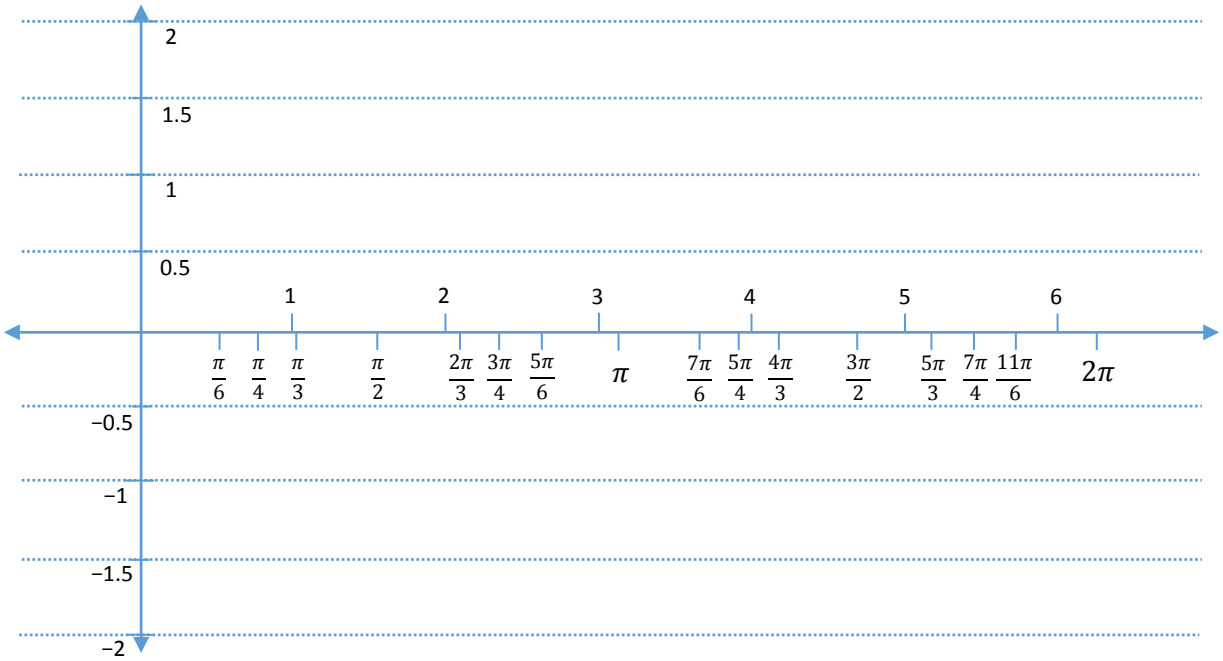
Math 3 Unit 8 Worksheet 8 **Name:**_____
The Cosine Graph **Date:**_____ **Per:**_____

1. $y = \cos x$ a) Fill-in the table with the fractional values for the equation, $y = \cos x$, then use a calculator to help approximate the decimal value for each of the fractions. After you have filled in the table of values, plot each of the points on the graph paper below and connect the dots with a smooth flowing curve.

x	0	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$	$2\pi/3$	$3\pi/4$	$5\pi/6$	π
$y = \cos x$ *(fractional)*									
$y = \cos x$ *(decimal)*									

x	π	$7\pi/6$	$5\pi/4$	$4\pi/3$	$3\pi/2$	$5\pi/3$	$7\pi/4$	$11\pi/6$	2π
$y = \cos x$ *(fractional)*									
$y = \cos x$ *(decimal)*									



What you have just graphed is one period of the function $y = \cos x$. If you continued plugging in values you would see this same-sized shape continuously emerging as you go to the left of $x = 0$ and to the right of $x = 2\pi$.

b) What is the highest value (*y*-coordinate) for this function? _____ At what location (*x*-coordinate) does this occur? _____

c) What is the lowest value (*y*-coordinate) for this function? _____ At what location (*x*-coordinate) does this occur? _____

d) Since this function is periodic (does the same exact pattern forever to the left and to the right):

What is the domain for this function? _____ What is the range for this function? _____

e) At what locations (*x*-coordinate) is the value of the function (*y*-coordinate) equal to zero? _____

The ***amplitude*** for the curve $y = \cos x$ is 1, since it goes up one and down one from its equilibrium value of elevation zero. (Amplitude in the cosine function works just the same as it does for the sine function, and it's still non-negative.)

