Math 27 **Graphs of $y = a\sin(bx)$ and $y = a\cos(bx)$** §4.5 – day 1

Some Definitions

Domain: The set of all allowable input (x) values.

Range: The set of all output (y) values.

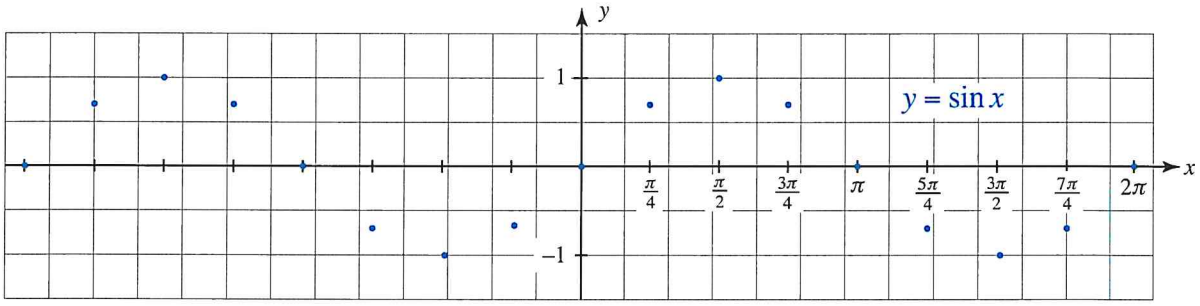
Amplitude: The vertical distance from the centerline to the highest point on the graph.

Periodic Function: A function that exhibits repetitive behavior. As you move left or right on the graph, there is some 'template' that repeats itself over and over.

Period: The length of the shortest template that can be used to produce the graph of a periodic function.

The graph of $y = \sin x$ over the interval $[-2\pi, 2\pi]$:

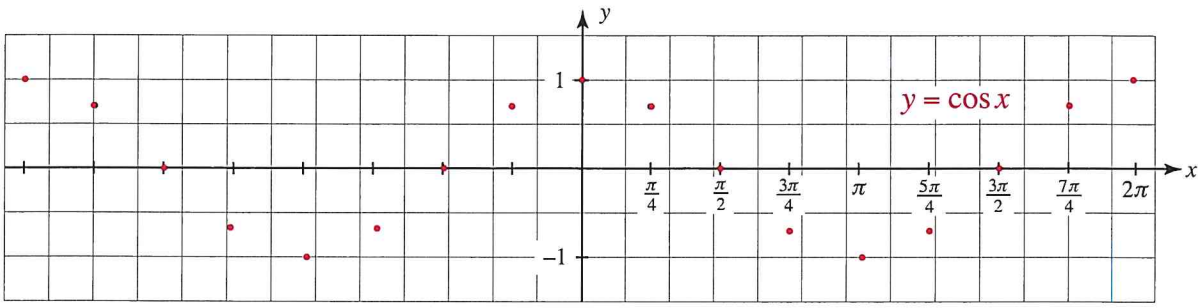
x	0	$\pi/4$	$\pi/2$	$3\pi/4$	π	$5\pi/4$	$3\pi/2$	$7\pi/4$	2π
y	0	$\sqrt{2}/2$	1	$\sqrt{2}/2$	0	$-\sqrt{2}/2$	-1	$-\sqrt{2}/2$	0



Domain:_____ Range:_____ Amplitude:_____ Period:_____

The graph of $y = \cos x$ over the interval $[-2\pi, 2\pi]$:

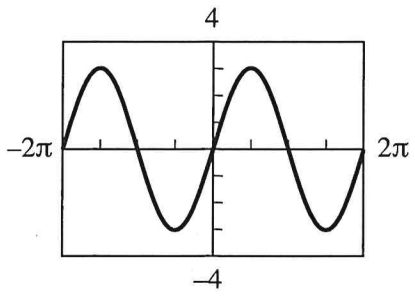
x	0	$\pi/4$	$\pi/2$	$3\pi/4$	π	$5\pi/4$	$3\pi/2$	$7\pi/4$	2π
y	1	$\sqrt{2}/2$	0	$-\sqrt{2}/2$	-1	$-\sqrt{2}/2$	0	$\sqrt{2}/2$	1



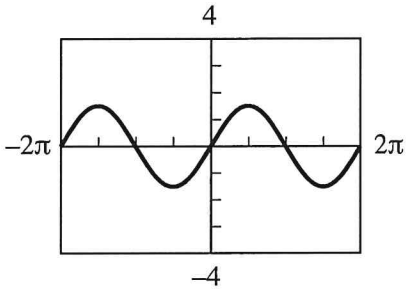
Domain:_____ Range:_____ Amplitude:_____ Period:_____

Examples: Determine the amplitude of each of the following functions.

