

**Georgia Department of Education**  
**Common Core Georgia Performance Standards Framework**  
*Third Grade Mathematics • Unit 2*

**Product 24**

**Product 30**

**Product 36**

## **PRACTICE TASK: Shake, Rattle, and Roll Revisited**

In this task, students will roll two cubes to get factors and use factors to find the product.

### **STANDARDS FOR MATHEMATICAL CONTENT**

**MCC.3.OA.1.** Interpret products of whole numbers, e.g., interpret  $5 \times 7$  as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as  $5 \times 7$ .*

**MCC.3.OA.2** Interpret whole-number quotients of whole numbers, e.g., interpret  $56 \div 8$  as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each.

### **STANDARDS OF MATHEMATICAL PRACTICE (SMP)**

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

### **BACKGROUND KNOWLEDGE**

Students are taught to write equations as early as Kindergarten. Variables and equations are powerful tools in representing mathematical ideas. In this task students are able to use all of their strategies to figure out products, quotients, and factors. (Teaching Student-Centered Mathematics, John A. Van de Walle and LouAnn H. Lovin, 2006).

### **COMMON MISCONCEPTION**

Students may have the misconception that they must find the product using one particular strategy or all multiplication strategies they have learned. It is important for students to be able to pick a strategy that makes sense to them and that they are able to use proficiently. This task allows them to practice multiplication strategies and develop efficient ways to solve multiplication problems.

### **ESSENTIAL QUESTIONS**

- What strategies can be used to solve multiplication problems?
- How does the order of the digits in a multiplication problem affect the product?
- What is the relationship between the factors and the product?

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**MATERIALS**

- drawing paper, blocks, any other materials that will help students visualize the problem
- “Shake Rattle and Roll” student game board
- 2 dice

**GROUPING**

Partners

**NUMBER TALK**

By now number talks should be incorporated into the daily math routine. Continue utilizing the different strategies in number talks and revisiting them based on the needs of your students. In addition Catherine Fosnot has developed “strings” of numbers that could be included in a number talk to further develop mental math skills. (See Minilessons for Early Multiplication and Division by Willem Uittenbogaard and Catherine Twomey Fosnot (2007).

**TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION (SMP 1, 6, and 8)**

Each player takes turns and rolls the number cubes and covers the product or any two factors of the product. For example, if a player rolls a 2 and an 8, the player could cover 16 (product), 2 (factor), or 8 (factor). If the product and factors have been covered, the player loses a turn. The first player to cover five squares in a row vertically, horizontally or diagonally wins the game. This same concept can be used to practice division facts following the same concept. However, change the numbers on the game board, focus on the divisor, dividend, and quotient.

**FORMATIVE ASSESSMENT QUESTIONS**

- What multiplication are you using?
- What patterns are you noticing?

**DIFFERENTIATION**

**Extension**

- Create game boards with larger numbers using 9 sided dice.

**Intervention**

- Provide students with manipulatives to form arrays with their two factors in order to find the products.



## Shake, Rattle and Roll Revisited

**Directions:** Each player takes turns and rolls the number cubes and covers the product or any two factors of the product. If the product and factors have been covered, the player loses a turn. The first player to cover five squares in a row vertically, horizontally or diagonally wins the game. To practice division facts follow the same concept however, change the numbers on the game board, focus on the divisor, dividend, and quotient.

24	4	9	3	18	2	20	12	4
4	1	20	12	4	3	25	5	8
2	3	6	4	30	36	1	5	18
4	9	1	18	6	5	16	1	9
25	20	4	25	3	2	5	4	8
5	12	2	1	15	12	6	18	5
24	3	24	8	3	5	4	24	2
15	8	6	9	36	3	18	6	24
8	5	16	25	2	30	6	2	3

### **Shake, Rattle and Roll Revisited (0-9)**

**Directions:** Each player takes turns and rolls the number cubes and covers the product or any two factors of the product. If the product of factors has been covered, the player loses a turn. The first player to cover five squares in a row vertically, horizontally or diagonally wins the game. To practice division facts follow the same concept however, change the numbers on the game board, focus on the divisor, dividend, and quotient.

24	4	27	49	18	63	20	12	45
35	21	64	12	28	7	25	14	0
2	48	6	54	30	36	21	72	18
16	9	45	18	35	48	16	1	32
72	20	7	54	3	10	27	4	8
40	12	42	1	15	12	6	32	5
24	14	36	8	4	5	56	24	63
15	0	6	9	36	42	18	56	24
81	28	16	40	2	30	6	10	3

### **SCAFFOLDING TASK: Use What You Know**

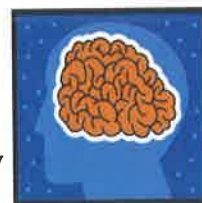
Using multiplication facts and a strategy, identify the unknown factor in a division problem. Students will then answer the provided word problems and create two of their own.

2 – 3 days

### **STANDARDS FOR MATHEMATICAL CONTENT**

**MCC.3.OA.6.** Understand division as an unknown-factor problem.

For example, find  $32 \div 8$  by finding the number that makes 32 when multiplied by 8. Conversations should also include connections between division and subtraction.



### **STANDARDS OF MATHEMATICAL PRACTICE (SMP)**

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

**\*\*\*Mathematical Practices 1 and 6 should be evident in EVERY lesson.\*\*\***

### **BACKGROUND KNOWLEDGE**

(Information quoted from Van de Walle and Lovin, Teaching Student-Centered Mathematics: Grades 3-5, page 123)

This missing-factor approach is likely to be invented by some students if they are solving measurement problems such as the following: “Grace can put 6 pictures on one page of her photo album. If she has 82 pictures, how many pages will she need?” Alternatively, you can simply pose a task such as  $82 \div 6$  and ask students, “What number times 6 would be close to 82?” and continue from there.

This task requires students to label parts of a division problem. Whereas memorizing terminology and definitions is not required, mathematical language should be used in every lesson.

### **COMMON MISCONCEPTIONS**

Students may have difficulty seeing multiplication and division as inverse operations. In order to develop an understanding of this relationship, students need to have ample opportunities to explore these two operations simultaneously.

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**ESSENTIAL QUESTIONS**

- How are multiplication and division related?
- How is division an unknown factor problem?

**MATERIALS**

- Unknown Factor Record sheet
- Counters
- Index cards

**GROUPING**

Partner/Independent

**NUMBER TALK**

By now number talks should be incorporated into the daily math routine. Continue utilizing the different strategies in number talks and revisiting them based on the needs of your students. In addition Catherine Fosnot has developed “strings” of numbers that could be included in a number talk to further develop mental math skills. (See Minilessons for Early Multiplication and Division by Willem Uittenbogaard and Catherine Twomey Fosnot (2007).

**TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION**

Using multiplication facts and a strategy of choice, students identify the unknown factor in a division problem. Students will also record and label parts of a division problem in both formats. Students will then answer the provided problems as well as create two of their own.

To begin, distribute one index card to each student. Ask them to write one multiplication problem, including the product on the card. (You may want to assign tables, rows, groups etc different numbers. For example one group writes different 4s facts, another writes different 6s facts.) Collect the cards. Choose one card from the stack. Reserve the rest of the stack for partner/independent practice.

