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**

Wave is 10 wide
∴ amp. = 5

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

$y = -5\sin[3(\theta - 60°)] - 3$

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

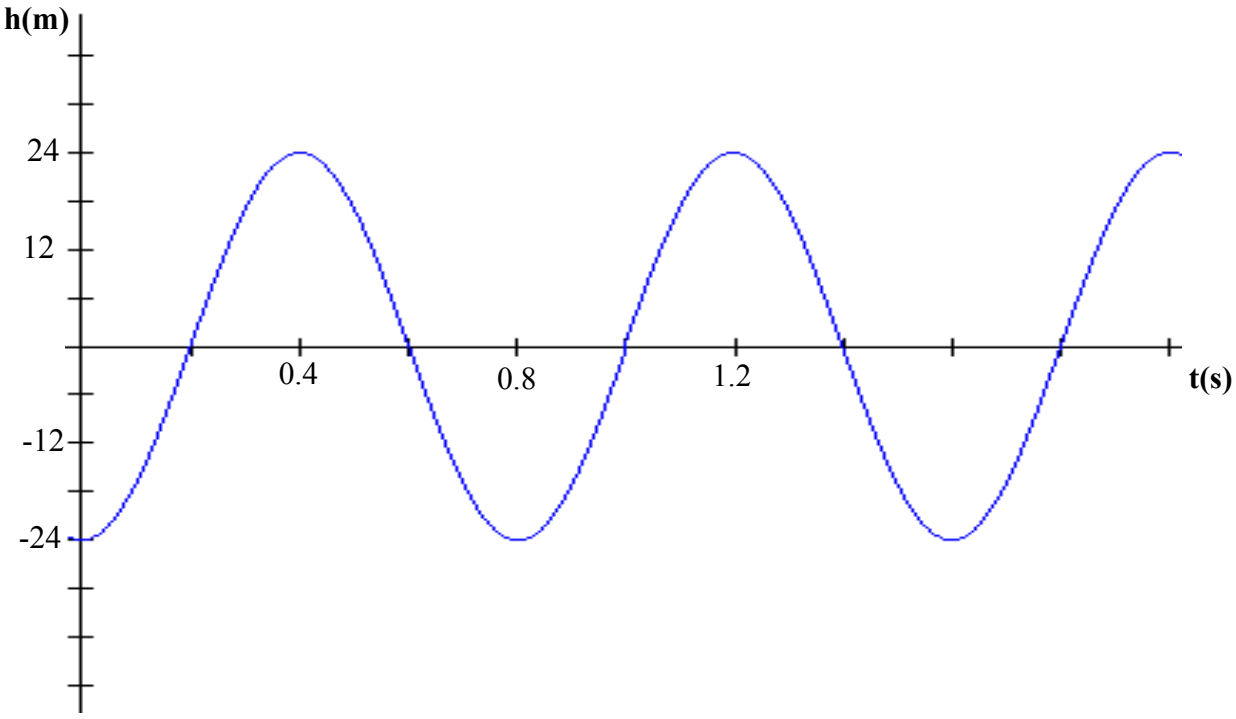
Developing the Equation of a Sinusoidal Function

STEPS: 1) Identify & label the sinusoidal axis.

2) Determine the amplitude, period & vertical translation.

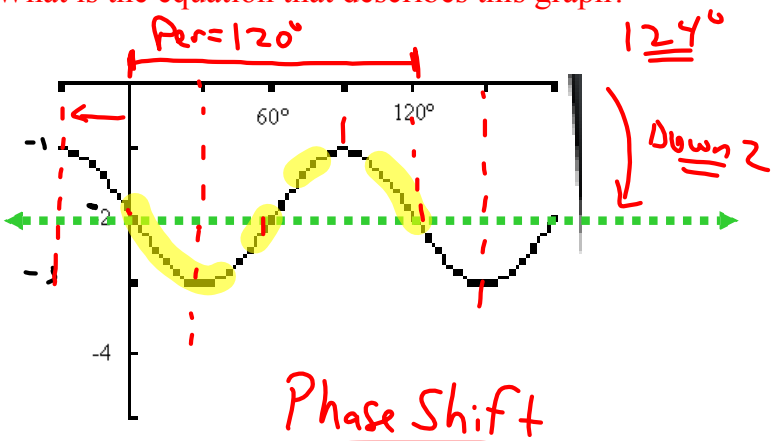
3) Pick a trig function & determine the corresponding phase shift.

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



Finding an Equation from a Graph:

What is the equation that describes this graph?



