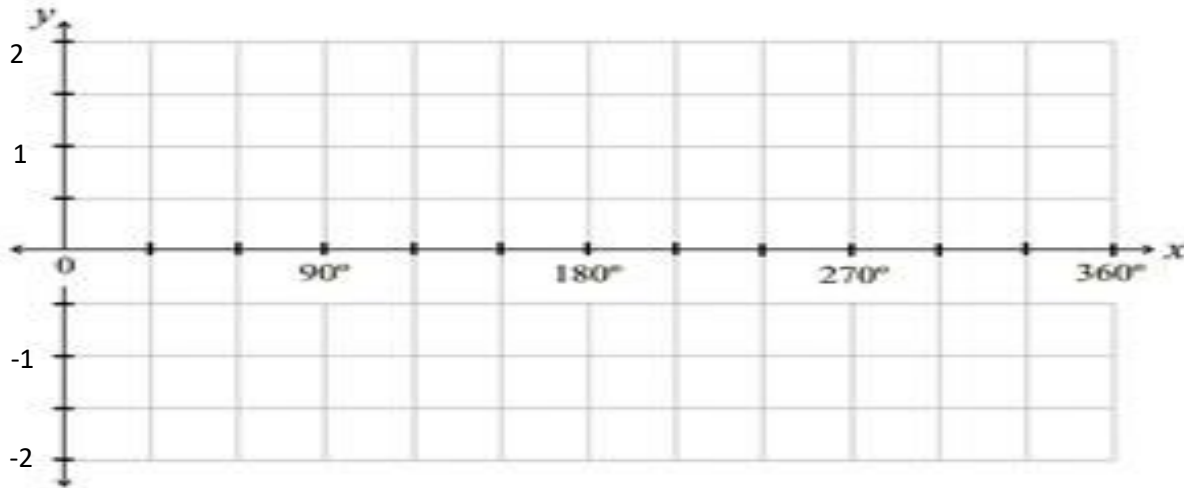


Transformations of the Sine Function

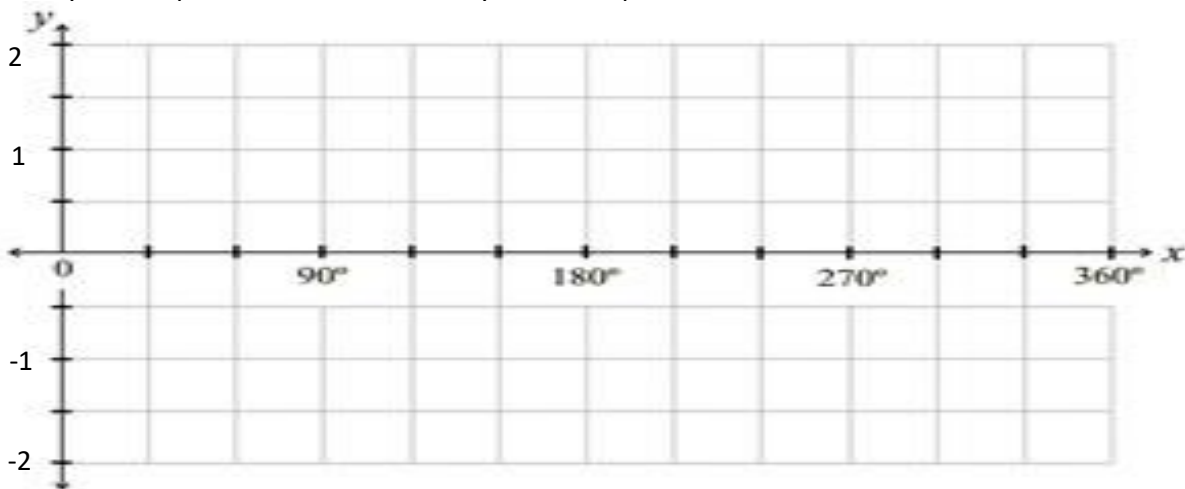
Today we will look at all sorts of graphs that have the sine ratio in their equation. We will talk about transformations of $y = \sin x$, similar to the way we discussed transformations of $y = x^2$ when we discussed vertex form.

Exploring Graphs of the Form $y = a \sin x$

Sketch a graph of $y = \sin x$ below.



