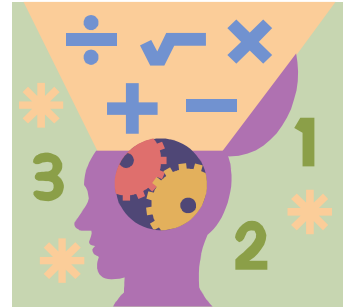


Algebra/Geometry Institute Summer 2010

Faculty Name: Christopher McCoy

School: West Bolivar High School
Rosedale, MS

Grade Level: 8th Grade



1. Teaching objective(s)

- Students will solve mathematical problems involving the order of operations.
 - **Pre-Algebra Number and Operations (Mathematics Framework)**
 1. Apply concepts and perform basic operations using real numbers in real-world contexts.
 - ∞ d. Simplify and evaluate expressions using order of operations and use real number properties to justify solutions.
 - **Institute Content Based**
 - IV. Develop and apply the basic operations of rational numbers to algebraic and numerical tasks.
 - ∞ c. Model order of operations to simplify and/or evaluate numerical and algebraic expressions.

2. Instructional Activities

- The teacher will begin the lesson by allowing the students to give the rules for the order of operations (both standard and those involving grouping symbols).
 - **Standard Order of Operation Rules:**
 - ∞ 1. Find the value of any powers.
 - ∞ 2. Multiply and divide in order from left to right.
 - ∞ 3. Add and subtract in order from left to right.
 - **Order of Operations When Grouping Symbols Are Used**
 - ∞ 1. Do all operations within parentheses first. (Follow the rules above within the parentheses.)
 - ∞ 2. If parentheses are contained within parentheses, start with the innermost group and work outward.

- ∞ 3. If an expression is written in fractional form using a division bar, do all operations above and below the division bar before dividing.
 - ∞ 4. Always use *Standard Order of Operations Rules* within grouping symbols whenever necessary.
- Students will complete an activity involving the order of operations.
 - Activity – Students will play “Math Jeopardy”. The rules are as follows:
 - ∞ Students will be placed in groups of four.
 - ∞ A grid will be drawn showing the categories of the problems. Each problem (block of the grid) will be worth points. The more difficult the problem, the more points it will be worth.
 - ∞ As each problem is chosen, the category from which the problem is chosen will be marked off the grid.
 - ∞ The teacher will give the problem and the students will need to solve the problem and give the answer.
 - ∞ Students will raise their hands when they’ve solved the problem. The group that has a member raise his/her hand the quickest will be allowed the first attempt at giving the solution. The student answering must give the solution in the form of a question. (If the answer is 20. The solution will be given in the following form - “What is 20?”)
 - ∞ The group with the most points at the end of the game wins. The group that wins will receive 5 bonus points towards their test grade.

3. Materials and Resources

- http://www.mathgoodies.com/lessons/vol7/order_operations.html
- <http://www.purplemath.com/modules/orderops.htm>
- Worksheet
- Chalk
- Chalkboard

4. Assessment

- Answer Key, Oral Answers from Students, Observe Students

Problems With Single-Digit Answers	Problems With Double-Digit Answers	Problems With Triple-Digit Answers	Problems Involving Grouping Symbols
2	2	2	2
4	4	4	4
6	6	6	6
8	8	8	8

MATH JEOPARDY

Problems for Math Jeopardy Activity

Single-digit answer problems

1. $4 + 3 \times 2 - 5$ (2 points)
2. $3^2 + 4^2 - 5^2$ (4 points)
3. $\sqrt[3]{27} - \sqrt[3]{9} + 3$ (6 points)
4. $2 \times 5(2) - 3(5) + 2 - 5$ (8 points)

Double-digit answer problems

5. $7 \times 8 - 3 \times 4 + 6$ (2 points)
6. $1 + 2^2 + 4^2 - 3^2$ (4 points)
7. $3^2 + \sqrt[3]{27} - \sqrt[3]{8}$ (6 points)
8. $4 + 5(3) - 2(4) + 6 \times 3$ (8 points)

Triple-digit answer problems

9. $4^2 + 3^4 + 2^3$ (2 points)
10. $4 + 15(6) + 4 \times 6$ (4 points)
11. $3 + 72 \times 5 - 7$ (6 points)
12. $6 \times 2 + 18 \times 7 - 4(3)$ (8 points)

Grouping symbol problems

13. $4(6 - 2 + 1) + 3^2 - (2 \times 1)$ (2 points)
14. $17 - 2[(6 - 4)(7 - 3) - 7]$ (4 points)
15. $3^2 + 2[(7 + 1)(7 - 5) - 12]$ (6 points)
16. $3^3 + 2^2[2(\sqrt[3]{27})(2 - 1) - (2 + 3)]$ (8 points)

Problems for Math Jeopardy Activity (Answer Key)

Single-digit answer problems

1. $4 + 3 \times 2 - 5 = 5$ (2 points)
2. $3^2 + 4^2 - 5^2 = 0$ (4 points)
3. $\sqrt[3]{27} - \sqrt[3]{9} + 3 = 3$ (6 points)
4. $2 \times 5(2) - 3(5) + 2 - 5 = 2$ (8 points)

Double-digit answer problems

5. $7 \times 8 - 3 \times 4 + 6 = 50$ (2 points)
6. $1 + 2^2 + 4^2 - 3^2 = 12$ (4 points)
7. $3^2 + \sqrt[3]{27} - \sqrt[3]{8} = 10$ (6 points)
8. $4 + 5(3) - 2(4) + 6 \times 3 = 29$ (8 points)

Triple-digit answer problems

9. $4^2 + 3^4 + 2^3 = 105$ (2 points)
10. $4 + 15(6) + 4 \times 6 = 118$ (4 points)
11. $3 + 72 \times 5 - 7 = 356$ (6 points)
12. $6 \times 2 + 18 \times 7 - 4(3) = 126$ (8 points)

Grouping symbol problems

13. $4(6 - 2 + 1) + 3^2 - (2 \times 1) = 27$ (2 points)
14. $17 - 2[(6 - 4)(7 - 3) - 7] = 15$ (4 points)
15. $3^2 + 2[(7 + 1)(7 - 5) - 12] = 17$ (6 points)
16. $3^3 + 2^2[2(\sqrt[3]{27})(2 - 1) - (2 + 3)] = 31$ (8 points)