Amp = 1

Per = 120°

V. Shift =

Per = 120°

124°

Down 2

Per = 360°

$(K)120 = 360(K)$

$120K = 360$

$K = \frac{360}{120} = 3$

$K = \frac{360°}{\text{Period}}$

Phase Shift

$y = \sin\theta$

$y = -\sin\theta$

$y = \cos\theta$

$y = -\cos\theta$

$y = -\sin(3(\theta))$ −2

$y = \sin(3(\theta - 60°))$ −2

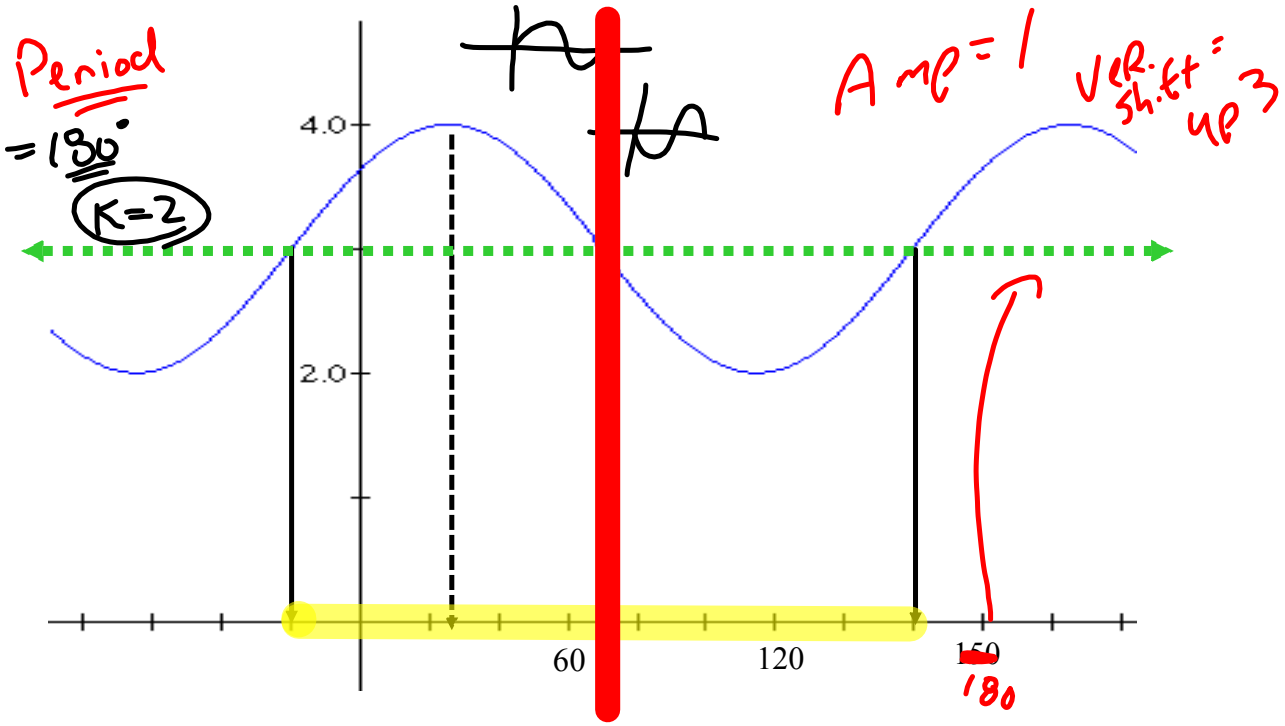
$y = \cos(3(\theta \overset{+30°}{-} 90°))$ −2

