Study Guide

Expressions Evaluating and Simplifying
03/01/2012

Expressions: Evaluating & Simplifying
Expressions look like equations except expressions do not have equal (=) signs. Expressions are "evaluated" or "simplified," not "solved."

To evaluate and simplify expressions with brackets and parentheses, use the rules regarding Order of Operations, Integer Properties, and Evaluating.
Here is the order of operations:

(1) Parentheses, Brackets, and Braces
(2) Exponents or Roots
(3) Multiply or Divide in order from left to right
(4) Add or Subtract in order from left to right

The order of operations is the same whether you are working with whole numbers, fractions, or decimals. Here are a few helpful hints for using the order of operations. First, remember to complete all operations of one type before moving on to the next type (for example, complete all multiplication and division before moving on to addition or subtraction). Second, remember that when working the multiplication or division move from the left to the right (for example, 2 x 6 ÷ 3. In this case, you would multiply first because the multiplication is the first operation when reading from the left to the right). Finally, addition and subtraction work the same way as multiplication and division - from the left to the right (for example, 10 - 6 + 2. In this case, you would subtract 6 from 10 first, then add the 2).

Evaluating an expression can occur in two ways. If the expression contains only operations and numbers, simply perform the indicated operations, observing the correct order. If the expression contains variables as well, number values will have to be substituted for each variable, and then simplified using the correct order of operations.

Example 1: Evaluate $3x + 2$ if $x = -2$

(1) $3(-2) + 2$
(2) $-6 + 2$
(3) -4

Step 1: Substitute -2 into the expression in place of the x's.
Step 2: Use the order of operations and multiply 3 and -2 first.
Step 3: Complete the addition.

Some expressions may have two variables. If values are given for both variables, substitute each value into their respective variable within the given expression.

Example 2: Evaluate $3(x - 3y)$ if $x = -2$ and $y = 2$

(1) 3(-2 - 3(2))
(2) 3(-2 -6)
(3) 3(-8)
(4) -24

Step 1: Substitute the values of x and y into the expression.
Step 2: Perform the multiplication that is within parentheses first.
Step 3: Subtract the numbers inside the parentheses.
Step 4: Multiply to complete the problem.

Example 3:

Evaluate [3+2(-4y + 2x)] - 5x if x = -1 and y = 1.

Step 1 [3 + 2(-4 + -2)] + 5
Step 2 [3 + 2(-6)] + 5
Step 3 [3 - 12] + 5
Step 4 [-9] + 5

Step 1: Substitute the values given for x and y wherever x and y are in the expression.
Step 2: Simplify within the parentheses.
Step 3: Multiply within the brackets.
Step 4: Add within the brackets.

Answer: -4