Unit Plan

Unit Title: Computation and Number Sentences
Grade Level: Fifth
Subject Areas Addressed: Mathematics, Language Arts
Time Frame: Five days
School District: Novi
School: Novi Meadows

Unit Summary:

Stage 1: Desired Results

A. MCF Standards/Benchmarks and Mathematics Grade Level Content Expectations addressed.

Content Standard 1: Students understand and use various types of operations (e.g. addition, subtraction, multiplication, division) to solve problems. (Operations and their Properties).

Benchmark: Develop and apply the appropriate method of computation, estimate, paper-and-pencil or calculators; explain why they are choosing a method and how they know which operations to perform in a given situation. V.1.E.2

Content Standard 2: Students analyze problems to determine an appropriate process for solution, and use algebraic notations to model or represent problems. (Algebraic and Analytic Thinking)

Benchmark: Write and solve open sentences (e.g. + 2 = 5) and write stories to fit the open the sentence. V.2.E.1

GLCE: Understand the relative magnitude of ones, tenths, and hundredths and the relationship of each place value to the place to its right, e.g., one is 10 tenths, one tenth is 10 hundredths. N.ME.5.08

GLCE: Solve applied problems involving multiplication and division of whole numbers. N.FL.05.05

GLCE: Multiply one-digit and two-digit whole numbers by decimals up to two decimal places. N.MR.05.17

B. Understanding:

Students will understand that…

- Addition can be completed using partial-sums and column-addition methods for whole numbers and decimals.
- Subtraction can be completed using trade-first and partial-differences methods for whole numbers and decimals.
- Multiplication can be completed using the partial-products and method for multiplying multidigit whole numbers and decimals.
- Multiplication can be completed using the lattice method for multiplication of whole numbers and decimals.
- Whole numbers and decimals have place values.
- Number sentences can be written and solved by understanding concepts about number stories and open sentences.

C. Essential Questions:

- How can you use different methods to solve addition problems?
- What are the different methods to solve subtraction problems?
- How do you apply operations efficiently and accurately when solving multiplication problems using the partial-products method?
- How can the lattice method be used for multiplication of whole numbers and decimals?
- What are place-values for whole numbers and decimals? How do you know?
- How can you solve number stories and open sentences using understandings of concepts?

D. Students will know…

- The partial-sums and column-addition methods to solve addition problems.
- The trade-first and partial-differences methods to solve subtraction problems.
- Efficient and accurate operations within the partial-products method for multiplying whole numbers and decimals
- How to use the lattice method for multiplication of whole numbers and decimals.
- The place-values for whole and decimal numbers.
- How to write and solve stories with open sentences.

Students will be able to…

- Given a method, find the solution to an addition problem.
- Given a method, find the solution to a subtraction problem.
- Efficiently and accurately use operations to solve problems including the partial-products method for multiplying whole numbers and decimals.
- Use the lattice method for multiplication of whole numbers and decimals.
- Given a set of numbers with their place-value, find the correct order, e.g., Find a 6-digit number with 1 is in tens place, 5 in the hundredths, etc.
- Write and solve number stories that include open sentences.

E. Prior Knowledge:

2.2 and 2.3

- Grades 1-3: Invent, share, and discuss paper-and-pencil methods for adding and subtracting multidigit whole numbers.
- Grade 4: Extend whole-number addition and subtraction methods to 1- and 2-place decimals

2.8

- Grade 3: Introduce the partial-products method for multiplying whole numbers with base-10 blocks and arrays.
- Grade 4: Extend the partial-products multiplication method to products of whole numbers and decimals.

2.4

- Grades 1-3: Introduce and use relation symbols (+,>,<); use situation diagrams to organize information and problem solving steps for solving number stories.
- Grades 3-4: Introduce problem-solving steps for solving number stories.
- Grade 4: Use situation diagrams to write open sentences for number stories.

F. Misconceptions:

2.2

- Students might confuse the place-values for numbers including decimals, e.g., 1 is in the tens place (left of the decimal) and 4 is in the tenths place (right of the decimal.)
- Students might confuse how they read the number verbally, e.g., 6.123 is written and read six and one hundredth, twenty-three thousandth.
- Students may not remember learning about this method in previous grades.

2.8

- Students might confuse the partial-product method with their "traditional" forms for multiplication in which they are comfortable with.

