Math 1113

Graphing Sine and Cosine Function
In Class Practice Worksheet

$P = \frac{2\pi}{B}$, $B = \frac{2\pi}{P}$

1. Determine the amplitude and period of each function.

a. $y=\sin(2x)$

Amplitude: 1

Period: π

b. $y=4\cos(x)$

Amplitude: 4

Period: 2π

c. $y=2\sin(4x)$

Amplitude: 2

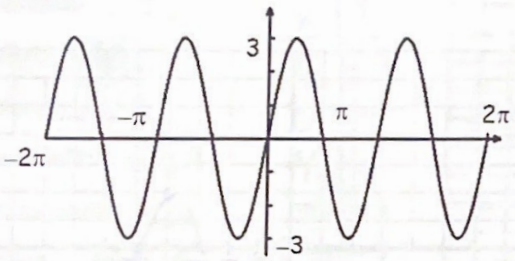
Period: $\pi/2$

d. $3\cos(\frac{2}{3}x)$

Amplitude: 3

Period: 3π

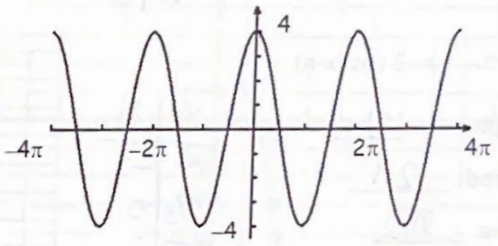
2. Determine the amplitude and period of each function. Then write an equation of each graph.



Amplitude = 3

Period = π $B = \frac{2\pi}{\pi} = 2$

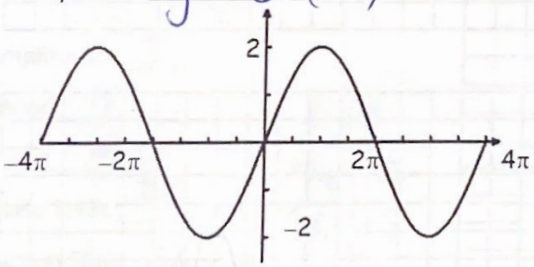
Equation: $y = 3\sin(2x)$



Amplitude= 4

Period= 2π $B = 1$

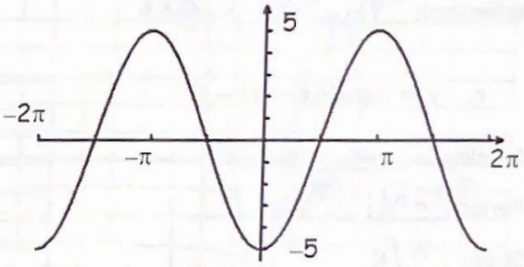
Equation: $y = 4\cos x$



Amplitude = 2

Period = 4π $B = 1/2$

Equation: $y = 2\sin(1/2x)$



Amplitude= 5

Period= 2π $B = 1$

Equation: $y = -5\cos x$

3. State the amplitude, period, mark, phase shift, vertical shift, and midline for each function. Then graph the function.