**Part I: (SMP 1, 2, 3, 4, 6, and 8)**

Write the known fact on the board/overhead/smart board. Discuss the fact and how it can be solved. (Check retention of strategies). Create a story problem from the fact. For example if the fact is  $4 \times 7 = 28$ , the story problem could be “28 people are riding the roller coaster. There are four people in each row. How many rows are in the roller coaster?”

Provide students (individually or at work groups) counters and blank index cards. Ask them to count out 28 counters (Great opportunity to discuss different strategies to count out 28 counters using counting by twos, threes, fours).

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Next, ask the students to identify the other given number in the problem. Discuss what has to happen next. Ask for suggestions on how to divide 28 into groups of four. Will they need four index cards to represent the roller coaster rows? Will they need to count out four roller coaster riders and put them on an index card to represent each row? Discuss with the class which model would correctly show the problem? Ask if there are any other strategies the students could have used to solve this problem.

Ask, what multiplication problem do we already know that could help us solve this story problem? Discuss, “Well, if we know  $4 \times 7 = 28$ , how can we use this fact to find the answer to the problem? Write the division equation and discuss the reasoning.

After the division equation has been written, introduce or reintroduce the parts of a division equation; divisor, dividend and quotient. Label the correct parts.

$$28 \div 4 = 7$$

Dividend is 28

Divisor is 4

Quotient is 7

$$\begin{array}{r} 7 \\ 4 \overline{)28} \end{array}$$

Repeat, using the student-made multiplication problems from the beginning of the lesson. Teacher, can provide a few story problems and then challenge the class to create more. Always give the product and one factor to create the story problem. Work with volunteers using the counters and index cards to model solutions for the group. Make sure to discuss what known multiplication fact could have been used to solve the story problem. Write the division sentence and label the parts. Allow time and encourage students to share how they solved the story problem.

**Part II: (SMP 1, 2, 3, 4, 6, 7, and 8)**

Same day or on the second day, distribute the Unknown Factor Recording Sheet. The students can be in partners, working groups or individual. Complete the first problem as a class. Let the students use the counters and index cards to model their math thinking. Allow time for them to explain. Discuss methods used to solve the unknown factor. Label the parts of the problem together. Complete the second as a class or allow students to complete on their own or with partners. After enough time for the students to come up with an answer, call the class back and discuss strategies used to find the unknown factor. Check student work and labeling. Continue as partners to solve the final problems.

**Part III: (SMP 1, 2, 3, 4, 5, 6, and \*)**

On the second or third day, hang or place the student written multiplication facts around the room. On the back of the Unknown Factor Recording sheet, have the students divide it into four sections. Each pair (or individual) will tip toe to a multiplication problem somewhere in the



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room. They must write their own unknown factor problem using the format the class practiced. Instruct them to write the multiplication problem. Write the unknown factor story problem. Write the division equation that solves the problem and label the parts of the division equation. Repeat until the partners or individual has four different unknown factor problems written. Have counters and index cards available if students would like to use them. Finally, ask for students to share the unknown factor problem they have created and how they solved it. Discuss strategies used. Students can also challenge a class mate to solve their unknown factor problem and model it using the counters and index cards, Extension: collect student record sheets and create a follow up task or station using the student created unknown factor problems.

**FORMATIVE ASSESSMENT QUESTIONS**

- What strategy can you use to solve an unknown factor problem?
- Describe how multiplication and division are alike.

**DIFFERENTIATION**

**Extension:**

- Students can create story problems that have a two step process.

**Intervention:**

- Students may use manipulatives or multiplication chart

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Name \_\_\_\_\_

Date \_\_\_\_\_

**Unknown Factor Stories**  
Student Record Sheet



**Directions:**

1. Use the known multiplication facts to solve the unknown factor problem.
2. Write a division equation that solves the problem.
3. Label the parts of the division equation (Dividend, Divisor, Quotient)

*Bonus: Write and label both ways to write a division equation*

*I know  $10 \times 7 = 70$ . How can I use that fact to find the answer to this problem?*

Mr. Adams bought 70 new notebooks for the class. There were 10 notebooks in each package. How many packages did Mr. Adams buy?

*I know  $4 \times 6 = 24$ . How can I use that fact to find the answer to this problem?*

Janey would like to put 24 pictures of her friends in a photo album. She can put 4 pictures on each page. How many pages in the photo album will have pictures of her friends on them?

*I know  $2 \times 4 = 8$ . How can I use that fact to find the answer to this problem?*

PetSmart has 8 hamsters. How many hamsters will fit in 4 cages?

*I know  $5 \times 7 = 35$ . How can I use that fact to find the answer to this problem?*

It took Sam 35 minutes to run each lap. If Sam ran 7 laps, how long did each lap take?

*I know  $6 \times 8 = 48$ . How can I use that fact to find the answer to this problem?*

Tanya spent \$48 at Old Navy. She bought eight new shirts at the same price. What was the price of each shirt?

*I know  $3 \times 9 = 27$ . How can I use that fact to find the answer to this problem?*

Kim spent \$27 on candy for her nine friends. How much did Kim spend on each friend?



### **PRACTICE TASK: Multiplication Chart Mastery**

In this task, students will explain and describe the patterns they find in the multiplication chart. This task would work well as a math conference interview. Consider using it as an assessment during the year, adding, deleting or changing questions as well as parts of the chart to uncover students' thinking and learning.

**APPROXIMATE TIME:** 2 days to complete

### **STANDARDS FOR MATHEMATICAL CONTENT**

**MCC.3.OA.5.** Apply properties of operations as strategies to multiply and divide.

Examples: If  $6 \times 4 = 24$  is known, then  $4 \times 6 = 24$  is also known. (Commutative property of multiplication.)  $3 \times 5 \times 2$  can be found by  $3 \times 5 = 15$ , then  $15 \times 2 = 30$ , or by  $5 \times 2 = 10$ , then  $3 \times 10 = 30$ . (Associative property of multiplication.) Knowing that  $8 \times 5 = 40$  and  $8 \times 2 = 16$ , one can find  $8 \times 7$  as  $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$ . (Distributive property.)

Use arrays, area models, and manipulatives to develop understanding of properties.

**MCC.3.OA.6.** Understand division as an unknown-factor problem.

For example, find  $32 \div 8$  by finding the number that makes 32 when multiplied by 8.

Conversations should also include connections between division and subtraction.

**MCC.3.OA.7** Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that  $8 \times 5 = 40$ , one knows  $40 \div 5 = 8$ ) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

### **STANDARDS OF MATHEMATICAL PRACTICE (SMP)**

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

**\*\*\*Mathematical Practices 1 and 6 should be evident in EVERY lesson.\*\*\***

### **BACKGROUND KNOWLEDGE**

When learning about multiplication, students need a wide variety of experiences and opportunities to explore and discover patterns on their own. Students need a good understanding

MATHEMATICS • GRADE 3 • UNIT 2: Operations and Algebraic Thinking: the Relationship Between Multiplication and Division

Georgia Department of Education

Dr. John D. Barge, State School Superintendent

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of how to read rows and columns on a multiplication chart and how to find products using the chart as a tool. Students should also have an understanding of the commutative property.

