

# Golf Ball Toss

## 121A – With Data

### Bringing Math Down to Earth

Materials needed: A golf ball of any color contrasting with the chalk or marker board

A yard or meter stick or tape measure

Six or seven volunteers from the class

Procedure: At one foot or 30 cm intervals draw eight to ten vertical lines extending from the eraser tray to the top of the chalk or marker board. Number the lines with their distances from the left most vertical line (which serves as the y-axis). Select a volunteer as catcher and station him/her at the far right of the board. Have each other volunteer select a line and stand facing it at close proximity to the board. Toss the ball to the catcher and between the board and the volunteers. Have each volunteer mark the height above the eraser tray at which the ball crosses his/her line. Have each volunteer measure and label the height to his/her mark. The procedure yields five or six ordered pairs whose coordinates will closely fit a parabola.

In a previous class we collected the following data:

(0, 23.5)      (30, 37.2)      (60, 35.8)      (90, 18.5)      (110, -1.5)

Using all but one of the ordered pairs, construct the least squares parabola (quadratic) for the trajectory of the ball. That is, let  $y$  be the height and  $x$  the horizontal distance from the y-axis, and produce the quadratic polynomial that predicts  $y$  from  $x$ . Use your calculator or computer. Then investigate these questions:

1. What does the function say the height of the ball was when it was 100 inches from the y-axis?

\_\_\_\_\_

2. At what value(s) of  $x$  does the function say the ball should have hit the eraser tray (or pass closely beside it)?

\_\_\_\_\_

3. At what distance(s) from the y-axis was the ball 28 inches above the eraser tray?

\_\_\_\_\_

4. At what distance from the y-axis was the ball at its highest point?

\_\_\_\_\_

5. What was the maximum height of the ball (measured, of course, from the eraser tray)?

\_\_\_\_\_

6. Pose one other question that can be answered with the function you produced: