Online Math Center

SIMPLIFYING EXPRESSIONS

An expression is a group of letters, numbers, and math symbols without any equals sign.
It can be a single letter or number, or it can be a long combination of letters and numbers.
The parts of the expression separated by the plus or minus signs are called terms.

Example:

$3x + 2y + 6$ is an expression. It has three terms.

$5xy^2 - 2x^3y^4 - 7xy + 6xy^2 - 12$ is an expression with five terms

7 is also an expression. It is a single term.

Each term has a number in front of it. The number is called a coefficient.

Example:

$$9x^2 + 2y - 14$$

This is a three termed expression. The coefficient of the first term is 9, the coefficient of the second term is 2, and the last term, -14 , is called a constant since it is by itself with no variable next to it.

To simplify an expression means to gather together all of the terms that look ***exactly alike*** and combine their coefficients.

"Like terms" must look ***exactly alike.***

Example:

$3x$ and $5x^2$

Both have an "x" in them, but they are not exactly alike.
One "x" is squared and the other is not.
They ***can not*** be combined.

Example:

$4x^3$, $5x^3$, and $-2x^3$

These ***are*** exactly alike. All three have an "x" which is cubed.
These **can be** combined.

To simplify an express means to combine like terms. In other words, gather together terms that look exactly alike and combine (add or subtract) their coefficients.

Example:

Simplify $3x^2 + 5x - 2 + 4x - 2x^2 + 8 - 2x$

This is a seven termed expression.
There are three types of terms: some with x^2, some with "x", and some which are constants.

$$3x^2 + 5x - 2 + 4x - 2x^2 + 8 - 2x$$

Gather together terms that look alike:

$$3x^2 - 2x^2 + 5x + 4x - 2x - 2 + 8$$

and combine (add or subtract) their coefficients:

$$(3 - 2)\,x^2 + (5 + 4 - 2)\,x - 2 + 8$$
$$1x^2 + 7x + 6$$

The x^2, the $7x$, and the 6 are three terms of the new expression.
They ***do not*** look exactly alike, so they can not be combined.
The original seven termed expression has been simplified to a three termed expression.

Three more examples:

Example 1.
Simplify the expression:

$13w + 4(4 - 5w)$	
$= 13w + 4(4) + 4(-5w)$	Use the distributive law.
$= 13w + 16 - 20w$	Review your signs with multiplication.
$= 13w - 20w + 16$	Get together like terms.
$= -7w + 16$	Arithmetic: 13 - 20 is -7.

This is a two termed expression, but the terms are not alike. We can not combine them.
So the original expression is simplified.

Example 2.
Simplify the expression:

$-3(2t + 4) + 8(2t - 4)$	Distributive law
$= -3(2t) - 3(4) + 8(2t) + 8(-4)$.	
$= -6t - 12 + 16t - 32$	Group like terms.
$= -6t + 16t - 12 - 32$	Arithmetic: -6 + 16 = 10
$= 10t - 44$	and -12 -32 = -44

This is a two termed expression with unlike terms.
The original expression has been simplified.

Example 3.
Simplify the expression:

$$
\begin{aligned}
& 5(2x^3 + 3x^2 + 1) + 2(-2x^3 + 5x^2 - 1) \\
= \; & 5(2x^3) + 5(3x^2) + 5(1) + 2(-2x^3) + 2(5x^2) + 2(-1) \\
= \; & 10x^3 + 15x^2 + 5 - 4x^3 + 10x^2 - 2 \\
= \; & 10x^3 - 4x^3 + 15x^2 + 10x^2 + 5 - 2 \\
= \; & 6x^3 + 25x^2 + 3
\end{aligned}
$$

The three termed expression with unlike terms is the answer.