

**You must show work to obtain credit and provide explanations where requested.**

**Problem A**

Imagine sitting on a Ferris wheel as it is turning. We think of this motion as circular since our body follows the circular path of the Ferris wheel. However, we can also think of this motion as a combination of going up and down (vertical movement) and going back and forth (horizontal movement). Some of the most useful applications of the trigonometric functions lie in their ability to separate circular motion into its vertical and horizontal components.

Suppose a Ferris wheel with an 80 foot diameter makes one revolution (in a counterclockwise direction) every 24 seconds. The Ferris wheel is built so that the lowest seat on the wheel is 10 feet off the ground. The boarding platform for the Ferris wheel is located at a height such that it is exactly level with the center or hub of the Ferris wheel. You take a seat level with the hub as the ride begins.

1. What is your height above the platform after 3 seconds (round your answer to the nearest tenth)? How long does it take you to reach the highest point? Show/explain how you obtained your answers.
2. Do you rise more in the first 3 seconds or in the next 3 seconds? Explain your answer.
3. What is your height above or below the platform after 9 seconds? After 12 seconds? After 15 seconds? After 36 seconds?
4. Create a table to represent the relationship between time and height above or below the platform for one complete revolution of the Ferris wheel.
5. Create a graph that shows the height above or below the platform as a function of time for one complete revolution of the Ferris wheel.
6. Find a formula for height above/below the platform as a function of time that corresponds to the values in your table and goes through the points on your graph.

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