2.9

- There may be confusion with which rows and columns get multiplied together, and how to write the product in the boxes (for single-digit 6, students need to write in 06).
- There may be confusion as to where the decimal point goes in the answer.
- There may be confusion with how to read the answer after performing lattice multiplication.

2.4

- Student might confuse the meaning of relation and operation symbols.
- Students might not remember the 4 different kinds of number stories learned in earlier grades.

Stage 2: Assessment Evidence

A. Culminating Performance Task

B. Culminating Performance Task Rubric

C. Other Evidence

- Through what other evidence (e.g. quizzes, tests, prompts, observations, dialogues, homework, journals) will students demonstrate achievement of the desired results?
- How will students reflect upon and self-assess their learning?

Stage 3: Learning Plan

Lesson 1

Teaching the lesson (*SRB*, p.27,29, and 30)

I. Introduction:

a) Individual Activity *(T)*: Math Message will be posted when the students enter classroom in the morning. It will read: *Study the examples on pages 28 and 29 of your* Student Reference Book (SRB). *Then write the following numbers in words on a half-sheet of paper:* 6, 028 112,303 0.27 4,925 (Bring 3 pages of lined paper to the floor)

b) Whole-Class Activity *(T)*: (After 5 minutes) Have students meet on the carpet. Introductory Mini-lesson *(W)* Introduce the new unit by saying, "Today we are going to talk a lot about place-value and digits. Last unit we began learning about this in our math boxes, remember? First, we are going to talk about what these words mean. Numbers are made up of

digits. 6, 0, 2, 8 are the digits that make the number 6,028. Each digit has a **place-value**. In this number the 6 = 6,000 0 = 000 2 = 20 8 = 8. The place-value is the worth of the digit."

- Have students raise hands and tell all the place-values for 71, 192, and 30, 295.

"It helps me when I have a place-value chart in front of me when I need to remember place-values. Copy this chart on your paper while I write on the board." Have students refer to the chart on page 29 in their *SRB.* Together, create a place-value chart. (Students write on scrap sheet.) "Clip this chart into your math section of your binder, this will be a helpful tool through this and every math unit this year."

c) Math Message Follow-Up: Students will be called on to answer Message and write the completed problem out on the white board (in the place-value chart). For each number, ask questions to the group, such as the following:

- How do you say this number? (Write on board)
- What is the **value** of the **digit** 2 in this number?
- What **digit** is in the hundreds (tens, tenths, etc) **place**? What is the **value** of that digit?

If additional review is necessary, discuss the whole-number and decimal place-value examples on the *SRB* pages 28-29. Examples, 7,581; 0.31; 0.429; 592,401.21; 83.941. Review the relationship between adjacent places:

- Each place has a value that is one-tenth the value of the place to its left. For example, 100 is 1/10 of 1,000.
- Each place has a value that is 10 times the value of the place to its right. For example, 1,000 is 10 times as much as 100.

d) Reviewing Addition Algorithms (*Math Journal* p.32; *SRB* p.13 and 35; *Math Masters*, p.12) Whole-Class Discussion: Pose problems similar to the ones below. Have students volunteer to describe how they got their answers.

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 607
  46
+239
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39 + 23

1.56 + 8.72

II. Lesson: Most students should be comfortable with their algorithm; however, they need to be comfortable using the *partial-sums* and the *column-addition* methods for this lesson. The partial-sums method helps students develop a good understanding of place value and addition.

Introduce/Connect with Message: "It is important to know the place-value of digits in order to solve addition problems. Give me thumbs up if you understand place-value, side-ways if you 'kind of get it,' and thumbs down if you need more

instruction. If your thumb is down go ask Mrs. McDonald and Mr. Peronis for help."

a) *The Partial-Sums Method*

*(E)***Addition is performed from the left to the right, column by column; the sum for each column is recorded on a separate line.** The partial-sums are added, either at each step or at the end.

Use examples like those on pages 13 and 35 on the *SRB* to demonstrate this method.

Example: 348 + 177 = ?		100s	10s	1s
		3	4	8
		+ 1	7	7
Add the 100s:	300 + 100 →	4	0	0
Add the 10s:	40 + 70 →	1	1	0
Add the 1s:	8 + 7 →	+	1	5
Find the Total:	400 + 110 + 15 →	5	2	5

Then, have student copy down these examples while students are helping solve problem on board. (467 + 135, 4.65 + 3.25, and 4.56 + 7.90.) Stress that students darken column/row lines, include place-values, and show work.

