Precalculus Name: ___________________________

Notes (4.6) --- Graphing Sinusoids

$$y = a \cdot \sin\big(b(x-h)\big) + k \quad \text{or} \quad y = a \cdot \cos\big(b(x-h)\big) + k$$

KEY TERMS:

amplitude	
period	
frequency	
midline	
phase shift	

Ex1) Find the amplitude of each of the following sinusoids & then use the language of transformations to describe how the graphs of b and c are related to a.

a) $f(x) = \cos x$ **b)** $y = \frac{1}{2}\cos x$ **c)** $y = -3\cos x$

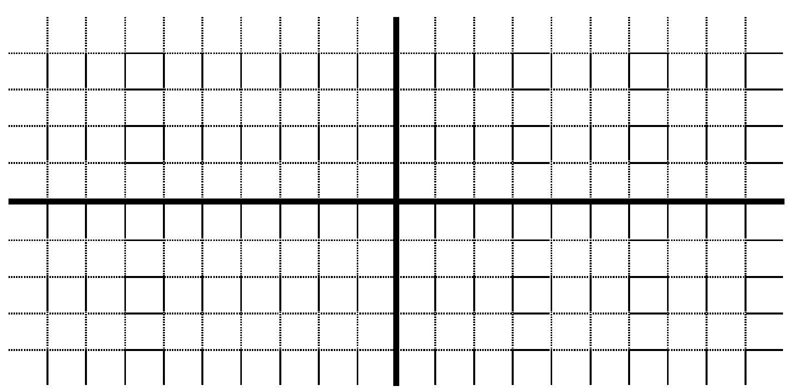
amp = ______ amp = ______ amp = ______

Ex2) Find the period of each of the following sinusoids & then use the language of transformations to describe how the graphs of b and c are related to a.

a) $f(x) = \sin x$ **b)** $y = 3\sin(-2x)$ **c)** $y = -2\sin\left(\frac{x}{3}\right)$

pd = ______ pd = ______ pd = ______

Ex3) Find the frequency of the function $f(x) = 4\sin\left(\frac{2x}{3}\right)$ and interpret its meaning graphically. Then sketch the graph in the window $[-2\pi, 2\pi]$ by $[-4, 4]$

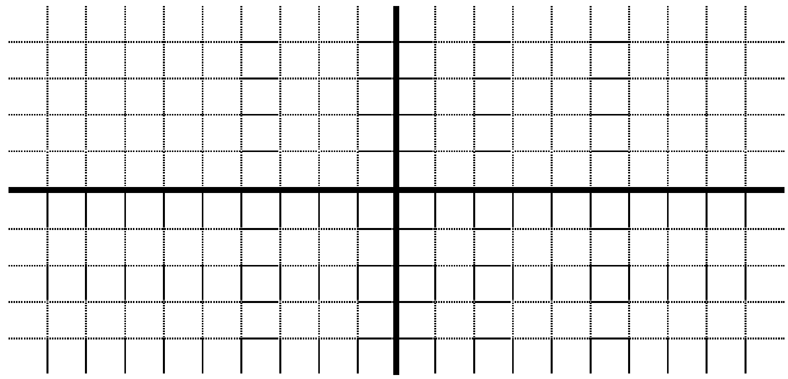


Ex4) **a)** Write the cosine function as a phase shift of the sine function. → cos (x) = _______________

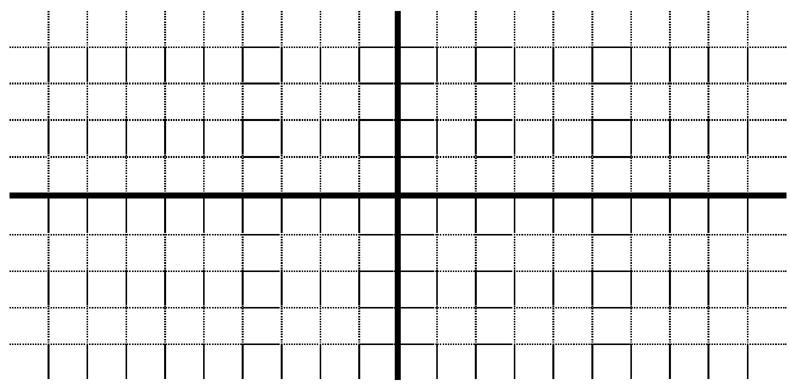
b) Write the sine function as a phase shift of the cosine function. → sin (x) = _______________

Ex5) Construct a sinusoid with a period of $\frac{\pi}{5}$, amplitude 6, passing through the point (2, 0)

$f(x)$ = ________________________



Ex6) Construct a sinusoid that rises from a minimum value at (0, 5) to a maximum value of (32, 25)



Graphs of Sinusoids

The graphs of $y = a \sin(b(x - h)) + k$ and $y = a \cos(b(x - h)) + k$ (where $a \neq 0$ and $b \neq 0$) have the following characteristics:

$$\text{amplitude} = |a|;$$

$$\text{period} = \frac{2\pi}{|b|};$$

$$\text{frequency} = \frac{|b|}{2\pi}.$$

When compared to the graphs of $y = a \sin bx$ and $y = a \cos bx$, respectively, they also have the following characteristics:

a phase shift of h;

a vertical translation of k.