Chapter 29

LIKE TERMS

A term is a number by itself or the product of a number and variable (or more than one variable).

EXAMPLES:

5 (a number by itself)
x (a variable)
$7y$ (a number and a variable)
$16mn^2$ (a number and more than one variable)

In an expression, terms are separated by an addition calculation, which may appear as a positive or negative sign.

EXAMPLES:

$5x + 3y + 12$ (The terms are $5x$, $3y$, and 12.)
$3g^2 + 47h - 19$ (The terms are $3g^2$, $47h$, and -19.)

ALTHOUGH THIS MAY LOOK LIKE A SUBTRACTION SYMBOL, YOU'RE ACTUALLY ADDING A NEGATIVE NUMBER.

We **COLLECT LIKE TERMS** (also called **COMBINING LIKE TERMS**) to simplify an expression—meaning, we rewrite the expression so that it contains fewer numbers, variables, and operations. Basically, you make it look more "simple."

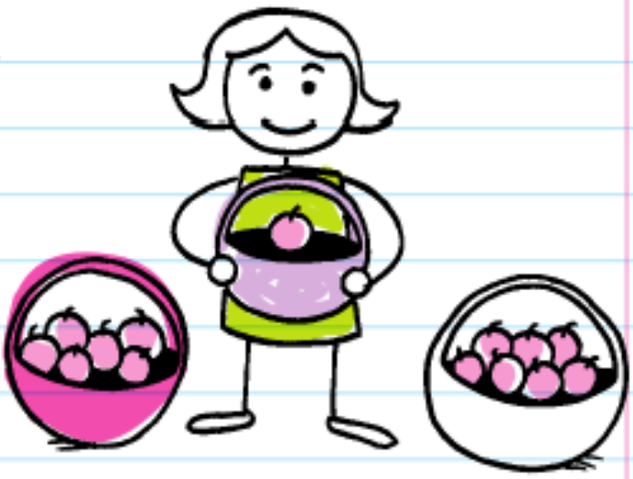
EXAMPLE: Denise has 6 apples in her basket. Let's call each apple "a."

We could express this as $a + a + a + a + a + a$, but it would be much simpler to write $6a$. When we put $a + a + a + a + a + a$ together to get $6a$, we are collecting like terms. (Each term is the variable a, so we can combine them with the coefficient of 6, which tells us how many a's we have.)

When combining terms with the same variable, add the coefficients.

EXAMPLE:

Denise now has 6 apples in her pink basket, 1 apple in her purple basket, and 7 apples in her white basket.



We could express this as $6a + a + 7a$ but it would be much simpler to write $14a$.

A variable without a coefficient actually has a coefficient of 1. So "m" really means "$1m$" and "k^3" really means "$1k^3$." (Remember the identity property of multiplication!)

EXAMPLE: $9x - 3x + 5x$

(When there is a "−" sign in front of the term, we have to subtract.)

$9x - 3x + 5x = 11x$

If two terms do NOT have the exact same variable, they cannot be combined.

EXAMPLE: $7m + 3y - 2m + y + 8$

(The $7m$ and $-2m$ combine to make $5m$, the $3y$ and y combine to make $4y$, and the constant 8 does not combine with anything.)

$7m + 3y - 2m + y + 8 = 5m + 4y + 8$

REMEMBER: A term with a variable cannot be combined with a constant.

$3ab$ can combine with $4ba$, because the commutative property of multiplication tells us that ab and ba are equivalent!

When simplifying, we often put the term with the greatest exponent first, and we put the constant last. This is called **DESCENDING ORDER**.

> Also, mathematicians tend to put their variables in alphabetical order!

EXAMPLE: $7m^2 + 2m - 6$

> In order to combine like terms, the variables have to be exactly the same. So, $4y$ cannot combine with $3y^2$ because $3y^2$ really means $3 \cdot y \cdot y$, so the terms are not alike.

Sometimes, we need to use the distributive property first and then collect like terms.

EXAMPLE: $3x + 4(x + 3) - 1$

$3x + 4(x + 3) - 1$ First, use the distributive property to catapult the 4 over the parentheses.

$= 3x + 4x + 12 - 1$ Next, collect like terms.

$= 7x + 11$ This is as simple as you can make this expression!

CHECK YOUR KNOWLEDGE

For **1** through **3**, list the terms in each expression.

1. $4t^3 + 9y + 1$
2. $11gh - 6t + 4$
3. $z + mn - 4v^2$

For **4** through **5**, list the coefficients and the constant in each expression.

4. $2m^5 + 3y - 1$
5. $19x^5 - 55y^2 + 11$

For **6** through **10**, simplify each expression.

6. $7x + 11x$
7. $12y - 5y + 19$
8. $3t + 6z - 4t + 9z + z$
9. $19mn + 6x^2 + 2nm$
10. $5x + 3(x + 1) + 2x - 9$

ANSWERS

CHECK YOUR ANSWERS

1. $4t^3$, $9y$, 1
2. $11gh$, $-6t$, 4
3. z, mn, $-4v^2$
4. Coefficients: 2, 3; Constant: -1
5. Coefficients: 19, -55; Constant: 11
6. $18x$
7. $7y + 19$
8. $-t + 16z$
9. $6x^2 + 21mn$
10. $10x - 6$