**Activity 2.5.1a – Home Run Ball**

Fenway Park, the home ballpark of the Boston Red Sox, is one of the most famous and most recognized professional sports venues in the United States. Built in 1912, Fenway Park is revered for its history and for the generations of ball players that have played on its field. The ballpark is also known for its unique outfield wall, labeled the Green Monster, which stands 37-feet high and is an imposing structure for batters. The image below shows the dimensions of the park. The numbers in white represent the distance between home plate and the outfield wall.

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| Wall | Height |
| Left Field Wall | 37 feet |
| Center Field Wall | 17 feet |
| Bullpen Wall | 5 feet |
| Right Field Wall | 4 feet |

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The Green Monster, due to its immense height, has prevented many well-struck baseballs from becoming home runs. Your task is to model the flight of a home run ball at Fenway Park. The table above displays information about heights of the outfield falls at Fenway Park that you can use to construct your model.

1. What type of mathematical function bests models the flight (path) of a home run ball? Explain.
2. What information do you need to develop a function to model the flight of the ball? Explain.
3. We can use a quadratic function to model the flight of a ball. The following coordinate system and variables can be used.

 

In this system, *x* is the horizontal distance between the ball and home plate, and *y* is the height of the ball above ground. Create three ordered pairs $(x,y)$ that would fit on the path of a home run ball at Fenway Park. Use the information about Fenway Park that is provided on the previous page. Explain why you chose each point.

1. Create a quadratic function of the form $y=ax^{2}+bx+c$ that passes through the three points identified in Question 3. Explain how you obtained the quadratic function.
2. Create a graph of the function on the coordinate plane below.

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1. How well does your function model the flight of a home run ball? To address this question, solve the following problems.
2. What is the maximum height that the ball reaches?
3. What is the maximum distance the ball travels if its flight were not impeded?
4. What is the height of the ball when it clears (passes over) the outfield wall?
5. Explain why your model corresponds to a home run ball at Fenway Park.