Trig 6.5

Find the phase shift and vertical translation for sine and cosine
Write equations given amplitude, period, phase shift and vertical translation
Graph compound functions

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

amplitude

$\frac{2\pi}{q} = \text{per}$

period

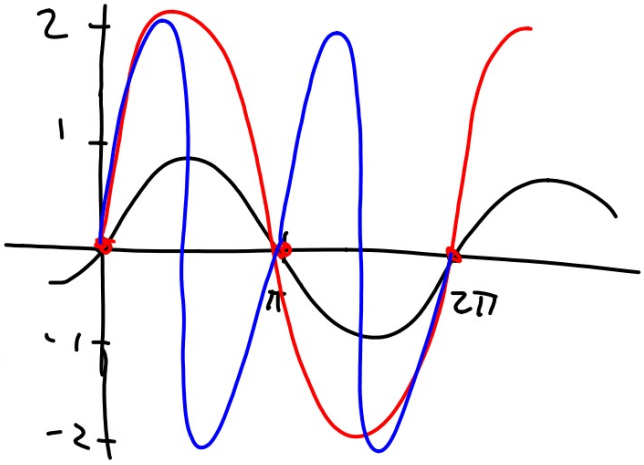
$\frac{2\pi}{2} = \pi$

midline (centerline)

vertical translation

phase shift

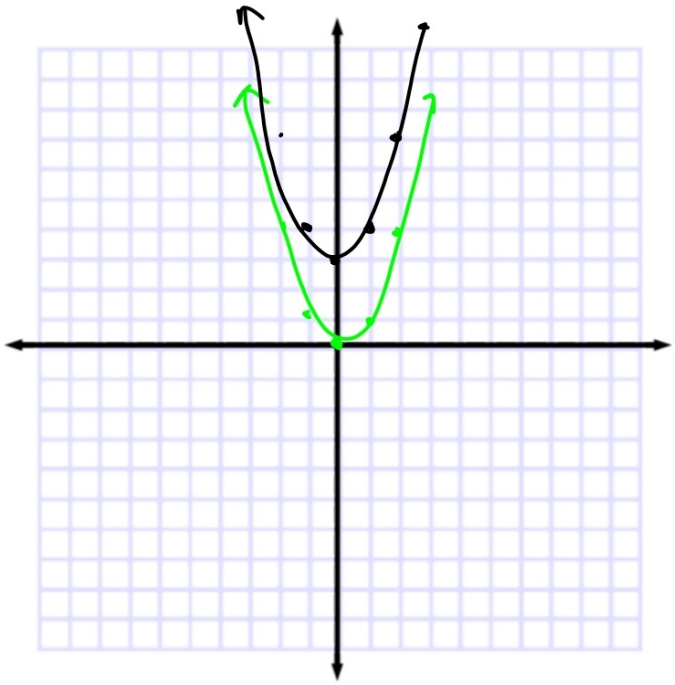
compound function



activity: Desmos

$y=x^2 + 3$

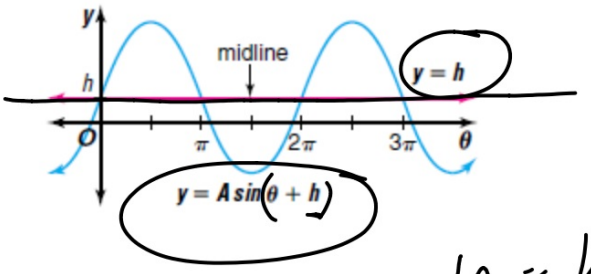
Transformations of parent graph (Algebra 2)



Desmos
y= sinx
y= 2 + sinx
y= -3 + sinx
….etc.
Note: Is 2 + whatever = whatever + 2 ?

