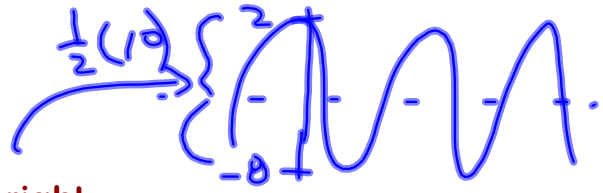
Developing Trigonometric Functions from Properties...

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

- **Models a sine function**
- **Period is 120°**
- **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**



$y = a\sin[k(\theta + c)] + d$

$a = \frac{Max - Min}{2}$

$y = -5\sin[3(\theta - 60°)] - 3$

$Per = \frac{360°}{k}$

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

$120° = \frac{360°}{k}$

$120k = 360$

$k = 3$

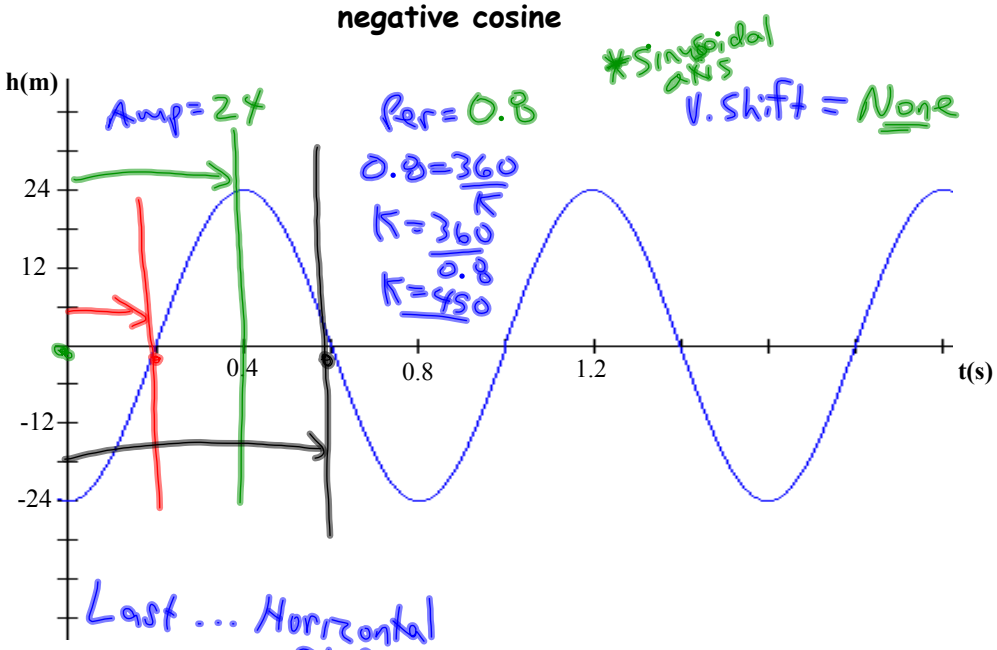
Developing the Equation of a Sinusoidal Function

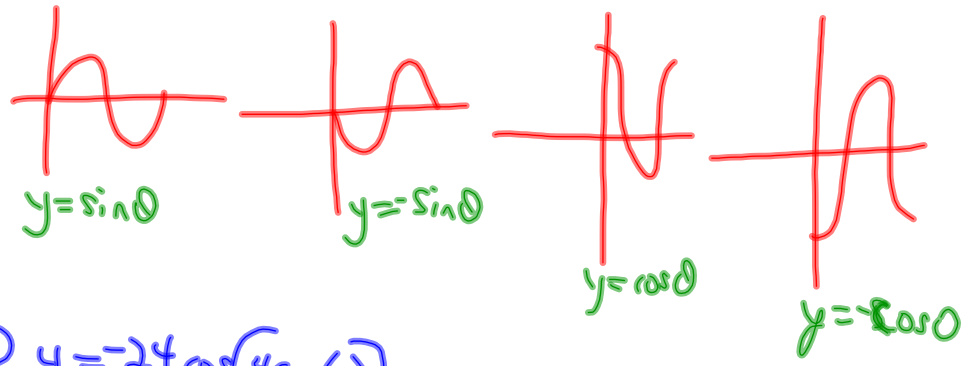
STEPS: 1) Identify & label the sinusoidal axis.