### **COMMON MISCONCEPTIONS**

Students may have the interpretation that they must fill in the multiplication chart from memory. It is important to be sure to make manipulatives available to students who may need them.

As students discover and verbalize patterns in the multiplication chart, they find more strategies with which to remember multiplication and division facts. The more familiar students become with patterns and predicting successive numbers in patterns, the better prepared they will be for further understanding.

### **ESSENTIAL QUESTIONS**

- What patterns of multiplication can we discover by studying a times table chart?
- How can we determine numbers that are missing on a times table chart by knowing multiplication patterns?

### **MATERIALS**

- “Multiplication Chart Mastery” recording sheet
- Manipulatives
- Blank Multiplication Chart (partially filled in from Finding Factors Task)

### **GROUPING**

Individual/Small group

### **NUMBER TALK**

By now number talks should be incorporated into the daily math routine. Continue utilizing the different strategies in number talks and revisiting them based on the needs of your students. In addition Catherine Fosnot has developed “strings” of numbers that could be included in a number talk to further develop mental math skills. (See Minilessons for Early Multiplication and Division by Willem Uittenbogaard and Catherine Twomey Fosnot (2007).

### **TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION**

Students may have the interpretation that they must fill in the multiplication chart from memory. It is important to be sure to make manipulatives available to students who may need them. As students discover and verbalize patterns in the multiplication chart, they find more strategies with which to remember multiplication and division facts. The more familiar students become

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with patterns and predicting successive numbers in patterns, the better prepared they will be for further understanding.

**Part I: (SMP 1, 2, 5, 6, 7 and 8)**

Students may begin to fill in their own multiplication chart. Challenge them to fill in the facts they know. Discuss what patterns they discover. How will they find the products they are missing?

**Part II: (SMP 1, 2, 3, 6, 7 and 8)**

Students will answer the questions on the “Multiplication Chart Mastery” recording sheet. Be sure to give students an opportunity to discuss their answers with peers and the teacher.

**FORMATIVE ASSESSMENT QUESTIONS**

- What patterns do you notice in the \_\_\_\_ column?
- If you think of  $8 \times 4$  as  $8 \times 2$  doubled, what is the product of  $8 \times 4$ ? Will this strategy always work? How do you know?
- What strategy could you use to find the products for the eight facts?
- Where are examples of the commutative property on the multiplication chart?

**DIFFERENTIATION**

**Extension:**

- Have a student fill in a multiplication chart and purposely include six wrong items. Trade with a partner and try to be the first to identify the incorrect numbers on the chart and make corrections.

**Intervention:**

- Provide students with a partially filled in multiplication chart. Be sure to strategically fill in the chart based on the student’s needs.

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Name \_\_\_\_\_

Date \_\_\_\_\_

**Multiplication Chart Mastery**

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18			27	30
4	8	12	16	20	24			36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36			54	60
7	14		28	35		49		63	70
8	16			40			64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

1. Mike filled in this chart to practice his multiplication facts. Which fact does he seem to know best?

\_\_\_\_\_

How do you know?

\_\_\_\_\_  
\_\_\_\_\_

2. Mike has all his nines facts correct, even though he has not memorized them. Explain one strategy he might have used to fill in his nines on the chart.

\_\_\_\_\_  
\_\_\_\_\_

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3. Mike is missing some of threes and fours facts. Fill them in for him and explain how you would teach him to find these answers.

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4. How could Mike use the fours facts to help him find the eights facts? Fill those in for him and explain your strategy.

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5. Mike has done a great job filling in all the numbers on the diagonal. What do you notice about these numbers?

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6. Do you see any other patterns on the multiplication chart? Describe at least one.

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7. Explain how the commutative property helps you fill in facts on the multiplication chart. Give an example.

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## **CONSTRUCTION TASK: Making the “Hard” Facts Easy**

In this task, students will practice using the distributive property.  
Approximately 2 Days to complete



### **STANDARDS FOR MATHEMATICAL CONTENT**

**MCC.3.OA.5.** Apply properties of operations as strategies to multiply and divide.

Examples: If  $6 \times 4 = 24$  is known, then  $4 \times 6 = 24$  is also known. (Commutative property of multiplication.)  $3 \times 5 \times 2$  can be found by  $3 \times 5 = 15$ , then  $15 \times 2 = 30$ , or by  $5 \times 2 = 10$ , then  $3 \times 10 = 30$ . (Associative property of multiplication.) Knowing that  $8 \times 5 = 40$  and  $8 \times 2 = 16$ , one can find  $8 \times 7$  as  $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$ . (Distributive property.) Use arrays, area models, and manipulatives to develop understanding of properties.

**MCC.3.OA.7** Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that  $8 \times 5 = 40$ , one knows  $40 \div 5 = 8$ ) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

### **STANDARDS OF MATHEMATICAL PRACTICE (SMP)**

1. Make sense of problems and persevere in solving them.
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7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

**\*\*\*Mathematical Practices 1 and 6 should be evident in EVERY lesson.\*\*\***

### **BACKGROUND KNOWLEDGE**

(Information quoted from Van de Walle and Lovin, Teaching Student-Centered Mathematics: Grades 3-5, page 113)

*For multiplication, the ability to break numbers apart in flexible ways is even more important than in addition or subtraction. The distributive property is another concept that is important in multiplication computation. For example, to multiply  $43 \times 5$ , one might think about breaking 43 into 40 and 3, multiplying each by 5, and then adding the results. Children require ample opportunities to develop these concepts by making sense of their own ideas and those of their classmates.*

Third grade students will not be required to use the distributive property for products greater than one hundred.



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**COMMON MISCONCEPTIONS**

When using the distributive property to solve problems, students will partition numbers and arrays at different points. It is important for students to decide the appropriate way to partition a number, instead of the teacher, so that the problem makes sense to them.

**ESSENTIAL QUESTIONS**

- How does understanding the distributive property help us multiply large numbers?
- What are strategies for leaning multiplication facts?

**MATERIALS**

- Connecting cubes (bags of 100)
- Graph paper
- Making the Hard Facts Easy Recording Sheet
- Crayons or colored pencils
- Scissors
- Glue

**GROUPING**

Small Group (Part 1)  
Partners or Independent (Part 2)

**NUMBER TALK**

By now number talks should be incorporated into the daily math routine. Continue utilizing the different strategies in number talks and revisiting them based on the needs of your students. In addition Catherine Fosnot has developed “strings” of numbers that could be included in a number talk to further develop mental math skills. (See Minilessons for Early Multiplication and Division by Willem Uittenbogaard and Catherine Twomey Fosnot (2007).

**TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION**

**Part I (SMP 1, 2, 3, 4, 6, 7, and 8)**  
(Students should be divided into small mixed ability groups)

Discuss with students that in order to make “hard” multiplication number sentences easier, they can use an easier multiplication fact. (Allow groups to discuss) Record or let students come up and record the “easy” multiplication facts on the board/overhead or smart board. Discuss why these are easy. (“Easy” multiplication facts consist of but are not limited to 1s, 2s, 5s, 10s).

