

WARMUP

Find the key points of

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

$+\frac{\pi}{3}$ to x

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

$-\frac{\pi}{2}$ from x

$$2) (0,0) \rightarrow \left(-\frac{\pi}{2}, 0 \right)$$

$$\left(\frac{\pi}{2}, 1 \right) \rightarrow (0, 4)$$

$$(\pi, 0) \rightarrow \left(\frac{\pi}{2}, 0 \right)$$

$$\left(\frac{3\pi}{2}, -1 \right) \rightarrow (\pi, -4)$$

$$(2\pi, 0) \rightarrow \left(\frac{3\pi}{2}, 0 \right)$$

$$1) (0,1) \rightarrow \left(\frac{\pi}{3}, -3 \right)$$

$$\left(\frac{\pi}{2}, 0 \right) \rightarrow \left(\frac{5\pi}{6}, 0 \right)$$

$$(\pi, -1) \rightarrow \left(\frac{4\pi}{3}, 3 \right)$$

$$\left(\frac{3\pi}{2}, 0 \right) \rightarrow \left(\frac{11\pi}{6}, 0 \right)$$

$$(2\pi, 1) \rightarrow \left(\frac{7\pi}{3}, -3 \right)$$

$$\frac{\pi}{2} + \frac{\pi}{3}$$

$$\frac{3\pi + 2\pi}{6}$$

$$\frac{5\pi}{6}$$

$$\frac{3}{7} + \frac{6}{11}$$

$$\frac{33 + 42}{77} = \frac{75}{77}$$

$$\frac{\pi}{1} + \frac{\pi}{3} = \frac{3\pi + 1\pi}{1 \cdot 3} = \frac{4\pi}{3}$$

$$\frac{3\pi}{2} + \frac{\pi}{3} = \frac{9\pi + 2\pi}{2 \cdot 3} = \frac{11\pi}{6}$$

Section 5.6 Sinusoidal Curves

Graph using period, phase shift, and amplitude.

horizontal shift

how high and how long.

$$y = a \sin(\omega x - \phi)$$

↑ greek letter "omega" ↓ greek letter "phi"

$$y = a \cos(\omega x - \phi)$$

$$\text{Amplitude} = |a|$$

$$\text{Period} = \frac{2\pi}{\omega}$$

$$\text{Phase Shift} = \frac{\phi}{\omega}$$

ex: $y = 3 \sin\left(\frac{\pi}{4}x\right)$

$$a = 3$$

$$\text{Amp} = |3| = 3$$

$$y = 3 \sin\left(\frac{\pi}{4}x - 0\right)$$

$$\omega = \frac{\pi}{4}$$

$$\text{Period} = \frac{2\pi}{\frac{\pi}{4}}$$

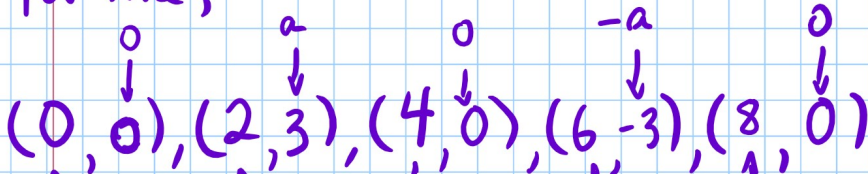
$$\phi = 0$$

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

$$= 8$$

$$\text{P.S.} = \frac{0}{\frac{\pi}{4}} = 0$$

For sine,



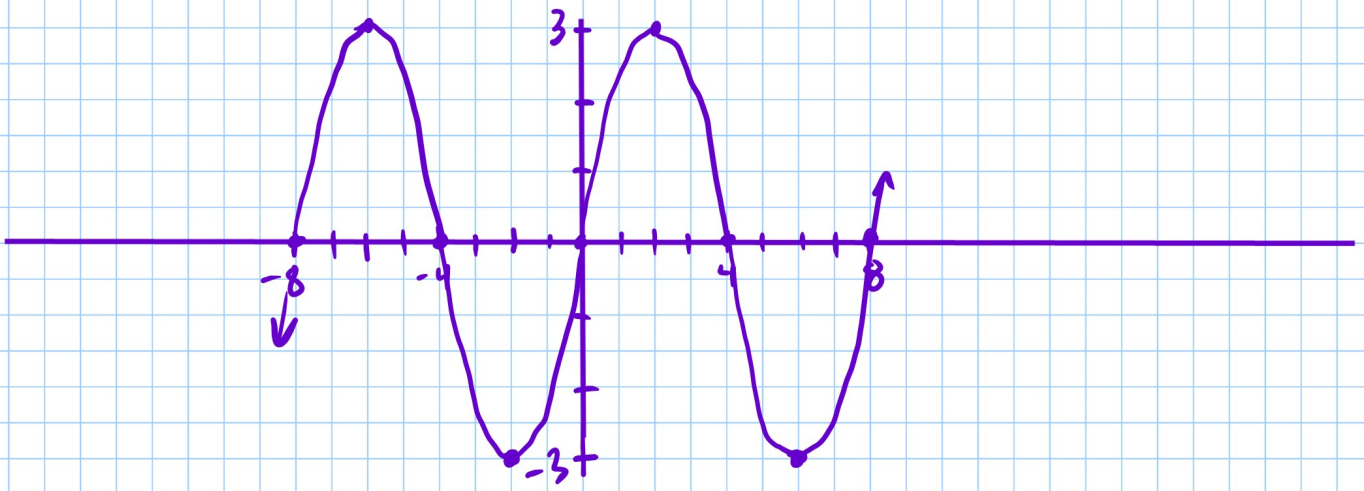
① P.S.

