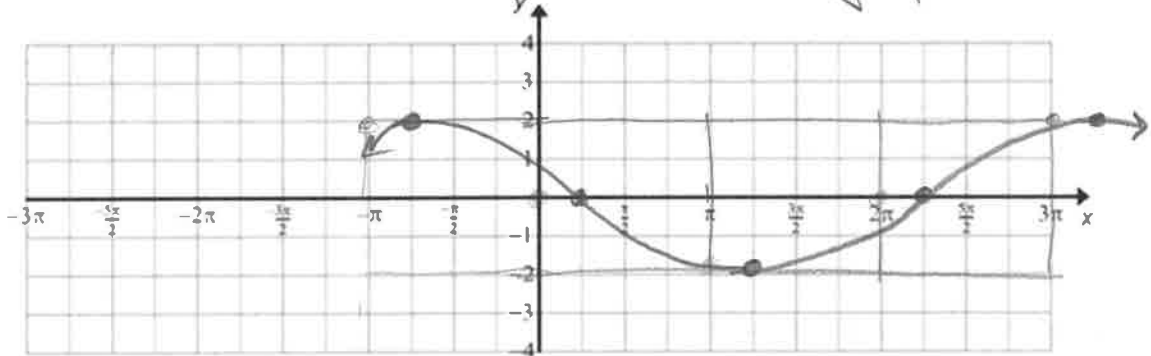


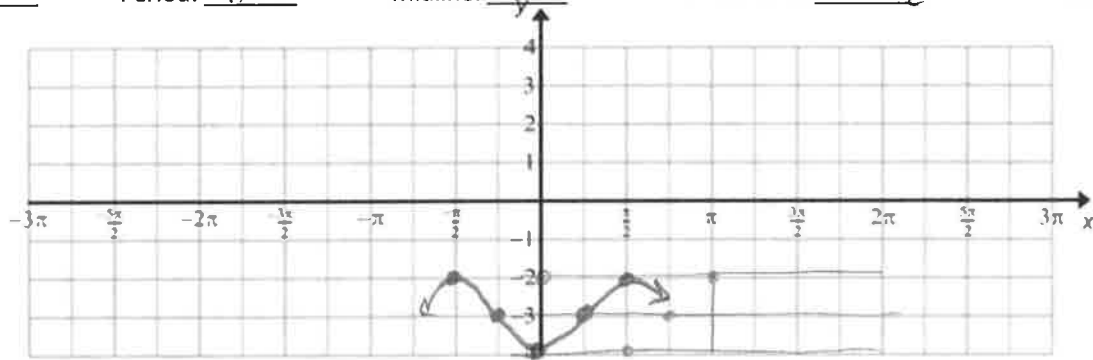
Objective 1: Graph Sine and Cosine Functions including phase shifts and model one as the other.

1. Graph each of the following trigonometric function. Identify each key feature and then write an equation in terms of the other trigonometric function.

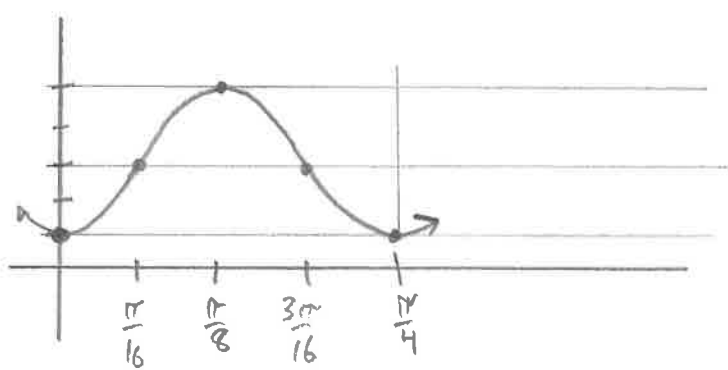
A.) $y = -2 \sin\left(\frac{1}{2}\left(x - \frac{\pi}{4}\right)\right)$ Cosine Equation: $y = 2 \cos\left(\frac{1}{2}\left(x + \frac{3\pi}{4}\right)\right)$
 Amplitude: 2 Period: 4π Midline: $y = 0$ Phase Shift: right $\frac{\pi}{4}$ Range: $[-2, 2]$



B.) $y = \cos(2x + \pi) - 3$ Sine Equation: $y = \sin\left(2\left(x - \frac{\pi}{4}\right)\right) - 3$
 Amplitude: 1 Period: π Midline: $y = -3$ Phase Shift: left $\frac{\pi}{2}$ Range: $[-4, -2]$



C.) $y = 3 - 2\cos(8(x))$ or $y = -2\cos(8x) + 3$ Sine Equation: $y = 2\sin\left(8\left(x - \frac{\pi}{16}\right)\right) + 3$
 Amplitude: 2 Period: $\frac{\pi}{4}$ Midline: $y = 3$ Phase Shift: none Range: $[1, 5]$
 (Create your own grid and label the x and the y-axis appropriately.)



