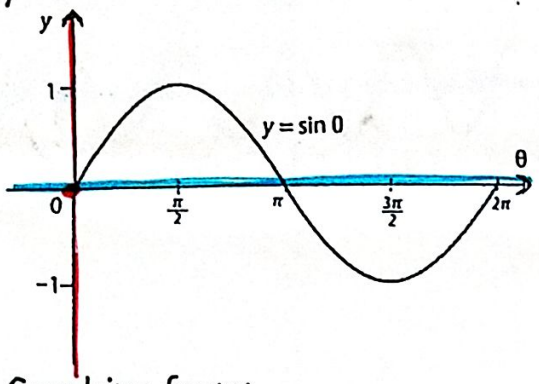
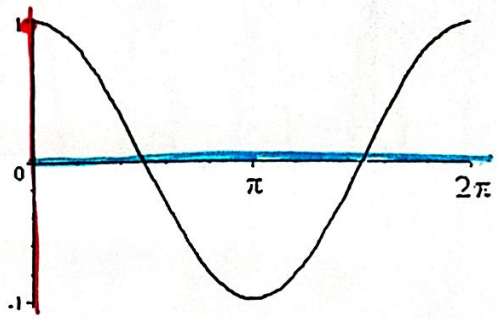
Graphs of Sinusoidal Functions- NOTES

y = sin x



y = cos x



Graphing form:

$y = a \sin b(x - h) + k$ $\qquad$ $y = a \cos b(x - h) + k$

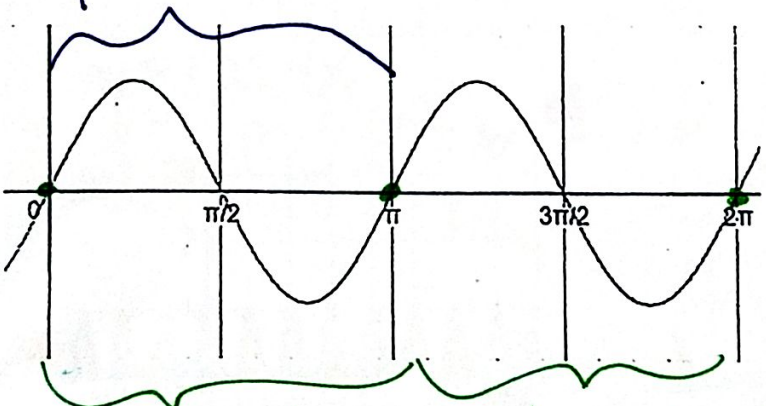
a = amplitude (stretches/compresses)

h = horizontal shift ↔ (opposite direction of sign)

k = vertical shift

b = frequency (how many cycles occur in 2π or $360°$)

period = π



period = amount of x-axis it takes to complete 1 cycle.

$pb = 2\pi$

1 cycle + 1 cycle $\Rightarrow b = 2$

Ex: Write an equation for a sine curve shifted up 4, left 7 with amplitude 8 and period of $\frac{\pi}{4}$.

$k = 4$ $\quad h = -7$ $\quad a = 8$ $\quad p = \frac{\pi}{4}$

$pb = 2\pi$

$\frac{4}{\pi}\left(\frac{\pi}{4}b\right) = \left(\frac{2\pi}{1}\right)\frac{4}{\pi}$

$b = 8$

$y = a \sin b(x - h) + k$

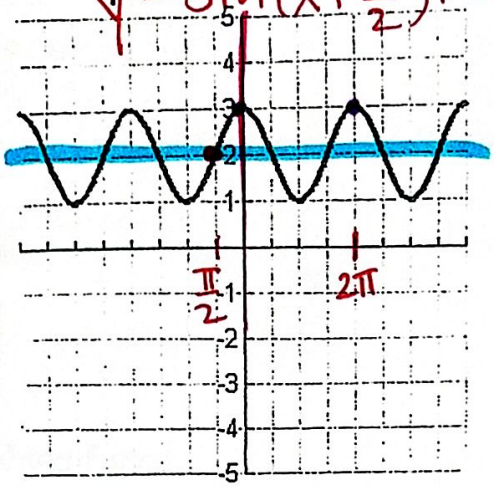
$y = 8 \sin 8(x - (-7)) + 4$

$y = 8 \sin 8(x + 7) + 4$

All graphs below are transformations on the graphs of the sine and cosine functions. Each unit on the x-axis represents $\frac{\pi}{2}$ units.

