Math 119 – Chapter 10.2 (Graphs of $y = a\sin bx \ and \ y = a\cos bx$)

Objectives:

- Find the amplitude and period for a sine and cosine function
- Graph the sine and cosine function

In the last section the graphs of $y = f(x) = \sin x \ and \ y = f(x) = \cos x$ were periodic and repeated every 2π times which is called the period of the function. In this section by putting a value in front of the independent variable x we will change the period of the function (i.e. the period is the x distance between any point and the next point at which the same pattern of y values starts repeating. This period is the distance along the x-axis required to get on complete cycle of a repeating pattern.

On your graphing calculator, let's graph

$y = f(x) = \sin x$

$y = f(x) = \sin 2x$

x	*2x*	*f(x)=sin2x*
0	0	
$\frac{\pi}{8}$	$\frac{\pi}{4}$	
$\frac{\pi}{4}$	$\frac{\pi}{2}$	
$\frac{3\pi}{8}$	$\frac{3\pi}{4}$	
$\frac{\pi}{2}$	π	
$\frac{5\pi}{8}$	$\frac{5\pi}{4}$	
$\frac{3\pi}{4}$	$\frac{3\pi}{2}$	
$\frac{7\pi}{8}$	$\frac{7\pi}{4}$	
π	2π	
$\frac{9\pi}{8}$	$\frac{9\pi}{4}$	
$\frac{5\pi}{4}$	$\frac{5\pi}{2}$	

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Graph: $y = f(x) = \sin x$
$y = f(x) = \sin 4x$

What does the period become in the second function?

Can you create a definition for the period of a function?

Without a graphing calculator, tell me the period of these functions:

1. $y = \cos 6x$

2. $y = \sin \frac{1}{4} x$

3. $y = \sin \pi x$

Without a graphing calculator, tell me the period of these functions and create a sketch of them:

4. $y = \sin 8x$

5. $y = \cos \frac{1}{3} x$

6. $y = \cos 2\pi x$

7. $y = 3\sin 4x$

8. $y = -4\cos 10x$

9. $y = -2\sin 3\pi x$

The period is given for a function of the form *y = sin bx*. Write the equation corresponding to the given values of the period.

1. $\frac{\pi}{6}$

2. 4

3. $\frac{3\pi}{7}$

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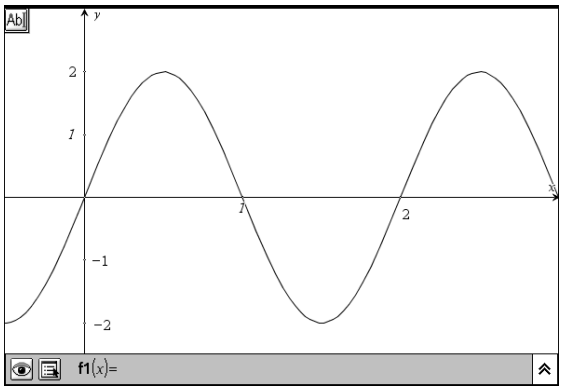
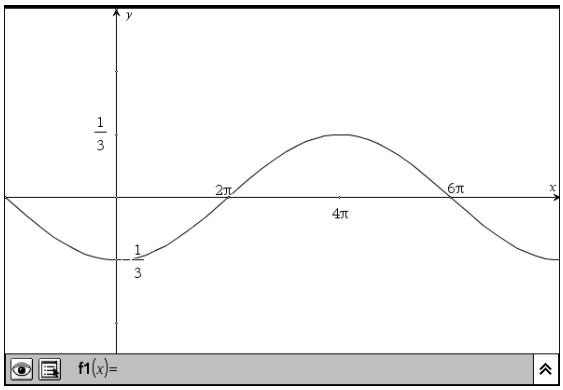
Let's play "What's My Function"? The first figure is of the form $y = a\sin bx$

The second figure is of the form $y = a\cos bx$.





A generator produces a voltage given by $V = 200\cos 50\pi t$ where t is the time in seconds. Sketch one cycle of the curve and verify your results using the graphing calculator.

Graph the same function as above but this time graph the function for a domain described as:

$0 \le t \le 0.06$

The velocity of a piston in an engine is given by $v = 5.0\cos 1600\pi t$ where *v* is the velocity in centimeters per second and *t* is the time in seconds. Sketch one cycle of the curve.