

## 2.3 Find Special Products of

- Goal** • Use special product patterns to multiply binomials.

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Georgia  
Performance  
Standard(s)

MM1A2c



# SQUARE OF A BINOMIAL PATTERN

## Algebra

$$(a + b)^2 = a^2 + \underline{+ 2ab} + b^2$$

$$(a - b)^2 = a^2 + \underline{- 2ab} + b^2$$

## Example

$$(x + 4)^2 = x^2 + \underline{+ 8x} + 16$$

$a = x$   
 $b = 4$   
 $+ 2(x)(4)$

$$(3x - 2)^2 = 9x^2 + \underline{- 12x} + 4$$

$$a = 3x$$

$$b = 2$$

$$2(3x)(2)$$



Use the square of a binomial pattern

Find the product.

$$a = 4x$$

$$b = 3$$

**Solution**

$$\begin{aligned} \text{a. } (4x + 3)^2 &= (4x)^2 + \underline{2(4x)(3)} + 3^2 \\ &= 16x^2 + \underline{24x} + 9 \end{aligned}$$

$$a = 3x$$

$$b = 5y$$

$$\begin{aligned} \text{b. } (3x - 5y)^2 &= (3x)^2 - \underline{2(3x)(5y)} + (5y)^2 \\ &= 9x^2 - \underline{30xy} + 25y^2 \end{aligned}$$

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

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



Find the product.  $a = x$

1.  $(x + 9)^2$

$b = 9$

$$x^2 + 2(x)(9) + 9^2$$

$$x^2 + 18x + 81$$

2.  $(2x - 7)^2$

$a = 2x$

$b = 7$

$$(2x)^2 - 2(2x)(7) + 7^2$$

$$4x^2 - 28x + 49$$

3.  $(5r + s)^2$

$a = 5r$

$b = s$

$$(5r)^2 + 2(5r)(s) + s^2$$

$$25r^2 + 10rs + s^2$$

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

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



# SUM AND DIFFERENCE PATTERN

Algebra

$$(a + b)(a - b) = \underline{a}^2 - \underline{b}^2$$

Example

$$(x + 4)(x - 4) = \underline{x}^2 - \underline{16}$$



Find the product.

**Solution**

$$\text{a. } (n + 3)(n - 3) = \underline{n}^2 - \underline{3}^2$$

Sum and  
difference pattern

$$= \underline{n}^2 - \underline{9}$$

Simplify.

$$\text{b. } (4x + y)(4x - y) = \underline{(4x)}^2 - \underline{y}^2$$

Sum and  
difference pattern

$$= \underline{16x}^2 - \underline{y}^2$$

Simplify.



**Use special products to find the product  $17 \cdot 23$ .**

### **Solution**

Notice that 17 is 3 less than **20** while 23 is 3 more than **20**.

$$17 \cdot 23 = (\underline{\mathbf{20}} - 3)(\underline{\mathbf{20}} + 3)$$

$$= \mathbf{20^2 - 3^2}$$

$$= \mathbf{400 - 9}$$

$$= \mathbf{301}$$

**Write as product.**

**Sum and difference pattern**

**Evaluate powers.**

**Simplify.**



4. Find the product  $(z + 6)(z - 6)$ .

$$z^2 - 6^2 = z^2 - 36$$

5. Find the product  $(4x + 3)(4x - 3)$ .

$$(4x)^2 - 3^2 = 16x^2 - 9$$

6. Find the product  $(x + 5y)(x - 5y)$ .

$$x^2 - (5y)^2 = x^2 - 25y^2$$



7. Describe how you can use special products to find  $39^2$ .

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

Notice that 39 is 1 less than 40.

$$(40 - 1)^2 = (40)^2 - 2(40)(1) + (1)^2$$

$$= 1600 - 80 + 1$$

$$= 1521$$



Assignment:  
p.70 2 – 24 even

