Algebra 2 – Section 3-6
Multiplying Polynomials

- Essential Question: How do you multiply polynomials?
- Is there more than one method you can use?

Review of the Distributive Property

- $a(b + c) = ab + bc$
- $3x(x - 3) = 3x^2 - 9x$
- $-x^2(-2x^2+3x-5) = 2x^4 - 3x^3 + 5x^2$

EXAMPLE 1 **Multiply polynomials using the distributive property**

Find the product $(x - 4)(3x + 2)$.

Use the distributive property twice and combine like terms

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

$3x^2 - 10x - 8$

Find the product $(a + 7)(3a - 1)$.

$3a^2 - 1a + 21a - 7$

$3a^2 + 20a - 7$

EXAMPLE 2 **Multiply binomials using the FOIL pattern**

FOIL

F – Product of the **1st** terms of each binomial

O – Product of the **outside** terms of each binomial

I – Product of the **inside** terms of each binomial

L – Product of the **last** terms of each binomial

Find the product $(3a + 4)(a - 2)$.

F $3a \cdot a = 3a^2$

O $3a \cdot -2 = -6a$

I $4 \cdot a = 4a$

L $4 \cdot -2 = -8$

$3a^2 - 2a - 8$

Find the product $(a + 5)(2a - 8)$.

$2a^2 + 2a - 40$

EXAMPLE 3 Multiply polynomials using a table

Find the product $(b^2 + 6b - 7)(3b - 4)$.

	b^2	$6b$	-7
$3b$	$3b^3$	$18b^2$	$-21b$
-4	$-4b^2$	$-24b$	28

$3b^3 + 14b^2 - 45b + 28$

Find the product $(a - 4)(a - 2)$.

$a^2 - 6a + 8$

EXAMPLE 4 Multiply using vertical alignment

Find the product $(2x^2 + 5x - 1)(4x - 3)$.

$$\begin{array}{r} 2x^2+5x-1 \\ 4x-3 \\ \hline -6x^2-15x+3 \\ 8x^3+20x^2-4x \\ \hline 8x^3+14x^2-19x+3 \end{array}$$

EXAMPLE 6 Squaring a binomial

To square a binomial like $(2x - 3)^2$ means to multiply it by itself. You cannot just pass out the exponent.

$(2x - 3)^2$ = $(2x-3)(2x-3)$ FOIL

$4x^2 - 12x + 9$

$(3x + 5)^2$ = $(3x+5)(3x+5)$

$9x^2 + 30x + 25$

Standardized Test Practice

The dimensions of a rectangle are $x + 3$ and $x + 2$. Which expression represents the area of the rectangle?

$(x+3)(x+2)$ $x^2 + 5x + 6$

(A) $x^2 + 6$ (B) $x^2 + 5x + 6$ (C) $x^2 + 6x + 6$ (D) $x^2 + 6x$

GUIDED PRACTICE

Find the product. Use the method of your choice.

4. $(x^2 + 2x + 1)(x + 2)$ $x^3 + 4x^2 + 5x + 2$

5. $(3y^2 - y + 5)(2y - 3)$ $6y^3 - 11y^2 + 13y - 15$

6. $(4b - 5)(b - 2)$ $4b^2 - 13b + 10$