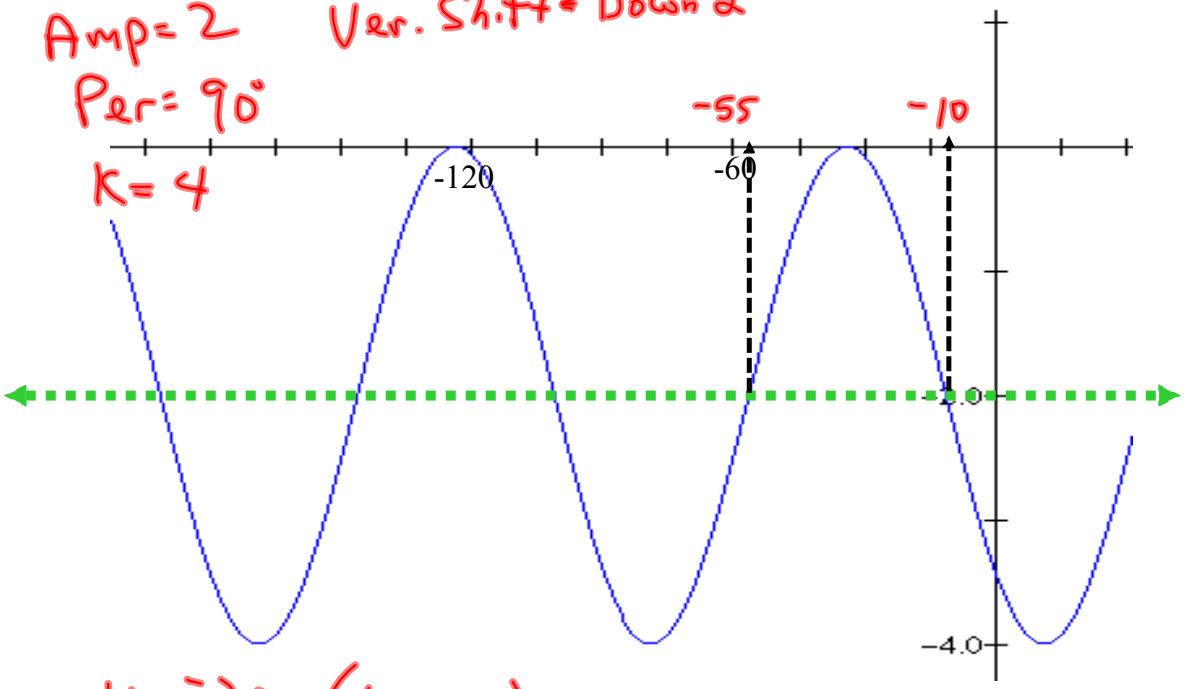
$y = \cos(2(\theta - 25^\circ)) + 3$

Write both a ~~sine and cosine~~ equation to describe the following graph:

Amp = 2 Ver. Shift = Down 2

Per = 90°

K = 4



$y = -2\sin(4(\theta + 10°)) - 2$

$y = 2\sin(4(\theta + 55°)) - 2$

#1-10

Attachments

Worksheet - Sketching Trigonometric Functions.doc

Worksheet Solns - Sketching Sinusoidal Relations.doc