- 1) What might the graph of $y = 2 \sin x$ look like? Sketch this graph above as well. (make a table of values if you need to)
- 2) What might the graph of $y = 0.5 \sin x$ look like? Sketch this graph above as well. (make a table of values if you need to)
- 3) Sketch the graphs of $y = -\sin x$ and $y = -2 \sin x$ on the graphs below, by considering how they would compare to $y = \sin x$. (make a table of values if you need to)



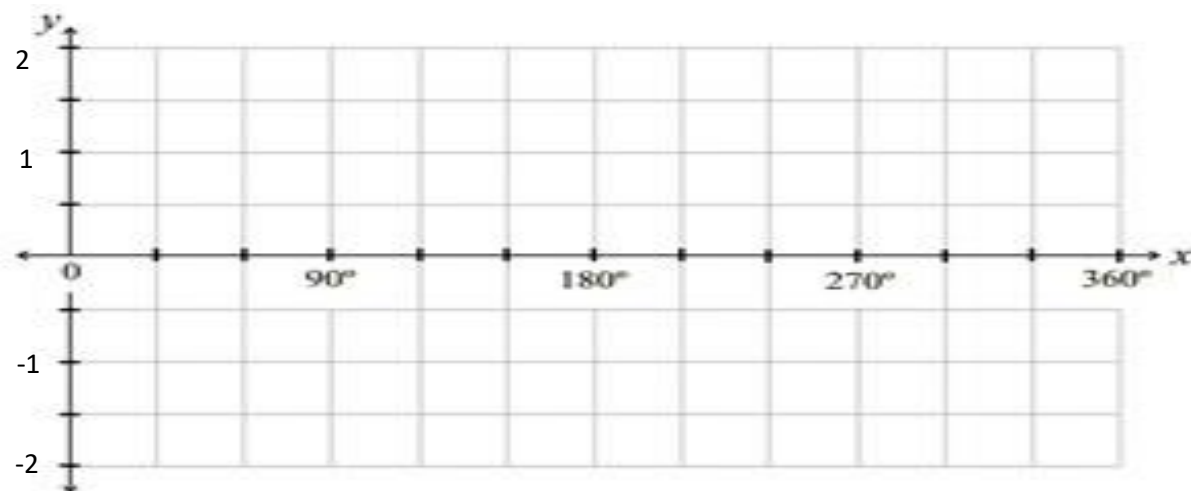
Summarize the results from the 5 graphs above by completing this table. Can you use a pattern to complete the last 2 rows of the table?

Equation	Amplitude	Equation of Axis	Period
$y = \sin x$			
$y = 2 \sin x$			
$y = 0.5 \sin x$			
$y = -\sin x$			
$y = -2 \sin x$			
$y = 10 \sin x$			
$y = -12 \sin x$			

What lesson is learned here about the graph of $y = a \sin x$?

Exploring Graphs of $y = \sin x + c$

- 1) What would the graph of $y = \sin x + 1$ look like compared to $y = \sin x$? Use this information to sketch $y = \sin x + 1$ below.
- 2) What would the graph of $y = \sin x - 1$ look like compared to $y = \sin x$? Use this information to sketch $y = \sin x - 1$ below.



- 3) Now sketch the graphs of $y = \sin x + 5$ and $y = \sin x - 5$. Notice that you don't need graph paper to do this, just think about where the important points would be.

Complete the table below. Some of these you have graphed others you need to figure out.

Equation	Amplitude	Equation of Axis	Period
$y = \sin x$			
$y = \sin x + 1$			
$y = \sin x - 1$			
$y = \sin x + 5$			
$y = \sin x - 5$			
$y = \sin x + 20$			
$y = 12 \sin x + 6$			

What is the lesson learned about graphs of the form $y = \sin x + c$?

Exploring Graphs of $y = \sin(kx)$

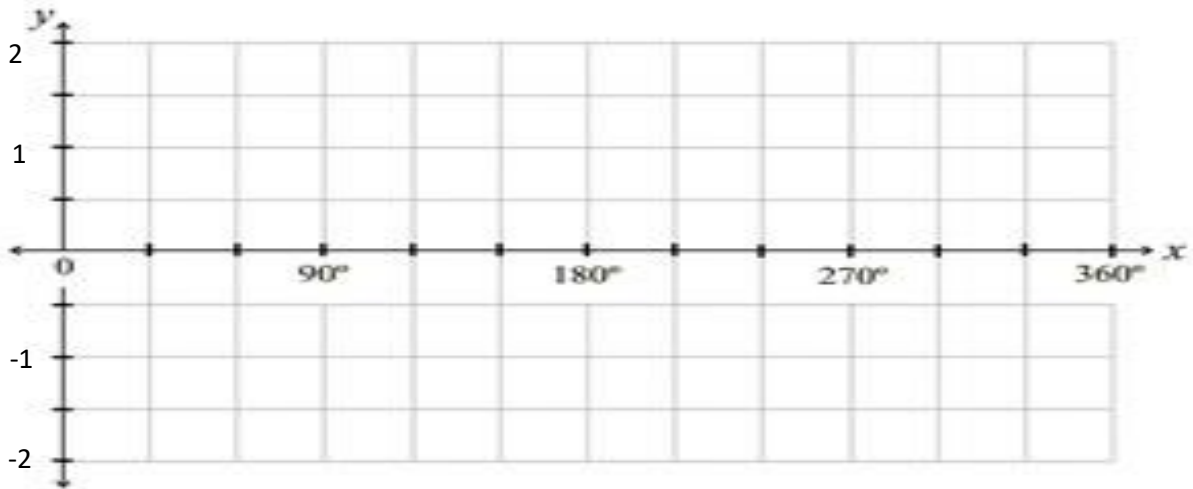
We know what the graph of $y = \sin x$ looks like, but what about the graph of $y = \sin 2x$? This question is a little more challenging than the ones above.

