

TOPIC

7

Topic Review

7.1-7.3

TOPIC ESSENTIAL QUESTION

- How do you work with polynomials to rewrite expressions and solve problems?

Vocabulary Review

Choose the correct term to complete each sentence.

- The Closure Property states that polynomials are closed under addition or subtraction because the result of these operations is another polynomial.
- A(n) Perfect Square Trinomial results when a binomial is squared. $(a+b)^2$
- A(n) monomial is a real number, a variable, or the product of a real number and one or more variables with whole number exponents.
- The product of two binomials in the form $(a+b)(a-b)$ is $a^2 - b^2$, which is called the difference of two squares.
- The standard form of a polynomial is an expression in which the terms are written in descending order according to their degree.

- Closure Property
- degree of a monomial
- degree of a polynomial
- difference of two squares
- monomial
- perfect-square trinomial
- polynomial
- standard form of a polynomial

Concepts & Skills Review

LESSON 7-1

Adding and Subtracting Polynomials

→ "like terms"

Quick Review

A polynomial is a monomial or the sum or difference of two or more monomials, called terms. Polynomials are named according to their degree. The degree of a polynomial is the greatest degree of any term of the polynomial. The standard form of a polynomial is a polynomial in which terms are written in descending order according to their degree.

Example

What is the difference $(5x^2 + 3x - 5) - (2x^2 + 8)$?

$$\begin{aligned} & (5x^2 + 3x - 5) - (2x^2 + 8) \\ &= 5x^2 + 3x - 5 - 2x^2 - 8 \quad \text{Apply subtraction to each term} \\ &= (5x^2 - 2x^2) + (3x) + (-5 - 8) \quad \text{Use the Commutative and Associative Properties to group like terms.} \\ &= 3x^2 + 3x - 13 \quad \text{Simplify.} \\ &\text{The difference is } 3x^2 + 3x - 13. \end{aligned}$$

Practice & Problem Solving

Name each monomial based on its degree.

- ~~8.~~ $2xy$ linear? ~~9.~~ $3x^2y$ cubic

Add or subtract to simplify each expression. Write your final answer in standard form.

- $(5x - 1) + (2x - 3)$ $7x - 4$
- $(2x^2 - 4x - 1) - (3x^2 + 8x - 4)$ $2x^2 - 4x - 1 - 3x^2 - 8x + 4 \rightarrow -x^2 - 12x + 3$
- $(5b^4 - 2 + 3b^2) + (5b^2 - 4 + 3b^4)$ $8b^4 + 8b^2 - 6$

- Reason** What is the missing term in the equation? $(\quad + 5) + (3x - 2) = 8x + 3$. Explain. $5x$

- Make Sense and Persevere** A garden center has $(3x^2 + 12x + 18)$ sq. ft of sod. One week, they receive $(4x^2 + 16x + 60)$ sq. ft of sod, and sell $(2x^2 + 9x + 27)$ sq. ft of sod. What expression represents the area of the remaining sod?

LESSON 7-2

Multiplying Polynomials

Quick Review

Use the **Distributive Property** to multiply polynomials as you would when multiplying integers numbers. Distribute the first polynomial to each term in the second polynomial.

Example

How can you use the **Distributive Property** to rewrite $(3x - 5)(4x - 9)$ as a polynomial?

Distribute the first binomial to each term in the second binomial.

$(3x - 5)(4x - 9)$

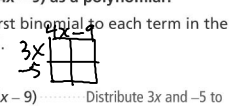
$= 3x(4x - 9) - 5(4x - 9)$ Distribute $3x$ and -5 to the second binomial.

$= 3x(4x) + 3x(-9) - 5(4x) - 5(-9)$ Distribute $3x$ and -5 to each term in the second binomial.

$= 12x^2 - 27x - 20x + 45$ Multiply.

$= 12x^2 - 47x + 45$ Combine like terms.

The product is $12x^2 - 47x + 45$.



Practice & Problem Solving

Use the **Distributive Property** to find each product.

15) $(x + 7)(x - 5)$ 16) $(2x - 5)(3x + 1)$

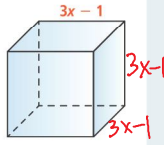
Use a **table** to find each product.

17) $(4x - 3y)(5x + y)$ 18) $(x + 4)(x^2 - 3x - 1)$

19) **Make Sense and Persevere** Identify the missing terms in the quotient and divisor.

$(x^2 + 3x + 8) \div (x + 1) = x^2 + 11x + 24$

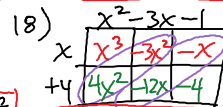
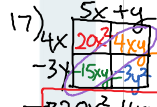
20) **Model With Mathematics** The volume of a cube is calculated by multiplying the length, width and height. What is the volume of this cube in standard form?



$V = l \cdot w \cdot h$
Same

15) $x^2 - 5x + 7x - 35 \rightarrow x^2 + 2x - 35$

16) $6x^2 + 2x - 15x - 5 \rightarrow 6x^2 - 13x - 5$



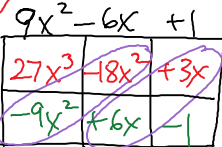
$\rightarrow 20x^2 - 11xy - 3y^2$

$\rightarrow x^3 + x^2 - 13x - 4$

20) $(3x-1)(3x-1)(3x-1)$

$9x^2 - 3x + 3x - 1$

$(9x^2 - 6x + 1)(3x - 1)$



$\rightarrow 27x^3 - 27x^2 + 9x - 1$

$a^2 + 2ab + b^2$

21) $(b)^2 + 2(b)(12) + (12)^2 \rightarrow b^2 + 24b + 144$

22) $(4x)^2 + 2(4x)(1) + (1)^2 \rightarrow 16x^2 + 8x + 1$

LESSON 7-3

Multiplying Special Cases

* Perfect Square Trinomial

Quick Review

$(a+b)^2$ is $(a+b)(a+b)$. The square of a binomial always follows the same pattern, $a^2 + 2ab + b^2$. The product of two binomials in the form $(a+b)(a-b)$ is $a^2 - b^2$. This is called the **difference of two squares**.

Example

What is the product $(4x - 9)(4x + 9)$?

Use the pattern.

$(4x - 9)(4x + 9)$

$= (4x)^2 - (9)^2$ Substitute $4x$ and 9 for a and b in $a^2 - b^2$.

$= 16x^2 - 81$ Simplify.

The product is $16x^2 - 81$.

Practice & Problem Solving

Write each product in standard form.

21) $(b + 12)(b + 12)$

22) $(4x + 1)(4x + 1)$

23) $(6x - 9)(6x + 9)$

24) $(3x - 4y)(3x + 4y)$

25) $(1.5x + 2)(1.5x - 2)$

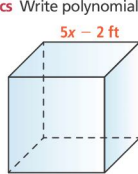
26) $(3a - 5b)^2$

27. **Look for Relationships** Find a value for m to make a true statement.

$m^2 - 64 = (5x + 8)(5x - 8)$

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28. **Modeling With Mathematics** Write polynomials in standard form to represent the surface area and volume of the cube.



23) $(6x)^2 - (9)^2 \rightarrow 36x^2 - 81$

24) $(3x)^2 - (4y)^2 \rightarrow 9x^2 - 16y^2$

26) $(3a - 5b)(3a - 5b)$

$(3a)^2 + 2(3a)(-5b) + (-5b)^2$
 $\rightarrow 9a^2 - 30ab + 25b^2$