Name___*Mrs. Jacob*___.

Math 9

(MTH1W)
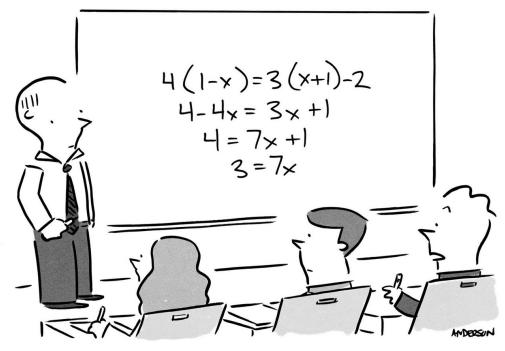
"Wouldn't it be more efficient to just find who's complicating equations and ask them to stop?"

Unit 2: ALGEBRA

- An Upgrade for your Mind!!! 😊

WHAT IS ALGEBRA? <u>Learning algebra is like learning to read.</u> It's a skillset for working with numbers and variables that unlocks a whole amazing world of math & science!

Math 9 – Unit 2: Algebra One   Name: _____

Lesson 2.1: Collecting Like Terms   Date: _____

In this unit, you will be introduced to one of the most important components to Mathematics: Algebra. Algebra comes from the Arabic word *"al-jabr"*, meaning "the coming together of broken parts", and math is about bringing together ideas to solve problems. In Algebra, we will look at how to use Mathematical symbols and the rules for manipulating them. Typically, the symbols are letters.

Learning Goal: We are learning common math terminology, and using those terms to simplify algebraic expressions.

To begin, let's define some terminology that is important in Algebra.

Expression: In Algebra, expressions are a combination of constants (represented by numbers) and variables (represented by letters)

eg $\neq$ $\boxed{3x+1}$; $xyz+5$; x^2+2x+3 ; $\frac{1}{2}x-y$

Variable: → (represented by lower case letters) represent quantities that can vary. It is usually used to represent and solve unknowns.

Numerical Coefficient: → number factor attached to each term

eg $\neq$ $3x^2+7x-2$

N. coeff $(3x^2)=3$; N. coeff $(7x)=7$; constant $=-2$

Constant: → fixed number

Like terms: $3x^2 + 2x^2 + 4n + 7n$ LIKE TERMS.

$3x$ and $-2x^2$ → UNLIKE Terms

$3x$ and $3y$

are terms which have the same variable combinations. (Same variables + exponents)

* A <u>term</u> is a building block of an expression.

Example: Given the following expressions, state the number of terms, the numerical coefficients for each term, and the constant term.

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

b) $-5y + 10x + 8 - 12y$

Expression	Terms	Numerical Coefficients	Constant terms
$3x^2 - 5x + 7$	$3x$ $-5x$ $+7$ Number of terms = 3	Coefficient of $3x$ = 3 Coefficient of $-5x$ = -5	7
$-5y + 10x + 8 - 12y$ $= -17y + 10x + 8$	Number of terms = 3	Coefficient of $10x$ = 10 Coefficient of $-17y$ = -17	8

In the above example, the second expression has 4 terms, but two of them had the same variable. This means that we can combine them together. All you need to do is add, or subtract, their coefficients. This process is called collecting like terms.

Collect the like terms in the above example: $-5y + 10x + 8 - 12y$

$-17y + 10x + 8$

More examples:

a) $-6 - 3r^2 - 4r + 2 + 6r$

$= -4 - 3r^2 + 2r$

$= -3r^2 + 2r - 4$

b) $-4k^3 - 8k^2 + 4 + 7k^4 - k^3 - 8k^2 - 1$

$= -5k^3 - 16k^2 + 3 + 7k^4$

$= 7k^4 - 5k^3 - 16k^2 + 3$

c) $7a^2b^2 + 2a^4 - 8a^3b^3 - 4a^2b - 2a^4 - 2a^3b^3 + 8a^2b^2$

$= 15a^2b^2 - 10a^3b^3 - 4a^2b$

Now for a super duper big example:

d) $-8x - x^2y^2 - 8x^3y^5 + 3x^3y + 2x^3y + 6x + 2x^2y^2 + 2xy - 2x^2y^2 + 5x^3y^4 + 3xy + 5x$

$$= 3x - x^2y^2 - 8x^3y^5 + 5x^3y + 5xy + 5x^3y^4$$

There's more! Did you ask, "what term should I write first?" If you did, good thinking! There is a definite order to writing out expressions. It is called descending order.

Descending order is: Highest

↓

Lowest   order → with respect to the exponents of
                                        variable x

Now go back to the above examples and put them in descending order.

When an expression is simplified, we call that a **simplified expression**, meaning **the terms are collected and written in** ____. However, we also have special names for expressions with one, two, or three terms.
descending order

$4x^2$ is called a **MONOMIAL**.

$3x^5 - 2xy$ is called a **BINOMIAL**.

$7y^2 + 5y - 1$ is called a **TRINOMIAL**.

Anything over that we just call a **POLYNOMIAL**.

Examples: For each expression, collect the like terms and state the type of polynomial.

a) $-2v - 2v^5 - 8 + 2v^5 + 7v$

$= 5v - 8$

BINOMIAL

b) $3xy - 4x^2y + 8x^4y + 6xy - 7x^2y - 7x^4y$

$= 9xy - 11x^2y + x^4y$

TRINOMIAL

c) $1.75x^5 - 0.6x^4 - 1.6x^4 + 0.85x^5$

$= 2.6x^5 - 2.2x^4$

BINOMIAL

Success Criteria:
- I can correctly define the following terms: expression, variable, coefficient, constant, like term, unlike term, monomial, binomial, trinomial, polynomial, and degree
- I can group like terms within algebraic expressions
- I can identify the degree and type of various polynomials

Build your Skills: :)

1. Create an algebraic expression to represent each of the following.

   a) A number x is tripled and then 19 is subtracted from the result.

   b) The variable y is squared and then the result is increased by 10.

   c) The variable n is decreased by 6 and then the result is multiplied by −8.

   d) A number p is increased by 70 and then the result is divided by 6.

2. The sum of the interior angles of a polygon can be found by subtracting 2 from the number of sides and multiplying the result by 180°.

   a) Determine an algebraic expression to represent the sum of the interior angles for a polygon with n sides.

   b) Use your expression from part (a) to determine the sum of the interior angles for an octagon.

   c) A regular polygon has equal side lengths and equal interior angles. Determine the value of each interior angle in a regular hexagon.

   d) The sum of the interior angles for a particular polygon is 1440°. How many sides does this polygon have?

   e) For a given regular polygon, each interior angle is 156°. How many sides does the polygon have?