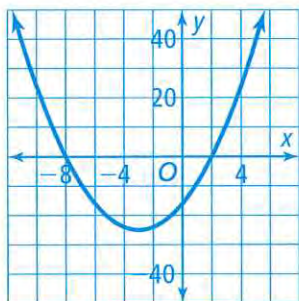


**CRITIQUE & EXPLAIN**

Corey wrote an equation in factored form,  $y = (x + 8)(x - 2)$ , to represent a quadratic function. Kimberly wrote the equation  $y = x^2 + 6x - 16$ , and Joshua wrote the equation  $y = (x + 3)^2 - 25$ .

- A. **Reason** Do all three equations represent the same function? If not, whose is different? Explain algebraically.



- B. How else could you determine if all three equations represent the same function?
- C. What information can Corey's form help you find that is more difficult to find using Kimberly's or Joshua's form?

**HABITS OF MIND**

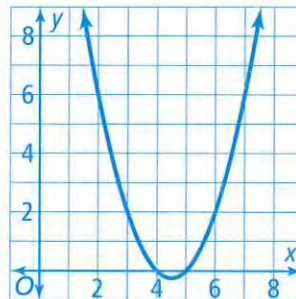
**Use Structure** Whose form of the equation is most useful for finding the vertex? The y-intercept? The x-intercepts? © MP.7

**EXAMPLE 1** Try It! Factor a Quadratic Expression

1. Factor the expression.

a.  $x^2 - 9$

b.  $3x^2 - 7x + 2$

**EXAMPLE 2** Try It! Relate Factors to Zeros of a Function2. The graph shows the function  $y = x^2 - 9x + 20$ . Identify the zeros of the function. How do the zeros relate to the factors of  $x^2 - 9x + 20$ ?**EXAMPLE 3** Try It! Solve Quadratic Equations by Factoring

3. Solve the equation by factoring.

a.  $x^2 + 8x = 20$

b.  $2x^2 = 3x + 2$

**HABITS OF MIND**

**Error Analysis** Anna solved the equation  $x^2 + 8x - 20 = 0$  by factoring. She wrote  $(x - 10)(x + 2) = 0$  and expected the  $x$ -intercepts of the function  $y = x^2 + 8x - 20$  to be at  $-10$  and  $2$ . Was she right? © MP.3

**EXAMPLE 4** **Try It! Find the Zeros of a Quadratic Function**

4. A baseball is thrown from the upper deck of a stadium, 108 ft above the ground. The function  $h(t) = -16t^2 + 32t + 128$  gives the height of the ball  $t$  seconds after it is thrown. How long will it take the ball to reach the ground?

**EXAMPLE 5** **Try It! Determine Positive or Negative Intervals**

5. Identify the interval(s) on which the function  $y = x^2 - 4x - 21$  is negative.

**HABITS OF MIND**

**Construct Arguments** Is it always true that the  $y$ -values of a quadratic function have opposite signs on either side of a zero of the function? Explain why or give a counterexample. © MP.3

**EXAMPLE 6** **Try It! Write the Equation of a Parabola in Factored Form**

6. Write an equation of a parabola with  $x$ -intercepts at  $(3, 0)$  and  $(-3, 0)$  and which passes through the point  $(1, 2)$ .

**HABITS OF MIND**

**Model With Mathematics** Is there any other parabola with  $x$ -intercepts at  $(-2, 0)$  and  $(-1, 0)$ ? Give an equation or explain why there is no such parabola. © MP.4





## Do You UNDERSTAND?

1. **ESSENTIAL QUESTION** How is the factored form helpful in solving quadratic equations?

2. **Error Analysis** Amir says the graph of  $y = x^2 + 16$  has  $-4$  as a zero. Is Amir correct? Explain. © MP3

3. **Vocabulary** How does the factored form of a quadratic equation relate to the Zero Product Property? © MP7

4. **Generalize** How does knowing the zeros of a function help determine where a function is positive? © MP8

## Do You KNOW HOW?

Factor each expression.

5.  $x^2 - 5x - 24$

6.  $5x^2 + 3x - 2$

Solve each equation.

7.  $x^2 = 12x - 20$

8.  $4x^2 - 5x = 6$

9. The height, in feet, of a t-shirt launched from a t-shirt cannon high in the stands at a football stadium is given by  $h(x) = -16x^2 + 64x + 80$ , where  $x$  is the time in seconds after the t-shirt is launched. How long will it take before the t-shirt reaches the ground?