Remind the students that each digit in a numeral has a value that depends on its place in the numeral. Stress that by this method, addition problems involving decimals are done in the same way as problems involving only whole numbers.

b) *The Column-Addition Method*

*(E)*This method is similar to the traditional addition algorithm that most adults know. Demonstrate examples like those on pages 13 and 35 on the *SRB.* In this method, **each column of numbers is added separately, and in any order.**

- If adding results in a single digit in each column, the sum has been found.
- If the sum in any column is a 2-digit number, it is renamed and part of it is added to the sum in the column on its left.

This adjustment serves the same purpose as "carrying" in the traditional algorithm.

Example: 359 + 298 = ?	100s	10s	1s
	3	5	9
	+ 2	9	8
Add the numbers in each column:	5	14	17
Adjust the ones and the tens:			
17 ones = 1 ten and 7 ones			
Trade the 1 ten into the tens column	5	15	7
Adjust the tens and hundreds:			
15 tens = 1 hundred and 5 tens			
Trade the 1 hundred into the hundreds column.	6	5	7

Then, have student copy down these examples while students are helping solve problem on board. (242 + 593, 7.34 + 9.12, 1.16 + 5.23.)

Stress that by this method, addition problems involving decimals are done in the same way as problems involving only whole numbers.

c) Practicing Addition of Whole Numbers and Decimals (*Math Journal* p.32; *SRB* p.13-15) Partner Activity *(T):* Students solve the problems on their own and then check each other's answers. Modify activity: Problems 1-4 need to be solved using the partial-sums method for addition and problems 5-8 need to be completed using the column-addition method. Circulate and assist when needed.

Before disbursement say, "If you could go home and teach your parents these algorithms you may start working with one partner. If you 'sort of get it' stay here and we will work through some more problems together. If you I explained it too confusing and you need one or more parts of the lesson explained in a new way go to the round table and Mrs. McDonald will re-explain."

Remind students (and write on board) that examples of addition of whole numbers are shown on pages 13-14 of *SRB*; and examples of addition and subtraction of decimals are shown on page 35.

III. Conclusion:

a) *(R, E)*Sharing Results (*Math Journal* p.32) Whole-Class Discussion: Some possible discussion questions include:

- Which method of addition do you prefer? Why?
- What are some of the advantages of each method?
- What are some of the disadvantages?
- When might a particular method be useful? When might it not be useful?

b) Study Link 2.2 (*Home Connection*)

- Students will practice estimating and finding sums.
- Students can solve problems using any method they choose

Lesson 2

Teaching the lesson

I. Introduction:

a) Individual Activity: Math Message will be posted when the students enter classroom in the morning. It will read:

Solve each problem.

81 – 47 *608 – 73* *35.26*
-19.62

(When you are finished with your Math Message please bring your math supplies to the floor along with an Expo marker. If you do not have an Expo marker you can either borrow one from a friend or one of mine)

b) "How to use Whiteboards" Minilesson: "For today's math lesson we will be using mini whiteboards just like this one on the wall. When you receive your white board you will use it for the next activity. If there is any improper use of the whiteboards they will be taken away-these are a privilege." (Have 2 students from each class pass out whiteboards) "I'll know you are ready to begin our next activity when you have only your whiteboard in your lap, a closed Expo marker in front of you, and your hands are on your head."

c) Individual Activity: Mental Math and Reflexes. "Today we are going to warm-up our brains with a mental math activity. We will do this every morning when you get to the floor. These will help you with your multiplication facts. These problems will prepare you for later lessons." Write these problems on the board (not orally). Have kids write on white boards.

Set A **Set B** **Set C** **Set D**

d) Whole-Class Activity: Students will be called on to answer Message and write the completed problem out on the white board. Tell students: "Today, we are going to learn 2 different subtraction algorithms. If you are not secure with your algorithm that you used this morning, you might find a new one that is easier for you."

