

Multiplication Lesson

Grade 4

Fall 2008

CMT Connections: 5a, 5b

Big Ideas:

- Being able to select a strategy and apply it appropriately to solve a multiplication problem. (Students will be introduced to a variety of strategies but may select one or more that they find meaningful/useful.)
- Being able to understand that multiplication is commutative—that is, you can switch the order of the factors and the product will stay the same.

Learning Objectives:

The student will be able to –

1. Represent and analyze quantitative relationships in a variety of ways
2. Describe mathematical relationships and situations through multiplication of whole numbers using symbols, number sentences, and equations.

Language Objectives:

The student will be able to –

1. Explain the meaning of “number sentence,” “times,” “multiply,” “array,” “manipulatives,” “factors,” “products,” and “commutative property” (“row” and “column” might be discussed, depending upon student comprehension)
2. Discuss and identify strategies for determining the solution to a multiplication problem.

Materials:

1. Grid paper
2. Dixie cups
3. M&M's
4. Paper
5. Multiplication Problems #1
6. Multiplication Problems #2
7. List of Vocabulary Words (included in review game directions)

Potential Student Misunderstandings

- Students may have some difficulty with concepts related to arrays. For example, the rows and columns may be confusing to some students (e.g., ELL students). The quantities in the rows versus the columns may be challenging to students.
- Multiplication represented as “groups of” may need to be reinforced.
- In using a number line, students may be confused about where to begin (e.g., beginning at 0) and how to represent skip counting on the number line.

Potential Higher Order Thinking:

- Compare and contrast representations of multiplication
- Analyze different strategies for determining solutions to multiplication problems
- Justify selection of strategies for determining solutions to multiplication problems.

Day #1 Initiation:

1. What are some different ways to say this number sentence: 3×5 ?
 1. three times five
 2. five times three
 3. three groups of five
 4. five groups of three
 5. add 3 five times
 6. add 5 three times

2. What are some strategies to solve this problem?

Procedure:

Discuss strategies students say and discuss the following strategies below if not mentioned. Have the students try to figure them out first before explaining them. Use guiding questions.

1. Repeated Addition/Skip Counting

$$3 + 3 + 3 + 3 + 3 = 15$$

a. What can you tell me about this problem? What is this strategy called? How does this relate to multiplication? What would the multiplication problem for this be?

$$3, 6, 9, 12, 15$$

b. What can you tell me about these numbers? What is this an example of? How does this relate to multiplication? What would the multiplication problem for this be?

c. What would this look like on a number line? How can a number line show multiplication? Where do I start on a number line?

2. Making an Array

○	○	○
○	○	○
○	○	○
○	○	○

- a. Show this picture on grid paper.
- b. (Turn this activity into a game.) Have students write down as many things about the picture as possible. Discuss their answers. Possible guiding questions follow.
 - What do you notice?
 - Does anyone know what this is called?

- What information can you tell me about this?
- What shape is this?
- An array is a rectangular arrangement of information in columns and rows.
- How many are across? How many down?
- What is a row? What is a column?
- How can this represent multiplication? What would the multiplication problem be for this?
- What if we reversed the rows and columns?
- (It may be easier for students just to think of an array in rows—4 rows of 3)
- c. Show this picture on grid paper without the circles.
- What does this look like now?
- How can we figure out how many there are in total?
 - Discuss *area* → arrays show area
 - How would we write this as a multiplication number sentence? Are there any other ways to write this?
 - $3 \times 4 = 12$
 - $4 \times 3 = 12$
 - Is this problem the same or different? Why?
 - Are the answers the same?
 - Does the order matter when multiplying? Why or why not? Ask students to discuss this in small groups or pairs and report back to larger group. [This is called the *commutative property* which means the order of the numbers does not change the results.]

Break up the problem and discuss what factors and products are. Give examples.

- 3 and 4 are factors, 12 is the product

Thinking Question: How are factors (or product) represented in an array (or area) model?

3. Have students complete the problems below using the strategies on the worksheet

Assessment: Students will be informally assessed through class discussion and group work. Their problem worksheets will be looked at to see if students demonstrate understanding of the strategies and whether they used them appropriately.

