Algebra/Geometry Institute Summer 2003

Lesson Plan One

Faculty Name: Joanna Dickison
School: Olive Branch Middle School
City: Olive Branch, MS
Grade Level: 8th Grade Math

1   Teaching objective(s)

The students will simplify expressions using order of operations.

2   Instructional Activities

➢ The students will begin class by completing a problem of the day in their journals, where they will solve the problem and write a paragraph describing the steps they took to find the solution. Because my school's schedule is based on a modified block schedule, I always choose problems that reinforce what the students learned the last time they were in my classroom (which is 48 hours).

Write on the board (or overhead) the following problem: "Solve for x in the following 2-step equation in your journals, then write a paragraph describing each step and <u>why</u> it was taken." $3x + 2 = 14$

Once the students have wrapped up their thoughts, two may volunteer to share their findings with the rest of the class. (8-10 minutes)

➢ The teacher will then pass out handouts to groups of four students containing the following problem:

John and Linda are on a date. They each ordered a hamburger and a shake for dinner, but John also got an order of fries.   Then they attended a movie, where they shared a soft drink and a large order of popcorn. If they started out the evening with $50, how much did they have when the date was over?

Item	Cost of each item
Hamburger	$3.25
Order of Fries	1.50
Shake	2.75
Movie Tickets	7.50
Soft Drink	3.50
Popcorn	4.00

Read the problem aloud, and instruct the students to begin working it out with their groups. (3 minutes)

o As the students work out the problem, the teacher should circulate through the groups, not correcting their work, but observing their work, so the teacher can know what to focus on if there are errors. The teacher should also look for a group that was solving their problem correctly so they may present their work to the class. (7 minutes) After students have worked out the problem, the teacher will ask each group what their amount of money left over was. Then the group who did the problem correctly may "publish" their work on the overhead. (The correct answer is $14.00.) (4 minutes)

o Then the teacher should initiate a classroom discussion with questions as to why each group solved the problem in the way they did. Most information and discussion should come from the students, with the teacher offering guidance in the form of directing questions. The conversation should end with the students realizing they already know and practice some of the rules of order of operations. (5-9 minutes)

➤ At this point, the students will get out their notes, and the teacher will write the following information on the overhead for the students to copy: (7-9 minutes)

o PEMDAS
o Then the teacher will explain that these letters stand for "Pink Elephants Marched Down A Street." (Write this sentence on the overhead.) The sentence serves as an acronym to help us remember the order of operations. (Write the following on the overhead, too.) The P stands for Parenthesis, because we always do what is inside parentheses first. The E stands for exponents. This is the second step. The M and D stand for Multiplication and Division, respectively. They are the third step. It is important to bring out the fact that we must do all multiplication and division <u>from left to right</u>. The A and S stand for Addition and Subtraction, which also must be completed <u>from left to right</u>.
o Then, the teacher should write the letters in a vertical line, with the steps numbered, like this:
  - P arenthesis
  - E xponents
  - M ultiplication   D ivision
  - A ddition   S ubtraction

  Hopefully, this will help students to see that multiplication and division are part of the <u>same step</u>, as are addition and subtraction.

o Now, do a sample problem with the students, $2^2 + 12 \div (3 \times 2) - 5$, modeling the correct method for evaluating using order of operations. (The answer will be 1.) (2-3 minutes)

➢ Assign students 7 or 8 problems (see examples below) to work on in groups from their textbook. Circulate and observe students who are working, and assist those who may be doing it incorrectly. (12-16 minutes)

    1. $5^2 + 8/2$ 2. $12 + 5 \times 4 + 3$ 3. $(6+3)/3+2$

➢ Have students return to their original seats and inform them that they will have an independent assignment to complete. You may hand out a teacher-created activity sheet, assign them something from their textbooks, or photocopy something from a resource you may have found, but the problems should be similar to the ones the students worked with in their groups. I would limit the number of problems to 10.

3   Materials and Resources

Materials:

    Overhead projector
    Journals
    Pencils
    Handouts with John/Linda Problem (Enough for each group)
    Textbooks
    Notebook Paper

Resources:

    Cavanagh, Mary C. "Order of Operations." <u>Math To Know: A Mathematics Handbook</u> (2000) pp 253-254.

4   Assessment

Students will solve the assigned problems with at least 70% accuracy.