II. Lesson Reviewing Subtraction Algorithms (*SRB*, p.15-17, 35-36)

a) *The Trade-First Method*

Read examples on pages 15 and 35 of the *SRB* to demonstrate this method. Write these examples on the board:

93	6.48	54, 729
- 21	- 3.45	- 34, 026
72	3.03	20,703

If any digit of the **minuend** (top number) is less than the one directly below it (For example 21-9) the minuend is adjusted *before* any subtracting is done. The minuend is adjusted by "trading." For example, we might need to trade 1 of the tens for 10 ones. (Say: "Just like you would do in the problem 21-9. First you would borrow 10 from the 20 and make 1, 11.")

Example: 463 - 275 = ?

Look at the 1s place;
5 ones cannot be removed from 3 ones; trade 1 ten for the 10 ones; adjust the tens and ones:

100s	10s	1s
	5	13
4	6	3
+ 2	7	5

Look at the 10s place
7 tens cannot be removed from 5 tens; trade 1 hundred for 10 tens; adjust the hundreds and tens:

3	15	13
4	5	3
- 2	7	5
1	8	8

Subtraction each column:
3 [100s] – 2 [100s]
15 [10s] – 7 [10s]
13 [1s] – 5 [1s]

Trading should always be done from right to left. It is important that you trade correctly so the final adjusted number has a digit greater than or equal to the digit directly below it.

Example: 32.9 – 15.6 = ?

10s	1s	0.1s
2	12 .	
3	2 .	9
- 1	5 .	6
1	7 .	3

Subtraction each column:
2 [10s] – 1 [10s]
12 [1s] – 5 [1s]
9 [0.1s] – 6 [0.1s]

Stress that subtraction problems involving decimals are done in the same way as problems involving whole numbers. Do example on whiteboard: 32.9 – 15.6

Monitor students to make sure that they are aligning the numbers properly. Do this by having students compute on a lined sheet of paper turned horizontally. If it helps have students write the place values above the columns.

b) *The Partial-Differences Method*

Use examples on page 17 of the *SRB* to demonstrate partial-differences method.

Example: 4,261 – 2, 637 = ?		
		4261
		- 2637
Subtract the thousands:	4,000 – 2,000 →	+ 2000
Subtract the hundreds:	600 – 200 →	- 400
(Smaller number is on the top; so include minus sign.)		
Subtract the tens:	60 – 30 →	+ 30
Subtract the ones:	7 – 1 →	- 6
(Smaller number is on top; so include minus sign.)		
Find the total:	2,000 – 400 + 30 – 6 →	1624

Point out that:

- The subtraction is performed from left to right, column by column.
- The smaller number in each column is always subtracted from the larger number.
  - If the bottom number is less than the top number, then the result will be added to obtain the final answer.
  - If the bottom number is greater than the top number, then the result will subtracted to obtain the final answer.

- To find the final answer, the partial differences are added or subtracted.

This adjustment serves the same purpose as "carrying" in the traditional algorithm.

Stress that subtraction problems involving decimals are done in the same way as problems involving only whole numbers. Do example 76.38 – 39.81.

Example: 76.38 – 39.81 = ?		76.38
		- 39.81
Subtract the tens:	*70 – 30* ⇒	+ 40.00
Subtract the ones:	*9 – 6* ⇒	- 3.00
Subtract the tenths:	*0.8 – 0.3* ⇒	- 0.50
Subtract the hundredths:	*0.08 – 0.01* ⇒	+ 0.07
Find the total: 40.00 – 3.00 – 0.50 + 0.07	**=**	**36.57**

c) Practicing Subtraction of Whole Numbers and Decimals (*Math Journal* p.34; *SRB* p.15-17, 35-36) Partner Activity: Students solve the problems on their own and then check each other's answers. Circulate and assist when needed.

III. Conclusion:

a) Sharing Results (*Math Journal* p.34) Whole-Class Discussion: Some possible discussion questions include:

- Which method of subtraction do you prefer? Why?
- What are some of the advantages of each method?
- What are some of the disadvantages?
- When might a particular method be useful? When might it not be useful?
- How is the partial-sums method similar to the partial-differences method? How are the methods different?

b) Study Link 2.3 (*Home Connection*)

- Students will practice estimating and finding differences.
- Students can solve problems using any method they choose.