2. $y = 2\cos x$ a) Think about what the 2 would do to each of the *y*-values from the filled-in table for $y = \cos x$. Using a different color from the previous problem, plot the points appropriate to $y = 2\cos x$ on the same graph, then connect the dots with a smooth flowing curve and answer the following questions.

b) What is the highest value (*y*-coordinate) for this function? _____ At what location (*x*-coordinate) does this occur? _____

c) What is the lowest value (*y*-coordinate) for this function? _____ At what location (*x*-coordinate) does this occur? _____

d) Since this function is periodic (does the same exact pattern forever to the left and to the right):

What is the domain for this function? _____ What is the range for this function? _____

e) At what locations (*x*-coordinate) is the value of the function (*y*-coordinate) equal to zero? _____

f) What is the amplitude for $y = 2\cos x$? _____

3. $y = \frac{1}{2}\cos x$ a) Think about what the ½ would do to each of the *y*-values from the filled-in table for $y = \cos x$. Using a different color from the previous problems, plot the points appropriate to $y = \frac{1}{2}\cos x$ on the same graph, then connect the dots with a smooth flowing curve and answer the following questions.

b) What is the highest value (*y*-coordinate) for this function? _____ At what location (*x*-coordinate) does this occur? _____

c) What is the lowest value (*y*-coordinate) for this function? _____ At what location (*x*-coordinate) does this occur? _____

d) Since this function is periodic (does the same exact pattern forever to the left and to the right):

What is the domain for this function? _____ What is the range for this function? _____

e) At what locations (*x*-coordinate) is the value of the function (*y*-coordinate) equal to zero? _____

f) What is the amplitude for $y = \frac{1}{2}\cos x$? _____

4. $y = -\cos x$ a) Think about what the -1 would do to each of the *y*-values from the filled-in table for $y = \cos x$. Using a different color from the previous problems, plot the points appropriate to $y = -\cos x$ on the same graph, then connect the dots with a smooth flowing curve and answer the following questions.

b) What is the highest value (*y*-coordinate) for this function? _____ At what location (*x*-coordinate) does this occur? _____

c) What is the lowest value (*y*-coordinate) for this function? _____ At what location (*x*-coordinate) does this occur? _____

d) Since this function is periodic (does the same exact pattern forever to the left and to the right):

What is the domain for this function? _____ What is the range for this function? _____

e) At what locations (*x*-coordinate) is the value of the function (*y*-coordinate) equal to zero? _____

f) What is the amplitude for $y = -\cos x$? _____

5. $y = 3\cos x + 1$ a) Using what you have learned about the sine function and your previous experience with functions in general, answer the following questions about the function $y = 3\cos x + 1$ after sketching it.

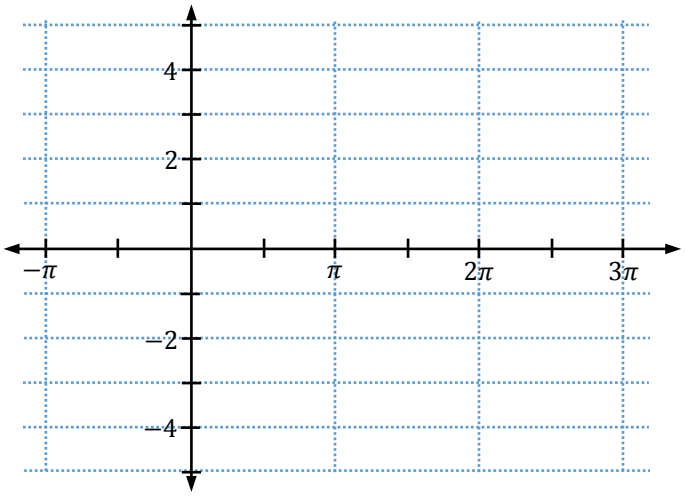
b) What is the highest value (*y*-coordinate) for this function? _____