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Understanding that this is an opinion question, allow this to be an open discussion for the students in a respectful environment.

Next, discuss what the “hard” facts or facts they haven’t yet mastered are and list the numbers on the board. If there are too many, decide on the two “hardest” facts (generally 7s, 8s and 9s). With a quick show of hands, let the class decide which are the “hardest” facts. Use these facts to model for the class (For this example, the 7s facts will be used).

Distribute bags of connecting cubes to each group. Instruct the groups to build seven rows of nine using the connecting cubes OR which ever “hardest fact” your class has chosen. Follow the example using  $7 \times 9$ . (But insert your factors) Arrange the seven rows of nine into an array and ask “From our knowledge of arrays, who can say the multiplication expression is represented in this array?” Correct response would be  $7 \times 9$ . Acknowledge that this is one of the “hard” facts. Ask students to pick which factor they consider the hardest and to split that factor into two easier factors (ex: 7 can become  $5 + 2$ ). Separate two rows of nine from the array you have created. What are the two arrays you have now? (Answer: 5 rows of nine and 2 rows of nine) Using our knowledge of arrays, can you find the product of each array? (5 rows of 9 is 45 and 2 rows of 9 is 18). Now, push the two arrays back together and ask “What is the total when we push together the two arrays?  $45 + 18$ ? Answer 63 so what would be the product of  $7 \times 9$ ? This is called the Distributive Property. We can break down or distribute one factor in a multiplication problem to create two expressions, and then add the products. You may repeat modeling this a second time with a different fact.

Finally, challenge the groups to use the distributive property on their own. Practice with these facts  $7 \times 8$ ,  $7 \times 4$  and  $7 \times 3$ . Circulate and check, asking groups how they distributed the one of the facts. Conclude with a class discussion about the distributive property. How does it work? Did you distribute one or both factors? What do you add together?

**Part II (SMP 1, 2, 4, 6, 7, and 8)**

Review one or two multiplication facts using the connecting cubes from Part 1. Discuss how the distributive property works. (Distribute one factor into two numbers from the easy facts, create the two arrays and add the products.) Encourage students to use this distributive strategy using graph paper and the Making the Hard Facts Easy recording sheet. Distribute these sheets to either partners or individuals. Model the first question. Circulate and check for comprehension of the directions. Continue to model the second question or students may complete with partners or individually.

**FORMATIVE ASSESSMENT QUESTIONS**

- How does the distributive property help us find the product of “hard” facts?
- When can you use the distributive property?

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**DIFFERENTIATION**

**Extension:**

- Students can create their own multiplication problems to solve using the distributive strategy. (Product does not need to be greater than 100)

**Intervention:**

- Students can continue to use manipulatives or repeated addition

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Name \_\_\_\_\_

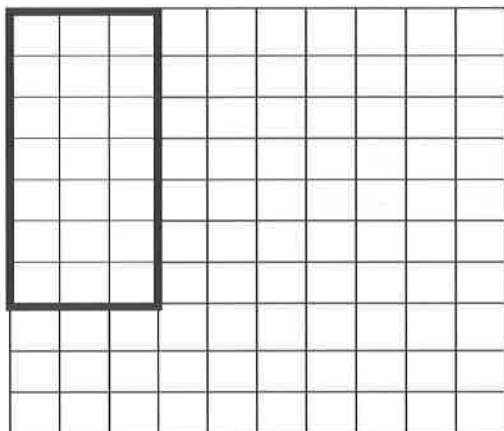
Date \_\_\_\_\_

**Making the "Hard" Facts Easy**  
**Student Recording Sheet**

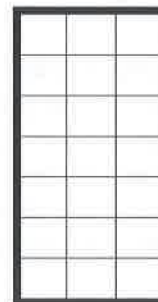


**Example:  $7 \times 3$**

**1. Outline 7 rows of 3 on graph paper**

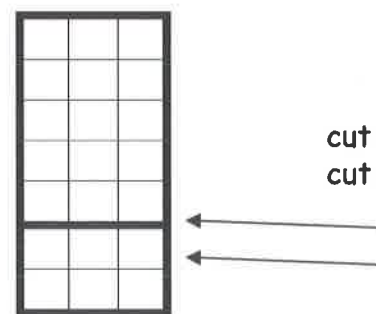


**2. Cut out 7 rows of 3 from graph paper**

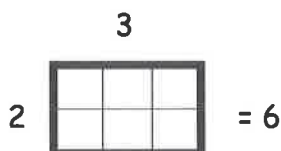
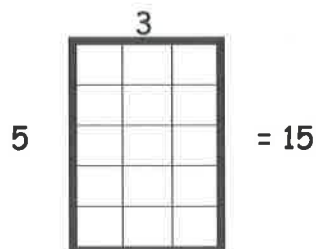


**3. Record what two numbers 7 can distribute to   5   +   2   = 7**

**4. Cut 7 rows of 3 to be two arrays, 5 rows of 3 and 2 rows of 3**



**5. Paste both arrays and label.**



**6. Record multiplication sentences**

$$5 \times 3 = 15$$

$$2 \times 3 = 6$$

$$15 + 6 = 21 \text{ so } 7 \times 3 = 21$$

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Name \_\_\_\_\_

Date \_\_\_\_\_

**Making the "Hard" Facts Easy**  
**Student Recording Sheet**

**My "Hard" facts**

**Hard fact** \_\_\_\_\_



1. Outline the array on graph paper.
2. Cut out the array from graph paper.
3. Record the two numbers \_\_\_ can distribute to \_\_\_ + \_\_\_ = \_\_\_.
4. Cut \_\_\_ rows of \_\_\_ to be two arrays, \_\_\_ rows of \_\_\_ and \_\_\_ rows of \_\_\_.
5. Paste both arrays and label.
6. Record multiplication sentences.



## **PRACTICE TASK: Find the Unknown Number**

In this task, students will complete division equations by finding the unknown factors.

**APPROXIMATE TIME:** 1 Day

### **STANDARDS FOR MATHEMATICAL CONTENT**

**MCC.3.OA.5.** Apply properties of operations as strategies to multiply and divide.

Examples: If  $6 \times 4 = 24$  is known, then  $4 \times 6 = 24$  is also known. (Commutative property of multiplication.)  $3 \times 5 \times 2$  can be found by  $3 \times 5 = 15$ , then  $15 \times 2 = 30$ , or by  $5 \times 2 = 10$ , then  $3 \times 10 = 30$ . (Associative property of multiplication.) Knowing that  $8 \times 5 = 40$  and  $8 \times 2 = 16$ , one can find  $8 \times 7$  as  $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$ . (Distributive property.)

Use arrays, area models, and manipulatives to develop understanding of properties.

**MCC.3.OA.6.** Understand division as an unknown-factor problem.

For example, find  $32 \div 8$  by finding the number that makes 32 when multiplied by 8.

Conversations should also include connections between division and subtraction.