Lesson 3

Teaching the Lesson

I. Introduction

a) Individual Activity: Math Message will be posted with the students enter the classroom in the morning. It will read: *Multiply. Show your work.*
*253 * 8 37 * 62*

b) Whole-Class Activity: (After 5 minutes) Have students meet on the carpet. Pass out white boards. Mental Math and Reflexes: *Pose problems such as the following:*

*3 * 8*	*6* 5*	*7 * 9*
*3 * 80*	*6* 50*	*7 * 90*
*30 * 80*	*60* 50*	*70 * 90*
*300 * 80*	*600* 50*	*700 * 90*

After each direction have students hold up their white boards facing the teacher for quick checking.

c) Whole-Class Activity: Math Message Follow-Up (*SRB*, p. 155): Ask student volunteers how they solved the multiplication problems.

II. Lesson

a) Reviewing the Partial-Products Method for Multiplication (*SRB*, p.19) Whole-Class Activity: Remind students that they have seen this method since third grade. *"This is a required method to know, even if you prefer others because it helps students develop a better understanding of place-value and multiplication."*

- Pass out "Following Directions Task" face down. Tell students that they have 3 minutes to complete the task. If they are finished they are to wait silently. This "Task" will help students remember the importance of direction following. Direction following is key in understanding this concept.

- Use examples from p. 19 of the *SRB* to demonstrate examples of this method. Explain: "Each part of one factor is multiplied by each part of the other factor. Each partial-product is written on a separate line. These partial-products are then added.

48 * 26 =?		100s	10s	1s
Think of 26 as 20 + 6			2	6
Think of 43 as 40 + 3	*		4	3
	40 * 20 →	8	0	0
	40 * 6 →	2	4	0
Multiply each part of 26 by each part of 43:	3 * 20 →		6	0
	3 * 6 →		1	8
Add four partial products:		11	1	8

- Have students complete a few more multiplication problems this way with the class. (Note: Make sure they include place-values, darkened columns/rows, and show work to the left of the problem correctly.) Then, have students solve one individually. "Thumb check" for understanding.

b) Introducing Multiplication of Decimals (*SRB*, p. 38-9)
Whole-Class Activity: Ask students to solve the problem *1.3 * 5* any way they wish.
After a couple minutes have children share their different ways of computation.

- One way: Multiply both factors as if both were whole numbers and adjust the product.

1. Make a magnitude estimate of the product.
2. Multiply the numbers as though they were whole numbers.
3. Then use the magnitude estimate as a guide to reinsert the decimal point at the correct location in the answer.

*Ex: 1.3 * 5 = ?*
1. Round 1.3 to 1. Since 1 * 5 = 5, the product will be in the ones place.

2. Ignore the decimal point. Multiply 13 (1.3) * 5 as if they were whole numbers. (A=65)

3. Since the magnitude estimate is in the ones, the product must be in the ones. The answer must be 6.5.

- Have students complete a few more problems with one decimal. Suggestions: *26 * 0.6 400 * 1.7*
- "Thumb check" and send thumbs down to Carri.
- Next, use examples from p.38-9 of the *SRB* to demonstrate how to find the product of two decimals.

*Ex: 3.4 * 4.6 = ?*
1. Round 3.4 to 3 and 4.6 to 5. Since 3 * 5 = 15, the product must be in the tens place.

2. Ignore the decimal points and multiply 34 * 46 as if they were whole numbers. (A=1,564)

3. Since the magnitude estimate is in the tens, the product must be in the tens. The answer must be 15.64.

- Have students complete a few more problems with two decimals. Suggestions: *6.3 * 1.8 0.71 * 3.2*
- "Thumb check" and send thumbs down to Tom.

c) Pass out "What's the Distance?" worksheet found in the Everyday Math supplemental binder. Partner Activity: The class should work on the first problem together and then work in groups of two to solve the rest of the problems. The teacher should circulate and monitor the students.

d) Practicing Multiplication of Whole Numbers and Decimals (*Math Journal*, p.50-1)
Partner Activity: Students who gave "thumbs up" are dismissed to work with a peer on p.50-51 in journal. Before dismissal read the page together. Have students circle magnitude estimation in the directions. In Problem 7 have students cross out "in at least one" and replace with "all."

III. Conclusion

a) Sharing Results
- Whole class discussion of answers.

b) Study Link (Home Connection)
- Students make magnitude estimates for and then solve multiplication problems in which the factors are whole and/or decimals.

