Unit 2: Polynomials
Guided Notes

____
Name

____
Period

If found, please return to Mrs. Brandley's room, M-8.

Self-Assessment

The following are the concepts you should know by the end of Unit 1. Periodically throughout the unit I will ask you to self-assess on how you are doing on these skills. It is essential for you to be able to identify what you do and do not understand in order to learn effectively. You will use the following scale:

5: Yes! I understand
4: I'm almost there.
3: I am back and forth.
2: I am just starting to understand.
1: I don't understand at all.

Concept 1: Polynomial Terms and Definitions

_____ I can identify the degree power, leading coefficient, and constants of a polynomial.

_____ I understand that a term is either a single number or variable, or numbers/variables multiplied together.

_____ I understand that terms in polynomials are separated by + or − signs.

_____ I can classify a polynomial based on how many terms it has. (e.g. binomial, trinomial)

Concept 2: Adding and Subtracting Polynomials

_____ I can add polynomials.

_____ I understand that adding two polynomials results in a polynomial.

_____ I can subtract polynomials.

_____ I understand that subtracting one polynomial from another results in a polynomial.

Concept 3: Multiplying Polynomials

_____ I can multiply polynomials.

_____ I understand that multiplying two polynomials together results in another polynomial

Concept 4: Dividing Polynomials

_____ I can divide polynomials using polynomial long division

_____ I can divide polynomials using synthetic division.

_____ I know when I can and cannot use synthetic division.

Concept 1: Terms and Definitions of Polynomials

Word Bank: **constant** **variable** **leading coefficient** **polynomial** **term** **monomial** **binomial** **trinomial** **degree** **operations** **standard form** **degree of a polynomial** **coefficient** **like terms**

1. A ______________________is a symbol for a number we don't know yet.

Examples: Non-Examples:

2. A _____________________is a single number or variable, or numbers and variables multiplied together separated by addition or subtraction.

Examples: Non-Examples:

3. A _____________________is an expression with constant(s) and/or variable(s) that are combined using addition, subtraction, multiplication, and whole number exponents.

Examples: Non-Examples:

4. A ________________________ is a polynomial with one term.

Examples: Non-Examples:

5. A ________________________ is two monomials combined together with addition or subtraction. It is a polynomial with two terms.

Examples: Non-Examples:

6. A __________________________ is three monomials combined together with addition or subtraction. It is a polynomial with three terms.

Examples: Non-Examples:

Generally when there are more than three terms in a polynomial, we just say that it is a polynomial with that number of terms. For example if the polynomial has four terms, we would say, “it is a polynomial with four terms.”

7. The _________________________ of a monomial is the sum of all the exponents on the variables within that term.

Examples: Non-Examples

8. When the monomials within a polynomial are organized by degree in descending order, the polynomial is said to be in _______________________.

Examples: Non-Examples

9. The __________________________________ is the degree of the highest degree monomial within that polynomial.

Examples: Non-Examples:

10. A ______________________________ is the numerical part of a monomial.

Examples: Non-Examples:

11. The ____ is the numeric part of the monomial with the highest degree within a polynomial. When the polynomial is written in standard form, it is the coefficient of the leading term.

Examples: Non-Examples:

12. A_________________________ is a monomial that doesn't include any variables. It is strictly numeric.

Examples: Non-Examples

13. Two or more terms of a polynomial that have the exact same variables raised to the exact same exponents in the exact same combinations (once they are simplified) are said to be_______________.

Examples: Non-Examples

Within a polynomial we can add together two monomials if they are like terms.

14. Adding or subtracting more than one polynomial together are examples of ____________________ that can be performed on polynomials, or more specifically, the terms (or monomials) within the polynomials that are like terms.

Examples: Non-Examples:

Put the following polynomials in standard form:

15. $-3+4x^5$

16. $4+8x^3-2x^2+3x$

17. $3x^3-2+8x^5-6x^2$

Name each polynomial by degree and number of terms. Identify its' leading coefficient and constant.

Example: $4x^2 + 5$ 2nd degree binomial. LC: 4 C: 5

18. $3x^4$

19. $5x^2 - 6x + 1$

20. $x^5 - 6$

21. $9 + 7x^3 - 4x$

Remember: integers are the whole numbers and their opposites {...-4, -3, -2, -1, 0, 1, 2, 3, 4...}

22. Pick two integers and write them here: _____ and _____

a. Add them: _____+_____=_____

b. Subtract them: _____− _____=_____

c. Multiply them: _____x_____=_____

d. Divide them: _____÷_____=_____

23. What does it mean that the integers are **closed** under addition, subtraction, and multiplication?

24. What does it mean that the integers are not closed under division? Show an example.

Throughout this unit, try to discover if polynomials are closed under any operations and if so, which ones.

Concept 2: Adding Polynomials

Add the following:

1. $7+9=$ 2. $3x+(-7x)=$ 3. $-4x^2+8x^2=$ 4. $6x^3+(-2x^3)=$

5. $(6x^3-4x^2+3x+7)+(-2x^3+8x^2-7x+9)=$

Try the following examples with your group, with a partner, or by yourself:

6. $(x^3-2x^2+9x)+(-7x+9)=$

7. $(-8x^2+3x+6)+(-2x^3+5x^2+x-4)=$

8. $(6x^3-2x^2+x+3)+(-4x^3+8x^2-5x+6)=$

9. Are polynomials closed under addition? YES NO

Subtracting Polynomials

Subtract the following:

10. $7-(-3)=$ 11. $2x-(-8x)=$ 12. $3x^2-2x^2=$

13. $(3x^2+2x+7)-(2x^2-8x-3)=$

Try the following examples with your group, with a partner, or by yourself:

14. $(x^3-4x^2+9x)-(-7x+5)=$

15. $(-8x^2+3x+6)-(-5x^3+2x^2+x-7)=$

16. $(7x^3-2x^2+3x+6)-(9x^3+3x^2-7x+2)=$

17. Are polynomials closed under subtraction? YES NO

Concept 3: Multiplying Polynomials

Multiplying Monomials

1. $7 \times 9 =$ 2. $x^2 \times x^7 =$ 3. $3x^5 \times 4 =$ 4 $6x^3 \times 3x^5 =$

Multiplying a Monomial and Binomial or Trinomial

5. $8(x^3 - 4x) =$

6. $4x^2(3x^3 + 6x^2 - 2x + 5) =$

Multiplying Binomials

7. $(x + 3)(x - 4) =$

8. $(4x^2 + 4)(3x - 2) =$

Multiplying a Binomial and Trinomial

9. $(x + 3)(4x^2 + 7x - 1) =$

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

Multiplying Trinomials

11. $(x^2 - 5x + 4)(3x^2 - 2x - 2) =$

12. $(3x^3 - 2x^2 + 7)(4x^2 + x - 3) =$

13. Are polynomials closed under multiplication?   YES   NO

Concept 4: Dividing Polynomials

4th grade Flashback: Long division

1. $656 \div 4$

2. $487 \div 32$

3. $528 \div 24$

Polynomial Long Division

4. $(20x^2 + 4x + x) \div 4x$ **5.** $(p^3 + 6p^2 + p - 2) \div (p + 1)$ **6.** $(5b^5 - b^4 - 15b + 6) \div (5b - 1)$

Synthetic Division

7. $(20x^2 + 4x + x) \div 4x$ **8.** $(p^3 + 6p^2 + p - 2) \div (p + 1)$ **9.** $(5b^5 - b^4 - 15b + 6) \div (5b - 1)$

When can you use synthetic division?