**MCC.3.OA.7** Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that  $8 \times 5 = 40$ , one knows  $40 \div 5 = 8$ ) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

### **STANDARDS OF MATHEMATICAL PRACTICE (SMP)**

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

**\*\*\*Mathematical Practices 1 and 6 should be evident in EVERY lesson.\*\*\***

### **BACKGROUND KNOWLEDGE/COMMON MISCONCEPTION**

(Information quoted from Van de Walle and Lovin, Teaching Student-Centered Mathematics: Grades 3-5, page 123)

This missing-factor approach is likely to be invented by some students if they are solving measurement problems such as the following: “Grace can put 6 pictures on one page of her photo album. If she has 82 pictures, how many pages will she need?” Alternatively, you can simply pose a task such as  $82 \div 6$  and ask students, “What number times 6 would be close to 82?” and continue from there.

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**ESSENTIAL QUESTIONS**

- How can you use multiplication facts to solve unknown factor problems?
- How are multiplication and division related?

**MATERIALS**

- Ten-sided dice or number cards (1-10) or playing cards Ace through 10
- Find the Unknown Number partner cards (You may want to put this in a sheet protector or laminate for reuse)

**GROUPING**

Partner

**NUMBER TALK**

By now number talks should be incorporated into the daily math routine. Continue utilizing the different strategies in number talks and revisiting them based on the needs of your students. In addition Catherine Fosnot has developed “strings” of numbers that could be included in a number talk to further develop mental math skills. (See Minilessons for Early Multiplication and Division by Willem Uittenbogaard and Catherine Twomey Fosnot (2007).

**TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION (SMP 1, 2, 6, 7 and 8)**

Partners will take turns rolling the ten-sided dice or choosing a card from a face down pile. If Partner 1 can use the number he/she rolled/chose to correctly complete any equation on the “Find the Unknown” partner card, they can record the number in the correct spot. Partner 2 then takes a turn. The partner to fill in the division equations correctly first wins that round. Partners can play again or switch cards with another pair of partners.

**FORMATIVE ASSESSMENT QUESTIONS**

- How do multiplication facts help in solving division equations?
- What strategy can you use to solve division equations?

**DIFFERENTIATION**

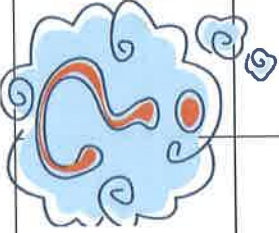
**Extension:**

- Create a game board that has two missing components. Use number cards to 100, or use a spinner (top) on a 100s chart. (must place books on each side to keep spinner (top) on the 100s chart.

**Intervention: (SMP 5)**

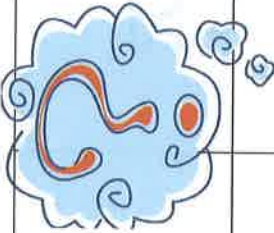
- Allow student to use multiplication chart or reduce the amount of rounds.

Find the Unknown Number (Partner Card A)

Partner 1	Partner 2
	
$12 \div \underline{\hspace{1cm}} = 2$	$18 \div 2 = \underline{\hspace{1cm}}$
$16 \div 4 = \underline{\hspace{1cm}}$	$\underline{\hspace{1cm}} \div 1 = 7$
$5 \div 5 = \underline{\hspace{1cm}}$	$8 \div 4 = \underline{\hspace{1cm}}$
$18 \div \underline{\hspace{1cm}} = 6$	$30 \div \underline{\hspace{1cm}} = 6$
$\underline{\hspace{1cm}} \div 2 = 4$	$20 \div \underline{\hspace{1cm}} = 2$

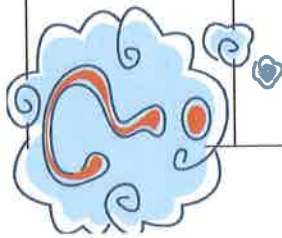


Find the Unknown Number (Partner Card B)

<div style="text-align: center;">  </div> <div style="display: flex; justify-content: space-between; padding: 10px;"> <div style="width: 45%; text-align: center;"> <h3>Partner 1</h3> </div> <div style="width: 45%; text-align: center;"> <h3>Partner 2</h3> </div> </div>	
$24 \div \underline{\hspace{2cm}} = 6$ $12 \div 4 = \underline{\hspace{2cm}}$ $6 \div 6 = \underline{\hspace{2cm}}$ $60 \div \underline{\hspace{2cm}} = 6$ $\underline{\hspace{2cm}} \div 2 = 5$	$20 \div 2 = \underline{\hspace{2cm}}$ $\underline{\hspace{2cm}} \div 1 = 3$ $36 \div 4 = \underline{\hspace{2cm}}$ $36 \div \underline{\hspace{2cm}} = 6$ $16 \div \underline{\hspace{2cm}} = 2$

Find the Unknown Number (Partner Card C)

Partner 2



$$32 \div 8 = \underline{\quad}$$

$$\underline{\quad} \div 1 = 7$$

$$16 \div 4 = \underline{\quad}$$

$$63 \div \underline{\quad} = 7$$

$$18 \div \underline{\quad} = 2$$

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<b>Partner 1</b>	$80 \div \underline{\hspace{1cm}} = 8$ $32 \div 4 = \underline{\hspace{1cm}}$ $7 \div 7 = \underline{\hspace{1cm}}$ $18 \div \underline{\hspace{1cm}} = 6$ $\underline{\hspace{1cm}} \div 2 = 3$
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## **CONSTRUCTING TASK: Making up Multiplication**

In this task, students will learn three different ways a multiplication problem can be written. They will then practice writing their own problems.

**APPROXIMATE TIME:** 3-4 days

### **STANDARDS FOR MATHEMATICAL CONTENT**

**MCC.3.OA.5.** Apply properties of operations as strategies to multiply and divide.

Examples: If  $6 \times 4 = 24$  is known, then  $4 \times 6 = 24$  is also known. (Commutative property of multiplication.)  $3 \times 5 \times 2$  can be found by  $3 \times 5 = 15$ , then  $15 \times 2 = 30$ , or by  $5 \times 2 = 10$ , then  $3 \times 10 = 30$ . (Associative property of multiplication.) Knowing that  $8 \times 5 = 40$  and  $8 \times 2 = 16$ , one can find  $8 \times 7$  as  $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$ . (Distributive property.) Use arrays, area models, and manipulatives to develop understanding of properties.

**MCC.3.OA.6.** Understand division as an unknown-factor problem.

For example, find  $32 \div 8$  by finding the number that makes 32 when multiplied by 8. Conversations should also include connections between division and subtraction.

### **STANDARDS OF MATHEMATICAL PRACTICE (SMP)**

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

**\*\*\*Mathematical Practices 1 and 6 should be evident in EVERY lesson.\*\*\***

### **BACKGROUND KNOWLEDGE**

“When teaching multiplication and division, it is essential to use interesting contextual problems instead of more sterile story problems (or “naked numbers”). With a meaningful context students are more likely to exhibit their most spontaneous and meaningful approaches to solving a problem because they have some connection to it.” (From: Van de Walle, *Teaching Student-Centered Mathematics*, Vol. II, 3-5)

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**COMMON MISCONCEPTION**

In part II of this task, students will begin exploring different types of multiplication word problems and begin looking at comparison problems. Comparison problems use the terms “*times as many*”. It is important for the teacher to recognize this as a comparison problem, but should not be taught as a key phrase for students to learn. Students should build their understanding of the problem by analyzing what is happening in the problem.