④ midpoint of 1st and 3rd x-values

③ midpoint of 1st and 5th x-values

⑤ midpoint of 3rd and 5th x-values

② P.S. + period



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

$a = -2$

$\omega = 4$

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

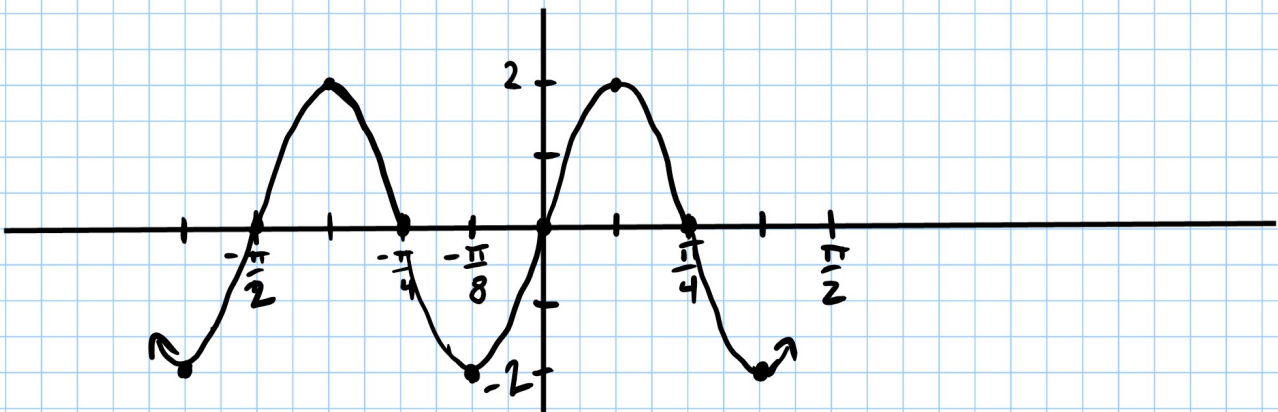
Amp = 2

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

P.S. = $\frac{-\frac{\pi}{2}}{4} = -\frac{\pi}{2} \cdot \frac{1}{4} = -\frac{\pi}{8}$

For cosine,

$\left(-\frac{\pi}{8}, -2\right)$	$\left(0, 0\right)$	$\left(\frac{\pi}{8}, 2\right)$	$\left(\frac{\pi}{4}, 0\right)$	$\left(\frac{3\pi}{8}, -2\right)$
\uparrow P.S.	\uparrow	\uparrow	\uparrow	\uparrow
	$\frac{1}{2}\left(-\frac{\pi}{8} + \frac{\pi}{8}\right)$	$\frac{1}{2}\left(-\frac{\pi}{8} + \frac{3\pi}{8}\right)$	$\frac{1}{2}\left(\frac{\pi}{8} + \frac{3\pi}{8}\right)$	P.S. + period
	$\frac{1}{2} \cdot 0$	$\frac{1}{2}\left(\frac{2\pi}{8}\right)$	$\frac{1}{2}\left(\frac{4\pi}{8}\right)$	$-\frac{\pi}{8} + \frac{\pi}{2} = \frac{-2\pi + 8\pi}{16}$
	0	$\frac{\pi}{8}$	$\frac{2\pi}{8} = \frac{\pi}{4}$	$= \frac{6\pi}{16} = \frac{3\pi}{8}$



Assignment

Find 5 points and graph

$$1) y = -4 \cos(\pi x + 3\pi)$$

$$2) y = 3 \sin(3x - \pi)$$