Lesson 4

Teaching the Lesson

I. Introduction

a) Individual Activity: Math Message will be posted with the students enter the classroom in the morning. It will read: *Multiply. Show your work.*
*32 * 146 4.5 * 0.82*

b) Whole-Class Activity: (After 5 minutes) Have students meet on the carpet. Pass out white boards. Mental Math and Reflexes: Have students find 1/10 of a number and 10 times a number. *Suggestions:*

1/10 of 800	*10 * 6*
1/10 of 100	*10 * 0.6*
1/10 of 105	*10 * 0.65*
1/10 of 10	*10 * 37*
1/10 of 15	*10 * 3.7*

c) Whole-Class Activity: Math Message Follow-Up (*SRB*, p. 155): Ask student volunteers how they solved the multiplication problems.
32 * 146 = 4,672 4.5 * 0.82 = 3.69

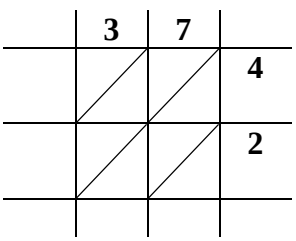
II. Lesson

a) Reviewing the Lattice Method of Multiplication (SRB, p.20 and 40)
Tell the class you are going to use the **lattice method** to solve multiplication problems. Remind them that they have probably been using this method since third grade. It is very easy to use if you know the basic multiplication facts.

**Pass out a lattice-computation grid (*Math Masters*, page 21) to students.

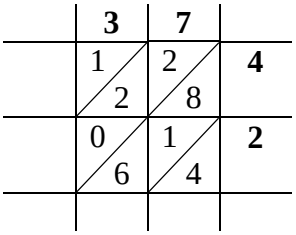
Do an example using whole numbers: 42 * 37 =?

1. The box with squares and diagonals is called a **lattice.** Write 37 above the lattice. Write 42 on the right side.

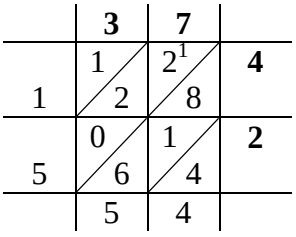


2. Multiply 4 * 7. Then multiply 4 * 3. Multiply 2 * 7.

Then multiply 2 *3. Write the answers as shown.



3. Add the numbers along each diagonal. Begin with the diagonal in the bottom right-hand corner. If the sum on a diagonal is 10 or more, write the ones digit in the answer space and the tens digit at the top of the next diagonal. Then add the numbers in that diagonal. For example, the sum of the numbers in the second diagonal is 15, so write 1 above the 2 in the third diagonal. The sum of the numbers in that diagonal is 1 + 2 + 2 = 5.



4. The answer is shown, starting on the left side of the lattice and continuing below the lattice.
   42 * 37 = 1,554

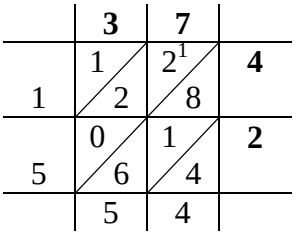
- Give students a couple whole-number multiplication problems to solve using the lattice method.
  88 * 97 =? 487 * 8 =?
- Thumb Check

*At this time, walk around to assist. Also, watch to make sure students are setting up the problem in the lattice right, before attempting to solve the problem.

b) The Lattice Method for Multiplying Decimals
These are as easy to calculate as multiplying whole numbers. Students may make magnitude estimates in order to check their answers, but the lattice

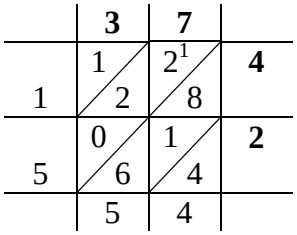
method does not require students to do this as it can automatically locate the position of the decimal in the final answer.

- Decimal points should be above a column line and to the right side of the grid on the right row line.



Do an example of a decimal multiplication problem using the lattice method:
3.7 * 4.2 =?

1. Make a magnitude estimate. $3.7 * 4.2 \approx 4 * 4 = 16$
   The product will be in the tens.
2. When writing the factors above and on the right side of the lattice, include the decimal points. In the factor above the grid, the decimal point should be above a column line. In the factor on the right side of the grid, the decimal point should be to the right of a row line.
3. Locate the decimal point in the answer as follows: Slide the decimal point in the factor above the grid down. Slide the decimal point in the factor on the right side of the grid across. The decimal points will intersect on a diagonal line. Slide that decimal point down along the diagonal line. Write a decimal point at the end of the diagonal line.