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





① $y = -24\cos[450(x)]$

OR

② $y = 24\cos[450(x - 0.4)]$ (-1.2)

OR

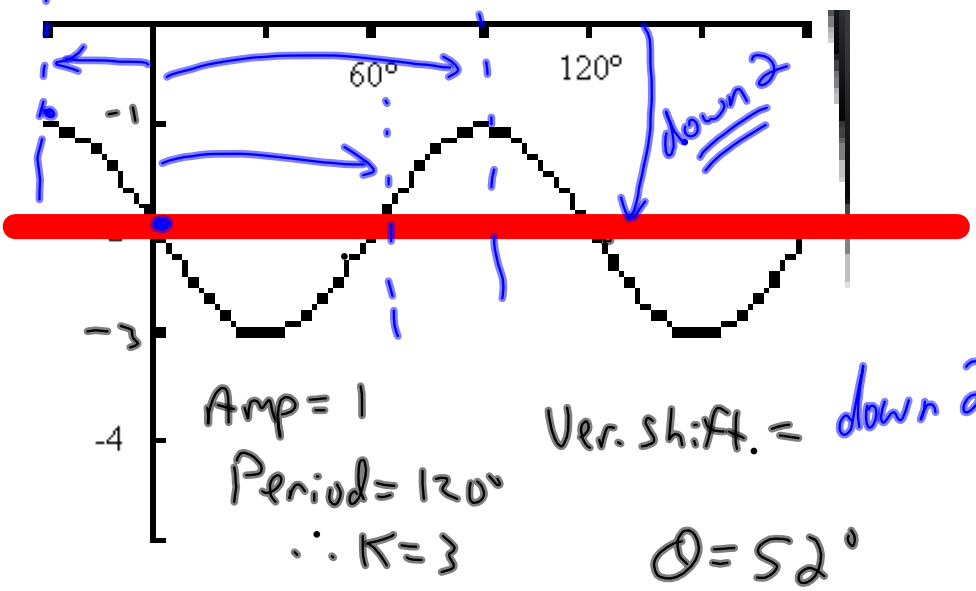
③ $y = 24\sin[450(x - 0.2)]$

OR

④ $y = -24\sin[450(x - 0.6)]$

Finding an Equation from a Graph:

What is the equation that describes this graph?



