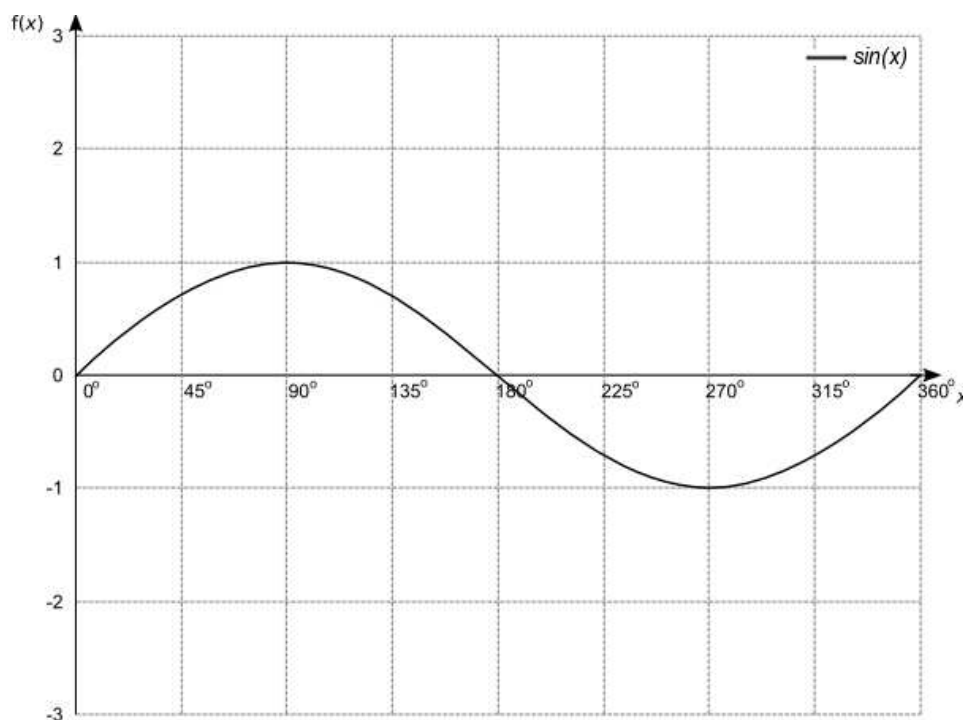


**Amplitude** In this section, we'll explore what happens when we vary the value of  $a$  in the sinusoidal function  $a \sin(x)$ . We'll set different values for  $a$  to see how it affects the function. We will set  $a$  to be  $\frac{1}{2}$ , 2 and 3. Fill in the corresponding values of these functions at various points along the  $x$ -axis in the table below:

$x$	$\sin(x)$	$\frac{1}{2} \sin(x)$	$2 \sin(x)$	$3 \sin(x)$
$0^\circ$	0			
$90^\circ$	1			
$180^\circ$	0			
$270^\circ$	-1			
$360^\circ$	0			

Now we have enough information to plot the curves  $\frac{1}{2} \sin(x)$ ,  $2 \sin(x)$  and  $3 \sin(x)$ . Sketch in these functions in the grid below.



- What changes have you noticed? Which properties of the sinusoidal function remain the same?