a. $y = 3 \sin(2x)$

Amplitude: 3

Period: π

Scale: $\pi/4$ Scale = Period / 4

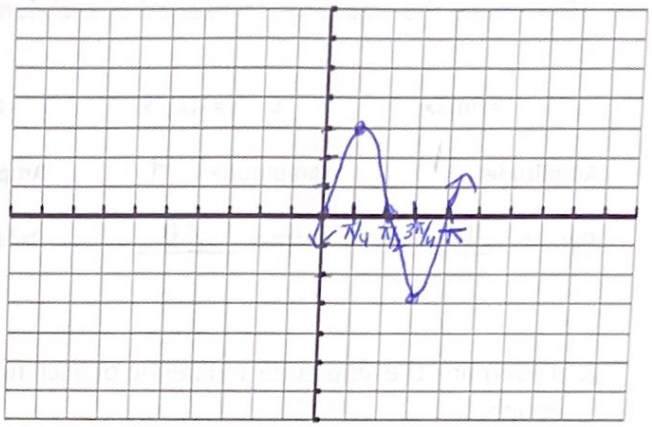
Phase Shift: $\emptyset$

Vertical Shift: $\emptyset$

Midline: $y = 0$

Reflection: None

x	y
0	0
$\pi/4$	3
$\pi/2$	0
$3\pi/4$	-3
π	0



b. $y = -2 \cos(x - \pi)$

Amplitude: 2

Period: 2π

Scale: $\pi/2$

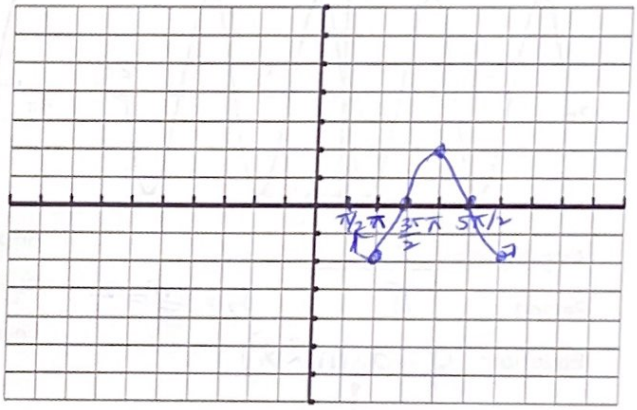
Phase Shift: π

Vertical Shift: $\emptyset$

Midline: $y = 0$

Reflection: Yes, over x-axis

x	y
π	-2
$3\pi/2$	0
2π	2
$5\pi/2$	0
$3\pi/2$	-2



c. $y = 3 \sin(4x - \pi) - 1$

Amplitude: 3

Period: $2\pi/4 = \pi/2$

Scale: $\pi/8$

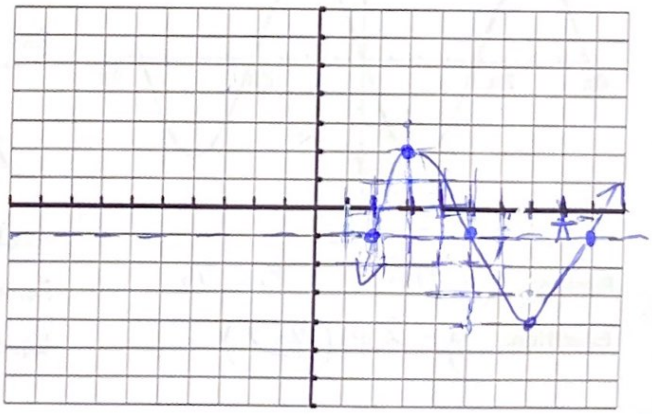
Phase Shift: $\pi/4$

Vertical Shift: -1

Midline: $y = -1$

Reflection: $\emptyset$

$\pi/4$	-1
$3\pi/8$	2
$5\pi/8$	-1
$7\pi/8$	-4
$9\pi/8$	-1



$\pi/4 + \pi/8 = 3\pi/8$

d. $y = \sin\left(\frac{1}{2}\left(x - \frac{\pi}{3}\right)\right)$

Amplitude: 1

Period: 4π $\quad 0 \le \frac{1}{2}x - \frac{\pi}{6} \le 2\pi$

Scale: π $\quad \pi/6 \le \frac{1}{2}x \le \frac{5\pi}{6}$

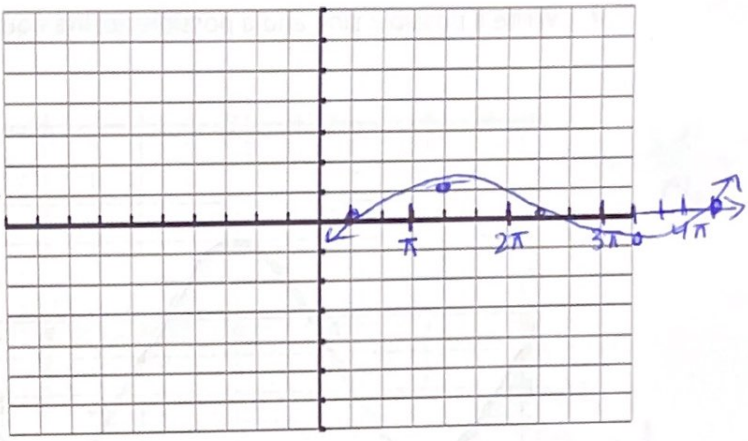
Phase Shift: $\pi/3$ $\quad \pi/3 \le x \le 5\pi/3$

