

Enrichment



Lesson: Evaluating Algebraic Expressions

Sixth Grade Objective: 5.02 Use and evaluate algebraic expressions.

Lesson

In algebra letters can stand for numbers. When you substitute a specific value for each variable, and then perform the operations, it's called **evaluating** the expression

A variable, such as x , is a kind of blank or empty symbol. It is therefore available to take any value we might give it: a positive number or a negative number; a whole number or a fraction.

Simply rewriting the expression, replacing the letter variables by the given numbers, then evaluate the expression carrying out the operations in the correct order (Parentheses, Exponents, Multiplication, Division, Addition and Subtraction).

To evaluate an algebraic expression means to:

- replace the variable(s) in the expression with numeric values that are assigned to them, and
- simplify the resulting numeric expression by using the http://www.math.unt.edu/mathlab/emathlab/order_in_which_mathematical_oper.htm
- the end result is the numeric value of the expression when the variable(s) take on the assigned values.

Example:

Evaluate $3(x^2 + 4x) - 3y$, given that $x = 2$ and $y = 5$

First, put 2 in the expression wherever 'x' appears, and put 5 in the expression wherever 'y' appears, and the result is:

$$3(2^2 + (4)2) - 3(5)$$

Next, simplifying using the *order of operations*

First the parentheses:

$$3(4 + 8) - 3(5) = 3(12) - 3(5)$$

Next, multiply

$$3(12) - 3(5) = 36 - (15)$$

Finally, subtract

$$36 - (15) = 21$$

Look at the table. The left column shows the value of 'x' and the right column shows the value of the expression when evaluated.

$x =$	x^2
1	1
2	4
3	9
4	16
5	25

This is considered the 'rule'...what you are supposed to do to the variable

We evaluated the expression, or rule, to fill in the chart

What would happen if you did not know the rule? Let's look at an example. Find the rule:

$x =$?
1	2
2	4
3	6
4	8

To find the rule, look at the pattern of the values once evaluated. Each value of 'x' was plugged into the same rule or expression.

Each value was doubled. The rule would be:

$$2x$$

Try these on your own!

Evaluate the expression to find the missing values in the table

1. Evaluate the expression $5(x + 8) + x + y$, given that $x = 3$ and $y = 30$

2. Find the rule used

$x =$?
1	6
2	7
3	8
4	9

3. Find the rule used

$x =$?
2	6
3	9
4	12
5	15
6	18

Check your answers!

1. Evaluate the expression $5(x + 8) + x + y$, given that $x = 3$ and $y = 30$

- First, rewrite the problem replacing the variables in the expression with the numeric values that are assigned to them.

$$5(3 + 8) + 3 + 30$$

- Next, the parenthesis

$$5(11) + 3 + 30$$

- Next, multiply

$$55 + 3 + 30$$

- Add from left to right

$$55 + 3 + 30 = \mathbf{88}$$

2. The rule is $x + 5$

3. The rule is $3x$

Quiz Yourself

1. Find the rule used

$x =$?
2	1
4	2
6	3
8	4
10	5
12	6
14	7
16	8

2. Evaluate the expression $5(x + 2) + x^2 + y$, given that $x = 4$ and $y = 6$

3. Evaluate the expression again $5(x + 2) + x^2 + y$, given that $x = 5$ and $y = 8$

Check Your Answers

- The rule is $x/2$ or $x \div 2$
- Evaluate the expression $5(x + 2) + x^2 + y$, given that $x = 4$ and $y = 6$
 - First, rewrite the problem replacing the variables in the expression with the numeric values that are assigned to them.
$$5(4 + 2) + 4^2 + 6$$
 - Next, the parenthesis
$$5(6) + 4^2 + 6$$
 - Next, the exponent
$$5(6) + 16 + 6$$
 - Next, multiply
$$30 + 16 + 6$$
 - Finally add from left to right
$$30 + 16 + 6 = \mathbf{52}$$
- Evaluate the expression $5(x + 2) + x^2 + y$, given that $x = 5$ and $y = 8$
 - First, rewrite the problem replacing the variables in the expression with the numeric values that are assigned to them.
$$5(5 + 2) + 5^2 + 8$$
 - Next, the parenthesis
$$5(7) + 5^2 + 8$$
 - Next, the exponent
$$5(7) + 25 + 8$$
 - Next, multiply
$$35 + 25 + 8$$
 - Finally add from left to right

$$35 + 25 + 8 = \mathbf{68}$$