

Algebra/Geometry Institute Summer 2005

Lesson Plan 3: Order of Operation

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School: Friars Point Elementary
Grade Level: 5th Grade



1 Teaching objective: The students will demonstrate how to evaluate expressions using order of operations.

2 Instructional Activities

- ❖ The teacher will begin class by telling the students that variables are used in expressions to represent an unknown value.
- ❖ The teacher will give examples of expressions.
Examples: $7x$ $9y$ $10x^2$ $3w$
- ❖ The teacher will tell the students that the expressions may be evaluated by replacing the variable with a number and using the rules of the order of operations.
- ❖ The teacher will list the rules for the orders of operations on the dry erase board and give examples of each rule.

Rules of Orders of Operations

1. Perform operations within parenthesis.

Examples: (3×2) $(2+6)$ $(9-2)$

2. Evaluate operations that have exponents.

Examples:

$$2^5 \rightarrow 2 \times 2 \times 2 \times 2 \times 2 = 32$$

$$7^2 \rightarrow 7 \times 7 = 49$$

$$4^3 \rightarrow 4 \times 4 \times 4 = 64$$

$$9^4 \rightarrow 9 \times 9 \times 9 \times 9 = 6561$$

3. Multiply or divide in order from left to right.

Examples:

$$21 \div 3 \times 2 \div 2 \rightarrow 7 \times 2 \div 2 \rightarrow 14 \div 2 \rightarrow 7$$

$$9 \times 2 \div 6 \times 4 \rightarrow 18 \div 6 \times 4 \rightarrow 3 \times 4 \rightarrow 12$$

4. Add or subtract in order from left to right.

Examples:

$$7+3-2+4 \rightarrow 10-2+4 \rightarrow 8+4 \rightarrow 12$$

$$7+11-3+2-6 \rightarrow 18-3+2-6 \rightarrow 15+2-6 \rightarrow 17-6 \rightarrow 11$$

- ❖ The teacher will give more examples of expressions telling the students the value of the variable.

Examples:

$$9z + 3(z^2-2) \quad z=10$$

$$9 \times 10 + 3(10 \times 10 - 2) \rightarrow$$

$$90 + 3(100-2) \rightarrow 90 + 3 \times 98 \rightarrow 90 + 294 \rightarrow 384$$

$$x \div 3 + 4x^2 - 2x \quad x = 9$$

$$9 \div 3 + 4(9 \times 9) - 2 \times 9 \rightarrow 3 + 4 \times 81 - 18 \rightarrow 3 + 336 - 18 \rightarrow 321$$

- ❖ The teacher will tell students to create five expressions.
Guidelines for Creating Expressions
 1. Use at least three operations.
 2. Use one exponent.
 3. Use a set of parentheses.
 4. Use at least one variable.
 5. Give the value of the variable(s).
- ❖ After creating the expressions, the students will exchange papers with another student. The other student will evaluate the expressions on the paper.
- ❖ The teacher will ask each student to demonstrate the process used to evaluate the created expression on the dry erase board.
- ❖ The teacher will give the students an activity that involves matching the expression with the result obtained after evaluating the expression.

3 Materials and Resources

Pencil

Paper

Math On Call, Great Source Education Group, Inc., 1998, p. 205-209

4 Assessment

The teacher will assess the students by grading the expressions activity, and by observing the student's demonstration of solving the expressions on the board.

Expressions

Match the expressions with the correct corresponding result by evaluating the expression and putting the correct alphabet in the blank.

<i>Expressions</i>	<i>Corresponding Result</i>
_____ 1. $7s + 9 - 2$ $s = 11$	a. 194
_____ 2. $11b \div 2 + b \times 3$ $b = 4$	b. 50
_____ 3. $9x + 7(10 \div x) - 3$ $x = 2$	c. 1,112
_____ 4. $d^3(10 - d) + d^2 - 4$ $d = 3$	d. 84
_____ 5. $5y^2 - (y + 2)$ $y = 15$	e. 116
_____ 6. $14x + 2x - 5 + 7(x+1)$ $x = 6$	f. 95
_____ 7. $2t(6t^2 - 4) + 11t - 7$ $t = 2$	g. 34

Answer Key for Expression Activity

1. d. 84
2. g. 34
3. b. 50
4. a. 194
5. c. 1,112
6. e. 116
7. f. 95