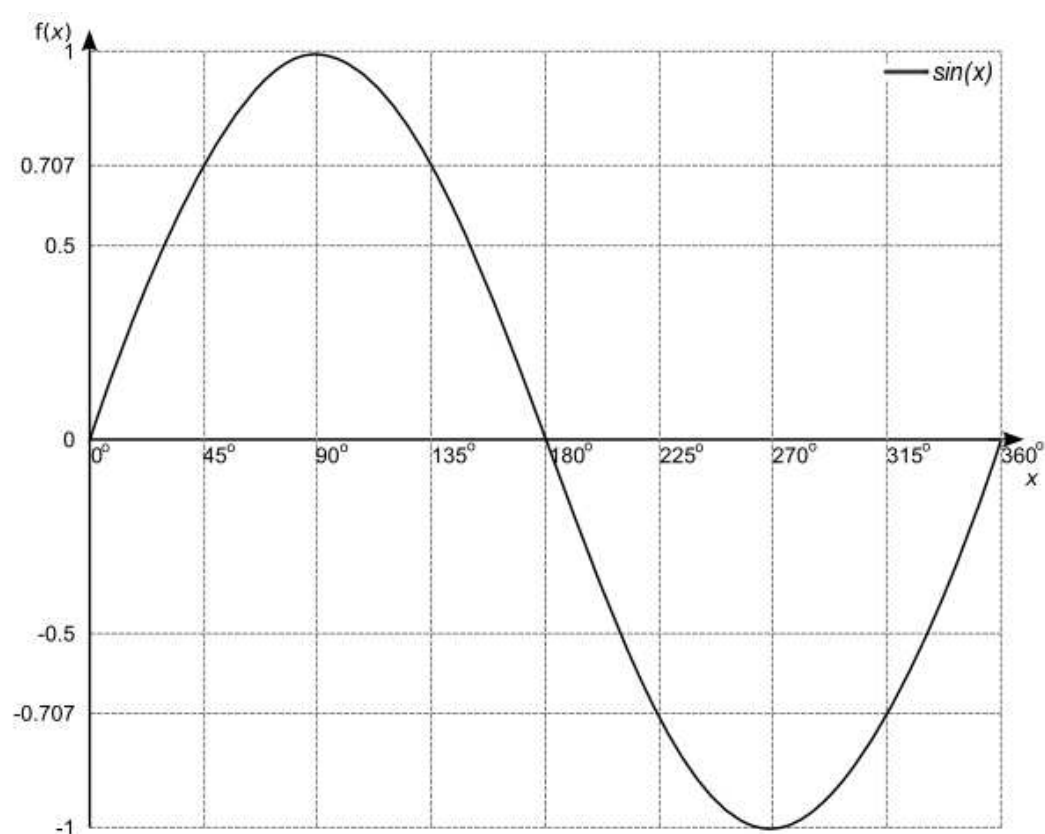
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- Can you also sketch the function  $-\sin(x)$  in the grid above?

**Periodicity** We've seen that the value  $a$  in the sinusoidal function  $a \sin(bx)$  only affects the *amplitude* of the resultant curve. Now, we'll explore what happens when we vary the value of  $b$ . We will investigate for values  $b = \frac{1}{2}$  and  $b = 2$ .

Fill in the values of these functions at various points along the  $x$ -axis in the table below:

$x$	$\sin(x)$	$2x$	$\sin(2x)$	$\frac{1}{2}x$	$\sin(\frac{1}{2}x)$
$0^\circ$	0	$0^\circ$		$0^\circ$	
$45^\circ$	$\frac{1}{\sqrt{2}}$	$90^\circ$			
$90^\circ$	1	$180^\circ$		$45^\circ$	
$135^\circ$	$\frac{1}{\sqrt{2}}$	$270^\circ$			
$180^\circ$	0	$360^\circ$		$90^\circ$	
$225^\circ$	$-\frac{1}{\sqrt{2}}$				
$270^\circ$	-1			$135^\circ$	
$315^\circ$	$-\frac{1}{\sqrt{2}}$				
$360^\circ$	0			$180^\circ$	

Now we are able to plot the functions  $\sin(2x)$  and  $\sin(\frac{1}{2}x)$ . Plot the points you've calculated above in the grid below and sketch the graphs of the two sinusoidal functions. (Remember to plot the curves against  $x$  and not  $2x$  or  $\frac{1}{2}x$ )



- What changes have you observed? Which properties of the sinusoidal function remain the same?  
\_\_\_\_\_
- Can you also sketch the function  $\sin(\frac{3}{2}x)$  in the grid above? Where are the  $x$ -intercepts?
- Varying the values of  $b$  will affect the *periodicity* of the sinusoidal function. For  $b > 1$ , the period of the function will \_\_\_\_\_; it will become compressed. For  $b < 1$ , the period of the function will \_\_\_\_\_; it will become more spread out.