Integrated Math 3 Name: _____
Unit 5: Graphing & Modeling Trig. Functions
5.7 Date: _____ Period: _____

Objective: To model trigonometric functions

The Situation: Mr. Shepherd is planning to take his girlfriend to Navy Pier in Chicago to propose at the top of the Ferris Wheel. While standing in line, he begins to thinking about trigonometry to calm his nerves and realizes the massive Ferris Wheel in front of him *actually* models a trigonometric function!

How is this possible?

The information presented at the ticket booth helps:

- The length of time it would take to ride the Ferris Wheel once is 8 minutes.
- The best view of Chicago (and the best location to propose!) is at the top of the Ferris Wheel, 200 feet above the ground.
- Everyone is expected to get off the Ferris Wheel once they reach the ground level.

Your task:

1. Determine how this information provides you with a model of trigonometric functions. Consider how to write a function that represents Mr. Shepherd's height as he rides the Ferris Wheel. What information do you need in order to write the trigonometric function? Be specific.

2. Write a function that represents the motion of the Ferris Wheel:

3. Sketch a graph representing the Ferris Wheel's motion

4. At what time(s) are they 100 feet above the ground? 150 feet? 200 feet?

Example 1: Mrs. DeMoya spends her summers kayaking in a nearby lake. As an efficient "paddler", she notices every four seconds the tip of her 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.

(A.) *How can we express the paddle's motion using a trigonometric function*? (B.) *After 16 seconds, where is the paddle's position in relation to the water's surface?*

Example 2: Mrs. Ecker was jumping on her trampoline with her kids. It takes Mrs. Ecker 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 Mrs. Ecker's jumping path over time.

(A.) *How can we express Mrs. Ecker's movements using a trigonometric function*? (B.) *After 20 seconds, where is Mrs. Ecker's position in relation to the trampoline?*