At what location (*x*-coordinate) does this occur? _____

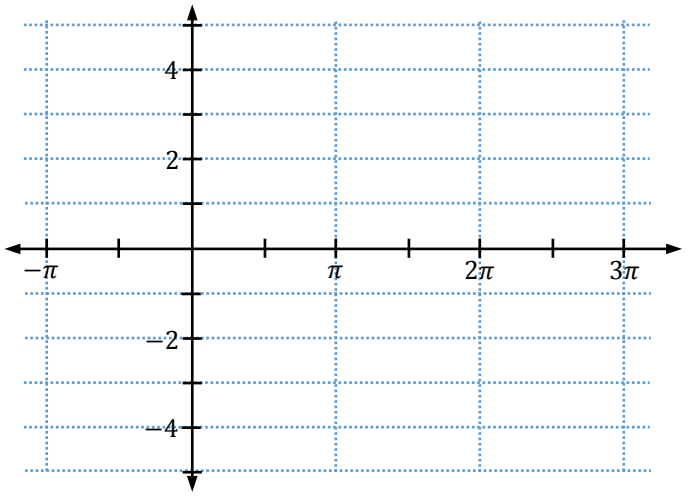
c) What is the lowest value (*y*-coordinate) for this function? _____

At what location (*x*-coordinate) does this occur? _____

d) Using a different color, extend the pattern for the function in both directions so that it contains the *x*-values, $-\pi \le x \le 3\pi$.



6. $y = -2\cos\left(x - \frac{\pi}{2}\right)$ a) Using what you have learned about the sine function and your previous experience with functions in general, answer the following questions about the function $y = -2\cos\left(x - \frac{\pi}{2}\right)$ after sketching it.



b) What is the highest value (*y*-coordinate) for this function? _____

At what location (*x*-coordinate) does this occur? _____

c) What is the lowest value (*y*-coordinate) for this function? _____

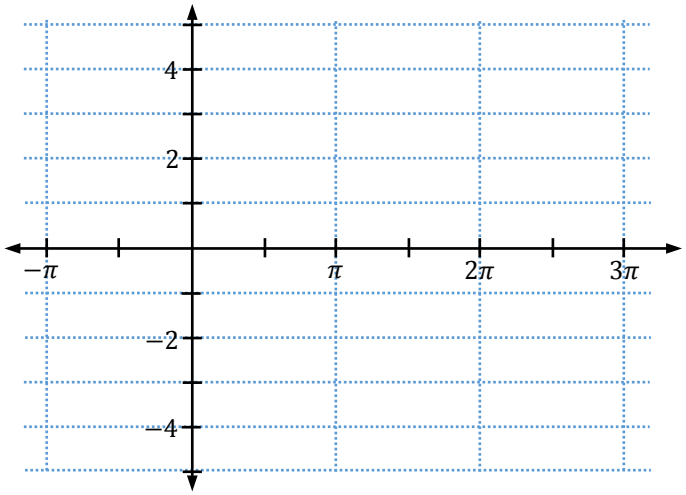
At what location (*x*-coordinate) does this occur? _____

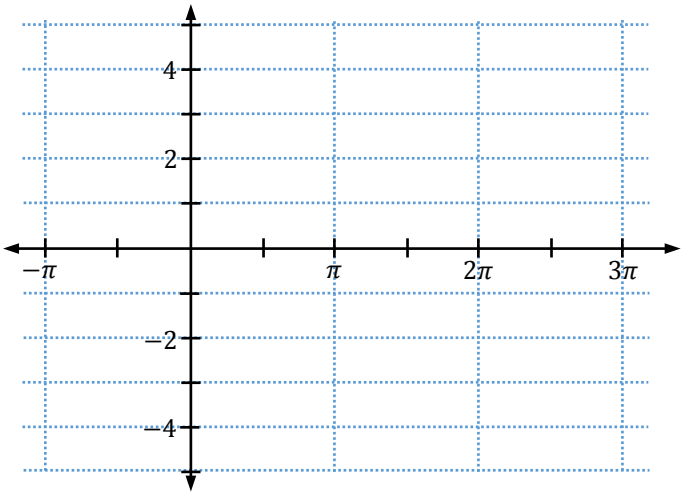
d) Using a different color, extend the pattern for the function in both directions so that it contains the *x*-values, $-\pi \le x \le 3\pi$.

[7-10]: Focus on the five key points for a trig function {beginning, middle, end, 1/4th, & 3/4th} to sketch the first period for each of the following functions in one color. Using a different color, extend the pattern for that function in both directions so that it contains the *x*-values $-\pi \le x \le 3\pi$.

7. $f(x) = 3\cos\left(x - \frac{\pi}{2}\right) + 1$

8. $f(x) = -\cos(x - \pi) + 2$





9. $f(x) = \frac{1}{2}\cos(x + \pi) + 3$

10. $f(x) = -2\cos\left(x + \frac{\pi}{2}\right) - 1$