Mathematics 9
Unit 3: Introduction to Polynomials

Sec. 5.2: Equivalent Expressions

Learning Targets

1. **Identify like terms and unlike terms**
2. **How to combine like terms**
3. **Combining like terms in algebraic expressions to simplify the expressions.**

Polynomials – what we already know:

Are made up of _____ .

_____ terms are just numbers.

_____ terms always have one coefficient (in the front), but can have one or more variables.

Examples of different terms: **x** **2x** **$-x^2$** **-5xy** **$7a^2b$** **$-bc^2$**

"Like" terms

Are groups of **2 or more terms** that share _____:

If the terms only have one variable in them, it has to be the _____ and the _____.

The terms can have different _____, but the coefficients may also be the same.

Examples of pairs of like terms with one variable:

x and **4b and**

$-3x^2$ and **m^2 and**

If the terms contain more than one variable, they have to be exactly the same _____, and the _____ on all of the variables have to match each other.

Examples of like terms with more than one variable:

xy and **$-2a^2b$ and**

_____ terms are always considered to be like terms with other constant terms.

Example: 8 and _____ are like terms

"Unlike" terms

Terms that do not share the characteristics of like terms.

Examples of pairs of *unlike* terms:

3x and 2y _____

18 and 3m _____

12ab and 5a _____

4x and $7x^2$ _____

$-a^2b$ and $8ab^2$ _____

Example:
Each set of terms contains two or more like terms. Identify the like terms.

a) $5b^2$ 3bc -2b 7c 6b

b) $3x^2$ 4xy $-2x^2$ $7x^2$ 0.5y

c) 3pq 11 $-4q^2$ -3 pq

You Try:

a) Give an example of 3 like terms

b) Identify the like terms in this list: 6t 3s $6t^2$ 6st -8s

Combining Like Terms

Algebraic expressions that contain like terms can be ***simplified*** by **<u>combining two or more like terms into one term</u>**.

Combining two or more like terms is done by simply _____ _____ (*using integer adding rules*) and keeping the variable portion unchanged.

5x and **9x** are like terms and can be combined.

Their coefficients are both positive, 5 and 9. Combining **5 + 9** gives us **14**.

Therefore, combining **5x** and **9x** we get _____

3b and **-8b** are like terms and can be combined.

One coefficient is positive, 3, and one coefficient is negative, -8. Combining **3 + (-8)** gives us **-5**.

Therefore, combining **3b** and **-8b** we get _____

$-6y^2$ and **$-3y^2$** are like terms and can be combined.

Their coefficients are both negative, -6 and -3. Combining **-6 + (-3)** gives us **-9**.

Therefore, combining **$-6y^2$** and **$-3y^2$** we get _____

Combining Like Terms to Simplify Algebraic Expressions

Rearrange the terms to group the like terms together. You must move the +/- signs that are in front of each term along with the term. Then, combine the like terms.

a) $4x - 2x + 3 - 6$

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

c) $4 - x^2 + 2x - 5 + 3x^2 - 2x$

Classifying polynomials:

In order to call an algebraic expression a "monomial" or "binomial" or "trinomial", etc., we first must make sure the expression does not contain any like terms.

Example:
4x + 8x has two terms but is **NOT** actually a binomial because these are like terms that can be combined into one term.

4x + 8x = 12x after combining like terms. This is a **monomial**.

In other words, a ***binomial*** is a polynomial made up of **TWO UNLIKE TERMS**.
And a ***trinomial*** is a polynomial made up of **THREE UNLIKE TERMS**.
Etc.

So when a problem asks you to "**classify**" a given polynomial, you must combine any like terms before you count the terms to classify the polynomial.

Example:
Combine like terms and then classify the polynomial that you have as a result.

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

b) $2x - 6 - 2x + 1$

Check your understanding: pg. 187 – 189, #7 – 12,