$y = \sin x + 2$ $y = \sin(x+2)$

* $y = 2 + \sin x$



Midline (centerline) is an equation!
y= 0

$y = h + A\sin\theta$

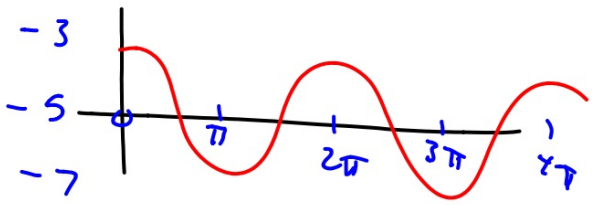
Vertical Shift of Sine and Cosine Functions

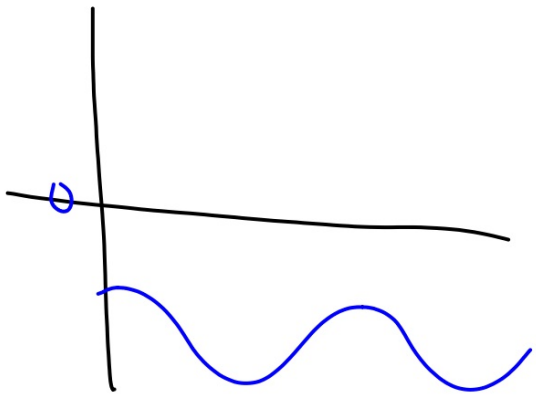
The vertical shift of the functions $y = A \sin(k\theta + c) + h$ and $y = A \cos(k\theta + c) + h$ is h. If $h > 0$, the shift is upward. If $h < 0$, the shift is downward. The midline is $y = h$.

$y = -5 + 2\cos\theta$

Example 2 State the vertical shift and the equation of the midline for the function $y = 2\cos\theta - 5$. Then graph the function.

VS down 5 $y = -5$



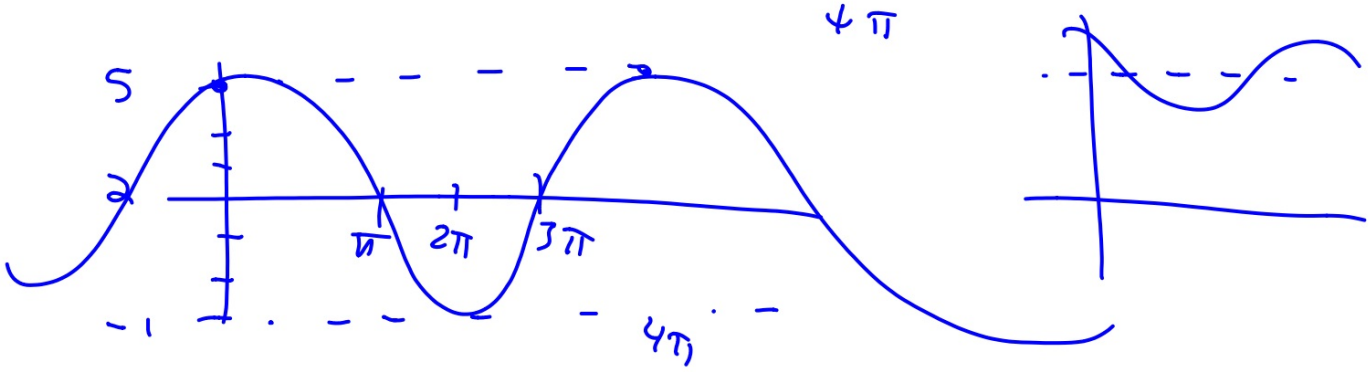


Graphing Sine and Cosine Functions	1. Determine the vertical shift and graph the midline. 2. Determine the amplitude. Use dashed lines to indicate the maximum and minimum values of the function. 3. Determine the period of the function and graph the appropriate sine or cosine curve. 4. Determine the phase shift and translate the graph accordingly.