Differentiation Options:

If students already know their multiplication facts, give them more difficult equations to solve. (ex. 13×7) Also, you could have them come up with their own strategies for division and discuss the relationship between multiplication and division.

Think/Hint cards may be used to scaffold learning.

Think/Challenge cards may be used to challenge students.

Closure:

Possible Guiding questions for closure:

What are some strategies you learned?

Which strategy or strategies worked best for you? Explain why.

What are some mathy words and phrases that you used today? (review vocabulary)

Does order of multiplication problems matter? What is that called?

NAME: _____ DATE: _____

Multiplication Problems #1

Use at least one of the following strategies to solve the problems below. Show your work. 😊

*Repeated Addition

*Skip counting

*Number line

*Making an Array

$$8 \times 7 =$$

$$6 \times 9 =$$

Which strategy works best for you? Why?

Day #2 Initiation:

1. Quick Review of previous day's strategies.

Procedure:

1. Manipulatives

- a. I have 3 cups and I am putting 5 M&M's in each cup.
 - What is a different way of saying this?
 - Is it the same or different if I take the M&M's out of cups but make 3 groups of 5?
 - How would I figure out how many I have altogether?
 - Can someone tell me a multiplication number sentence for this problem if I wanted to figure out the total?
 - the x is the number sentence, 3×5 stands for groups of
- b. What if I have 5 cups of 3, is that the same or different as the problem above? Is my answer the same?
 - What are the factors, product?
 - When the order does not matter what property is that called?
- c. Do you know what manipulatives are?
Manipulatives are any kind of objects, which designed to be touched, moved and/or arranged to help you understand mathematics problems.

2. Drawing a picture



- a. What does this picture represent?
 - b. How is this picture similar or different to the example with manipulatives above?
 - c. How can you represent this in a multiplication problem?
1. Have the students get into groups.
 2. Give the students a list with the vocabulary words discussed from yesterday.
3. Have the students complete the problems below using the strategies they have learned today.
 4. If there is extra time have students write their own multiplication problems and give the problem to another to group to solve using a strategy.

NAME: _____ DATE: _____

Multiplication Problems #2

Use one of the following strategies to solve the problems below. Show your work. 😊

*Manipulatives

*Drawing a Picture

$$4 \times 7 =$$

$$5 \times 9 =$$

Circle the factors below in the number sentences. **Underline** the product. On the back, describe some things that you know about factors and products. Compare your ideas with a classmate.

$$20 = 10 \times 2$$

$$6 \times 3 = 18$$

$$8 \times 8 = 64$$

$$36 = 12 \times 3$$

Possible Review Game

1 Point

number sentence
multiply

2 Points

array
factor
product

3 Points

manipulatives
commutative property

Give the students to 10-15 minutes to write definitions down of the word above ***as a group***. Students share definitions with the class. Different words are worth different points. Group with the most points win. [This could also be done *noncompetitively*.]

Give each group a word and have them write a group definition, as well as show an example of what the word means on piece of paper to be posted in the classroom. Share examples. These could be added to and/or compared/contrasted with a classroom Word Wall.

Assessment: Students will be informally assessed through class discussion and group work. Their problem worksheets will be looked to see if they understand the strategies and used them appropriately.

Differentiation Options: If students already know their multiplication facts, give them more difficult equations to solve. (ex. 13×7) Also, you could have them come up with their own strategies for division and discuss the relationship between multiplication and division.

Closure: What strategies can you use to solve a multiplication problem? What strategies work best for you and why?

Some possible Think Cards

Think/Hint Cards for M&M Activity	Think/Challenge Cards
<p>Each cup must have an equal amount of M&Ms</p>	<ul style="list-style-type: none"> • Come up with a multiplication number sentence based on the M&Ms you put in each cup. • Then create a word problem using this number sentence.
<p>Try using one of the strategies to solve this problem.</p> <ul style="list-style-type: none"> • Manipulatives • Drawing a Picture • Making an Array • Skip Counting • Repeated Addition • Use a Number Line 	<p>If I had 14 cups and 19 M&Ms in each cup, how many M&Ms do I have?</p> <p>Explain or show how you figured this out.</p>
<p>An array might look something like this.</p> <pre style="margin-left: 40px;"> * * * * * * * * * * * * * * * * * * * * </pre>	