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 Polynomials

_____ I can add polynomials.

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

Concept 3: Subtracting Polynomials

_____ I can subtract polynomials.

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

Concept 4: Multiplying Polynomials

_____ I can multiply polynomials.

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

Concept 1: Terms and Definitions of Polynomials

A _____**VARIABLE**_____ is a symbol for a number we don't know yet.

Examples: Non-Examples:

A ____**TERM**_____is a single number or variable, or numbers and variables multiplied together separated by addition or subtraction.

Examples: Non-Examples:

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

Examples: Non-Examples:

A _____**MONOMIAL**_____ is a polynomial with one term.

Examples: Non-Examples:

A _____**BINOMIAL**_____ is two monomials combined together with addition or subtraction. It is a polynomial with two terms.

Examples: Non-Examples:

A _____**TRINOMIAL**_____ 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.”

The _____**DEGREE**_____ of a monomial is the sum of all the exponents on the variables within that term.

Examples: Non-Examples

When the monomials within a polynomial are organized by degree in descending order, the polynomial is said to be in _____**STANDARD FORM**_____.

Examples: Non-Examples

The _**DEGREE OF A_POLYNOMIAL**_____ is the degree of the highest degree monomial within that polynomial.

Examples: Non-Examples:

A _____**COEFFICIENT**_____ is the numerical part of a monomial.

Examples: Non-Examples:

The ____**LEADING COEFFICIENT**_____ 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:

A_____**CONSTANT**_____ is a monomial that doesn't include any variables. It is strictly numeric.

Examples: Non-Examples

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_**LIKE TERMS**___.

Examples: Non-Examples

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

Adding or subtracting more than one polynomial together are examples of _____**OPERATIONS**____ 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:

$-3+4x^5$ $4+8x^3-2x^2+3x$ $3x^3-2+8x^5-6x^2$

$4x^5-3$ $8x^3-2x^2+3x+4$ $8x^5+3x^3-6x^2-2$

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

$3x^4$ 4th degree monomial. LC: 3 C: 0

$5x^2-6x+1$ 2nd degree trinomial. LC: 5 C: 1

x^5-6 5th degree binomial. LC: 1 C: -6

$9 + 7x^3 - 4x$ 3rd degree trinomial. LC: 7 C: 9

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

Pick two integers and write them here: _____ and _____

Add them: _____+_____=_____ Subtract them: _____ − _____=_____

Multiply them: _____x_____=_____ Divide them: _____ ÷ _____=_____

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

When you add, subtract, or multiply any two integers, the resulting answer is an integer.

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

It is possible to divide two integers and have the answer not be an integer. Ex: 1/2

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:

$7+9=$ 16 $\quad 3x+(-7x)=$ -4x $\quad -4x^2+8x^2=4x^2$ $\quad 6x^3+(-2x^3)=4x^3$

$(6x^3-4x^2+3x+7)+(-2x^3+8x^2-7x+9)=4x^3+4x^2-4x+16$

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

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

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

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

Are polynomials closed under addition? **YES** NO

Concept 3: Subtracting Polynomials

Subtract the following:

$7-(-3)=$ **10** $\quad 2x-(-8x)=$ **10x** $\quad 3x^2-2x^2=x^2$

$(3x^2+2x+7)-(2x^2-8x-3)=x^2+10x+10$

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

$(x^3-4x^2+9x)-(-7x+5)=x^3-4x^2+16x+5$

$(-8x^2+3x+6)-(-5x^3+2x^2+x-7)=-5x^3-10x^2+2x+13$

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

Are polynomials closed under subtraction? **YES** NO

Concept 4: Multiplying Polynomials

Multiplying Monomials

$7 \times 9 = \mathbf{63}$ $x^2 \times x^7 = x^9$ $3x^5 \times 4 = 12x^5$ $6x^3 \times 3x^5 = 18x^8$

Multiplying a Monomial and Binomial or Trinomial

$8(x^3 - 4x) = 8x^3 - 32x$

$3(2x^5 + 3x^2 - 7x + 4) = 6x^5 + 9x^2 - 21x + 12$

$4x^2(3x^3 + 6x^2 - 2x + 5) = 12x^5 + 24x^4 - 8x^3 + 20x^2$

Multiplying Binomials

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

$(4x^2 + 4)(3x - 2) = 12x^3 - 8x^2 + 12x - 8$

$(7x^3 - 3x)(x^2 + 9) = 7x^5 + 60x^3 - 27x$

Multiplying a Binomial and Trinomial

$(x + 3)(4x^2 + 7x - 1) = 4x^3 + 19x^2 + 20x - 3$

$(3x - 1)(2x^3 - 5x + 2) = 6x^4 - 2x^3 - 5x^2 + 12x - 2$

$(2x^2 + 3)(x^2 + 3x - 4) = 2x^4 + 6x^3 - 5x^2 + 9x - 12$

Multiplying Trinomials

$(x^2 - 5x + 4)(3x^2 - 2x - 2) = 3x^4 - 17x^3 + 20x^2 + 2x - 8$

$(3x^3 - 2x^2 + 7)(4x^2 + x - 3) = 12x^5 - 5x^4 - 11x^3 + 34x^2 + 7x - 21$

$2x^2 + 6x - 1)(x^3 - 4x + 5) = 2x^5 - 8x^3 + 6x^4 - 14x^2 + 30x - 5$

Are polynomials closed under multiplication? **YES** NO