Amp = 1

Period = 120°

$\therefore K = 3$

Ver. shift. = down 2

$\theta = 52°$

$y =$

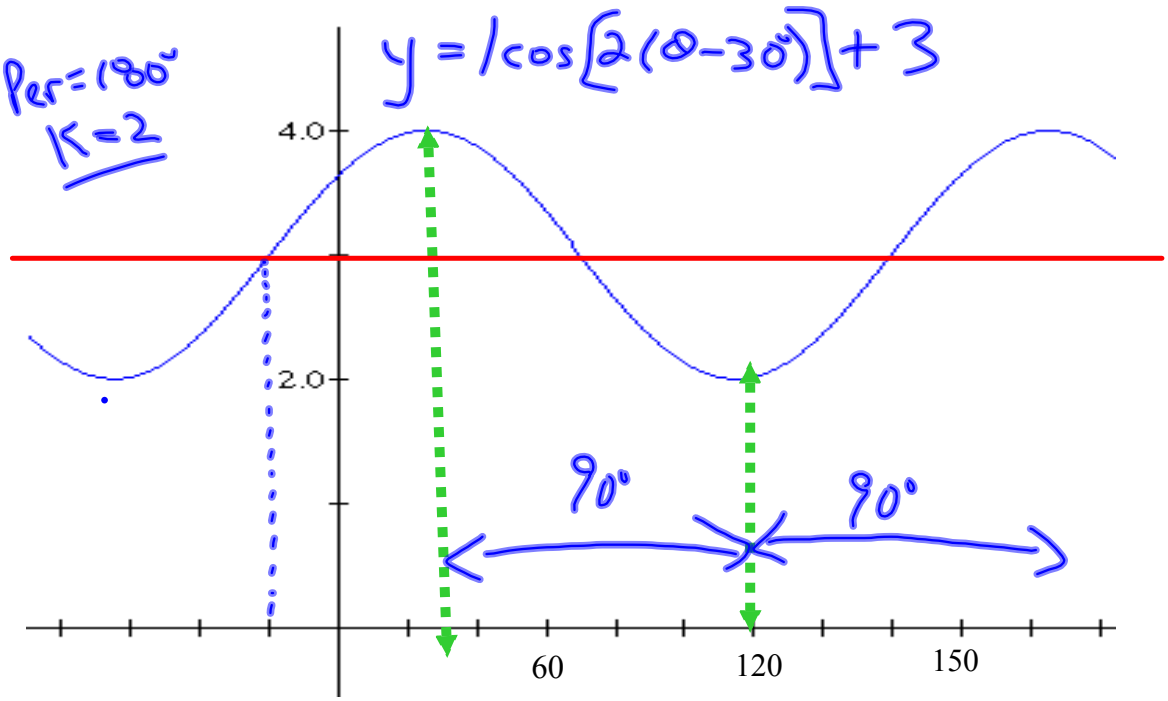
$y = -\sin(3\theta) - 2$

$y = \sin[3(\theta - 60)] - 2$

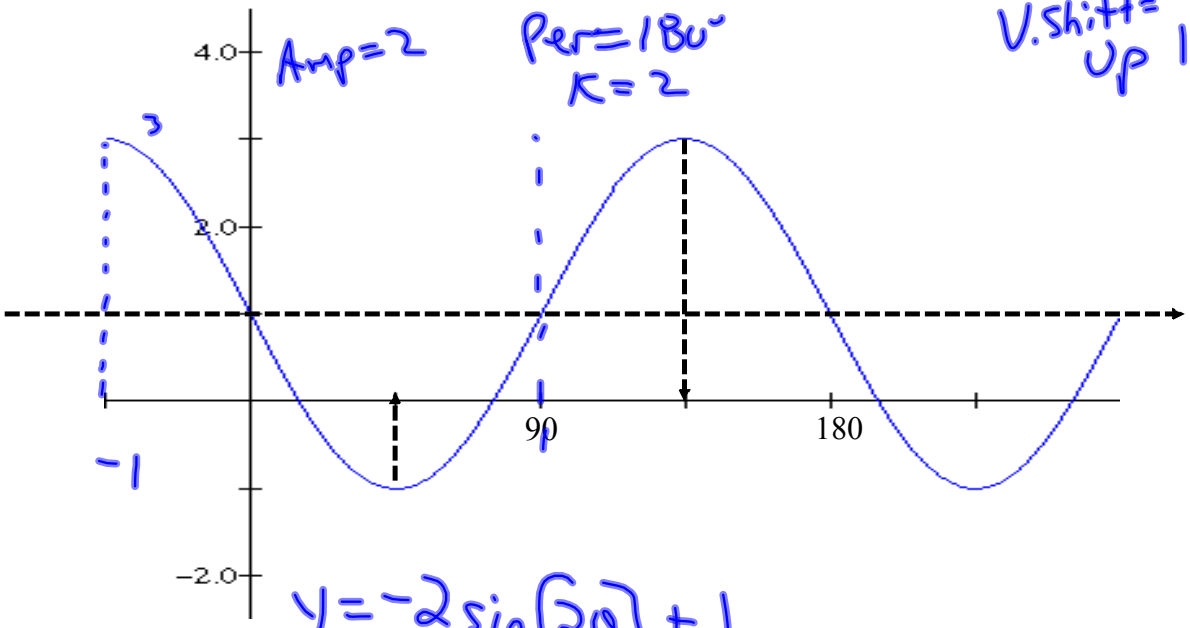
$y = \cos[3(\theta + 30 - 90)] - 2$

$y = -\cos[3(\theta - 30)] - 2$

Determine a sine and a cosine equation for this graph



Find four equations that match the graph:



$y = -2\sin[2\theta] + 1$

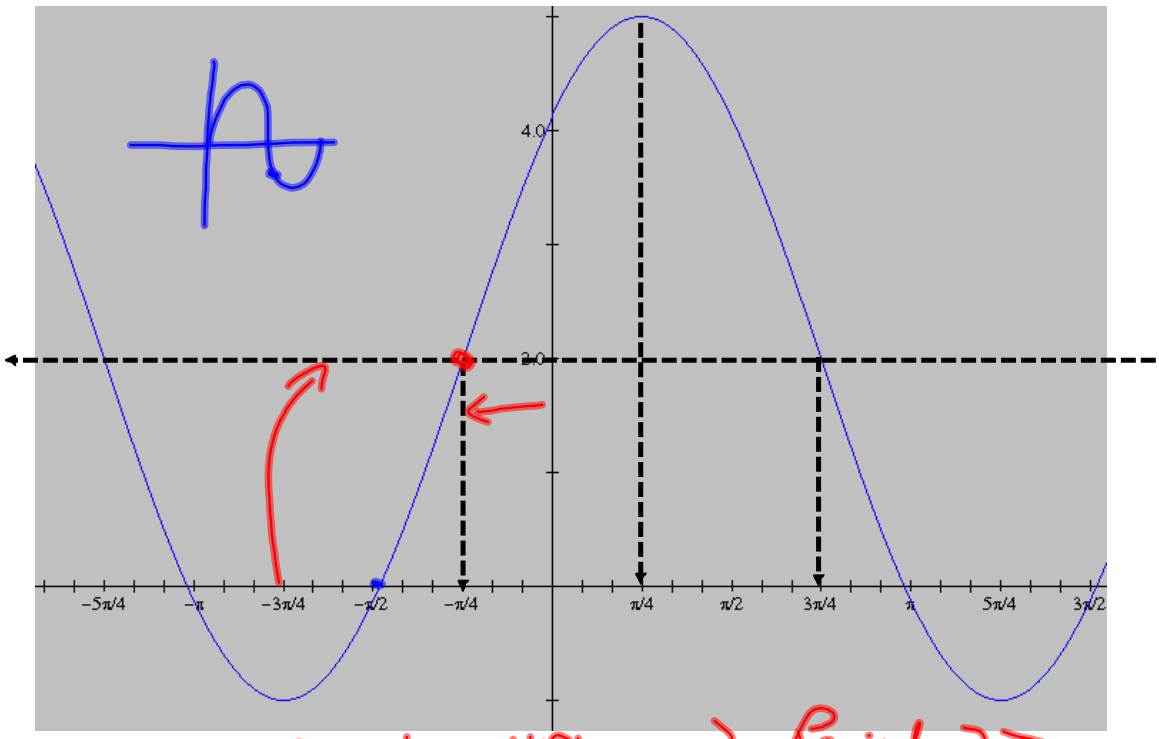
$y = 2\sin[2(\theta - 90)] + 1$

$y = 2\cos[2(\theta + 45° - 135°)] + 1$

$y = -2\cos[2(\theta - 45°)] + 1$

Check with a calculator...

Find a Sine and Cosine Equation From the Graph:



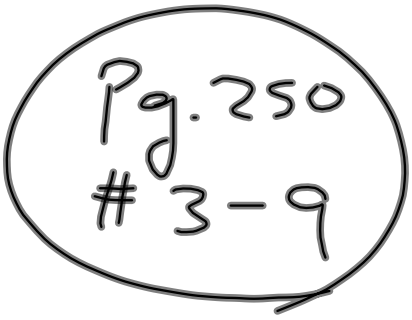
Amp = 3 Ver. shift = up 2 Period = 2π

$K = 1$

$y = 3\cos\left(\theta - \frac{\pi}{4}\right) + 2$

$-3\pi/4$

$y = -3\sin\left(\theta + \frac{\pi}{4}\right)$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