Math 9 Tripp

Name: _____**KEY**_____

Chapter 4 – Polynomials

Test Date: _____

To do:

4.1 – Polynomials

- Complete Notes ◯
- Quiz 1 ◯

4.2 – Simplify Polynomials

- Complete Notes ◯

4.3 – Adding and Subtracting Polynomials

- Complete Notes ◯
- Quiz 2 ◯

Assignment # 2 (Units 3 & 4) ◯

Write Unit Test ◯

Math 9 **Lesson 4.1 – Polynomials** Tripp

An **expression** is the result of applying arithmetic operations to numbers and variables. For example:

$$3x^2 - 7$$

The variable ***x*** has a **degree** of **2**. The **3 (in front of the x^2)** is a **coefficient**.

A **polynomial** is an algebraic expression that is the sum of numbers and terms involving variables with exponents that are whole numbers; the variables can be multiplied by or divided by any numbers. For example:

In the above example, $3x^2 - 7$ is a polynomial.

A **term** is a part of a polynomial, separated from the other terms by addition signs. For example:

In the above example, $3x^2$ is a single term and -7 is a second term, both within the same polynomial.

A **degree** is the power to which the variable in a term is raised; if a term contains two variables, its degree is the **sum** of the exponents of those variables. For example:

Degrees of each term in $5a^4b^2 - 3b + 4$: (4 + 2 = 6), 1, and 0, respectively.

The **degree of the polynomial** is the greatest of the degrees of the polynomial's terms. For example:

$$7x^2 - 3x + 5$$

Degree of $7x^2$: 2 , degree of $3x$: 1 , degree of 5: 0

Example 1: Identify each expression as a monomial, binomial, or trinomial. Identify the degree of each polynomial, all coefficients, variables, and constants.

$-6a^3b^2$	$2x + 7$	$x^2 - 6x + 9$
Monomial	Binomial	Trinomial
Degree: 3 + 2 = 5	Degree: 1	Degree: 2
Coeff.: –6	Coeff.: 2	Coeff.: 1, –6
Var(s).: *a* and *b*	Var(s).: *x*	Var(s).: *x*
Constant(s): none	Constant(s): + 7	Constant(s): + 9

Example 2: Write the following polynomial in descending order.

$$7x^3y - 5x^4 + 9x^2y^4 + 8x^5 - 2x - 13$$

$$9x^2y^4 + 8x^5 - 5x^4 + 7x^3y - 2x - 13$$

Example 3: Evaluate the following polynomial for $x = 2$

$$7x^2 - 3x + 5$$

$$= 7(2)^2 - 3(2) + 5$$

$$= 7(4) - 6 + 5$$

$$= 28 - 6 + 5$$

$$= 27$$

Math 9 **Lesson 4.2 – Simplify Polynomials** Tripp

In order to model polynomials, you may need to **group like terms/simplify**, which is the act of combining or gathering "like terms" creating an equivalent polynomial with fewer terms.

Like terms are terms of a polynomial that are identical (same variable and same exponent) except for their coefficients. For examples:

Like terms: $3x^2$, $-x^2$, $\frac{x^2}{2}$

Example 1: Simplify $2x - 3x^2 + 5 - 4x + 6x^2$:

$$3x^2 - 2x + 5$$

Example 2: Which two of the following polynomials below are equivalent? Explain:

a) $2x^2 + xy - y^2 - 2y + 1$

b) $2x^2 - xy - y^2 - 2y + 1 + x^2 - 2x^2 + xy$

c) $xy + 2x^2 + xy - y^2 - 2y + 1 + x^2 - x^2 + xy - 2xy$

a) $2x^2 + xy - y^2 - 2y + 1$

b) $-x^2 - y^2 - 2y + 1$

c) $2x^2 + xy - y^2 - 2y + 1$

Therefore, a) and c) are equivalent.

Math 9 **Lesson 4.3 – Adding and Subtracting Polynomials** Tripp

To add polynomials, we group **like terms** and simplify.

To subtract a polynomial, we add its **opposite (negative).**

Example 1: Add $(4x^2 + 2xy - 8)$ to $(-6x^2 - 4xy)$:

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

Example 2: Joan and Chris both have jobs. They work the same number of hours per week.

Their pay rates and expenses are shown:

	Pay per Hour	**Weekly Expenses**
Joan	$15	$40 Transportation
Chris	$14	$35 Cafeteria Charge

a) Use a polynomial to describe their combined income:

$total(h) = (15h - 40) + (14h - 35) = 29h - 75$

b) Determine their combined weekly income if they both work 40 h in a week:

$total(40) = 29(40) - 75 = 1160 - 75 = 1085$

Example 3: Determine the difference of $3x^2 - 2x + 2$ by $2x^2 - 2x + 1$:

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

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

$= x^2 + 1$

Example 4: Determine the difference of the following polynomials:

a) $3x^2 - 2x + 1$ and $2x^2 - 2x - 2$

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

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

$= x^2 + 3$

b) $-4x^2 + xy + 1$ and $-2x^2 + 3xy + 1$

$(-4x^2 + xy + 1) - (-2x^2 + 3xy + 1)$

$= (-4x^2 + 2x^2) + (xy - 3xy) + (1 - 1)$

$= -2x^2 - 2xy$