- 1) To answer this question, try completing a table of values.

x	y = sin x	y = sin 2x
0		
45		
90		
135		
180		

x	y = sin x	y = sin 2x
225		
270		
315		
360		

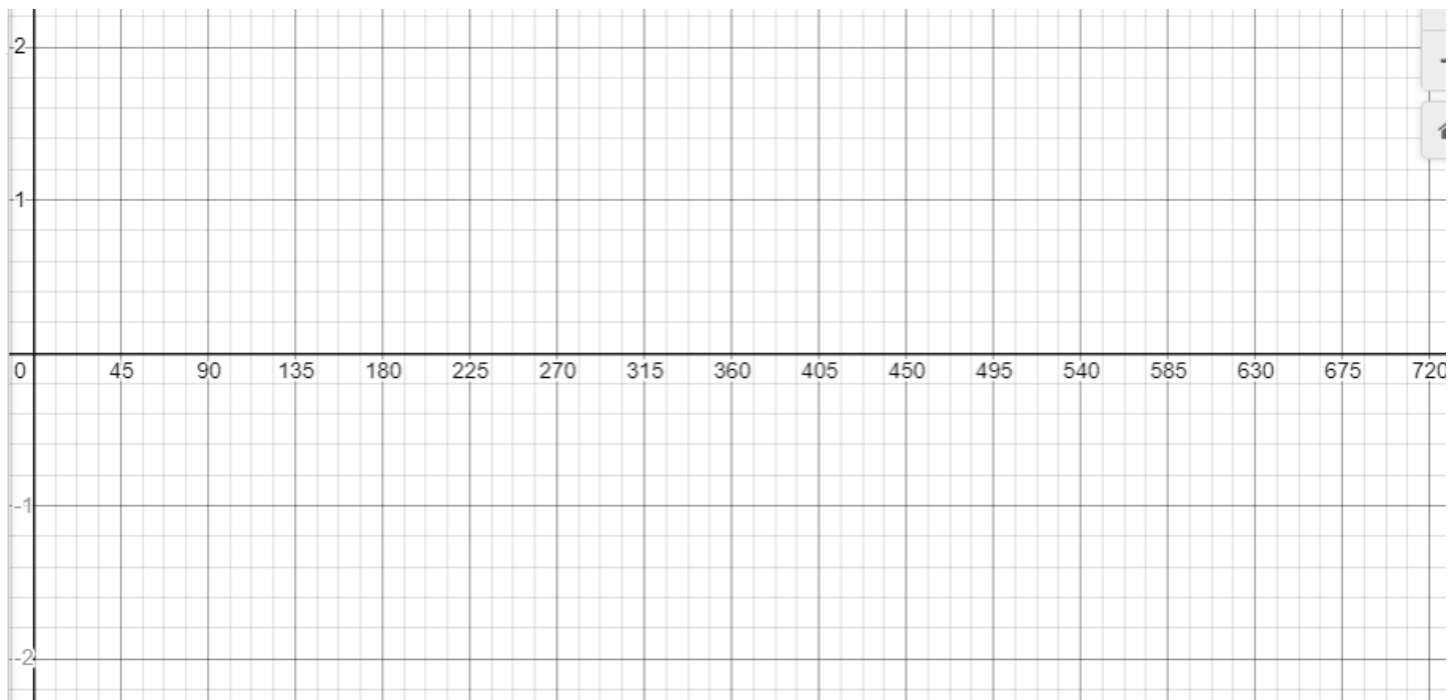
2) Sketch $y = \sin x$ and $y = \sin 2x$ below.



3) Try to figure out what $y = \sin\left(\frac{x}{2}\right)$ looks like. Note that $y = \sin\left(\frac{x}{2}\right)$ is the same as $y = \sin\left(\frac{1}{2}x\right)$

x	$y = \sin x$	$y = \sin\left(\frac{x}{2}\right)$
0		
90		
180		
270		
360		
450		
540		
630		
720		

Sketch $y = \sin x$ and $y = \sin\left(\frac{x}{2}\right)$ graphs below.



Complete the table below. See if you notice the pattern and can complete the table for functions you did not graph.

Equation	Amplitude	Equation of Axis	Period
$y = \sin x$			
$y = \sin(2x)$			
$y = \sin\left(\frac{x}{2}\right)$			
$y = \sin(3x)$			
$y = \sin\left(\frac{x}{10}\right)$			