SUM AND DIFFERENCE PATTERN To find the product $(x + 2)(x - 2)$, you can multiply the two binomials using the FOIL pattern.

$$(x + 2)(x - 2) = x^2 - 2x + 2x - 4 \quad \text{Use FOIL pattern.}$$
$$= x^2 - 4 \quad \text{Combine like terms.}$$

This suggests a pattern for the product of the sum and difference of two terms.

KEY CONCEPT   *For Your Notebook*

Sum and Difference Pattern

Algebra   **Example**

$(a + b)(a - b) = a^2 - b^2$ $(x + 3)(x - 3) = x^2 - 9$

EXAMPLE 2   **Use the sum and difference pattern**

Find the product.

a. $(t + 5)(t - 5) = t^2 - 5^2$ **Sum and difference pattern**

               $= t^2 - 25$ **Simplify.**

b. $(3x + y)(3x - y) = (3x)^2 - y^2$ **Sum and difference pattern**

               $= 9x^2 - y^2$ **Simplify.**

✔ **GUIDED PRACTICE**   **for Example 2**

Find the product.

  5. $(x + 10)(x - 10)$ **6.** $(2x + 1)(2x - 1)$ **7.** $(x + 3y)(x - 3y)$

SPECIAL PRODUCTS AND MENTAL MATH The special product patterns can help you use mental math to find certain products of numbers.

EXAMPLE 3   **Use special products and mental math**

Use special products to find the product 26 · 34.

Solution

Notice that 26 is 4 less than 30 while 34 is 4 more than 30.

     $26 \cdot 34 = (30 - 4)(30 + 4)$ **Write as product of difference and sum.**

            $= 30^2 - 4^2$ **Sum and difference pattern**

            $= 900 - 16$ **Evaluate powers.**

            $= 884$ **Simplify.**