Vertical Shift: $\emptyset$

Midline: $y = 0$

Reflection: $\emptyset$

x	y
$\pi/3$	0
$4\pi/3$	1
$7\pi/3$	0
$10\pi/3$	-1
$13\pi/3$	0



e. $y=-4\cos(x+\frac{\pi}{2}) - 3$

Amplitude: 4

Period: 2π

Scale: $\pi/2$

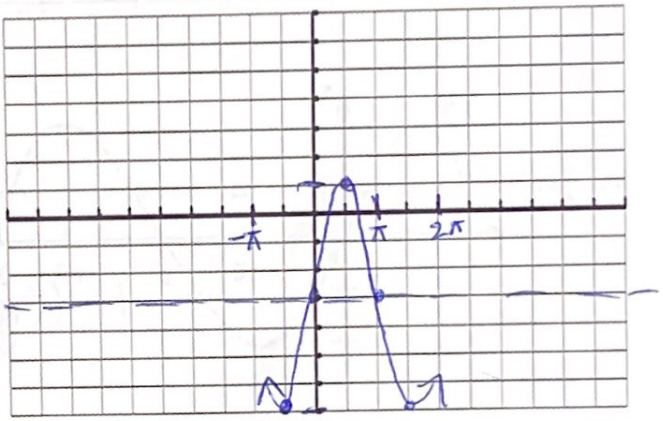
Phase Shift: $-\pi/2$

Vertical Shift: -3

Midline: $y = -3$

Reflection: Yes, over x axis

x	y
$-\pi/2$	-7
0	-3
$\pi/2$	1
π	-3
$3\pi/2$	-7



f. $y=-5\sin(2x-\frac{\pi}{2})$

Amplitude: 5

Period: π

Scale: $\pi/4$

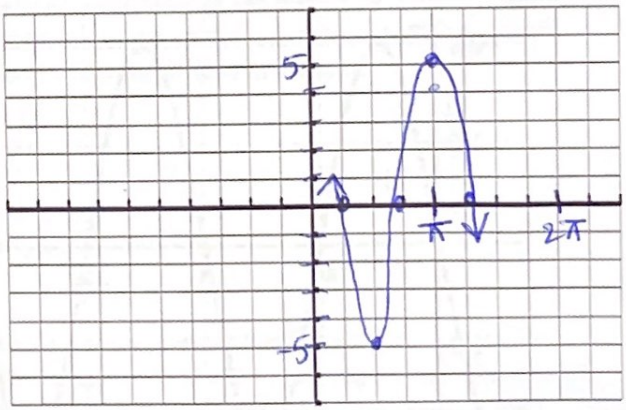
Phase Shift: $\pi/4$

Vertical Shift: $\emptyset$

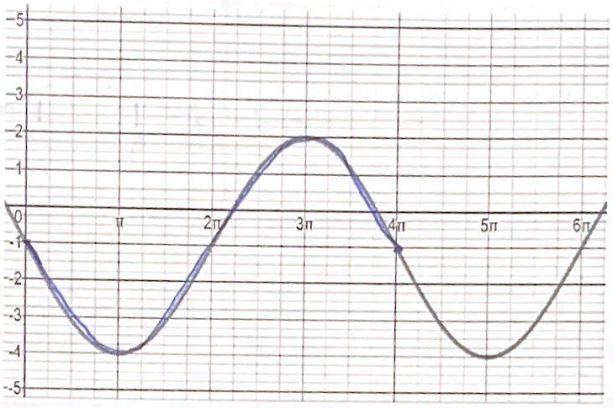
Midline: $y = 0$

Reflection: no

x	y
$\pi/4$	0
$\pi/2$	-5
$3\pi/4$	0
π	5
$5\pi/4$	0



4. Write a possible sine and a possible cosine equation for the graph below:



Min = -4 Max = 2

$D = \frac{-4+2}{2} = -1$

$A = 3$

$P = 4\pi$

$B = 1/2$

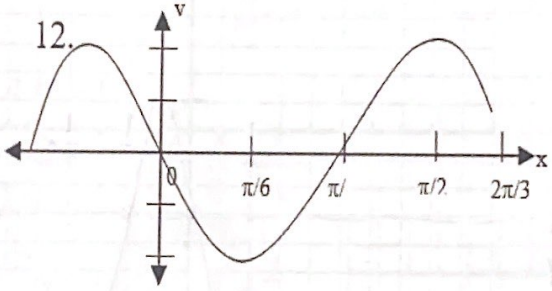
Sine Equation:

$y = -3\sin(\frac{1}{2}x) - 1$

Cosine Equation:

$y = -3\cos(\frac{1}{2}(x - \pi))$

12.



