7-5
Day 2

Name: Completed Notes

PC
S2

Objective(s):

- Use trigonometric to model trigonometric functions to model real life situations.

Warm-up

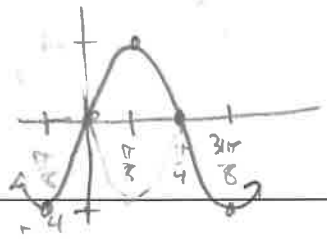
$4\left(x+\frac{\pi}{8}\right)$

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

A.) Identify the amplitude, period, reflections and shifts from the parent function.

- Amp = 4
- Period: $\frac{2\pi}{4} = \frac{\pi}{2}$
- Reflection over x-axis
- Shift left by $\frac{\pi}{8}$

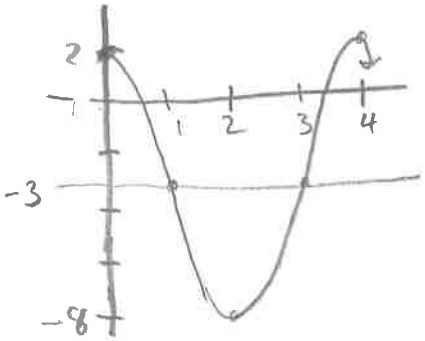
B.) Write a sine equation that would return the same values as the given function.



$y = 4\sin(4x)$

Trigonometric Modeling Continued:

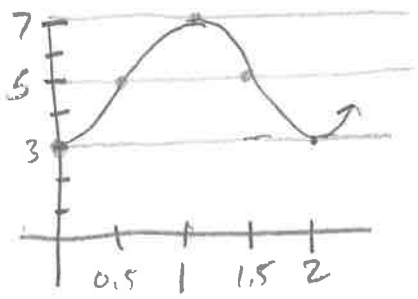
Ex 1: You spend your summers kayaking in the nearby lake. As an efficient "paddler", you notice every four seconds the tip of your paddle is lifted 2 inches above the water's surface. If the paddle reaches 8 inches below the surface at most, write an equation modeling the height of the paddle over time.



$y = 5\cos\left(\frac{\pi}{2}x\right) - 3$

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

Ex 2: Mr. Leverentz was jumping on his trampoline with his kids. It takes Mr. Leverentz 2 seconds to jump four feet above the trampoline and return back to its surface. If the surface of the trampoline is three feet above ground level, write a trigonometric function modeling Mr. Leverentz's jumping path over time.



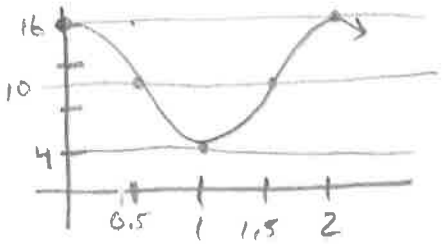
$y = -2\cos(\pi x) + 5$

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

Partner Practice:

1. During a workout, an athlete is timed to complete a full push-up in 2 seconds. When the athlete is in resting position, his body is leveled at 16 inches above the ground. When his body is in flexing position, he is leveled at 4 inches above the ground.

   A.) *Write a model for the height the athlete's body is above the ground over time.*



$y = 6\cos(\pi x) + 10$

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

   B.) *After 1 minute, what is the height of the athlete's body above the ground*

$y = 6\cos(\pi \cdot 1) + 10$

$y = 6(-1) + 10$

$y = -6 + 10 = 4$

4 inches above the ground

2. The longest day of the year occurs in June and has 14 hours of sunlight. The shortest day of the year occurs in December with only 8 hours of sunlight. If these two days occur within six months of each other:

   A.) *write an equation that models how many hours of sunlight occur over time.*

x = # of months since June

y = hours of sunlight

$y = 3\cos\left(\frac{\pi}{6}x\right) + 11$

$b = \frac{2\pi}{12} = \frac{\pi}{6}$

   B.) *What month(s) of the year would there be 11 hours of sunlight?*

September and March