

Exploring Graphs of Quadratic Functions

Not all functions are linear. The graphs of nonlinear functions have different shapes. One type of nonlinear function is a quadratic function. The graph of a quadratic function is a parabola. You use a data collection device to conduct an experiment and investigate quadratic functions.

SET UP the Lab

- Set up the data collection device to collect data every 0.2 second for 4 seconds.
- Connect the motion sensor to your data collection device. Position the motion detector on the floor pointed upward.



ACTIVITY

- Step 1** Have one group member hold a ball about 3 feet above the motion detector. Another group member will operate the data collection device.
- Step 2** When the person operating the data collection device says "go," he or she should press the start button to begin data collection. At the same time, the ball should be tossed straight upward.
- Step 3** Try to catch the ball at about the same height at which it was tossed. Stop collecting data when the ball is caught.

ANALYZE THE RESULTS

1. The domain contains values represented by the independent variable, time. The range contains values represented by the dependent variable, distance. Use the graphing calculator to graph the data.
2. Write a sentence that describes the shape of the graph. Is the graph linear? Explain.
3. Describe the position of the point on the graph that represents the starting position of the ball.
4. Use the TRACE feature of the calculator to find the maximum height of the ball. At what time was the maximum height achieved?
5. Repeat the experiment and toss the ball higher. Compare and contrast the new graph and the first graph.
6. Conduct an experiment in which the motion detector is held at a height of 4 feet and pointed downward at a dropped ball. How does the graph for this experiment compare to the other graphs?