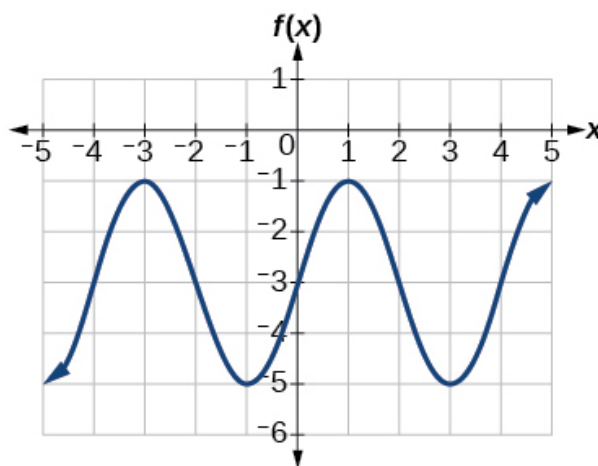


**NEW OUTCOME: Create the corresponding graph or equation for a periodic function.**

**NOTES:** After watching the videos, we now know the effect of  $a$  and  $m$  on the sine and cosine graph with equations of  $y = a \sin x + m$  and  $y = a \cos x + m$ . These are listed below as well:

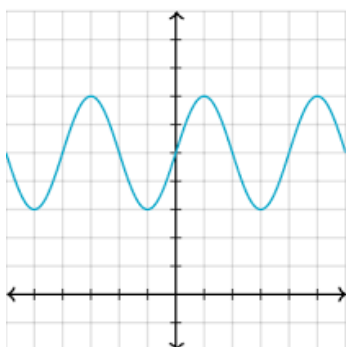
- $m = \text{midline}$ , the horizontal line that intersects the middle of the graph. We can calculate this value by **adding** the maximum and minimum, then divide by 2 (you also can sometimes just see where the middle of the graph is). The graph to the right has a midline of  $y = -3$ :
- $a = \text{amplitude}$ , the distance from the midline to the maximum or minimum of the graph. We can calculate this value by **subtracting** the maximum and minimum, then divide by 2. The graph to the right has an amplitude of 2.



**PRACTICE:**

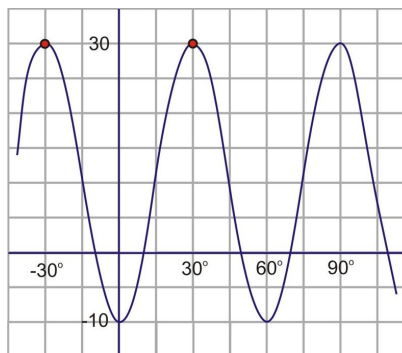
1. For each graph below, determine the following information:

(a)



Maximum: \_\_\_\_\_  
 Minimum: \_\_\_\_\_  
 Amplitude ( $a$ ): \_\_\_\_\_  
 Midline ( $m$ ): \_\_\_\_\_

(b)



Maximum: \_\_\_\_\_  
 Minimum: \_\_\_\_\_  
 Amplitude ( $a$ ): \_\_\_\_\_  
 Midline ( $m$ ): \_\_\_\_\_

2. For each equation below, determine the following information without looking at the graph:

(a)  $y = 7 \sin(x) + 4$

Amplitude ( $a$ ) : \_\_\_\_\_  
 Midline ( $m$ ): \_\_\_\_\_  
 Maximum: \_\_\_\_\_  
 Minimum: \_\_\_\_\_

(b)  $y = -5 \cos(x) + 2$

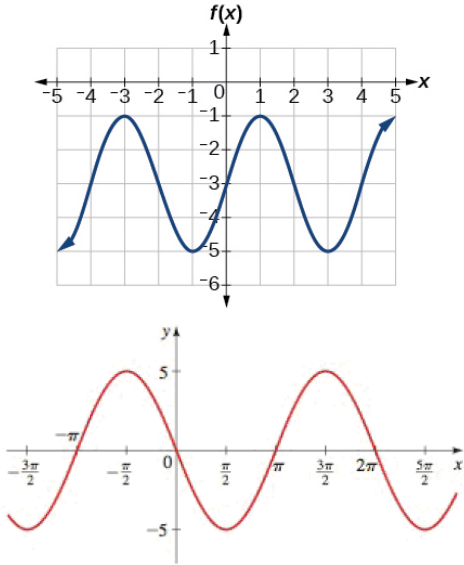
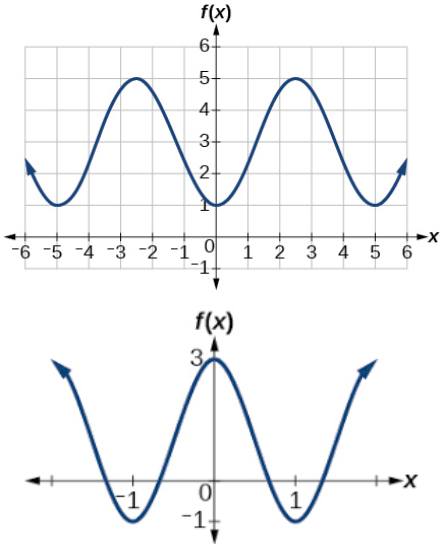
Amplitude ( $a$ ) : \_\_\_\_\_  
 Midline ( $m$ ): \_\_\_\_\_  
 Maximum: \_\_\_\_\_  
 Minimum: \_\_\_\_\_

