



## Algebra/Geometry Institute Summer 2003

### Lesson Plan 1

**Faculty Name:** Cheryl Marshall

**School:** Broad Street

**City:** Shelby, MS

**Grade Level:** 6<sup>th</sup> - 8<sup>th</sup>

- 1 Teaching objective(s)  
Evaluate expressions using order of operations.

Use the distributive property to evaluate expressions.

- 2 Instructional Activities

The teacher will differentiate between numerical and algebraic expressions, both verbally while modeling examples using the order of operations. Discussion will occur about numerical expressions containing only numbers while algebraic expressions contain one or more alphabets and that these alphabets are called variables. Examples will be shown on the board, such as  $8 + 4$ ,  $x + 10$ ,  $a - b + 7$ ,  $6^3 \div (2 \cdot 9)$ , etc. Students will then be asked when given an expression to classify it as numerical or algebraic.

The teacher will explain that when you evaluate an expression, you need to follow an order of operations. Introduction of the rules for order of operations will then take place. An example will be modeled on the board such as, evaluate  $(9 + 6) \div 5 \cdot 4 + (2^3 - 3)$ . Another example will be placed on the board. Students will be asked to explain the correct order in which to evaluate that expression.

The teacher will discuss and review some common errors students may make such as remembering operations within parenthesis must be done first and that exponents show how many times the base must be multiplied - not to multiply the base times the exponent.

Students will practice simplifying expressions such as  $(5 + 2) \div 7 + 9 \cdot 0.5 - 3$ ,  $8 + 1 - 10 \div 4 - 12 \div 4$ , etc.

The teacher will demonstrate the definition of the distributive property. The teacher will role-model examples of how the distributive property works using the example:

$6(10 + 7)$ ,  $4(2n + 2)$ , and  $2(a + b + 4c)$ .

Have students practice using the distributive property. Students will show the distribution process by drawing arrows from the number outside the parentheses to each number or variable inside the parentheses.

Have students practice simplifying expressions using the distributive property. Examples:  $13(10 - 7)$ ,  $(5 + n)3$ ,  $5(6m + 4n - 3n)$ .

The teacher will give the expression  $6(10 + 7)$ . Students will be asked to explain why  $6(10 + 7)$  and  $6 \times 10 + 7$  are not equivalent, but  $6(10 + 7)$  and  $6 \times 10 + 6 \times 7$  are. Guided questions will be given to help students evaluate this expression, such as, do you think there can be two answers? Why are the rules for the order of operations necessary?

The teacher will review and demonstrate the rules for using the order of operations, now including expressions using the distributive property and examples such as,  $(60 - 20) \div 4 + 2(3 + 6)$ ,  $(5^2 + 3) \div 3(18 - 7)$ , etc.

Give the mnemonic "Please Excuse My Dear Aunt Sally". Have students create a mnemonic using vocabulary meaningful to them.

Have students practice simplifying expressions using the order of operations. Students will be asked to circle the operation they need to do first. Then the next, then the next, until the problem is solved.

Prepare a set of seven or more cards with four of the cards being the four basic operations and the remaining cards in numbers. For each group, have students arrange the number cards in random order or give them a specified order. Then direct them to use two or three operation cards to form expressions. Then add an exponent card. Again ask students to create expressions. Have students simplify their expressions. Provide students with calculators to check answers.

Provide students with real-life problems such as: How can a monthly salary of  $\frac{1}{4}$  of sales plus \$500 be interpreted? How do the parentheses help find the

Celsius temperature  $C = \frac{5}{9}(F-32)$ ?

### 3 Materials and Resources

Resource textbooks, pen, pencil, calculators, flashcards.

Ideas and activities adapted from the following resource texts:

Glencoe, Mathematics: Applications and Connections, Course 3, pages 11-15, @ 2001.

Prentice Hall, Middle Grades Math: Tools for Success, Course 2, pages 84-89, @ 2001.

McGraw, Mathematics: Connections, Level 7, pages 221-222, @ 2001.

### 4 Assessment

Have students form small groups. Students will be given an expression with at least three operations to write. One student writes the first step in words. The next student does the 1st step and writes the second step in words. Students keep taking turns until the problem is simplified and there is a description for each step.

Performance tasks, observation, writing, portfolio, grading, tests.