4.2 * 3.7 = 15.54

- Give students a couple multiplication problems in which one factor is a decimal.
- Thumb Check

c) Multiplying Whole Numbers and Decimals by the Lattice Method (Math Journal, p.53)

Partner Activity: After partners solve problems on their own, they check each others answers. Circulate and assist when needed.

III. Conclusion

a) Sharing Results

- Check work as a whole class and correct with pen

b) Study Link 2.6 (*Home Connection*)

- Students are shown how three multiplication problems are solved using the lattice method.
- Students try to figure out how to use method and solve a problem by this method.

Lesson 5

Teaching the lesson

I. Introduction:

a) Individual Activity: When students are completed with their Monday Writing Prompt and Share they will be dismissed for math. At this time, students will be asked to pick up a white board (on table) and bring it with them to the carpet.

b) Individual Activity: Mental Math and Reflexes. Students estimate the answers to the following problems: (Tell students to answer with 'Yes/No' and work to prove their answer. After each problem have students share how they arrived at their answer.)

- Michael has $8.00. Does he have enough money to buy 3 fancy pencils for $1.98 each and an eraser for $1.73? ***Yes***. *ex: 3 x 2 = 6 + 2 = 8*
- Lucy takes about 48 minutes to walk from her house to the store. If she must get back in an hour and a half, does she have enough time to walk to the store and back? ***No***. *ex: 50 + 50 (50 x 2) = 100 minutes which is 1 hour and 40 minutes*
- Jeremy can drive his car about 32 miles per gallon of gas. He has about 5 gallons in his tank. He is driving to his sister's house, which is 84 miles away. Does he have enough gas to get there and back? ***No***. *ex: 30 x 5 = 150, 80 x 2 = 160*

c) Whole-Class Activity: Tell students that today's lesson is about **number sentences**. (Post Number Sentence) Ask students *to try and write an example of what they think a number sentence might be on their clean white board*. (Have 3 students that have an example of number sentence on board stand up.) Ask: "*How are these examples different from yours?*" Make sure that the following points are mentioned:

- Number sentences are similar to English sentences, except that they use math symbols instead of words.
- Some number sentences are true and some are false. For example, 10 – 2 = 8 is a **true number sentence**. The number sentence 8 / 2 > 4 * 100 is a **false number sentence.**

- A number sentence must have a **relation symbol**. Students should be familiar with the relation symbols shown in the margin. For example, the number sentence 10 – 2 = 8 contains the relation symbol "=." The number sentence 8 / 2 < 4 * 100 contains the relation symbol "<."
- Number sentences also contain numbers and **operation symbols**. For example, the number sentence 10 – 2 = 8 contains three numbers (10, 2, and 8) and the operation symbol "-." The number sentence 8 / 2 < 4 * 100 contains four numbers (8, 2, 4, and 100) and the operation symbols "/" and "*."

Relation Symbols	Operation Symbols
< means *is less than* > means *is greater than* = means *is equal to*	+ means *plus* • means *minus* x or * means *times* or / means *divided by*

**If students have difficulty explaining what a number sentence is tell them:

- *I notice that <u>(student's name)</u> included an equal sign. A number sentence must include an equal sign. This is called a relational symbol. Other relational symbols are < and >.* (Post Symbols chart) *A number sentence must also include operation symbols.*
- Have students try writing a number sentence on white boards again. Pick another 3 students to stand.
- *<u>(Student's name)</u> example is also an example of a true number sentence* (Post True Number Sentence) *because <u>(problem)</u> is correct. Right? What if someone gave the example 8 – 2 = 5? Is it still a number sentence? Yes, because it includes a relation and operation symbol; however the statement is false. This is called a false number sentence.* (Post False Number Sentence) Have students write either true or false on whiteboards after posting 4 more problems.
- Thumb Check for understanding
- "*Now we know what a number sentence is*."

d) Individual Activity: Post <u>Math Message</u>. It will read: *What is the value of* 34 – x = 18?

e) Discuss Math Message problem. *The number sentence 34 – x = 18 is an example of a number sentence in which one of the numbers is missing. We write the letter x in place of the missing number.*

