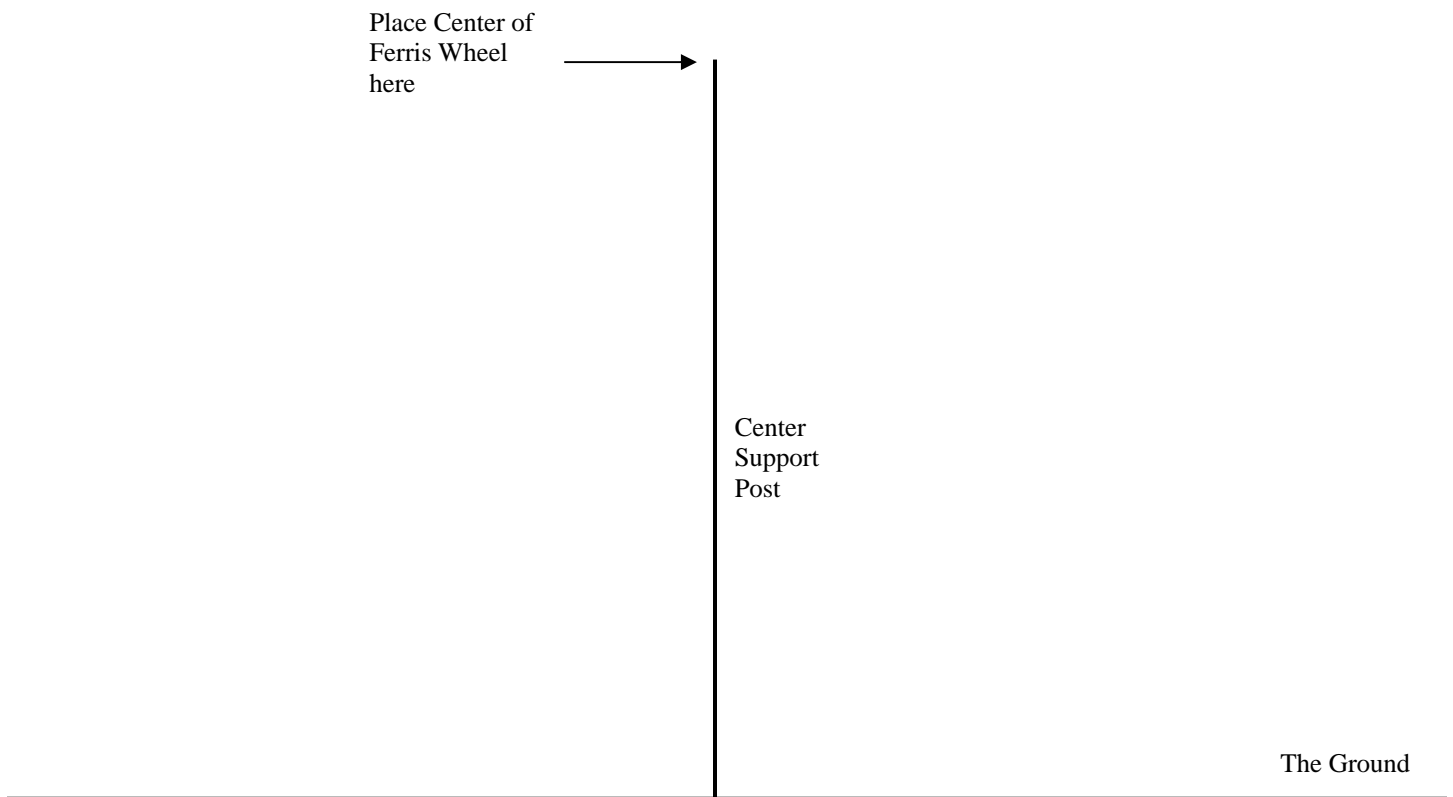


Ferris Wheel Trigonometry

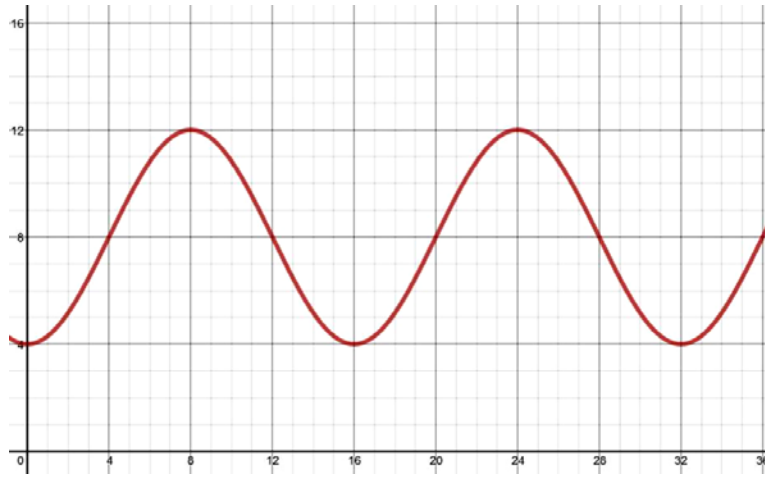


1. Cut out one of the circles. This is your Ferris Wheel. There is a car at the end of each radial segment.
2. Punch a small hole in the center of your Ferris Wheel. Fasten the center of the Ferris Wheel at the center mark on the support post above.
3. Place a sticky dot at the end of one of the radial segments to represent a Ferris Wheel car. Assume Passengers board from the lowest point. How high off the ground is a passenger the moment he/she boards the Ferris Wheel car? Measure with a ruler and use a scale of $1\text{ cm} = 1\text{ ft}$.
4. The angular speed of the car is 30 degrees per second. Rotates the car 30 degrees. Now what is the altitude of the passenger car?

5. Complete a table which gives the height (h) of the passenger as a function of time (t) in seconds.

6. How long does it take for the Ferris Wheel to complete a revolution?
7. On the graph paper, graph the height of the passenger as a function of time for three revolutions of the Ferris Wheel. Plot the points for each second and connect the points with a smooth curve.
8. What is the minimum height? The maximum height?
