

# Assignment

## Write

How can you determine the types of solutions when using the Quadratic Formula?

## Remember

The Quadratic Formula,  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ , can be used to calculate the solutions to any quadratic equation of the form  $ax^2 + bx + c = 0$ , where  $a$ ,  $b$ , and  $c$  represent real numbers and  $a \neq 0$ .

On the graph of a quadratic function,  $\pm \sqrt{b^2 - \frac{4ac}{2a}}$  is the distance from  $(-\frac{b}{2a}, 0)$  to each root.

## Practice

The formula shown can be used to calculate the distance,  $s$ , an object travels in  $t$  seconds. In this formula,  $u$  represents the initial velocity, and  $a$  represents a constant acceleration. Use this formula to answer each question.

$$s = ut + \frac{1}{2}at^2$$

- Kian is driving 48 miles per hour and is starting to merge onto the highway; therefore, he must increase his speed. He gradually accelerates at a rate of 7 miles per hour for several seconds.
  - Substitute the initial velocity and constant acceleration into the formula to write an equation to represent the distance Kian travels.
  - Use the Quadratic Formula to determine the roots of the equation. What do the roots represent in the context of the problem situation? Explain your reasoning.
- Sonja is driving her car 32 miles per hour when she passes Dominique's house. She then accelerates at a rate of 3 miles per hour for several minutes until she passes the movie theater. Sonja knows that the movie theater is 2.9 miles from Dominique's house.
  - Substitute the initial velocity, constant acceleration, and distance into the formula to write an equation represent the distance Sonja travels.
  - Use the Quadratic Formula to determine the roots of the equation you wrote in part (a). What do the roots represent in the context of the problem situation? Explain your reasoning.
- Use the discriminant to determine the number of real roots for each equation. Then solve the quadratic equations with real roots.
  - $4x^2 + 8x - 12 = 0$
  - $x^2 + 2x - 10 = 0$
  - $9x^2 - 12x + 4 = 0$
  - $3x^2 - 4 = 0$
  - $3x^2 + 2x - 2 = 0$
  - $x^2 - 3x + 5 = 0$

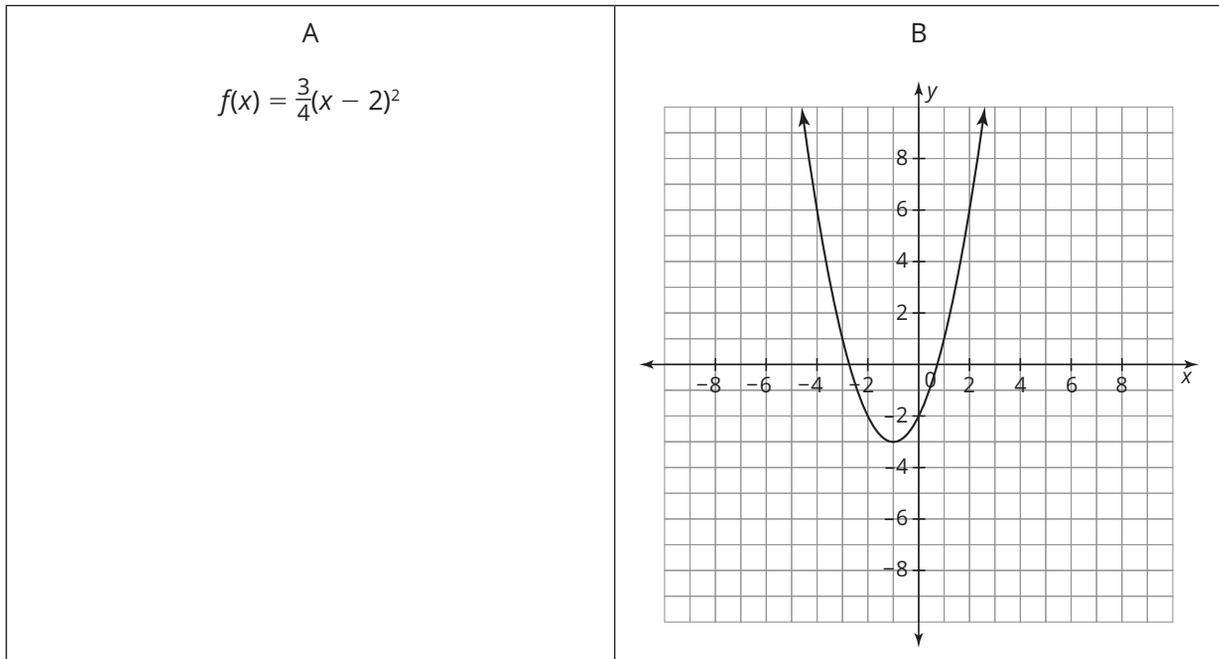
## Stretch

Consider the function  $f(x) = -2x^2 + bx - 5$ . Determine the  $b$ -value(s) that would ensure the function has two real roots. Explain your reasoning.

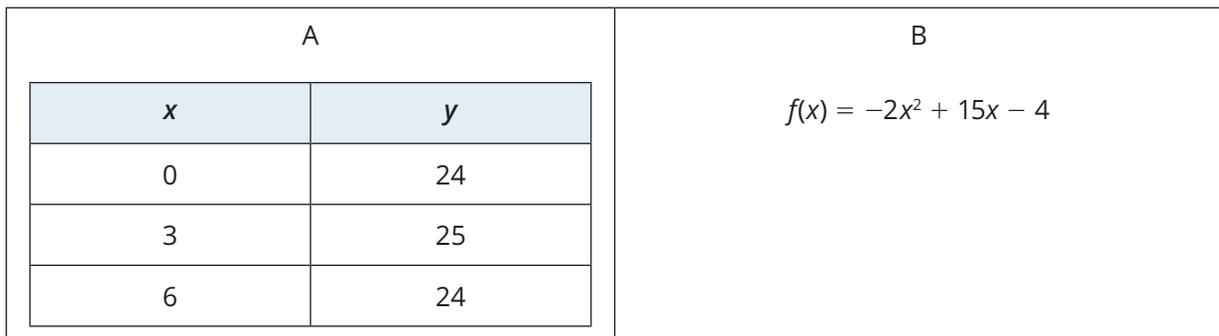
## Review

1. Analyze each pair of representations. Then, answer each question and justify your reasoning.

a. Which function has a greater y-intercept?



b. Which function has a greater absolute maximum?



2. Complete the square to determine the roots of each equation. Show your work.

a.  $y = 2x^2 + 5x - 14$

b.  $y = -3x^2 - 6x + 10$

3. Consider the function  $f(x) = (x + \frac{1}{2})(x - \frac{3}{4})$ .

a. Identify the form of the function as factored, general, or vertex.

b. Identify the zeros and axis of symmetry of the function.