

1. Let $f(x) = x^2 - 6x + 1$

- Evaluate $f(3)$.
- For what values of x does $f(x) = 1$?
- For what values of x does $f(x) = f(1)$?

2. Solve each of the following equations by completing the square. In some of the equations the square is already completed. Which equations are these? If there is no real solution, say so.

- $x^2 = 1 + 6x$
- $x^2 + 3x = 5$
- $3x^2 = 4x + 5$
- $(x - 3)^2 + 5 = 41$
- $(x - 3)^2 + 2x = 41$
- $(x - 3)^2 + 1 = 6$
- $2(3x - 17)^2 - 1 = 71$
- $5 - (x - 3)^2 = 2$
- $(x - 3)^2 - 5 = 2$

3. A rectangle is twice as long as it is wide. The area of the rectangle is 30 square feet. Find the dimensions of the rectangle to the nearest hundredth. Check your answer.

4. A rectangular floor is 5 feet longer than it is wide. Its area is 80 square feet. First estimate the dimensions of the floor and then find the dimensions to the nearest hundredth. Check your answer.

5. A ball is thrown straight up from a cliff with an initial speed of 80 ft/sec. The height of the ball (in feet) above the ground after t seconds is given by the function

$$h(t) = -16t^2 + 80t + 44.$$

- Find the height of the cliff.
- Find the height of the ball two seconds after being released.
- When is the ball at the same height as it is one second after being released?
- Find all times when the ball is 128 feet above the ground.
- When is the ball 50 feet high?
- Find the height of the ball one second before it hits the ground.
- * Find a one-second time interval during which the ball falls 20 feet.

6. An object dropped from rest near the surface of the earth falls $16t^2$ feet in t seconds. The speed of sound in air is approximately 1100 ft/sec.

- You drop a rock into a 400 foot well. How long after dropping the rock do you hear it hit the water?
- You hear a rock hit the water 6 seconds after you drop it into a well. How deep is the well?

7. At the same time you throw a cantaloupe straight up, your friend drops a watermelon from the top of a 400 foot cliff. The height of the cantaloupe (in feet) above the ground t seconds after being released is given by the function

$$f(t) = -16t^2 + 96t + 3,$$

and the height of the watermelon (in feet) above the ground t seconds after being dropped is given by the function

$$g(t) = 400 - 16t^2$$

- Find the height of the cantaloupe when the watermelon hits the ground.
- How high are the fruits when they are at the same height?
- When is the watermelon 13 feet above the cantaloupe?
- How far is the watermelon above the cantaloupe one second before the watermelon is 13 feet above the cantaloupe?