Geometry Lomac 2015-2016 **Date** 11/30 **due** 12/1 | **Introduction to Polynomials** **6.1L**

Name _____ **Per**_____

LO: I can simplify polynomial expressions and write them in standard form

emath 7.1

☐ **DO NOW** On the back of this packet

☐ (1) **Numbers written as powers of 10**

The way we write numbers in our systems is interesting because with only 10 digits, i.e. 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9, we are able to write whole numbers as large as we would like. This is because what we really are doing is **counting** how many **powers of 10** that we have.

***Exercise* #1:** Write each of the following numbers as a sum of multiples of powers of 10. The first is done as an example.

(a) $563 = 500 + 60 + 3$
$= 5 \cdot 100 + 6 \cdot 10 + 3$
$= 5 \cdot 10^2 + 6 \cdot 10 + 3$

(b) 274

(c) 3,842

(d) 5,081

(e) 21,478

We can now use algebra to replace the base of 10 with a generic base of x (or whatever variable you like).

***Exercise* #2:** Consider the number $63,735$.

(a) As in #1, write this number as the sum of multiples of powers of 10.

(b) If $x = 10$, write this number in terms of an equivalent expression involving x.

☐ (2) Polynomial Expressions

The base of a polynomial certainly doesn't have to be 10. But, all polynomials have a form similar to your answer in letter (b). Let's define them a little more definitively.

POLYNOMIAL EXPRESSIONS

Any expression of the form: $ax^n + bx^{n-1} + cx^{n-2} + \cdots + \text{constant}$, where the exponents, $n, n-1$, $n-2$, etcetera are all positive integers. Note that **not all powers** need to be presents because the **coefficients**, i.e. *a*, *b*, *c*, etcetera can be zero.

***Exercise* #3:** Of the expressions shown below, circle all of them that represent polynomials. Discuss why the ones that aren't polynomials fail the definition above.

$4x^2 + 8x + 1$ $\qquad$ $9x^2 + 2x + \frac{1}{x}$ $\qquad$ $2^x + 3^x + 4^x$ $\qquad$ $2x^2 + 5x^3 - x + 8$

It is often important to place polynomials in their **standard form**. The standard form of a polynomial is simply achieved by writing it as an **equivalent expression** where the powers on the variables **always descend**.

***Exercise* #4:** Write each of the following polynomials in standard form.

(a) $3x^2 + 5x^3 + 7 - 8x$ $\qquad$ (b) $9x^4 + 2x - x^2 + 1$ $\qquad$ (c) $3 - 2x - 5x^2$

☐ (3) Adding Polynomials

Polynomials are simply abstract representations of numbers that we see every day and they behave like these numbers as well. Let's look at adding polynomials together.

***Exercise* #5:** Consider the numbers 523 and 271.

(a) Write each as the sum of multiples of powers of 10 as previously done.

(b) Add these numbers by adding each individual power of 10.

(c) Use this idea to add:
$$\begin{array}{r} 5x^2 + 2x + 3 \\ +\,2x^2 + 7x + 1 \end{array}$$

(d) Find the sum of the polynomials $-4x^2 + 9x - 3$ and $7x^2 - 5x + 4$.

☐ (4) **Polynomial Applications**

APPLICATIONS

8. A box has a width that is 2 inches greater than its height and a length that is 6 inches greater than its height. It's volume is given by the polynomial expression $x^3 + 8x^2 + 12x$, where x is the box's height. What is the box's volume, in cubic inches, if its height is 10 inches?

(1) 1,812 (3) 182

(2) 1,920 (4) 2,180

☐ (5) **Polynomial Reasoning**

REASONING

9. Polynomial expressions act a lot like integers because the structure of polynomials is based on the structure of integers. Based on the statement below about integers, make a statement about polynomials.

Statement About Integers: An integer added to an integer gives an integer.

Statement About Polynomials: _____

_____

☐ (6) **Exit Ticket**

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☐ (7) **Homework**
cont.

5. Which of the following is *not* a polynomial expression?

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

(2) 3^x (4) $6x+1$

6. Write each of the following polynomial expressions in standard form.

(a) $7x^2+4x^3+5+2x$ (b) $4-x-5x^2$ (c) x^3+x-7x^2+2

(d) $2x+1-3x^3+5x^2$ (e) $4x^3-2x^2+6-8x$ (f) $y^5+y^{10}-y^2+y^7$

7. Find each of the following sums and differences. Write your answer in simplest standard form.

(a) $6x^2-2x+8+3x^2+7x-2$ (b) $x^3+4x^2-8x+3+x^3-x+1$

(c) $\left(5x^2+3x-1\right)-\left(3x^2-6x+4\right)$ (d) $\left(2x^3-5x^2+8x-1\right)-\left(-4x^3+8x^2-3x-9\right)$

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The LO (Learning Outcomes) are written below your name on the front of this packet. Demonstrate your achievement of these outcomes by doing the following:

(1) Simplify and write in standard form

(e) $4x^2+6x-3-3x^2+2x+4$

(f) $\left(4x^2+6x-3\right)-\left(3x^2+2x+4\right)$

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(1) Translation to algebra progress. Write one or more algebraic statement(s) to represent this situation. Be sure to write at least one "Let" statement to define any variables.

The girls' swim team is hosting a fund raiser. They would like to raise at least $500. They are selling candles for $5 and flower arrangements for $6. The girls estimate that at most they will sell 200 items.