Part I

Group Members’ Names: Lisa Bee / Tiffany Santana

Title: Multiple Tower Multiplication and Division

Lesson Summary: Students will create a multiple tower using a given number. After finding ten multiples using a calculator, students will finish the list by finding patterns in the ascending numbers. After the multiple tower is complete, students will solve given multiplication and division problems using only the multiple tower.

Key Words: multiples, multiple tower, multiplication, division

Background Knowledge:
- skip counting
- division = repeated subtraction
- multiplication = repeated addition
- basic TI 34-II calculator skills
- definition of multiple
- relationship between division/multiplication

NCTM Standards

Grade Five
- Number, Number Sense and Operations – Strand #8
- Patterns, Functions and Algebra – Strand #2
- Patterns, Functions and Algebra – Strand #5

Objectives:
- Students will be able to find multiples using number patterns
- Students will be able to create and solve multiplication and division problems using multiple towers
- Students will be able to describe in writing the relationship between the operations of multiplication and division

Materials:
- Register tape
- TI 34-II calculators (at least one per pair)
- Markers
- Student activity sheet
- Paper
- Pencil
- Scotch or masking tape
Part II

Lesson Title: Multiple Tower Multiplication and Division

Team Members’ names and file name: Lisa Bee and Tiffany Santana- Bee Santana LP1

Lesson Goals:
- Students will be able to find multiples using number patterns and calculators.
- Students will be able to create and solve multiplication and division problems using multiple towers.
- Students will be able to describe in writing the relationship between multiplication and division problems, which they have completed.

Investigations:

a. Day 1
- Begin class by having students stand at desk. Give them a number to kip count by. Throw squishy ball to first student. That student says first skip count and throws ball to another student. He/She says next skip count and throws to the next student, etc…. Repeat this activity several times, increasing the difficulty of the number. After everyone has had a chance, conclude activity by reminding students that skip counting is another way of listing multiples.

- Explain how to build multiple towers using the number 21. Multiple Towers consist of register tape, marker, and the students counting by multiples of a specific number. In this case it is 21. The length of the tower will be determined by the height of the student. (see picture on Part 3) After showing students how to write the numbers on the tape, by doing an example together, they can begin writing. Students write the first numbers at the bottom of the tower and working up from there. They will use the calculator to find first ten multiples of 21 and record on register tape.
The students know they are done when they have filled the tape completely. (completed would be the their height) Next the students will examine the list to find pattern in the tower. Once they recognize patterns, students should complete tower without a calculator. They should check their work every 10-15 multiples to eliminate error.

Day 2
- Before students begin working on class assignment, the class will complete sample multiplication and division problems on board using their already made multiple tower. With their partner, students will complete an activity sheet containing multiplication and division problems they will be able to answer using tower and no calculators. (See attached sample activity sheet)

b. Students will summarize:
   1. Patterns they found while working together to complete the tower. They should use mathematical vocabulary while summarizing, such as place value, multiple, increase and decrease.

   2. Relationships between multiplication and division using prior knowledge of these operations.

c./d. Extensions/Real World Applications
- Using the tower with their partners, students will create their own multiplication and division problems. Each group is required to develop the problem, write it out on paper, and make an answer key for other groups to make reference to.

- They will then turn these problems into story problems using situations they might encounter in their personal lives.
Each group will trade their problems and use their multiplication tower to solve. The need to figure out the problem using the strategy for solving multiplication and division problems on the tower.
Part III
- To the right is the first portion of the students’ multiple tower.
- The following will be the examples on the board and answers.

1. $21 \times 11 = 231$
2. $21 \times 14 = 294$

3. $336 / 21 = 16$
4. $567 / 21 = 27$

- See attached answer key for the activity sheet.
Multiple Tower Multiplication and Division

DIRECTIONS: Complete these problems using your multiple tower. Do not use a calculator! After completed, you may use a calculator to check your work. If you find an error, go back to your tower and try to find your mistake.

Part 1: Multiplication
1. 21 x 32 = 672
2. 16 x 21 = 336
3. 21 x 27 = 567
4. 9 x 21 = 189
5. 23 x 21 = 483

Part 2: Division
6. 693 / 21 = 33
7. 168 / 21 = 8
8. 273 / 21 = 13
9. 609 / 21 = 29
10. 420 / 21 = 20

Challenge!
11. What is 21 squared? 441