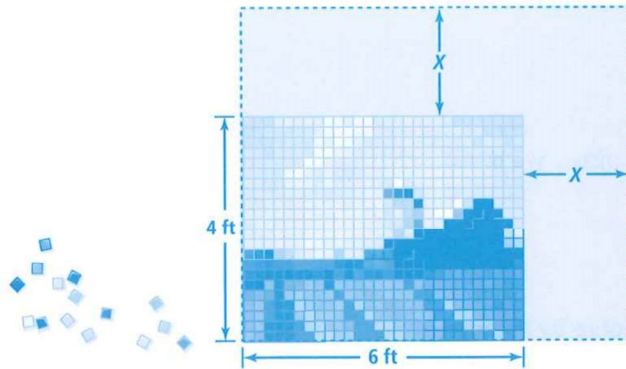




Activity

MODEL & DISCUSS

An artist has started a mosaic tile design on a wall. She needs to cover the entire wall.



A. Write expressions to represent the length of the wall and width of the wall.

B. **Use Structure** What expression represents the area of the entire wall? Explain. © MP.7

C. How can you determine the area of the part of the wall that the artist has not yet covered?

HABITS OF MIND

Make Sense and Persevere How might factoring help you solve a quadratic equation? Explain. © MP.1

9-2

Solving Quadratic Equations by Factoring

PearsonRealize.com

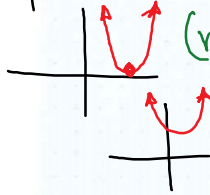
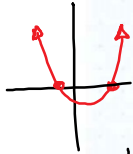
Zero product ~~product~~ factors

If $A \cdot B = 0$
then $A = 0$ or $B = 0$

Notes

Assess

$ax^2 + bx + c = 0$
() () = 0



Setting $y=0$:
Finding x -intercepts
(roots/zeros/solutions)

EXAMPLE 1

Try It! Use the Zero-Product Property

1. Solve each equation.

a. $(2x - 1)(x + 3) = 0$

$2x - 1 = 0$ or $x + 3 = 0$

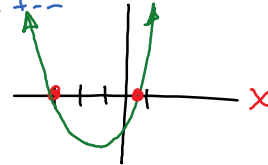
$\frac{2x}{2} = \frac{1}{2}$ or $\frac{-3}{-3} = \frac{-3}{-3}$