$D = 0$ $A = 2$

$P = 2\pi/3$

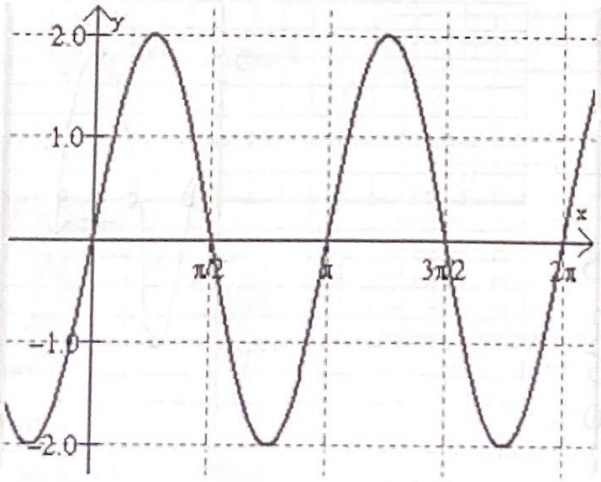
$B = 3$

Sine Equation:

$y = -2\sin(3x)$

Cosine Equation:

$y = -2\cos(3(x - \pi/6))$



$D = 0$ $A = 2$

$B = 2$

$P = \pi$

Sine Equation:

$y = 2\sin(2x)$

Cosine Equation:

$y = 2\cos(2(x - \pi/4))$

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Additional Questions:

1. Write an equation of a sine function with an amplitude of $\frac{2}{5}$ and a period a period of $\frac{\pi}{2}$.

$B = \frac{2\pi}{\pi/2} = 4$

$y = \frac{2}{5}\sin(4x)$

2. Write an equation of a sine function with a period of 4π and a phase shift of π to the right.

$\frac{2\pi}{4\pi} = \frac{1}{2}$

$y = \sin\left(\frac{1}{2}(x-\pi)\right)$

3. Write an equation of a cosine function with amplitude 2, period of π, phase shift left by $\frac{\pi}{4}$, and shift down by 1.

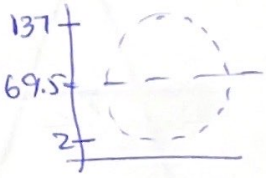
$B = \frac{2\pi}{\pi} = 2$

$y = 2\cos(2(x+\frac{\pi}{4})) - 1$

4. The London Eye is a huge Ferris wheel with a diameter of 135 meters (443 feet). It completes one rotation every 30 minutes. Riders board from a platform 2 meters above the ground. Express a rider's height above ground as a function of time in minutes.

$P = 30\text{ min}$ $B = \frac{2\pi}{30} = \frac{\pi}{15}$

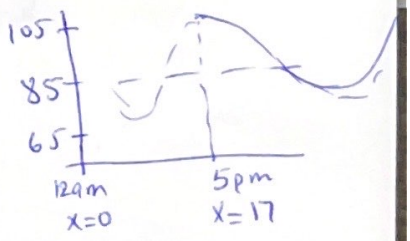
$D = \frac{2+137}{2}$ $D = 69.5$ $A = 67.5$



$\boxed{y = -67.5\cos(\pi/15 x) + 69.5}$

5. Outside temperatures over the course of a day can be modeled as a sinusoidal function. Suppose the high temperature of 105°F occurs at 5PM and the average temperature for the day is 85°F. Find the temperature, to the nearest degree, at 9AM.

$P = 24\text{ hrs}$ $B = \pi/12$



$\boxed{y = 20\cos(\pi/12(x-17)) + 85}$

$y = 20\cos(\pi/12(9-17)) + 85$

$\boxed{y = 75°F}$