Objective 2: Write equations of Sine and Cosine functions given a description or the graph.

2. Write an equation in terms of Sine to fit each of the following description.

A.) A graph that has a period of $\frac{\pi}{8}$, has been reflected over the x-axis and translated up 5 units.

Equation: $y = -\sin(16x) + 5$

$b = \frac{2\pi}{\frac{\pi}{8}} = 2\pi \cdot 8 = 16$

B.) A graph with an amplitude of 3 units, has a phase shift of 2 units and a period of 3 units.

Equation: $y = 3\sin(\frac{2\pi}{3}(x+2))$

$b = \frac{2\pi}{3}$

3. Write an equation in terms of Cosine to fit each of the following description.

A.) A graph that has been reflected over the x-axis and translated down 3 units and 4π units to the left.

Equation: $y = -\cos(x+4\pi) - 3$

B.) A graph with a period of $\frac{1}{2}$, an amplitude of 5.6 units and has been reflected over the y-axis.

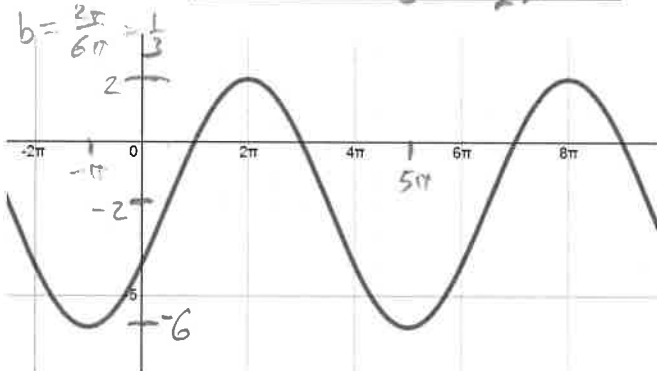
Equation: $y = -5.6\cos(4\pi x)$

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

4. Write a Sine and a Cosine equation for the following graphs.

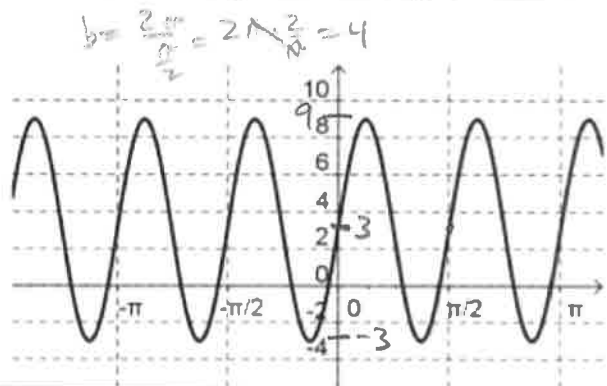
Cosine Equation: $y = 4\cos(\frac{1}{3}(x-2\pi)) - 2$

Sine Equation: $y = 4\sin(\frac{1}{3}(x-\frac{\pi}{2})) - 2$



Cosine Equation: $y = 6\cos(4(x-\frac{\pi}{8})) + 3$

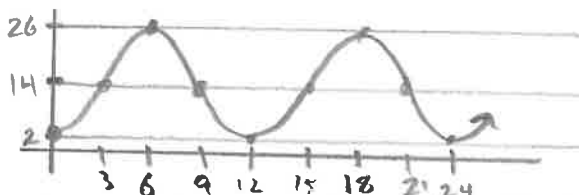
Sine Equation: $y = 6\sin(4x) + 3$



Objective 3: Use trigonometric functions to model real life problems.

5. A Ferris wheel has a radius of 12m and makes one complete revolution every 12 seconds. The bottom of the wheel is 2m above the ground. If a person gets on at the bottom and goes up, determine the following:

A.) Sketch the graph to model the motion of the ferris wheel (two revolutions).



B.) Write an equation to model the motion of the ferris wheel.

$y = -12\cos(\frac{\pi}{6}x) + 14$

C.) What high above the ground will you be when you are on the top?

26m