4-3 Modeling with Quadratic Functions

Standards

A2.A.CED.A.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

A2.S.ID.B.2 Represent data on two quantitative variables on a scatter plot and describe how the variables are related. Fit a function to the data; use functions fitted to data to solve problems in the context of the data.

Examples

1. (I do) Consider the points (0, 0), (-1, -2), and (1, 6).
   a. Create a model for the points in standard form? Would a linear or quadratic model be appropriate for this situation? Explain.

   b. Compare both models. Verify the model that fits best by visual inspection of the graph.

2. (We do) A player throws a basketball toward the hoop. The basketball follows a parabolic path through the points (2, 10), (4, 12), and (10, 12).
   a. Apply a regression model to create a quadratic function to model this situation.

   b. Analyze the function. What would the solutions to the function represent in this situation?

3. (They do) The table shows a meteorologist's predicted temperatures for this particular day.
    a. What is a quadratic model for the data?

time	temperature
8 am	52
10 am	64
12 pm	72
2 pm	78
4 pm	81
6 pm	76

    b. Use your model to predict the high temperature for the day.

You do Practice 4-3: Complete your assignment on a separate sheet of paper. Show all work.

1. Find an equation in standard form of the parabola passing through the points.
a. (1, -3), (2, 0), (3, 9) b. (3, -1), (2, -5), (4, -5)

2. A player hits a tennis ball across the court and records the height of the ball at different times, as shown in the table below.

a. Find a quadratic model for the data.
b. Use the model to estimate the height of the ball at 4 seconds.
c. What is the ball's maximum height?

Time (s)	Height (ft)
0	5.5
1	6.0
2	5.5
3	4.0