(c)  $y = 25 \sin(x) + 35$

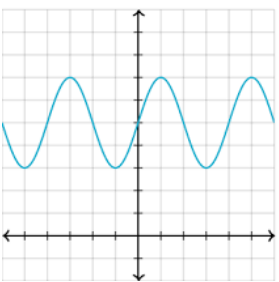
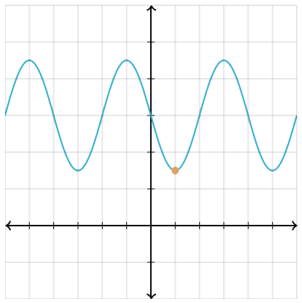
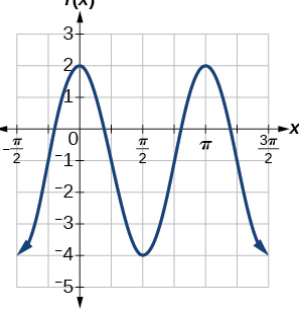
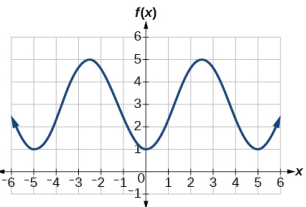
Amplitude ( $a$ ) : \_\_\_\_\_  
 Midline ( $m$ ): \_\_\_\_\_  
 Maximum: \_\_\_\_\_  
 Minimum: \_\_\_\_\_

**EXPLORE:**

1. HOW DO YOU KNOW IF THIS IS A SINE OR COSINE GRAPH?

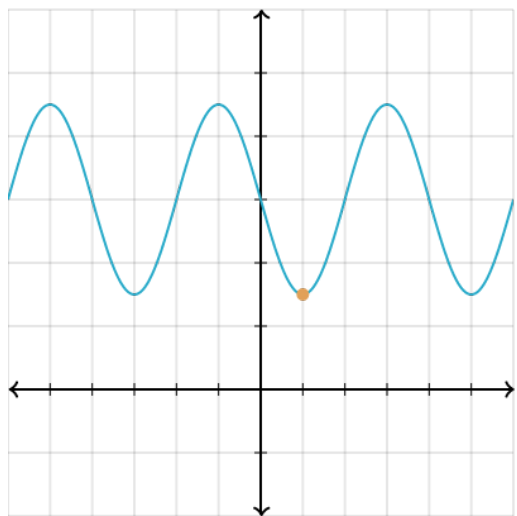
Sine Curves	Cosine Curves
	
<p>What did you notice?  <i>Hint: What is the y-intercept?</i></p>	<p>What did you notice?  <i>Hint: What is the y-intercept?</i></p>

2. HOW DO YOU KNOW IF THE AMPLITUDE IS POSITIVE OR NEGATIVE?

Sine Curves		Cosine Curves	
<i>Positive</i>	<i>Negative</i>	<i>Positive</i>	<i>Negative</i>
			
<p>What did you notice?  <i>Hint: What is the y-intercept?</i></p>	<p>What did you notice?  <i>Hint: What is the y-intercept?</i></p>		

## SUMMARY: Did you get it?

The concepts of today's lesson are explained in the three examples here. If this seems at all confusing, join Katherine at 12:15 today to ask any questions or to go over the task together during office hours (use the link provided in our google classroom).



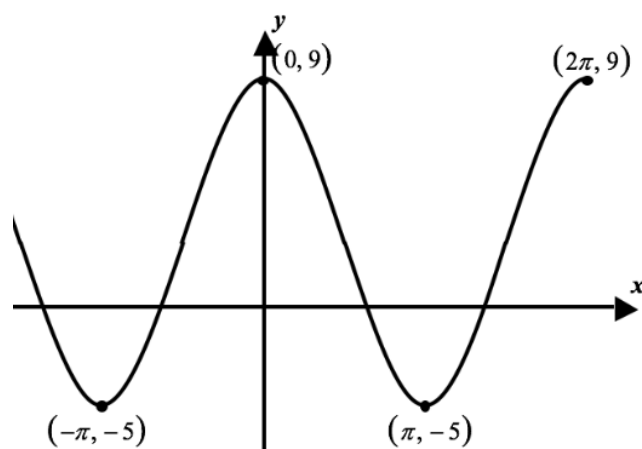
(b) I can see a few characteristics from the graph right away:

- Maximum: 4.5
- Midline:  $y = 3$
- Minimum: 1.5
- This is a Negative Sine curve because the graph intercepts the y-axis at the midline (characteristic of all Sine curves) and starts to decrease (characteristic of all negative Sine curves).
- Amplitude: -1.5 (distance from midline to maximum or minimum)

$$y = 10\sin(x) - 3$$

(a) I can tell the amplitude is 10 and the midline is -3 because of the placement of the values in the equation  $y = a \sin x - m$ . From these I can add and subtract the amplitude to the midline to find the maximum and minimum values.

- Amplitude: 10
- Midline: -3
- Minimum:  $-3 - 10 = -13$
- Maximum:  $-3 + 10 = 7$



(c) I can see a few characteristics from the graph right away:

- Maximum: 9
- Midline:  $y = 2 \rightarrow$  I added the maximum and minimum then divided  $(9 + -5)/2$ .
- Minimum: -5
- This is a Positive Cosine curve because the graph intercepts the y-axis at the maximum. The characteristics of all Cosine curves to intercept at max (positive) or min (negative).
- Amplitude: 7  $\rightarrow$  I subtracted the maximum and minimum then divided  $(9 - -5)/2$ .