$y = -\cos(3(\theta - 30° \; -150°))$ −2

$\theta = 124°$

$\theta = 124°$ $y = -2.2079$

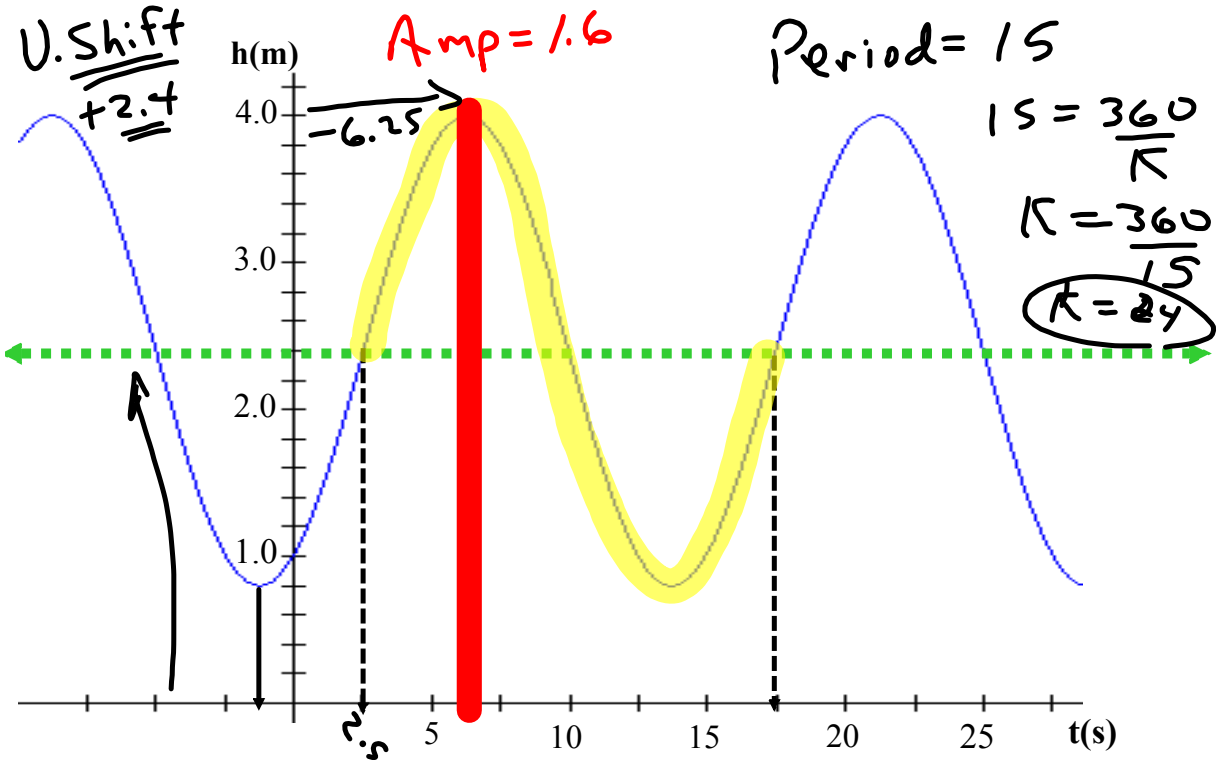
Determine a trigonometric function to describe this graph



$y = 1\sin[2(\theta + 20°)] + 3$

$y = -\sin[2(\theta - 70°)] + 3$

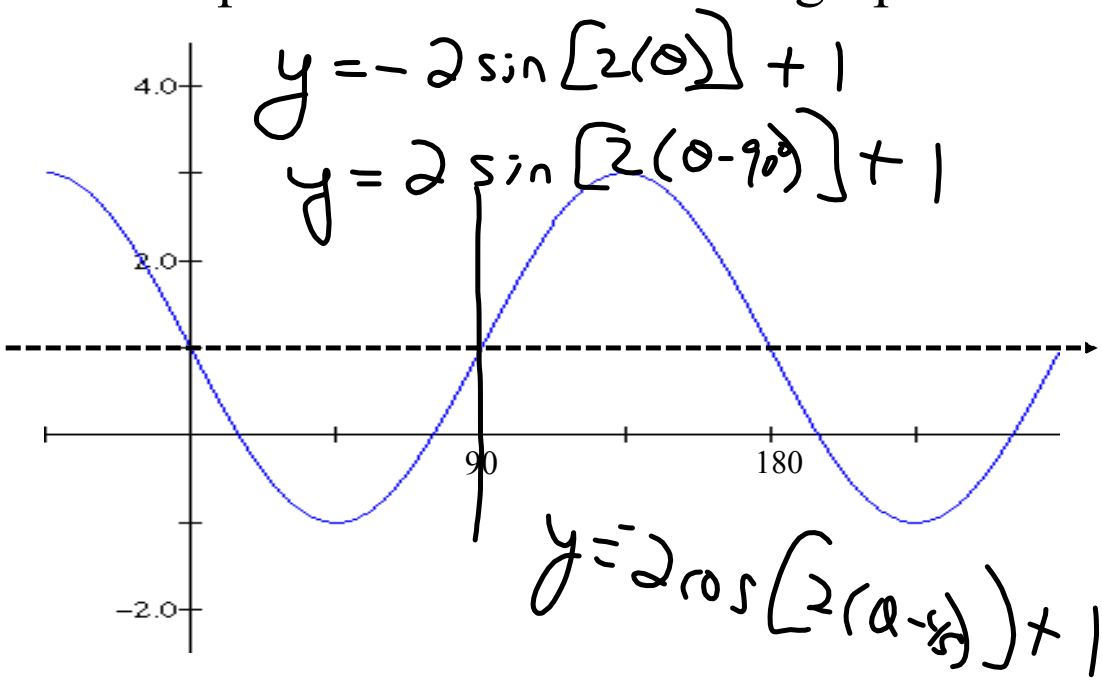
What about those not centered around the x-axis?
Find both a sine and cosine equation to describe the graph.



$y = 1.6 \sin[24(t-2.5)] + 2.4$

$y = 1.6 \cos[24(t-6.25)] + 2.4$

Find four equations that match the graph:



Check with a calculator...

Textbook....

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