9.3 Find Special Products of Polynomials

Before	You multiplied polynomials.
Now	You will use special product patterns to multiply polynomials.
Why?	So you can make a scientific prediction, as in Example 4.

Key Vocabulary
- **binomial,** *p. 555*
- **trinomial,** *p. 555*

The diagram shows a square with a side length of $(a + b)$ units. You can see that the area of the square is

$$(a + b)^2 = a^2 + 2ab + b^2.$$

This is one version of a pattern called the square of a binomial. To find another version of this pattern, use algebra: replace b with $-b$.
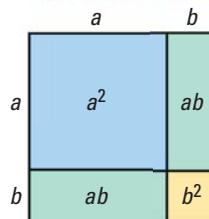
$$(a + (-b))^2 = a^2 + 2a(-b) + (-b)^2 \quad \text{**Replace b with $-b$ in the pattern above.**}$$

$$(a - b)^2 = a^2 - 2ab + b^2 \quad \text{**Simplify.**}$$

KEY CONCEPT
For Your Notebook

Square of a Binomial Pattern

Algebra

$$(a + b)^2 = a^2 + 2ab + b^2$$

$$(a - b)^2 = a^2 - 2ab + b^2$$

Example

$$(x + 5)^2 = x^2 + 10x + 25$$

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

EXAMPLE 1 Use the square of a binomial pattern

USE PATTERNS

When you use special product patterns, remember that a and b can be numbers, variables, or variable expressions.

Find the product.

a. $(3x + 4)^2 = (3x)^2 + 2(3x)(4) + 4^2$ **Square of a binomial pattern**

$\qquad\qquad = 9x^2 + 24x + 16$ **Simplify.**

b. $(5x - 2y)^2 = (5x)^2 - 2(5x)(2y) + (2y)^2$ **Square of a binomial pattern**

$\qquad\qquad = 25x^2 - 20xy + 4y^2$ **Simplify.**

✓ **GUIDED PRACTICE** for Example 1

Find the product.

1. $(x + 3)^2$ **2.** $(2x + 1)^2$ **3.** $(4x - y)^2$ **4.** $(3m + n)^2$