Learning Targets:

- Use a graphic organizer to multiply polynomials.
- Use the Distributive Property to multiply polynomials.

SUGGESTED LEARNING STRATEGIES: Graphic Organizer, Create Representations, Think-Pair-Share, Look for a Pattern

A graphic organizer can be used to multiply polynomials that have more than two terms, such as a binomial times a trinomial. The graphic organizer at right can be used to multiply $(x + 2)(x^2 + 2x + 3)$.

	x	2
x^2	x^3	$2x^2$
$2x$	$2x^2$	$4x$
3	$3x$	6

$= x^3 + 4x^2 + 7x + 6$

1. Draw a graphic organizer in the space provided in the *My Notes* section to represent $(x - 3)(x^2 + 5x + 6)$. Label each inner rectangle and find the sum.

2. How many boxes would you need to represent the multiplication of $(x^3 + 5x^2 + 3x - 3)(x^4 - 6x^3 - 7x^2 + 5x + 6)$ using the graphic organizer?

   a. Explain how you determined your answer.

   b. **Use appropriate tools strategically.** Would you use the graphic organizer for other multiplications with this many terms? Explain your reasoning.

The Distributive Property can be used to multiply any polynomial by another. Multiply each term in the first polynomial by each term in the second polynomial.

$$(x - 3)(5x^2 - 2x + 1) = 5x^3 - 17x^2 + 7x - 3$$

3. Determine each product.

   a. $x(x + 5)$

   b. $(x - 3)(x + 6)$

   c. $(x + 7)(3x^2 - x - 1)$

   d. $(3x - 7)(4x^2 + 4x - 3)$

4. How can you predict the number of terms the product will have before you combine like terms?

My Notes

My Notes

MATH TIP

Polynomials are *closed* under multiplication. A set is closed under multiplication if the product of any two elements in the set is also an element of the set.

5. Are all of the answers to Item 3 polynomials? Justify your response.

6. Explain why the product of two polynomials will always be a polynomial.

7. You can find the product of more than two polynomials, such as $(x + 3)(2x + 1)(3x - 2)$.

a. To multiply $(x + 3)(2x + 1)(3x - 2)$, first determine the product of the first two polynomials, $(x + 3)(2x + 1)$.

$(x + 3)(2x + 1) =$

b. Multiply your answer to Part (a) by the third polynomial, $(3x - 2)$.

8. Determine each product.

a. $(x - 2)(x + 1)(2x + 2)$

b. $(x + 3)(3x + 1)(2x - 1)$

c. $(x - 1)(3x - 2)(x + 4)$

d. $(2x - 4)(4x + 1)(3x + 3)$

Check Your Understanding

Determine each product.

9. $a(b + c)$

10. $(a + b)(a + c)$

11. $(a + b)(a^2 + b + c)$

12. $(a + b)(a + c)(b + c)$

LESSON 25-3 PRACTICE

Determine each product.

13. $x(x + 7)$

14. $x(2x - 5)$

15. $(y + 3)(y + 6)$

16. $(y + 3)(y - 6)$

17. $x(2x^2 - 5x + 1)$

18. $(x - 1)(2x^2 - 5x + 1)$

19. $(2x - 7)(5x^2 - 1)$

20. $(2x - 7)(5x^2 - 3x - 1)$

21. $(x + 2)(x - 3)(x + 1)$

22. $(x + 2)(2x - 3)(2x + 1)$

23. Attend to precision. A binomial of degree 2 and variable x and a trinomial of degree 4 and variable x are multiplied. What will be the degree of the product? Explain your reasoning.