

Investigation 4B: Graphs of Sinusoidal Functions

The purpose of this investigation is to be able to describe the graphs of the sine and cosine functions, as well as to know how the variables a , b , and c affect the graphs of

$$f(x) = a\sin(bx) + c$$

and

$$f(x) = a\cos(bx) + c$$

I. The basic sinusoidal functions.

A. Open Geogebra and graph $f(x) = \sin(x^\circ)$ [Important: You **must** type the degree symbol, because Geogebra uses radians by default.]

B. Change the scale so you can see at least two periods of the wave.

C. Fill in the first empty column of this table.

Function	$f(x) = \sin(x^\circ)$	$f(x) = \cos(x^\circ)$
sketch the graph		
coordinates of y-intercept		
equation of central axis		
amplitude		
period		
domain		
range		
Starting at the y-intercept, is the graph increasing or		

decreasing?		
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D. Now hide or delete the first graph, and graph the function $f(x) = \cos(x^\circ)$.

E. Fill in the second column of the table above.

II. The general sinusoidal functions.

A. We will now explore how some parameters (variables) affect the sinusoidal graphs. Delete or hide your previous graph.

B. Make sliders called a , b , and c .

C. Graph the function $f(x) = a \cdot \sin(b \cdot x^\circ) + c$.

D. Fill in the left column of the table.

Function	$f(x) = a \cdot \sin(b \cdot x^\circ) + c$	$f(x) = a \cdot \cos(b \cdot x^\circ) + c$
sketch the graph (pick your favorite values for a , b , and c , and write them here) $a =$ $b =$ $c =$		
How does a affect the graph?		
How does b affect the graph?		
How does c affect the graph?		
<i>The answers below will be in terms of a, b, and c.</i>		
coordinates of y -intercept		
equation of central axis		
amplitude		
period		
domain		
range		
starting at y -intercept,		

increasing or decreasing?		
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E. Now hide or delete the first graph, and graph the function $f(x) = a \cdot \cos(b \cdot x^\circ) + c$.

F. Fill in the right column of the table above.