**ESSENTIAL QUESTIONS**

- What strategies can help you solve real world multiplication problems?
- How can you write a mathematical sentence to represent a multiplication model we have made?
- How can you use what you know about multiplication to help you write your own multiplication problem?

**MATERIALS**

- Interlocking cubes
- Number strip
- Graph paper
- Two ten-sided dice
- Index cards
- Making up Multiplication, Student recording sheet
- Wipe off boards (optional)

**GROUPING**

Small Group/Partners/Independent

**NUMBER TALK**

By now number talks should be incorporated into the daily math routine. Continue utilizing the different strategies in number talks and revisiting them based on the needs of your students. In addition Catherine Fosnot has developed “strings” of numbers that could be included in a number talk to further develop mental math skills. See Minilessons for Early Multiplication and Division by Willem Uittenbogaard and Catherine Twomey Fosnot (2007).

**TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION (SMP 1, 2, 3, 4, 5, 6, 7, and 8)**

**Part I- Small Group**

Provide each group with an equivalent group/set problem. For example: There are 3 cars. Each has 2 people in it. How many people are there altogether? OR There are 6 fish bowls. Each contains 4 goldfish. How many goldfish are there altogether? OR There are 7 tables. Each table has 4 legs. How many legs are there altogether?

The students can model these and similar types of problems with:

- Interlocking cubes
- Jumps on a number strip
- Drawing a picture
- Creating an array

After the groups have solved their problems and explained their solutions, present the students with the task of making up their own story problems using the number sentence structure above with the different factors and products. The students can write their problems on index cards and swap with other groups. The students can solve the student created problem on a wipe off board or paper showing their strategies and multiplication sentences. Ask the students to label the two factors and one product in the problem. Ask for volunteers to share the problem and how they got the answers.

Did all of the student-created problems work? If some did not work due to wording or values too high, collectively decide how to adjust the problem so it is able to be solved. Return the cards to the owners. Have the owners solve their problem on the back of the index card. The students should also label the factors and product. Collect and review for accuracy and content.

**Part II: Exploring different types of story problems (whole group/partners)**

First, begin with comparison problems (“*times as many*”), where possible, using a context familiar to students. Brainstorm with the class and decide on three separate topics to write their comparison problems. (Possible topic: lunch, pets, toys, types of cards, pencils)

For example: Anna has 3 carrots in her lunchbox and Jessie has 3 *times as many* carrots as Anna. How many carrots does Jessie have in her lunchbox?

Have students identify the factors and product in each multiplication problem you solve with the students.

Pose a few questions to the whole group and have students solve collaboratively with their partner and then share their thinking. Ask them to pose their own problems using “*times as many*” in their problem. They can use index cards, wipe off boards or paper to present their own

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problems to partners to solve. Ask the students to label the two factors and one product in the problem. Share problems, solutions and strategies used.

Next, work with several array problems (equivalent groups). Pose problems such as: The students are lined up in 3 teams. Each team has 6 members. How many students are there altogether? Identify and label the two factors and product.

Students can use graph paper, peg boards, bead strings, or interlocking cubes to create arrays to solve the problems. Students can then create their own array problem for a partner to solve. Ask the students to label the two factors and one product in the problem. Share problems, solutions and strategies used.

Next, work with unknown-factor problems. Allow students to solve a few problems working with their partners, and then ask them to pose their own problems.

If you need 1 car for 5 people, how many cars will you need for 15 people? OR If you need 1 fish bowl for 2 goldfish, how many bowls will you need for 18 goldfish? OR If each table seats 4 people, how many tables will you need for 28 people?

Now ask the students to make up word problems using the unknown-factor problem structure. They can use index cards, wipe off boards or paper to present their own problems to partners to solve. Ask the students to label the two factors and one product in the problem. They can use repeated subtraction as well as unknown-factor multiplication.

Finally, ask students to share their problems and solutions. Ask if they could write their answers using a division sign.

### **Part III**

Use the Making up Multiplication, Student recording sheet as evaluation.

Teachers may decide to use this each day to record the student's progress by having the student create and solve the type of multiplication story problem after each session. Then use another copy to assess at the end of the task as record of performance.

- Explain one strategy you can use to solve a multiplication word problem?
- How can you find the unknown-factor in a multiplication problem?
- What is a factor?
- What is a product?

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**DIFFERENTIATION**

**Extension**

- Give the student the product and ask them to find out how many different factors could be used to solve the problem. Which factors would be the most likely? Explain the reasoning and strategy used.

**Intervention**

- Guided practice that simulates the task, done ahead of time, will enable students to develop problem solving strategies.
- Using manipulatives instead of graph paper.
- Use Making Up Multiplication, Student Response sheet with problem already created. The student will solve the problem and label the parts of the number sentence only.



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Name \_\_\_\_\_

**Making up Multiplication**  
**Student Recording Sheet**



**Directions:**

- A) Write your own a word problem for each type.
- B) Solve the problem and show your fabulous math work.
- C) Label the parts of the number sentence.

**Problem Type 1:**

How many times as many: (Comparison Problem)

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**Problem Type 2:**

Array problem (Equivalent groups problem)

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**Problem Type 3:**

If I have..., then I need...problems (Unknown-factor problem)

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Name \_\_\_\_\_

**Making up Multiplication**  
**Student Recording Sheet**



**Directions:**

- A) Write your own a word problem for each type.
- B) Solve the problem and show your fabulous math work.
- C) Label the parts of the number sentence.

**Problem Type 1:**

How many times as many: (Comparison Problem)

*Amber has 3 stickers on her notebook, and Jill has 4 times as many stickers on her notebook. How many stickers does Jill have on her notebook?*

**Problem Type 2:**

Array problem (Equivalent groups problem)

*Rob has 5 rows of flowers in his garden. Each row has 9 flowers. How many flowers are there in all?*

**Problem Type 3:**

If I have..., then I need...problems (Unknown-factor problem)

*If you need 1 box for 6 markers, how many boxes will you need for 24 markers?*



**CONSTRUCTING TASK: Field Day Blunder**

In this task, students will complete a multi-step word problem.

**STANDARDS FOR MATHEMATICAL CONTENT**

**MCC.3.OA.3** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

**MCC. 3.OA.4** Determine the unknown whole number in a multiplication or division equation relating three whole numbers.

**STANDARDS OF MATHEMATICAL PRACTICE (SMP)**

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

**BACKGROUND KNOWLEDGE**

Depending on the student's reasoning and understanding of the problem, this could be solved using multiplication and division, but also acted out through manipulatives. Regardless of how the problem is solved, it is important that students use words, numbers, and pictures to communicate their reasoning.

**COMMON MISCONCEPTION**

Multiplication and division are usually taught separately. However, multiplication and division should be combined in order for students to see how they are related. "Experiences with making and counting groups, especially in contextual situations, are extremely useful. Products or quotients are not affected by the size of numbers as long as the numbers are within the grasp of the students" (Teaching Student-Centered Mathematics, 2006, John A. Van de Walle and LouAnn H. Lovin). This idea becomes evident in this task.

