Online Math Center

EXPRESSIONS and EQUATIONS

As you study mathematics, it will be very important to distinguish between an expression and an equation. You solve an equation but simplify an expression.

Expression: an expression is a collection of math symbols with no equals sign.
The math symbols might include numbers, variables (letters), operation symbols (+, - , *, /, or ^), and such grouping symbols as parentheses ( ), brackets [ ], or braces { }.

Some examples of expressions:
(notice that they do ***NOT*** equal anything).

$$(3x - 2) * 4 [2^3 - 2(x - 1)]$$

$$\frac{9x - 1}{4x + 7}$$

$$\pi(y) + 2e^{\pi\iota}$$

We simplify expressions.

To simplify means to "do arithmetic, perform algebra" until there is nothing more to do.

Example,

Simplify the expression: $5(3x + 2) - 2(x + 1)$

distribute: $5(3x) + 5(2) - 2(x) - 2(1)$

multiply: $15x + 10 - 2x - 2$

combine like terms: $15x - 2x + 10 - 2$

the answer: $13x + 8$

Notice that we have ***not*** tried to find what "x" equals.
There is ***no*** equals sign in the original problem.

Also see a related topic: **order of operations**

Equation: an equation is formed when two expressions are equal.
An equation has three parts to it:

The Left Side (an expression)	An Equals Sign	The Right Side (another expression)
$3x + 2$	$=$	8

Some examples of equations:

$$7x - 25 = 2x + 15$$

$$\frac{2x - 1}{5x + 4} = \frac{3x + 2}{1x - 3}$$

$$\sin^2(x) + 2\sin(x) + 1 = 0$$

To solve an equation means to use algebraic rules which allow you to find the value(s) for the variable (the letter) which will make the original equation true.

Example,

solve: $3x - 2 = 1x + 6$

subtract "1x" from each side: $3x - 1x - 2 = 1x - 1x + 6$

$$2x - 2 = 0 + 6$$

add "2" to both sides: $2x - 2 + 2 = 6 + 2$

$$2x = 8$$

divide both sides by 2: $\frac{2x}{2} = \frac{8}{2}$

the answer: $x = 4$

We have found what value of "x" will make the equation $3x - 2 = 1x + 6$ true.

To check the solution, replace "x" by the "4" and see if a true statement is formed.

$$3x - 2 = 1x + 6$$
$$3(4) - 2 = 1(4) + 6$$
$$12 - 2 = 4 + 6$$
$$10 = 10$$

Ten equals ten is a "true" statement. The solution worked!