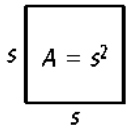
# 8-7 Reteaching

## Factoring Special Cases

The area of a square is given by $A = s^2$, where s is a side length. When the side length is a binomial, the area can be written as a perfect-square trinomial. If you are given the area of such a square, you can use factoring to write an expression for a side length.




**Problem**

A mosaic is made of small square tiles called tesserae. Suppose the area of one tessera is $9x^2 + 12x + 4$. What is the length of one side of a tessera?

Because the tile is a square, you know the side lengths must be equal. Therefore, the binomial factors of the trinomial must be equal.

| | |
|---|---|
| $x^2 + 12x + 4 = (\square\ \square\ \square)^2$ | This is a perfect square trinomial and can be factored as the square of a binomial. |
| $9x^2 = (3x)^2$ | $9x^2$ and 4 are perfect squares. Write them as squares. |
| $4 = 2^2$ | |
| $2(3x)(2) = 12x$ | Check that $12x$ is twice the product of the first and last terms. It is, so you are sure that you have a perfect-square trinomial. |
| $9x^2 + 12x + 4 = (3x + 2)^2$ | Rewrite the equation as the square of a binomial. |

Multiply to check your answer.

$(3x + 2)(3x + 2) = 9x^2 + 6x + 6x + 4 = 9x^2 + 12x + 4$✓

The length of one side of the square is $3x + 2$.

## Exercises

**Factor each expression to find the side length.**

1. The area of a square oil painting is $4x^2 + 28x + 49$. What is the length of one side of the painting?

2. You are installing linoleum squares in your kitchen. The area of each linoleum square is $16x^2 – 24x + 9$. What is the length of one side of a linoleum square?

3. You are building a table with a circular top. The area of the tabletop is $(25x^2 – 40x + 16)\pi$. What is the radius of the tabletop?

4. A fabric designer is making a checked pattern. Each square in the pattern has an area of $x^2 – 16x + 64$. What is the length of one side of a check?

**Problem**

What is the factored form of $4x^2 - 9$?

$4x^2 - 9 = (\square + \square)(\square - \square)$

Both $4x^2$ and 9 are perfect squares. You know the signs of the factors will be opposite, so the $x$-terms will cancel out.

$\sqrt{4x^2} = 2x$

$\sqrt{9} = 3$

Find the square root of each term.

$(2x + 3)(2x - 3)$

Write each term as a binomial with opposite signs, so the $x$-terms will cancel out.

Multiply to check your answer.

$$(2x + 3)(2x - 3) = 4x^2 + 6x - 6x - 9$$
$$= 4x^2 - 9 \checkmark$$

The factored form of $4x^2 - 9$ is $(2x + 3)(2x - 3)$.

## Exercises

**Factor each expression.**

**5.** $9x^2 - 4$

**6.** $25x^2 - 49$

**7.** $144x^2 - 1$

**8.** $64x^2 - 25$

**9.** $49x^2 - 16$

**10.** $36x^2 - 49$

**11.** $81x^2 - 16$

**12.** $16x^2 - 121$

**13.** $25x^2 - 144$

**14.** $16x^2 - 9$

**15.** $x^2 - 81$

**16.** $4x^2 - 49$