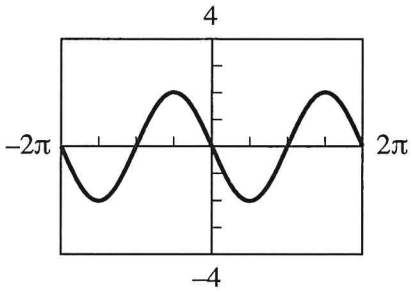
1. $y = 3\sin x$ Amp = _____



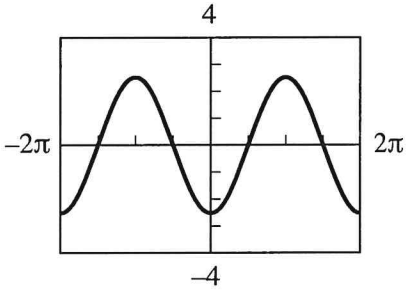
2. $y = \frac{3}{2}\sin x$ Amp = _____



3. $y = -2\sin x$ Amp = _____



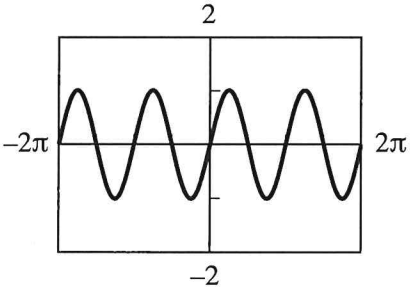
4. $y = -\frac{5}{2}\cos x$ Amp = _____



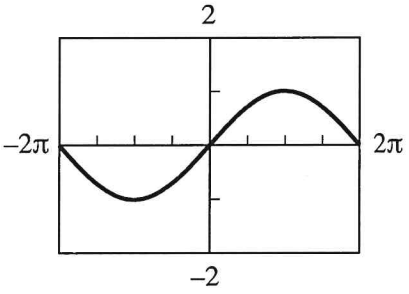
Observation: For the graphs of $y = a\sin x$ and $y = a\cos x$ the factor of a modifies the amplitude of the functions. The new amplitude is: _____

Examples: Determine the period of each of the following functions.

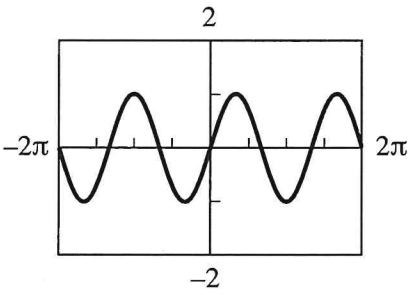
5. $y = \sin(2x)$ Per = _____



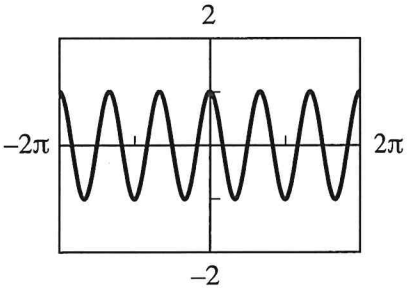
6. $y = \sin(\frac{1}{2}x)$ Per = _____



7. $y = \sin(\frac{3}{2}x)$ Per = _____



8. $y = \cos(-3x)$ Per = _____



Observation: For the graphs of $y = \sin(bx)$ and $y = \cos(bx)$ the factor of b modifies the period of the functions. The new period is:

Example 9. State the amplitude and period of each of the following functions.

a) $y=-\frac{1}{3}\sin\left(\frac{1}{3}x\right)$ Amp = Per =

b) $y=\frac{2}{3}\cos\left(\frac{3x}{2}\right)$ Amp = Per =

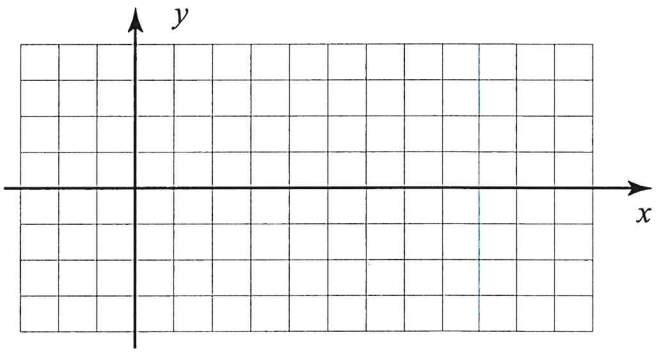
c) $y=10\sin(\pi x)$ Amp = Per =

d) $y=-\cos\left(-\sqrt{3}x\right)$ Amp = Per =

Example 10. Identify amplitude and period and sketch one period of $y=3\sin(\frac{\pi}{6}x)$

Amp =

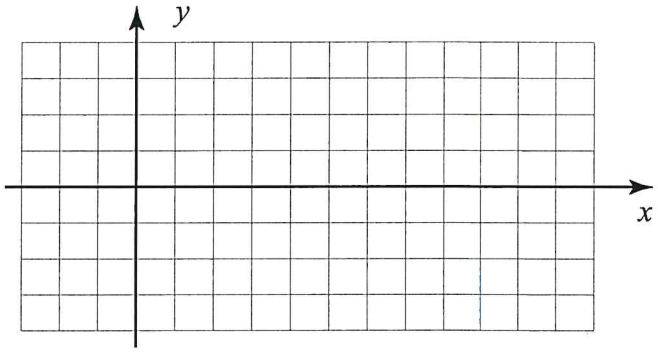
Per =



Example 11. Identify amplitude and period and sketch one period of $y=3\cos\left(\frac{\pi}{4}x\right)$

Amp =

Per =



Example 12. Identify amplitude and period and sketch one period of $y=-4\sin\left(4x\right)$

Amp =

Per =