Order of Operations and Absolute Value

Levels of Math

When solving an algebraic equation with several different operations (addition, subtraction, multiplication, division, and exponents), there is an order that determines which operation to do first. This order is related to the four levels of math.

> **Level 1** - Counting
> **Level 2** - Fast counting, or instant counting, is adding,
>   and the inverse of adding is subtracting.
> **Level 3** - Fast adding of the same number is multiplying,
>   and the inverse of multiplying is dividing.
> **Level 4** - Fast multiplying of the same number is exponents,
>   and their inverse, roots.

When systematically solving an equation, go in order with the highest level first and then sequentially to the lower levels. First exponents, then multiplying, and then adding. Before you get to the operations themselves, make sure that all the parentheses have been taken care of first.

Order of Operations

A fun way to remember this is to think of your. . . **PARA**chute **EX**pert **M**y **D**ear **A**unt **S**ally.

Parenthesis - Parachute
Level 4) **E**xponents - Expert
Level 3) **M**ultiply and **D**ivide - My Dear
Level 2) **A**dd and **S**ubtract - Aunt Sally

When you have two operations on the same level such as adding and subtracting, proceed from left to right in the natural order of the equation. This is illustrated in the third line of the first example.

Example 1

$$(4 \times 3) + 4^2 - 6 =$$ PARAchute – parentheses

$$12 + 4^2 - 6 =$$ EXpert – exponents

$$12 + 16 - 6 = 22$$ Adding and Substracting from left to right

Sometimes parentheses are added to organize and group the same kinds of things.

Example 2

First, group terms according to their kind.

$$5A + 3 + 4A + 2 - 5 - A + 1$$
$$(5A + 4A - A) + (3 + 2 - 5 + 1)$$
$$8A + 1$$

Absolute Value

Absolute value signs make the final result of the operations between them positive. When deciding on the order of operations, treat absolute value bars like parentheses.

$|-3| = 3$ The absolute value bars make negative three positive.

$|3| = 3$ The absolute value bars leave positive three unchanged

$-|-3| = -3$ The absolute value bars make negative three positive. Then the negative sign takes effect, and the answer is a negative three.

$-|3| = -3$ The absolute value bars leave positive three unchanged. Then the negative sign takes effect, and the answer is a negative three.