- The letter *x* is called a **variable**. (Post Variable) Number sentences that contain a variable called **open sentences**. (Post Open Sentence) <u>Open sentences are neither true nor false.</u> Only when we replace the variable with a number sentence that is either true or false.
- A number used in place of x that makes the number sentence true is called a **solution** of the sentence. (Post solution) The solution of 34 – x = 18 is 16, because 34 – **16**= 18 is a true number sentence. (Post 34 – 16 = 18)

- Remind students that they have been using variables since Kindergarten, without calling them variables. They may have seen number sentences written with question marks, blank rules, or empty boxes. For example, in the number sentence 34 - □ = 18, the empty box is used to stand for the missing number. The T is the variable and the number 16 is the solution.
- Repeat with 27 + n = 42. (Post signs when appropriate)

Continue with more problems involving number sentences with variables until students begin to develop a secure understanding. (An appropriate answer looks like this n = ___) *Suggestions*:

26 – n = 12	d * 3 = 27
8 = 32 / n	146 + 34 = t

II. Lesson

a) Reviewing the Guide for Solving Number Stories and Using Open Sentences (SRB 220-221) Whole-Class Activity:

Have students individually read pages 220-221 in *SRB*. Briefly discuss problem solving and the guide for solving number stories on pages 220 and 221 in the *SRB*. Then use one of the Check Your Understanding problems to illustrate the steps outlined in the guide. Try to maintain a brisk pace.

Use the following examples to review situation diagrams that were used in earlier grades. Have students focus on writing an open sentence that models the story; and then solve the open sentence to find the answer to the story. (Have students solve on white boards)

Example 1: At breakfast, the temperature outside was 47 degrees Fahrenheit. By lunchtime, the temperature had gone up to 63 degrees Fahrenheit. How many degrees warmer was it by lunchtime?

What does this problem ask? We want to find by how much the starting number increased. To solve the story, follow these steps:

Step 1. We know that the temperature at breakfast was 47 degrees Fahrenheit and that it had gone up to 63 degrees Fahrenheit. Decide on a letter variable to use for the missing number (the number of degrees the temperature has increased). Any letter may be used, but it often helps if the letter can serve as a reminder of what is to be found. For example, t (for temperature) or d (for degrees) are sensible choices for the story.

Have 3 kids stand up. *These are all open sentences for this problem. Make yours look like there's. This is an open*

sentence because it has a variable. Is it true? (Not yet because it hasn't been solved.)

Step 2. Ask students to write an open sentence showing how the variable and other numbers in the story are related. Depending on how students view this problem, both 47 + t = 63 and 63 – 47 = t are possible open sentences.

Have 3 kids stand up with solution including t = 16. *Make yours look like there's.* Post 47 + 16 = 63 on board. *Now, this is a true number sentence because it has been solved and does not include a variable.*

If my solution is t = 16. What is my answer including the unit? (16 degrees Fahrenheit)

b) Solving Addition and Subtraction Number Stories (Math Journal p 36 and 37) Go through page 36 in the Math Journal together. Thumb check. Do another problem if necessary. Partner Activity: Do the problem first as a class. **Remind students to write the appropriate unit as part of the answer.** Partners then complete the rest of the problems on the journal pages.

- Shake maraca 2 minutes after dismissal. Tell students that they need to check with Mrs. McDonald, Mr. Peronis, or me before they continue with problem number two.

III. Conclusion:

a) Sharing Results (*Math Journal* p.36-7)

Whole-Class Discussion: Reserve sufficient time to discuss students' answers.

- Students correct own work with pen

b) Study Link 2.4 (*Home Connection*)

- Solve addition and subtraction number stories.
- Students Point out to students that they may not need to use all of the number given in each problem.

Unit Resources/References Needed:

A. Attached worksheets/handouts used.
B. Teacher website:
C. Student website:
D. Materials needed to do activities:

- Everyday Mathematics Teacher's Learning Guide
- Everyday Mathematics Student Reference Book (*SRB*)
- Everyday Mathematics Math Journal
- Expo Marker
- White Board

- Graph Paper/Scrap Paper
- Worksheets
    i. **“**What’s the Distance?”
    ii. “The Computer Club…”
- Study Links
    i. 2.2
    ii. 2.3
    iii. 2.8
    iv. 2.9
    v. 2.4