Unit 8, Lesson 17

Quadratic Meanings

Let's explore the meaning of quadratics.

17.1 Does It Make Sense?

1. What are the solutions to the equation $f(x) = -16x^2 + 48x + 64$? Explain or show your reasoning.

2. Do both solutions make sense if x represents time since an object is thrown and $f(x)$ represents the height of the object? Explain your reasoning.

17.2 Getting the Ball Off the Roof

A ball is kicked off the roof of a building. Its height above the ground, given in feet, t seconds after it is kicked, is represented by the equation $h(t) = -16t^2 + 33t + 37$.

1. At what height is the ball when it is kicked? Explain or show your reasoning.

2. At what height is the ball 2 seconds after it is kicked? Explain or show your reasoning.

3. What does it mean for the situation when $h(t) = 8$?

4. What does it mean for the situation when $t = 1.3$?

5. Graph the function.

   a. Approximate the number of seconds after the ball is kicked when it will hit the ground. Explain how you know.

   b. Approximate the number of seconds after the ball is kicked when it will reach its highest point. Explain how you know.

   c. Approximate the number of seconds after the ball is kicked when it will reach its starting height again. Explain how you know.

6. Write an equation that represents the exact moment when the ball hits the ground.

17.3 Kicking the Field Goal

Andre kicks a football for a field goal. The height above ground, given in feet, t seconds after it is kicked, is represented by the equation $g(t) = -16t^2 + 56t + 0.5$.

1. At what height is the ball when it is kicked? Explain or show your reasoning.

2. At what height is the ball 2 seconds after it is kicked? Explain or show your reasoning.

3. What does it mean for the situation when $g(t) = 10$?

4. What does it mean for the situation when $t = 1.7$?

5. Graph the function.
   a. Approximate the number of seconds after the ball is kicked when it will hit the ground. Explain how you know.

b. Approximate the number of seconds after the ball is kicked when it will reach its highest point. Explain how you know.

c. Approximate the number of seconds after the ball is kicked when it will be 10 feet above the ground for the second time. Explain how you know.

6. Write an equation that would give the exact time when the ball is 10 feet above the ground.