**The Lattice Method of Multiplication**

by Tanya Starkey

**Plan Framework**

**Grade Level and Subject Area**

4th Grade Academically Talented Mathematics

**Date you are scheduled to teach the lesson**

Thursday, October 11, 2012

**Time frame of lesson**

40 minutes

**Purpose of Lesson**

This lesson is designed to teach students how to multiply multi-digit whole numbers using the lattice method. The lattice method will then be used to multiply decimals. The purpose is to give students practice in utilizing different methods in order to reach the product of two factors. This fits into the estimation and computation unit by providing students with a different method to perform multiplication computations, as well as incorporates estimation during the multiplication of decimals in order to determine where the decimal point needs to be placed in the product.

**Learning Objective(s)**

The students will be able to:

1. Use the lattice method to complete multi-digit whole-number multiplication problems
2. Use the lattice method to complete decimal multiplication problems
3. Recognize and define a "lattice"
4. Determine what size lattice to use and correctly set up a multiplication problem using the lattice method

**Materials Required**

Supplies for the students include: pen/pencil, lattice-computation grids, Lattice Practice worksheet from student workbook, Multiplication by the Lattice Method worksheet from student workbook, notebook

Supplies for the teacher includes: pen/pencil, ELMO, lattice-computation grids, student worksheets

**Instructional Sequence**

**INTRODUCTION**

First, I would like everyone to take out a sheet of paper and multiply two whole-number factors. Please write 123x 8 on your paper and solve (circulate the classroom and observe different methods).

1. What was your answer?
	1. Answer: 984
2. How did you get this answer? I would like one person to come up to the board and demonstrate how they got their answer.
	1. One student shows class how he/she got his/her answer
3. Did anyone do it a different way?
	1. If anyone used the lattice method, ask them to demonstrate the technique on the board. If not, continue to step 2.

**INSTRUCTIONAL PROCEDURES**

WHOLE-CLASS DISCUSSION

Transition statement: We know how to multiply using the standard method, which is what you all (or most) used in order to find the product of 123 x 8. Today we will be learning a new method of multiplication for whole-numbers and decimals.

1. Question: Does anyone know what this is? (Show a lattice grid on the board)
Possible answers:
	1. A lattice
		1. Follow-up question: Where do we see lattices in real life?
			1. Answer: under a deck
			2. Answer: pie
		2. Follow-up question: What is a lattice grid used for?
			1. Answer: multiplication
	2. A grid for multiplying
		1. Follow-up question: Does anyone know what this grid is called?
			1. Answer: a lattice
2. Pass out worksheets for the students to fill in as we do examples on the board.
3. The box with squares and diagonals is called a lattice**.**
4. We are going to practice how to do lattice multiplication using the lattice grids (pass out two to each student)
5. Demonstrate how to set up the problem 123 x 8 using ELMO (write first factor along top of grid, write second factor on right side of grid)
6. Demonstrate how to multiply the digits and write the answers in the correct boxes (fill in the box where the multiplied digits intersect)
	1. Note that the answer is never more than two digits: tens go in the left diagonal portion and ones go in the right diagonal portion)
7. Demonstrate how to add the numbers in each diagonal row (start at bottom right of grid, carry ten's to top right of next row)
8. Demonstrate how to determine the answer (read the number from top left to bottom right)
9. Go through another example with class on ELMO (37x42)
	1. First, estimate what the answer will be (10's, 100's, 1,000's, or 10,000's)
		1. Answer: 1,000's
		2. Where do we put the first factor?
			1. Answer: on the top of the grid
		3. Where do we put the second factor?
			1. Answer: on the right side of the grid
		4. What two numbers do we multiply first?
			1. Answer: numbers on right and top (7 and 4)
		5. What is the answer to 7 times 4?
			1. Answer: 28 (write 28 in appropriate place)
		6. What two numbers do we mulitiply next?
			1. Answer: numbers on right and bottom (7 and 2)
		7. What is the answer to 7 times 2?
			1. Answer: 14 (write 14 in appropriate place)
		8. What are the  next two numbers we multiply?
			1. Answer: numbers on left and top (3 and 4)
		9. What is the answer to 3 times 4?
			1. Answer: 12 (write 12 in appropriate place)
		10. What are the last two numbers we have to multiply?
			1. Answer: numbers on left and bottom (3 and 2)
		11. What is the answer to 3 times 2?
			1. Answer: 6 (write 6 in appropriate place and instruct students to write a "0" where 10's would go)
		12. The first diagonal we need to add up only has a 4 in it, so we will write the 4 at the bottom.
		13. The next diagonal has a 8, 1, and 6 in it. 8 + 1 = 9, and 9 + 6 = 15, so we carry the 1 to the next diagonal, and write the 5 at the bottom of the diagonal
		14. What is the next diagonal answer?
			1. Answer: 1 + 2 + 2 + 0 = 5
		15. What is the answer for the next diagonal?
			1. Answer: 1
		16. So, what is our final answer?
			1. Answer: 1,554 (write multiplication and problem under lattice (37 x 42 = 1,554)
10. Have students take out their student workbooks and open to page 54. Ask the students to complete the first example in Column B on their own (8 x 274)
11. Who thinks they have the correct answer? What did you get?
	1. Answer: 2,192 (write equation and answer under grid on ELMO)
12. Students who have finished may finish question 2 in Column B (67 x 45)
13. Who got an answer for this one? What did you get?
	1. Answer: 3,015 (write equation and answer under grid on ELMO)