$x = \frac{1}{2}$ or $x = -3$

$2x + 3 = 0$ or $3x - 1 = 0$

$\frac{2x}{2} = \frac{-3}{2}$ or $\frac{3x}{3} = \frac{1}{3}$

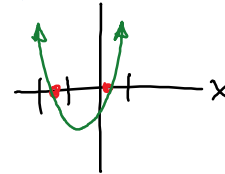
$x = -\frac{3}{2}$ or $x = \frac{1}{3}$



$2x + 3 = 0$ or $3x - 1 = 0$

$\frac{2x}{2} = \frac{-3}{2}$ or $\frac{3x}{3} = \frac{1}{3}$

$x = -\frac{3}{2}$ or $x = \frac{1}{3}$



EXAMPLE 2

Try It! Solve by Factoring

2. Solve each equation by factoring.

a. $x^2 + 16x + 64 = 0$

$(x + 8)(x + 8) = 0$

$x + 8 = 0$ double root

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$

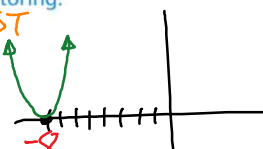
$x = -8$

$x = -8$

$x = -8$

$x = -8$

$x = -8$



$1, 64$
 $2, 32$
 $4, 16$
 $8, 8$

b. $x^2 - 12x + 64 = 0$

$x^2 - 12x + 64 = 0$

$(x + 4)(x - 16) = 0$

$x + 4 = 0$ or $x - 16 = 0$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

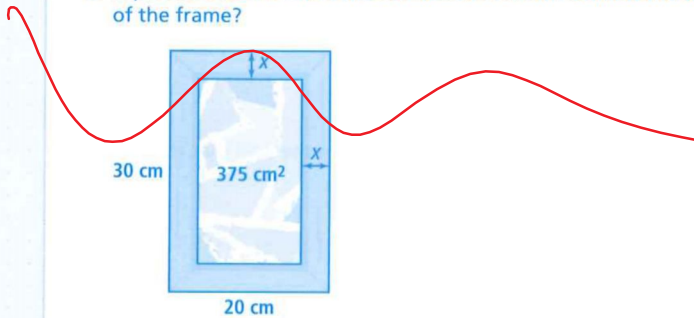
$x = -4$ or $x = 16$

$x = -4$ or $x = 16$

EXAMPLE 3

Try It! Use Factoring to Solve a Real-World Problem

3. A picture inside a frame has an area of 375 cm^2 . What is the width of the frame?

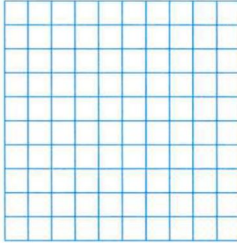


HABITS OF MIND

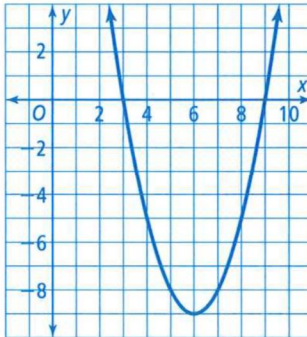
Reason Why is there only one solution to a quadratic equation in the form $x^2 + 2ax + a^2 = 0$? © MP.2

EXAMPLE 4  **Try It!** Use Factored Form to Graph a Quadratic Function

4. Use factoring to graph the function $f(x) = 2x^2 + 5x - 3$.

**EXAMPLE 5**  **Try It!** Write the Factored Form of a Quadratic Function

5. What is the factored form of the function?

**HABITS OF MIND**

Communicate Precisely How do the factors of a function relate to the graph of the function? Explain. © MP.6

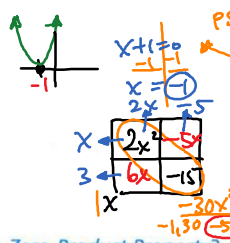
Do You UNDERSTAND?

1. **ESSENTIAL QUESTION** How does factoring help you solve quadratic equations?

2. **Use Structure** Compare the solutions of $2x^2 + 5x - 7 = 0$ and $4x^2 + 10x - 14 = 0$. What do you notice? Explain. **MP.7**

3. **Vocabulary** What is the Zero-Product Property? When can you use it to solve a quadratic equation? Explain.

4. **Generalize** If a perfect-square trinomial has a value of 0, how many solutions does the equation have? Explain. **MP.8**



Do You KNOW HOW?

Solve each equation.

5. $(x - 10)(x + 20) = 0$
 $x - 10 = 0$ or $x + 20 = 0$
 $x = 10$ or $x = -20$

6. $(3x + 4)(x - 4) = 0$
 $3x + 4 = 0$ or $x - 4 = 0$
 $3x = -4$ or $x = 4$
 $x = -\frac{4}{3}$ or $x = 4$

7. Factor and solve each equation
 $x^2 + 18x + 32 = 0$
 $(x + 2)(x + 16) = 0$
 $x + 2 = 0$ or $x + 16 = 0$
 $x = -2$ or $x = -16$

8. $x^2 - 4x - 21 = 0$
 $(x - 7)(x + 3) = 0$
 $x - 7 = 0$ or $x + 3 = 0$
 $x = 7$ or $x = -3$

Solve each equation.

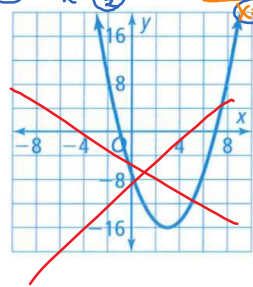
9. $x^2 + 2x = -1$
 $x^2 + 2x + 1 = 0$
 $(x + 1)(x + 1) = 0$
 $x + 1 = 0$
 $x = -1$

11. $2x^2 + x = 15$
 $2x^2 + x - 15 = 0$
 $(x + 3)(2x - 5) = 0$
 $x + 3 = 0$ or $2x - 5 = 0$
 $x = -3$ or $x = \frac{5}{2}$

13. Write the factored form of the quadratic.
 $x^2 - 3x - 18 = 0$
 $(x - 6)(x + 3) = 0$
 $x - 6 = 0$ or $x + 3 = 0$
 $x = 6$ or $x = -3$

10. $x^2 - 8x = 9$
 $x^2 - 8x - 9 = 0$
 $(x - 9)(x + 1) = 0$
 $x - 9 = 0$ or $x + 1 = 0$
 $x = 9$ or $x = -1$

12. $5x^2 - 19x = -18$
 $5x^2 - 19x + 18 = 0$
 $(x - 2)(5x - 9) = 0$
 $x - 2 = 0$ or $5x - 9 = 0$
 $x = 2$ or $x = \frac{9}{5}$



14. Factor the equation $x^2 - 6x + 5 = 0$. Find the coordinates of the vertex of the related function and graph the equation $x^2 - 6x + 5$.

