Topic :   ALGEBRA

Sub-Topic: LIKE AND UNLIKE TERMS

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Types of terms

LIKE
Same variables with Same powers

UNLIKE
Different variables (or) Same variables with different powers

7xy & 15xy
Same variables ✓
Power of each ✓
Like

$3x^2y$ & $3xy^3$
Same variables ✓
Power of x ✗
Unlike

Like Terms

"Like terms" are terms whose variables (and their exponents such as the (^{2})in (x^2) are the same.

Note: the coefficients (the numbers you multiply by, such as "5" in 5x) can be different.

Example: 7x   x   -2x

Are all like terms because the variables are all **x**

Example: $(\frac{1}{3})xy^2$ $-2xy^2$ $6xy^2$ xy^2

Are all like terms because the variables are all xy^2

Unlike Terms

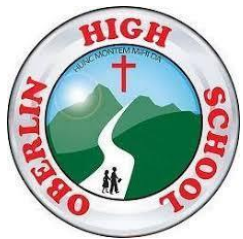If they are not like terms, they are called "Unlike Terms":

Unlike Terms   Why they are "Unlike Terms"

$-3xy$ $-3y$ $12y^2$ ← these are all unlike terms

                                                (xy, y and y^2 are all different)

Example: These are all Unlike Terms because the variables and/or their exponents are different:

2x $2x^2$ 2y   2xy

Mrs. S. Cole-Smith
Mathematics Educator

Like Terms: Terms that have identical variable parts (**same variable**(s) and **same exponent(s))**.

When simplifying using addition and subtraction, you combine "like terms" by keeping the "like term" and adding or subtracting the numerical coefficients.

Examples: $3x + 4x = 7x$ $13xy - 9xy = 4xy$ $12x^3 y^2 - 5x^3 y^2 = 7x^3 y^2$

| Like Terms	Unlike Terms	Why are they Unlike Terms?
$2x + 19x$	$2x + 19a$	The variables are different.
$4w - 10w$	$4w - 10w^2$	The exponents are different.
$14.2r - 12r$	$12r - 12s$	The variables are different.
$32a^2 + 9a^2$	$32a^2 + 9a^3$	The exponents are different.
$8y + 5y$	$8y + 5$	One term is a constant and the other has a variable.

Steps for Combining Like Terms

The steps for combining like terms are as follows.

To Combine Like Terms, follow these steps:

- **Identify the items which are "Like Terms"**

- **Rewrite the expression so that the like terms are all next to each other**

- **Combine the groups of like terms together to make a simplified shorter final answer**

  This last step involves adding or subtracting the like terms

Mrs. S. Cole-Smith
Mathematics Educator
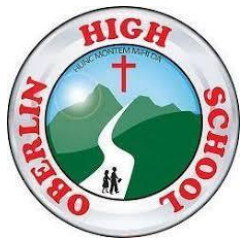
Like Terms – Example One

Simplify: **7mn – 2mn + 3mn**

7mn – 2mn + 3mn (three like terms)

= 5mn + 3mn

= 8mn

= **8mn** ✓

Like Terms – Example Two

Simplify : **4g + 3h + 2g + 3gh + 6hg**

4g + 3h + 2g + 3gh + 6gh   (6hg = 6gh)

= 4g + 2g + 3h + 3gh + 6gh

= 6g + 3h + 9gh

= 6g + 3h + 9gh ✓

Like Terms – Example Three

Simplify the expression: **4w + 3 + 2w - 1**

4w + 3 + 2w – 1 (Now Group Like Terms)

= 4w + 2w + 3 – 1 (Combine Like Terms)

= 6w + 2

= **6w + 2** ✓

Like Terms – Example Four

Simplify: $2a^3 - 10ab^2 + 3a^3 - ab^2 - 7$

$$2a^3 - 10ab^2 + 3a^3 - ab^2 - 7$$

$$= 2a^3 + 3a^3 - 10ab^2 - 1ab^2 - 7$$

$$= \quad 5a^3 \quad - \quad 11ab^2 \quad - 7$$

$$= \quad 5a^3 - 11ab^2 - 7 \checkmark$$

Like Terms – Example Five

Simplify the expression: $4a^2 + 3a + 5a^3 - 1$

The expression contains terms that are all different from each other.

The expression cannot be simplified any further.

$$4a^2 + 3a + 5a^3 - 1 \checkmark$$

Mrs. S. Cole-Smith
Mathematics Educator

WORKSHEET

Simplify the following

1. $3a + 4a$

2. $-12b + 6b - 4b$

3. $5a^2 - 6a + 7a^2 + 3a - 2 + 8a + 7$

4. $9x^3 - 7x^2 + 4x^2 - x + 4x^3 - 3x^2$

5. $2h^2 - 7h + 2h^2 - h + 6 + 4h - 9h$

6. $4ab - 6ab + 3a^2b + 4ab^2 + 5a^2b$

7. $7xy - 4x^2y^2 + 2xy^2 + 6xy + 3x^2y^2 - 7x^2y^2$

8. $4h^4j - 14h^3j^2 + 16h^2j^2 + 13h^4j + 15h^3j^2 - 17h^4j$

9. $8x^3y^2 - 7x^2y + 8x + 4 - 6x^3y^2 + 2x^2y + 4x^2y - 3x + 5$

10. $3r^3t + 5rt^2 - 6rt + 5 + 4rt - 3 + 6rt^2$

Maths is FUN

Department of Mathematics
Oberlin High School
Lawrence Tavern P.O.
LawrenceTavern,
St. Andrew
Jamaica, W.I.

Mrs. S. Cole-Smith
Mathematics Educator