**ESSENTIAL QUESTIONS**

- How can multiplication and division be used to solve real world problems?
- How can we use patterns to solve problems?

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**MATERIALS**

- drawing paper, blocks, any other materials that will help students visualize the problem
- “Field Day Blunder” student recording sheet

**GROUPING**

Partners

**NUMBER TALK**

By now number talks should be incorporated into the daily math routine. Continue utilizing the different strategies in number talks and revisiting them based on the needs of your students. In addition Catherine Fosnot has developed “strings” of numbers that could be included in a number talk to further develop mental math skills. See Minilessons for Early Multiplication and Division by Willem Uittenbogaard and Catherine Twomey Fosnot (2007).

**TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION (SMP 1, 2, 3, 4, 5, 6, 7, and 8)**

Students will follow the directions below from the “Field Day Blunder” recording sheet.

Mrs. Nelson’s third grade class was very excited about the upcoming field day events. Each third grade class was given a helmet and sacks for the upcoming sack race. Once the sack race was complete, Mrs. Nelson’s class moved on to the next race. As the students rushed to the next event, they left all of their helmets and sacks in a big pile. Christopher and Megan were left to match the helmets with the sacks. Some of the sacks were for 2 people, and some were for 3 people. There were 24 helmets in all. Christopher and Megan were able to match all of the helmets to their sacks. How many 2- and 3-person sacks could there be?

**FORMATIVE ASSESSMENT QUESTIONS**

- How many sacks do you think were left in the pile? How do you know?
- How did you determine the number of 2 person and 3 person sacks?
- Do you think there is more than one right solution for this task? Why do you think so? How can you find out?

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**DIFFERENTIATION**

**Extension**

- Determine three different combinations of sacks and helmets.

**Intervention**

- Provide students with a total number of sacks.



Name \_\_\_\_\_ Date \_\_\_\_\_

**Field Day Blunder**

Mrs. Nelson's third grade class was very excited about the upcoming field day events. Each third grade class was given a helmet and a sack for the upcoming sack race. Once the sack race was complete, Mrs. Nelson's class moved on to the next race. As the students rushed to the next event, they left all of their helmets and sacks in a big pile. Christopher and Megan were left to match the helmets with the sacks. Some of the sacks were for 2 people, and some were for 3 people. There were 24 helmets in all. Christopher and Megan were able to match all of the helmets to their sacks. How many 2- and 3-person sacks could there be? Use numbers, pictures and words to communicate your reasoning.

1. Draw pictures to show all the ways you can arrange the sacks and helmets.
2. Label and write matching number sentences for each arrangement.
3. Choose your favorite arrangement and explain why you think it would be the best arrangement so that every student has a helmet and a sack.



**CONSTRUCTING TASK: Leap Frog**  
(adapted from Baltimore County Public Schools)

In this task students will measure the leaps of origami frogs to the nearest inch and plot the measurement on a line plot graph.

**STANDARDS FOR MATHEMATICAL CONTENT**

**MCC.3.MD.4.** Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

**STANDARDS OF MATHEMATICAL PRACTICE (SMP)**

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.

**BACKGROUND KNOWLEDGE**

“The need to gather data will come from the class naturally in the course of discussion or from questions arising in other content areas. Science, of course, is full of measurements and thus abounds in data requiring analysis. Line plots are useful counts of things along a numeric scale. One advantage of a line plot graph is that every piece of data is on the graph.” (Teacher Student-Centered Mathematics, John A. Van de Walle and LouAnn H. Lovin, 2006).

In this task students will use data gathered from frog jumps to create a line plot graph.

**COMMON MISCONCEPTIONS**

When studying line plots, it is important for students to realize that the x axis is always a number line. Line plots are not to be used with categorical data.

**ESSENTIAL QUESTIONS**

- Why are there different types of graphs?
- How do you know which type of graph is appropriate for your data?

**MATERIALS**

- Student recording sheet
- 3 x 5 index card
- Scissors
- Rulers

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- Masking Tape
- Internet Access
- Directions for origami frog <http://www.ljhs.sandi.net/faculty/mteachworth/avid-information/origami-frog-lab-avid.pdf>

## **GROUPING**

Individual/Partner Task

## **NUMBER TALK**

By now number talks should be incorporated into the daily math routine. Continue utilizing the different strategies in number talks and revisiting them based on the needs of your students. In addition Catherine Fosnot has developed “strings” of numbers that could be included in a number talk to further develop mental math skills. (See Minilessons for Early Multiplication and Division by Willem Uittenbogaard and Catherine Twomey Fosnot (2007).

## **TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION**

This task is designed to deepen students understanding of collecting and displaying data. In this task students will measure the leaps of origami frogs to the nearest inch and plot the measurement on a line plot graph.

### **Part I**

Have students discuss graphs and their purpose. On the board have examples of different types of graphs third graders are responsible for learning. Have students identify each graph and discuss each graph’s purpose. Students can attach labels to graphs for a visual representation. Explain to students that they will be creating a line plot graph. Go into detail of what a line plot graph is and why it is used.

### **Part II**

Tell students that they are going to create a line plot graph showing how far Origami Frogs jump. Have students watch a brief YouTube video about a Frog Jumping Contest to pique their interests. You can find a video of a contest on <http://www.frogtown.org/> . View video prior to lesson to make sure it is appropriate. After viewing the video have students discuss what they saw. Display data of a frog jumping contest you “attended”. Ask students how the data was gathered. Students should mention that the data is in inches. Briefly discuss measuring and using a ruler. Ask students which type of graph would best fit the data you collected from a frog jumping contest. If students do not automatically choose line plot graph, discuss the graph they chose and why it would not be appropriate and then discuss line plot graphs again.

### **Part III (SMP 1, 2, 5, 6, and 7)**



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Explain to students that they will have their own frog jumping contest by creating Origami frogs out of paper. You can find a video of how to make an origami frog on [http://www.youtube.com/watch?v=luG7\\_nzBHjI&feature=fvo&ad=21937675894](http://www.youtube.com/watch?v=luG7_nzBHjI&feature=fvo&ad=21937675894) . The video is easy, however, you may want to write some directions down for your students. Also model each fold of the frog for clarification. Give students a few minutes to practice jumping with their paper frogs. Break students into groups of four to six. Students should take turns measuring the distance the frogs jump. Each group needs masking tape to mark the starting and end point, a ruler to measure the jump, and a recording sheet. Students should not measure their own jumps. Have students follow the directions on the student recording sheet.

**FORMATIVE ASSESSMENT QUESTIONS**

- What parts are needed to make a complete chart, table, or graph? (title, labels, etc.)
- Why would you organize data in different ways?
- Why are graphs used to display data?

**DIFFERENTIATION**

**Extension**

- Have students create a frog out of larger paper to see if it makes a difference in the distance the frogs jump. Have students predict the outcome.

**Intervention**

- Provide only inch rulers instead of rulers with multiple tick marks.

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**Leap Frog**



- A. Each frog in the group will take one leap. Someone in your group will measure the distance your frog jumps. Be sure to place a piece of masking tape on the starting and end point of the jump. Use a ruler and measure the distance the frog jumps to the nearest inch. Record the distance on the chart below. Use the information collected in the table to create a group line plot graph.

