### 7.9 Giant Parthenon Wheel

## A Develop Understanding Task

1. Ignoring air resistance, the following graph shows how far an object - a bowling ball, basketball, anvil, etc. - will fall after $0,1,2$, and 3 seconds. Plot how far
 you expect an object would fall after 4 and 5 seconds.
Then, write an explicit equation to calculate the distance an object would fall after $t$


$$
\begin{aligned}
f(n) & =f(n-1) \\
a_{n} & =a_{n-1} \\
y & =(4 \times)^{2}
\end{aligned}
$$

2. Make a table of values to look at how this function is growing. Is the function growing in a similar manner to linear or to exponential functions? Justify your answer. Can you write a recursive equation to describe the function?
3. While sitting at the very top of the Giant Parthenon Wheel, Sam accidentally drops his sunglasses. The top of the Giant Parthenon Wheel is 115 feet abe ground. Model the height of his sunglasses from the ground over time as they fall. Use as many representations as possible (graph, table, equation).

4. If the Giant Parthenon Wheel makes one full turn in $60 \widehat{\text { seconds, will Sam make it to the }}$ bottom before his sunglasses do? Explain.
Bo second, to get down
5. Suppose Sam didn't drop his sunglasses. In fact, he was having an argument with his girlfriend who took his sunglasses and threw them downward with an initial rate of 5 feet per second. What effect(s) would this initial velocity have on the equation, table, and graph? How long will it take his sunglasses to hit the ground?

$$
h=-16 t^{2}-5 t+111
$$

6. Before the Tractor Pull at the Rand Grandstand, all of the tractors line up and parade in a straight line to meet the crowd. When a driver arrives to the center, he throws his hat straight up into the air hoping it will land on the head of the next tractor driver when he pulls into the center.
a. His hat is 8 feet from the ground when he throw it upwards with an initial velocity of 12 feet per second. Model the hat's height above ground with tables, equations, and

c. If it takes 3 seconds for the second tractor to pull to the center, will the hat make it onto the driver's head? Explain why or why not.