DECIMALS WITH LATTICE

Transition to multiplying decimals. Put a multiplication problem on the board that has decimals in it (9.1 x 3.6)

1.     "We can also multiply decimals using this method of multiplication"

2.     First, let's make an estimate. What do you think our answer will be close to?

1.     9.1 is close to 9, and 3.6 is close to 4, so what is 9 x 4?

1.     Answer: 36

2.     So, is this answer in the 10s, 100s, 1,000s, or 10,000s?

1. Answer: 10s

3.     Ask students how to set up a lattice using the numbers provided on a piece of paper

1.     Answer: 9 and 1 on top. 3 and 6 on right

4.     Where do you think we would put the decimal points?

1.     Answer: in between the 9 and 1 and in between the 3 and 6

5.     Now, complete the problem like before, and forget about the decimals until you finish

6.     What did you get as your answer?

1.     Answer: 3,276

7.     We know by looking at the numbers 9.1 and 3.6 that 3,276 cannot be the correct answer

8.     Show students how to draw lines in the grid coming from the decimal points until they intersect. Then follow the diagonal line going down and to the left. Tell students that this is where the decimal point goes

9.     Now what does our answer say?

1.     Answer: 32.76

10.   Make another grid on your paper for the factors 0.9 x 4.3 and solve

11.   What did you get as your answer?

1.     Answer: 3.87

PARTNER WORK

Transition to partner work. Split students up into partner groups and ask them to complete page 55 together with their partner (circulate room guiding struggling students and answering questions when necessary)

1. When the majority of the class has completed the activty (or when permitted time is up) ask students to return to their desks
2. Review answers to the problems completed (ask students for the answers to the problems and address any mistakes

**CLOSURE**

1. Write multiplication problem: 32 x 54 on board
2. Tell students that they will be asked to make their own lattice and solve as an "exit slip" activity, and as soon as they bring it to me in the front of the classroom to be checked they can head to their stations
3. Tell students to raise their hand if they have questions, otherwise bring their exit slip to me when they are done
	1. Answer: 1,728

**JUST IN CASE ACTIVITY**

1. Give students extra problems which they will need to make their own grid for
	1. 21 x 46 = 966
	2. 513 x 658 = 337,554
	3. 1.9 x 45 = 85.5

**Adaptations/Accommodations**

For students who are struggling, I will circulate the room and answer questions that they may have

For advanced learners, I will give the pairs of students extra problems which they will need to make their own grid for (same as just in case activity) 21 x 46 = 966 , 513 x 658 = 337,554 , 1.9 x 45 = 85.5

**Sources Cited**

*Everyday Mathematics Grade 5*. Vol. 1. N.p.: McGraw Hill, n.d. Print. Teacher's Lesson Guide.