1) $y = \cos x + 2$

$y = \sin\left(x + \frac{\pi}{2}\right) + 2$



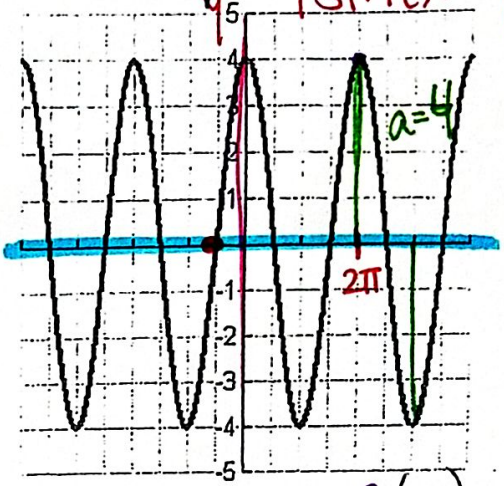
$b = 1$

$k = 2$

2) $y = 4\cos x$

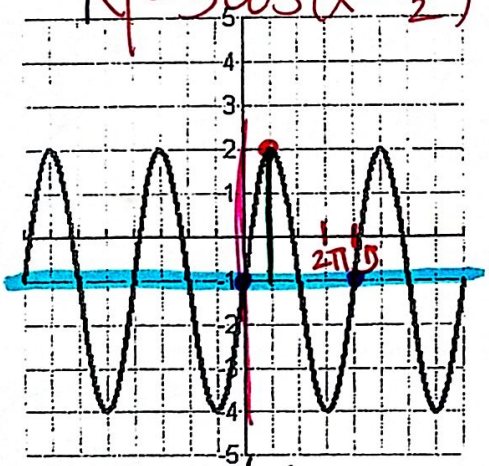
$y = 4\sin\left(x + \frac{\pi}{2}\right)$

$b = 1$



3) $y = 3\sin x - 1$

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



$b = 1$

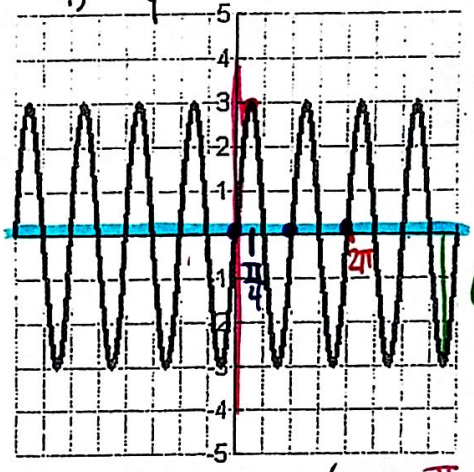
$k = -1$

$a = 3$

4) $y = 3\sin 2(x)$

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

$b = 2$

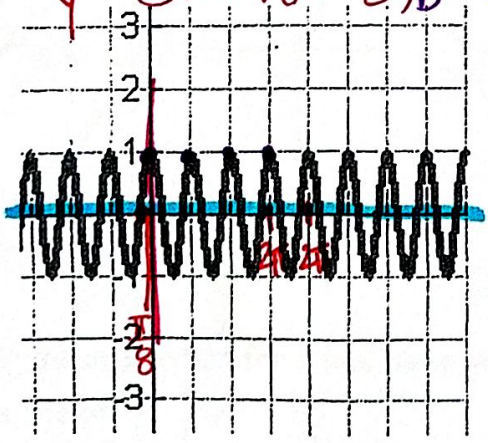


$k = 0$

$a = 3$

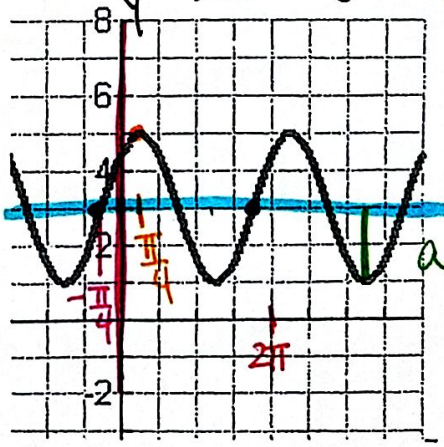
5) $y = \cos 4x$

$y = \sin 4\left(x + \frac{\pi}{8}\right)$ $b =$



6) $y = 2\sin\left(x + \frac{\pi}{4}\right) + 3$

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



$k = 3$

$a = 2$

$b = 1$