Section 8.2
Quadratic Equations and Their Applications

> **In class work**: Solve each problem.

1. When Maria serves in volleyball, the ball leaves her hand with an upward velocity of 20 feet per second. The height "h" of the volleyball above the ground after "t" seconds is given by: $h = -16t^2 + 20t + 5$.
a) If nobody hits the ball, how long will it take the ball to hit the ground?   (A:1.46 sec)
b) If nobody hits the ball, how long will it take the ball to reach its initial height again?   (A: 5/4 sec)

2. A box with no top is to be made from a rectangular piece of cardboard in which the length of the cardboard is three times the width of the cardboard. The box will be made by cutting 2 inch squares from each corner and holding up the sides.
a) Find a formula for the volume "V" in terms of the width "x" of the cardboard.
b) If the volume of the box is 1222 cubic inches, find the dimensions of the cardboard.   (A: 17 in by 51 in)

3. Hortense is investing $2600 in an account where interest is calculated according to the formula $A = P(1+r)^t$ where P is the original principal, r is the interest rate and t is the time measured in years. If Hortense wants her money to grow to double in two years, what interest rate must the account have? (Approximate the answer to the nearest hundredth of a percent)   (A: 41.42%)

4. The owners of a day-care center plan to enclose a divided play area against the back wall of their building. They have 300 feet of picket fence and would like the total area of the playground to be 6000 square feet. Can they enclose the playground with the fence they have, and if so what should the dimensions of the playground be?   (A: 72.35 ft by 82.95 ft or 27.65 ft by 217.05 ft)

5. A piece of wire is 8 inches long. The wire is cut into two pieces and then each piece is bent into a square. Find the length of each piece if the sum of the areas of these squares is to be 2 square inches.   (A: 4 in by 4 in)

6. Working together, two people can mow a large lawn in 4 hours. One person can do the job alone 1 hour faster than the other person. How long does it take each person working alone to mow the lawn? Round to the nearest tenth of an hour.   (7.5 hr and 8.5 hr)

7. Earl borrowed $5500 from his uncle for 2 years with interest compounded annually according to the formula $A = p(1+r)^t$ where "p" is the original principal, "r" is the interest rate and "t" is the time measured in years. At the end of 2 years he owed his uncle $6474.74. What was the interest rate on the loan?   (A: 8.5%)

8. The base of an isosceles triangle is one inch shorter than the equal sides, and the altitude of the triangle is two inches shorter than the equal sides. What is the length of the equal sides?   (A: 17 in)