Adv Alg 4

Name _____

Date_____Pd_____

FERRIS WHEELS

Assume that all ferris wheels rotate in the counterclockwise direction.

1. Megatron likes to ride the ferris wheel.   The ferris wheel has a 16 meter diameter and makes one complete revolution every minute.   The center of the ferris wheel is 10 meters above ground. Megatron's height above ground, with respect to time ("*t*" in minutes), can be modeled with a sinusoidal function. The ride starts at the very bottom of the ferris wheel. **Sketch** a picture**. Label the diagram with the information given in this problem. **Graph** Megatron's height above ground (on the y-axis) with respect to time (x-axis). Then, use the *guiding question* to help write an equation.

**Label your picture with t=0, 15, 30, 45, and 60 seconds and the corresponding heights.   These points are key points to use for graphing. Assume that at t=0 seconds, Megatron is at the very bottom of the ferris wheel.

GUIDING QUESTIONS:
a. How far above ground is the lowest point of the ferris wheel?

*b. If the **radius equals the amplitude**, then the amplitude = _____*

c. What is the midline/vertical shift? _____ (Remember midline/vertical shift of the graph is halfway between the maximum and minimum heights of the ferris wheel.)

d. What is the period (or how long to complete one revoluation)? _____   What is "b"? _____ (Remember: b = 2π/P, where P is the period).

e. Does your graph look like sine or cosine? Use y = a cos b(θ) + k or y = a sin b(θ) + k to write the equation of the graph that models the height of the ferris wheel with respect to time.

Equation: y = _____

2. The tallest ferris wheel in the world, the High Roller, was opened in March 2014 in Las Vegas, NV. It measures 520 feet in diameter. The ferris wheel makes one complete rotation in 30 minutes. At the highest point on the ferris wheel, the height above ground is 550 feet. The height of the ferris wheel, with respect to time, can be modeled with a sinusoidal function. If the ride starts at the 3 o'clock position, determine the equation of the height of the ferris wheel with respect to time. First, sketch a picture depicting height and time at the four key points**. Then, identify the amplitude, vertical shift/midline, and period.
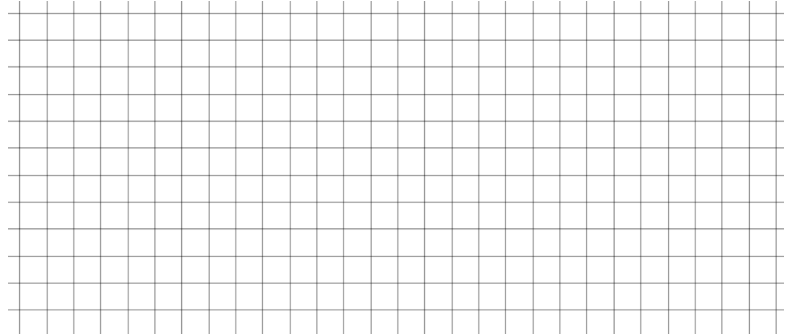
**Label your diagram with t=0, 7.5, 15, 22.5, and 30 minutes and the corresponding heights. These points are key points to use for graphing.

GUIDING QUESTIONS:
a. How far above ground is the lowest point of the ferris wheel?

b. If the radius equals the amplitude, then the amplitude = _____

c. What is the midline/vertical shift? _____ (Remember midline/vertical shift of the graph is halfway between the maximum and minimum heights of the ferris wheel.)

d. What is the period (or how long to complete one revoluation)? _____ What is "b"? _____ (Remember: b = 2π/P, where P is the period).

e. Does your graph look like sine or cosine? Use y = a cos b(θ) + k or y = a sin b(θ) + k to write the equation of the graph that models the height of the ferris wheel with respect to time.

Equation: y = _____

3.   Beyonce gets on a ferris wheel but the ride doesn't start until she is at the very top of the ferris wheel due to loading more passengers. The diameter of the ferris wheel is 200 feet, and sits 10 ft above ground. The ferris wheel makes a full revolution in 2 minutes. **Graph** and **write the equation** of the height of Beyonce on the ferris wheel with respect to time.
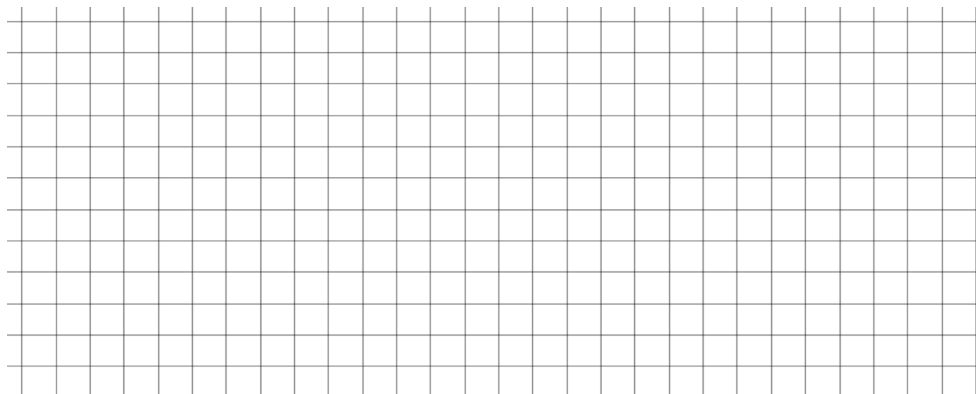
Equation: y = _____

4. After pimping out a ferris wheel, Xzibit decides to ride it. The ride doesn't start until he is at the 3 o'clock position of the ferris wheel due to loading more passengers.   The diameter of the ferris wheel is 120 feet, and sits 8 feet above ground. The ferris wheel makes 2 revolutions in a minute.   **Graph** and **write the equation** of the height of Xzibit on the ferris wheel with respect to time.

Equation: y = _____

5. After eating mama's spaghetti, Eminem thought it would be a brilliant idea to get on a ferris wheel that completes 3 revolutions in a minute. Knowing that Eminem had a full belly of mama's spaghetti, nobody else decided to ride the ferris wheel. So, as soon as Eminem got on, the ride started immediately.   The diameter of the ferris wheel is 50 feet, and sits 6 feet above ground. **Graph** and **write the equation** of the height of Eminem on the ferris wheel with respect to time.

Equation: y = _____