

## 8.2 PART 2 MULTIPLYING POLYNOMIALS

### *Multiplying Binomials and Trinomials*

To multiply  
a binomial  
by a binomial,  
you can use the  
FOIL Method.

$$(3x + 4)(x - 5)$$

$$(3x + 4)(x - 5)$$

**FIRST**  
**OUTER**  
**INNER**  
**LAST**

$$(3x)(x) + (3x)(-5) + (4)(x) + (4)(-5)$$

$$3x^2 + -15x + 4x + -20$$

$$3x^2 + -11x + -20$$

$$3x^2 - 11x - 20$$

Use the FOIL method to find the product.

$$1. \quad (4x + 1)(2x - 3)$$

$$\begin{array}{cccc} \text{F} & & \text{O} & \\ (4x)(2x) & + & (4x)(-3) & + & (1)(2x) & + & (1)(-3) \\ \text{I} & & \text{L} & \end{array}$$

$$8x^2 \quad + \quad -12x \quad + \quad 2x \quad + \quad -3$$

$$8x^2 \quad - \quad 12x \quad + \quad 2x \quad - \quad 3$$

$$8x^2 \quad - \quad 10x \quad - \quad 3$$

Use the FOIL method to find the product.

$$2. \quad (x - 5)(6x - 7)$$

$$\begin{array}{cccc} \text{F} & & \text{O} & \\ (x)(6x) & + & (x)(-7) & + & (-5)(6x) & + & (-5)(-7) \\ \text{I} & & \text{L} & \end{array}$$

$$6x^2 \quad + \quad -7x \quad + \quad -30x \quad + \quad 35$$

$$6x^2 \quad - \quad 7x \quad - \quad 30x \quad + \quad 35$$

$$6x^2 \quad - \quad 37x \quad + \quad 35$$

Use the FOIL method to find the product.

$$4. \quad (3x + 11)(4x + 7)$$

$$(3x)(4x) + (3x)(7) + (11)(4x) + (11)(7)$$

$$12x^2 + 21x + 44x + 77$$

$$12x^2 + 65x + 77$$

Use the FOIL method to find the product.

$$3. \quad (8x - 3)(2x + 1)$$

$$(8x)(2x) + (8x)(1) + (-3)(2x) + (-3)(1)$$

$$16x^2 + 8x - 6x - 3$$

$$16x^2 + 2x - 3$$

$$16x^2 + 2x - 3$$

You can also multiply  
two binomials  
using the  
distributive property.

Recall from Chapter 2,  
 $3(2x - 5)$  becomes  $6x - 15$ .

5.  $x(3x^2 + 6x - 8)$

6.  $-3x(2x^2 - x + 4)$

Use the distributive property to find the product.

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

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

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

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

$$x^2 + -3x + 2x + -6$$

$$x^2 + \begin{matrix} \swarrow & \searrow \\ -3x & +2x \\ \end{matrix} + -6$$

$$x^2 - x - 6$$

Use the distributive property to multiply.

$$7. \quad (x - 2)(x + 4)$$

$$\begin{matrix} \xrightarrow{x} & \xrightarrow{-2} \\ x(x+4) & -2(x+4) \end{matrix}$$

$$x \cdot x + x \cdot 4 \quad -2 \cdot x \quad -2 \cdot 4$$

$$x^2 + 4x \quad -2x \quad -8$$

$$x^2 + 2x - 8$$

Use the distributive property to multiply.

$$8. \quad (2x + 1)(x + 2)$$

$$\begin{aligned} & 2x(x+2) + 1(x+2) \\ & 2x \cdot x + 2x \cdot 2 + 1 \cdot x + 1 \cdot 2 \\ & 2x^2 + 4x + x + 2 \\ & 2x^2 + 5x + 2 \end{aligned}$$

Regardless of whether  
you like the **FOIL**  
method or the  
**distributive property**...  
you **MUST** use the  
distributive property to  
multiply anything  
**larger** than binomials!

Use the distributive property to multiply.

$$9. (x + 4)(x^2 - 5x + 7)$$

$$(x + 4)(x^2 - 5x + 7)$$

$$x(x^2 - 5x + 7) + 4(x^2 - 5x + 7)$$

$$x \cdot x^2 - x \cdot 5x + x \cdot 7 + 4 \cdot x^2 - 4 \cdot 5x + 4 \cdot 7$$

$$x^3 \quad \boxed{-5x^2} \quad \boxed{+7x} \quad \boxed{+4x^2} \quad \boxed{-20x} \quad +28$$

$$x^3 - x^2 - 13x + 28$$

Use the distributive property to multiply.

$$10. (x - 3)(3x^2 + x - 4)$$

$$x(3x^2 + x - 4) - 3(3x^2 + x - 4)$$

$$x \cdot 3x^2 + x \cdot x - x \cdot 4 - 3 \cdot 3x^2 - 3 \cdot x - 3 \cdot 4$$

$$3x^3 \quad \boxed{+x^2} \quad \boxed{-4x} \quad \boxed{-9x^2} \quad \boxed{-3x} \quad +12$$

$$3x^3 - 8x^2 - 7x + 12$$