$(x-2)^2$

$y = 2 + 3\cos\frac{1}{2}\theta$

$\frac{2\pi}{\frac{1}{2}} = 4\pi$



If it was just 2(Θ) what would change?
Factor so just Θ to see the phase angle

Horiz → opp

$y = x^2$

$y = (x-1)^2$

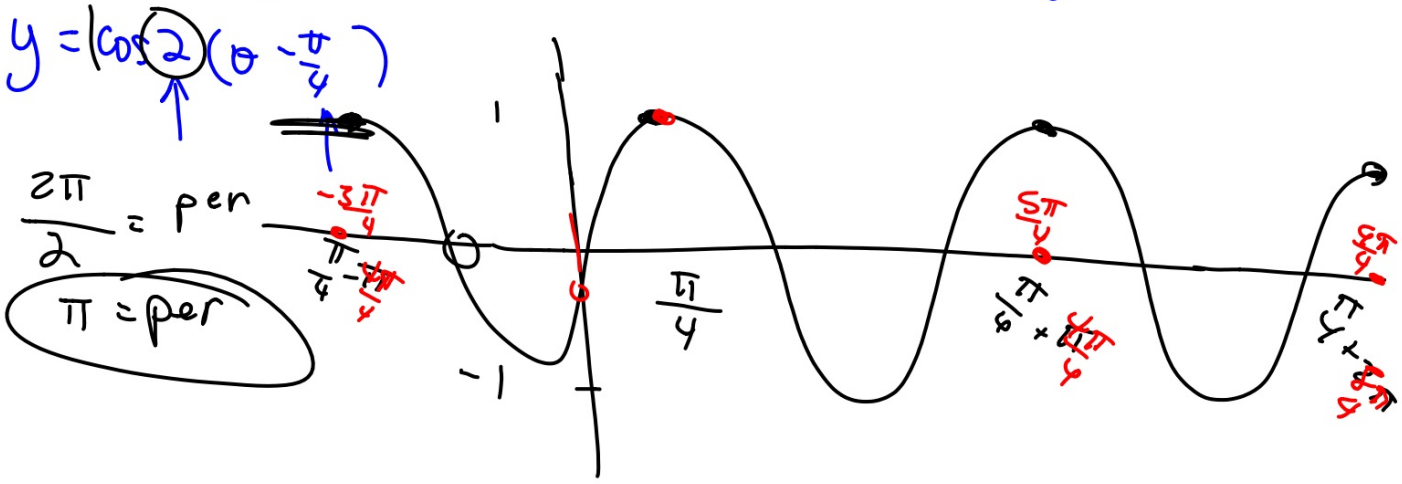
$y = (x+3)^2$

b. $y = \cos\left(2\theta - \frac{\pi}{2}\right)$

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

$\frac{2\pi}{2} = \text{per}$

$\pi = \text{per}$



$\frac{\frac{1}{2}\theta + \pi}{\frac{1}{2}}$ $\frac{1}{2}(\theta + 2\pi)$ $\frac{2}{1}\left(\frac{2\pi}{\frac{1}{2}}\right)$ = per

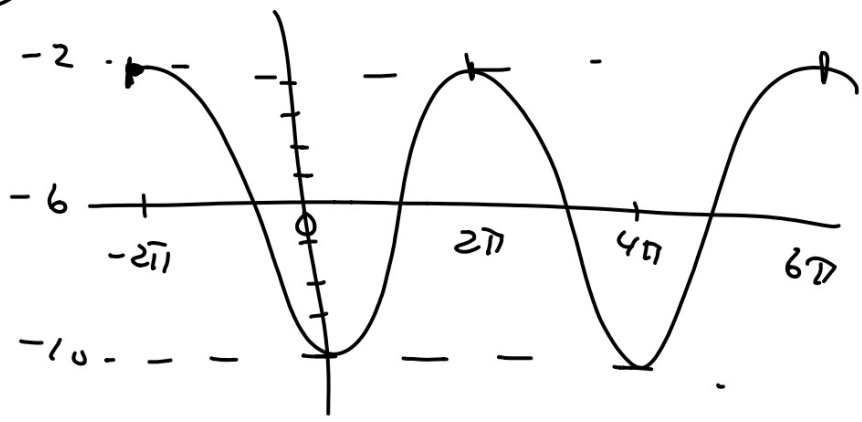
Example 3 State the amplitude, period, phase shift, and vertical shift for $y = 4\cos\left(\frac{\theta}{2} + \pi\right) - 6$. Then graph the function.

A = 4

per 4π

PS left $+2\pi$

VS -6



Example 5 Write an equation of a sine function with amplitude 4, period π, phase shift $-\frac{\pi}{8}$, and vertical shift 6.

LA = 4

per = π

PS $\frac{\pi}{8}$ left

LVS +6

$y = 6 + 4\sin 2\left(\theta + \frac{\pi}{8}\right)$

$\frac{2\pi}{n} = \frac{\pi}{1}$

$n\pi = 2\pi$

$\frac{n\pi}{\pi} = \frac{2\pi}{\pi}$

13-39。