

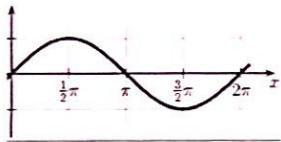
# 7.5 GUIDED NOTES: Graphs of Sine and Cosine

Amplitude, Period, Frequency, and Vertical Shift

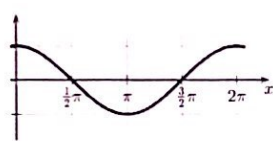
	Definition	How to find on a graph:	How to find in an equation:
amplitude	distance from the midline to a maximum or minimum midline - imaginary line graph oscillates about (bounces up and down around)	find midline count up or down	$amp =  a $
period	how long (how many radians) until the graph repeats	count how long before graph repeats	$P = \frac{2\pi}{b}$
frequency	how much of the wave happens in one radian	take reciprocal of period	$freq = \frac{1}{period}$
vertical shift	how far above or below the x-axis the graph was moved (where the midline is)	find middle between max & min	$+d \rightarrow up$ $-d \rightarrow down$

There is also such thing as a phase shift. You will learn about it in your next math class.

Sine looks like:

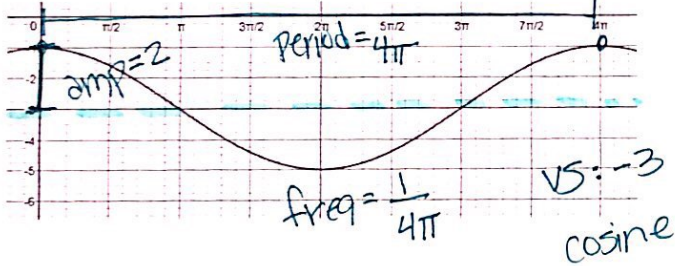


Cosine looks like:

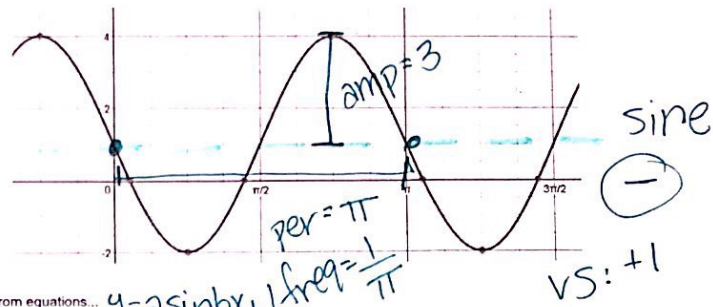


From graphs...

Ex1) Determine the amplitude and period of each function. Tell whether it's a sine or cosine function.



Ex2) Determine the amplitude and period of each function. Tell whether it's a sine or cosine function.



From equations...  $y = a \sin bx + d$

Ex 1)  $y = -4 \cos 4x + 7$   
 Amplitude:  $| -4 | = 4$   
 Period:  $\frac{2\pi}{4} = \frac{\pi}{2}$   
 Frequency:  $\frac{2}{\pi}$   
 Vertical Shift: up 7

Ex 3)  $y = \sin x + 2$   
 Amplitude: 1  
 Period:  $2\pi$   
 Frequency:  $\frac{1}{2\pi}$   
 Vertical Shift: up 2

Ex 5) Given an amplitude of 7, a period of  $4\pi$ , and a vertical shift down 3 units, write the equation of the sine function.  
 $a = 7, -7$   $b \cdot 4\pi = \frac{2\pi}{b} \cdot b = \frac{4\pi}{4\pi} = \frac{2\pi}{4\pi} = b = \frac{1}{2}$

Ex 6) Given an amplitude of 3, a frequency of  $\frac{1}{\pi}$ , and a vertical shift up 7 units, write the equation of the cosine function.  
 $a = \pm 3$   $\frac{1}{\pi} = f$   $\pi = \frac{2\pi}{b}$   
 $P = \pi$   $b = 2$

$y = 7 \sin \frac{1}{2}x - 3$   
 $y = -7 \sin \frac{1}{2}x - 3$

Ex 2)  $y = 6 \sin \frac{1}{3}x - 4$   
 Amplitude: 6  
 Period:  $\frac{2\pi}{1/3} \rightarrow 2\pi \cdot 3 = 6\pi$   
 Frequency:  $\frac{1}{6\pi}$   
 Vertical Shift: down 4

Ex 4)  $y = \frac{1}{2} \cos \frac{4}{3}x$   
 Amplitude:  $\frac{1}{2}$   
 Period:  $\frac{3\pi}{2}$   
 Frequency:  $\frac{2}{3\pi}$   
 Vertical Shift: none

$y = 3 \cos 2x + 7$   
 $y = -3 \cos 2x + 7$