Lesson 5-7
Quadratic Word Problems

1. Scarlett flies from New Braunfels Texas to Lima, Peru. At the start of her flight (time = 0), her elevation is 630 feet above sea level. The direct flight takes 8 hours (time = 8), and her elevation when she lands is 5030 feet above sea level. At time = 4 hours, she elevation was 6190 feet.
   a. Use the three points to find a quadratic equation for the path of Scarlett's flight.
   b. What is Scarlett's elevation at 2 hours?
   c. What is Scarlett's elevation at 7 hours?
   d. What is the highest elevation her flight reached **AND** at what time did they reach it?
   e. At what **times** was Scarlett's at an elevation of 6000 feet?

2. Lacen and Josiah are playing paintball. Lacen's location is at (-2, 50). Josiah's location is at (2, 250). Lacen shoots a paintball at Josiah and hits him. The paintball passed through the point (-1, 410).
   a. Use the three points to find a quadratic equation for the path of the paint ball.
   b. The second number of the coordinates is the height in feet. What is the height of the paintball when x = 2?
   c. What is the maximum height of the paintball **AND** at what time did it reach it?
   d. Paul is flying a drone at a constant height of 660 feet. Is it possible that Lacen's paintball could hit Paul's drone?

3. Grace is thinking about getting a car. She read an article online that said gas mileage depends on the speed that you drive. If you drive slowly, the car uses more gas because the engine isn't operating efficiently. If you drive very fast, the wind resistance reduces the gas mileage. Grace found out that at 20 miles per hour, the cost of driving a car is 66 cents per mile. At 30 miles per hour, it is 60 cents. At 70 miles per hour, the cost is 56 cents.
   a. Use the three points to find a quadratic equation the shows how the cost depends on the speed you drive.
   b. What is the cost when you drive 40 miles per hour?
   c. What speeds would you have to drive to make the cost equal 70 cents per mile?
   d. What is the lowest cost per mile? At what speed does this occur?

4. Peyton is helping her dad plant a new garden. He wants to make a rectangular garden with a sidewalk path all the way around the outside (See the picture below). The rectangle will be 30 feet by 50 feet. He hasn't figured out how wide to make the sidewalk just yet. Let the width of the sidewalk equal x.
   a. The length of the planting area is 50 – 2x. The width of the planting area is 30 – 2x. To find the area of a rectangle, you multiply length times width. Multiply these two expressions to find an equation for the planting area.
   b. How big will the planting area be if the sidewalk is 3 feet wide?
   c. If Mr. Callas wants to have a planting area of exactly 800 square feet, how wide should his sidewalks be?
   d. If he wants to have an equal area for the sidewalks and the planting area, how wide should the sidewalks be?