9. Approximately how many seconds after the ride starts is the passenger at a height of 8 feet for the first time?
10. At what value of t is the rider at a height of 8 feet for the second time?
11. List all of the values for t during the three revolutions that correspond to a height of 8 feet.
12. If the ride continued for two more revolutions, what would be the values for t that correspond to a height of 8 feet?
13. During the 99th revolution, what would be the two values for t that correspond to a height of 8 feet?
14. If you know the first time that a passenger is at a certain height, except the maximum and minimum height, how do you find the next one?
15. If you know the first time that a passenger is at a certain height, except the maximum and minimum height, how do you find the third one?
16. Compare your graph to the graphs of other students in your group. How does the radius of the Ferris Wheel affect the graph?

1. This graph gives the height of the passenger on a Ferris Wheel as a function of time.



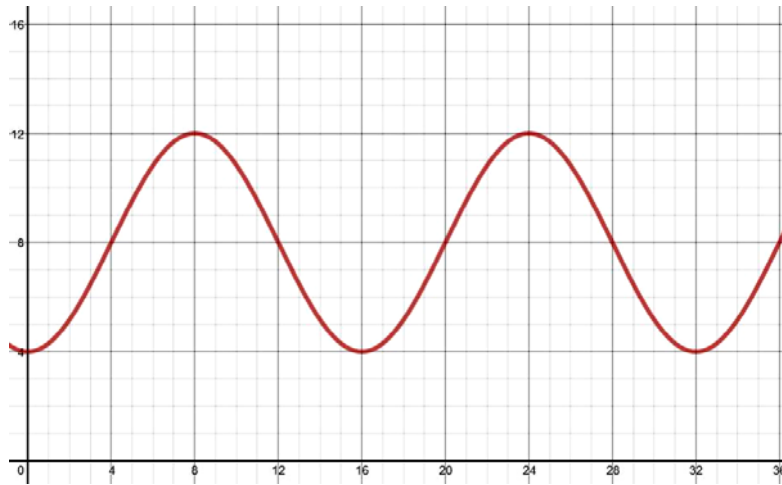
How tall is the post?

What is the radius of the Ferris Wheel?

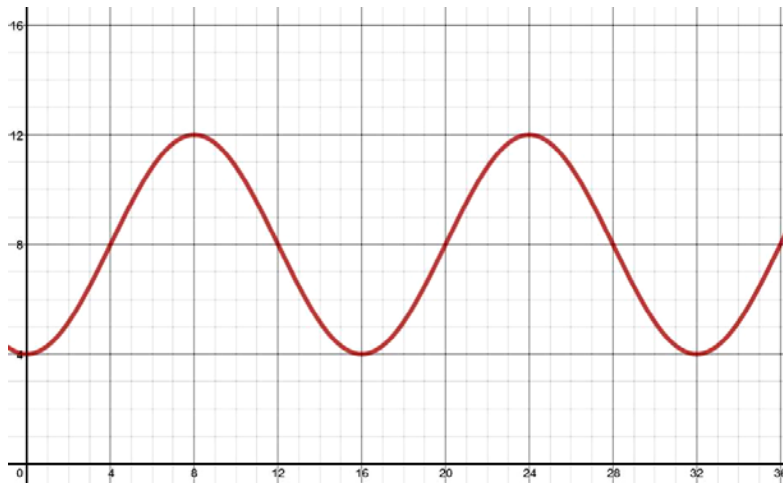
How fast, in degrees per second, is the wheel turning?

The next four problems ask you to think about how your graph would change if certain details about the Ferris Wheel were changed.

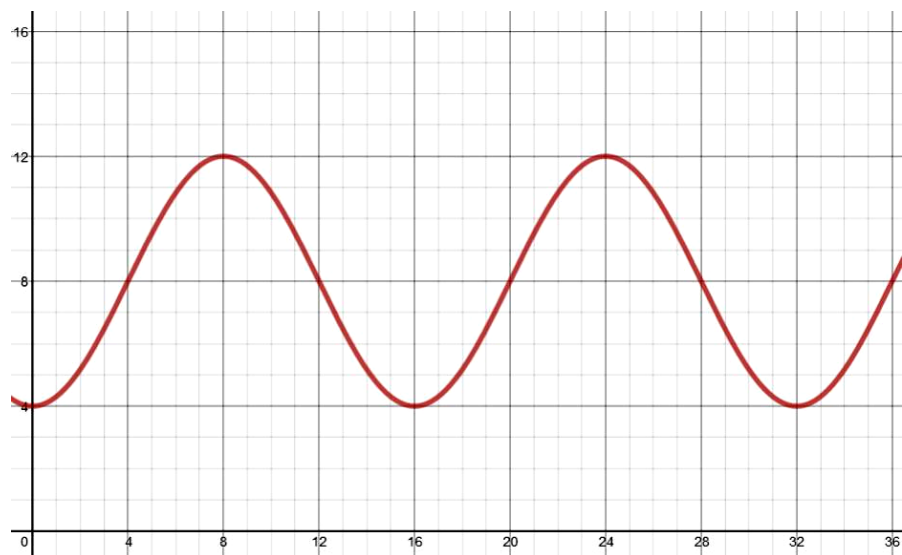
2. Sketch the graph of height of the passenger on a Ferris Wheel as a function of time, if the center post were three feet taller.



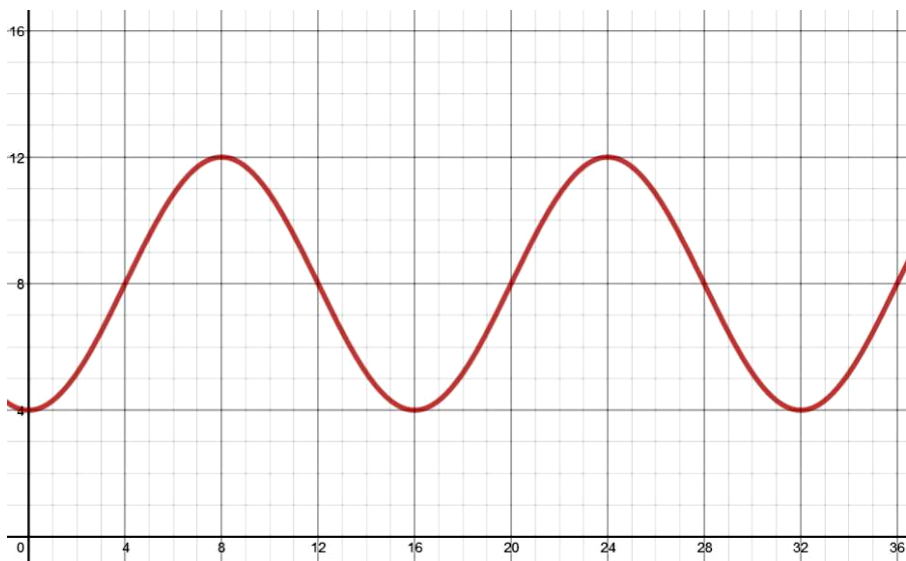
3. Sketch the graph of height of the passenger on a Ferris Wheel as a function of time, if the radius were three feet longer.



4. Sketch the graph of height of the passenger on a Ferris Wheel as a function of time, if the angular speed were doubled.



5. Sketch the graph of height of the passenger on a Ferris Wheel as a function of time who is in the car directly behind the passenger we already graphed.



6. Give the first 10 values for t (approximate to the nearest tenth of a second) that correspond to a height of 10 feet.