Frog Owner	Distance Jumped (nearest inch)

- B. Using the data in the table above create a line plot graph for your group. Be sure to include all the elements of a line plot graph.
- C. Create a line plot graph using all the data from each group.
- D. Looking at your class data and your group data what conclusions can you draw? Were there any outliers?

### **CONSTRUCTING TASK: Our Favorite Candy**

In this task students will collect data based their favorite candy.



### **STANDARDS OF MATHEMATICAL CONTENT**

**MCC.3.MD.3.** Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*

### **STANDARDS OF MATHEMATICAL PRACTICE (SMP)**

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
6. Attend to precision.

### **BACKGROUND KNOWLEDGE**

It is important for students to be able to gather their own data about a topic that is important to them. When students formulate the questions they want to ask, the data they gather become more and more meaningful. (Teacher Student-Centered Mathematics, John A. Van de Walle and LouAnn H. Lovin, 2006). How they organize the data and the techniques for analyzing them have a purpose.

### **COMMON MISCONCEPTIONS**

Students may read the mark on a scale that is below a designated number on the scale as if it were the next number. For example, a mark that is one mark below 80 grams may be read as 81 grams. Students realize it is one away from 80, but do not think of it as 79 grams.

Although intervals on a bar graph are not in single units, students count each square as one. To avoid this error, have students include tick marks between each interval. Students should begin each scale with 0. They should think of skip-counting when determining the value of a bar since the scale is not in single units.

### **ESSENTIAL QUESTIONS**

- How do I decide what increment scale to use for a bar graph?
- How do you interpret data in a graph?

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**MATERIALS**

- Chart paper/graphing paper

**GROUPING**

Individual/Partner Task

**NUMBER TALK**

By now number talks should be incorporated into the daily math routine. Continue utilizing the different strategies in number talks and revisiting them based on the needs of your students. In addition Catherine Fosnot has developed “strings” of numbers that could be included in a number talk to further develop mental math skills. (See Minilessons for Early Multiplication and Division by Willem Uittenbogaard and Catherine Twomey Fosnot (2007).

**TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION**

**Part I (SMP 1, 2, 4, and 6)**

Review with students how to collect data using a tally chart and how to count tallies appropriately. Review the elements of a graph. Create a class graph as a model over something that is familiar to students; favorite cars, favorite game, etc.

**Part II (SMP 1, 2, 3, 4, and 6)**

Students follow the directions on the “Our Favorite Candy” recording sheet. Have students analyze the chart on the student recording sheet and complete the numbered tasks.

1. Organize the data by making a tally chart below to record the data.
2. Create a bar graph using the tally chart. Be sure to include a title, labels for the x and y axis, a scale, and accurate bars.
3. Write two statements that you can learn from analyzing (looking at) this data.

**FORMATIVE ASSESSMENT QUESTIONS**

- How do I decide what increment scale to use for a bar graph?
- How do you interpret data in a graph?
- How can I show data using a line plot graph?
- How do I decide what symbol to use when constructing a pictograph?

**DIFFERENTIATION**

**Extension**

- Have students survey a class for the same information. Have students compare the data from the original data set to the data they collected from another class.

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**Intervention**

- Lessen the amount of data in the table in order to be more manageable for struggling students.

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Name \_\_\_\_\_

Date \_\_\_\_\_



**Our Favorite Candy**

Ryan	Skittles
Mark	M & M's
Anthony	Gummy Bears
Sarah	Starburst
Jenise	Snickers Candy Bar
Annittra	Airheads
Janice	Skittles
Jasmine	M & M's
Teresa	Airheads
Lania	M & M's
Ronnie	Starburst
Jeremy	M & M's
Rick	Airheads
Khalil	Gummy Bears
Samantha	M & M's
Megan	Airheads
Joanie	Starburst
Kavon	Skittles
Stephanie	Skittles

1. Organize the data by making a tally chart below to record the data
2. Create a bar graph using the tally chart. Be sure to include a title, labels for the x and y axis, a scale, and accurate bars. Use your journal or another sheet of paper.
3. Write two things you can learn from analyzing (looking at) this data. Use complete sentences.



## **CULMINATING TASK I: My Special Day!**

### **2 Days to complete**

In this task, students will plan a party under \$100.

### **STANDARDS FOR MATHEMATICAL CONTENT**

**MCC.3.OA.5.** Apply properties of operations as strategies to multiply and divide.

Examples: If  $6 \times 4 = 24$  is known, then  $4 \times 6 = 24$  is also known. (Commutative property of multiplication.)  $3 \times 5 \times 2$  can be found by  $3 \times 5 = 15$ , then  $15 \times 2 = 30$ , or by  $5 \times 2 = 10$ , then  $3 \times 10 = 30$ . (Associative property of multiplication.) Knowing that  $8 \times 5 = 40$  and  $8 \times 2 = 16$ , one can find  $8 \times 7$  as  $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$ . (Distributive property.) Use arrays, area models, and manipulatives to develop understanding of properties.

**MCC.3.OA.6.** Understand division as an unknown-factor problem.

For example, find  $32 \div 8$  by finding the number that makes 32 when multiplied by 8. Conversations should also include connections between division and subtraction.

**MCC.3.OA.7** Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that  $8 \times 5 = 40$ , one knows  $40 \div 5 = 8$ ) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

### **STANDARDS OF MATHEMATICAL PRACTICE (SMP)**

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

**\*\*\*Mathematical Practices 1 and 6 should be evident in EVERY lesson.\*\*\***

### **BACKGROUND KNOWLEDGE**

In most cases the culminating task is used as an assessment. This task is rich in SMPs as the students reason through their planning. In order to truly assess their reasoning, the teacher must circulate and conference with the students as they are planning. The Formative Assessment Questions can be used to guide these conferences. In addition to this, when students share their party planning in the end, they will have the opportunity to ask and answer questions about their planning from their peers.

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“Assessment need not look different from instruction. The typical approach of an end-of-chapter test of skills may have some value but it is not appropriate as the main method of assessment. Assessment can and should happen every day as an integral part of instruction. If you restrict your view of assessment to tests and quizzes, you will miss seeing how assessment can help students grow and inform instruction. (Van de Walle and Lovin, Teaching Student-Centered Mathematics: Grades 3-5, page 30)

“Assessment should focus on what students do know instead of what they do not know” (NCTM, 1989).”

### **ESSENTIAL QUESTIONS**

- How is multiplication and division used to solve a problem?
- When can you use multiplication or division in real life?

### **MATERIALS**

Planning Information sheet

### **GROUPING**

Partner or Independent

### **NUMBER TALK**

By now number talks should be incorporated into the daily math routine. Continue utilizing the different strategies in number talks and revisiting them based on the needs of your students. In addition Catherine Fosnot has developed “strings” of numbers that could be included in a number talk to further develop mental math skills. See Minilessons for Early Multiplication and Division by Willem Uittenbogaard and Catherine Twomey Fosnot (2007).

### **TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION (SMP 1, 2, 3, 5, 6, and 7)**

Students will plan a special day, just for them! They have to keep the cost of their day under \$100. Each student will use the Planning recording sheet to decide how many guests will be invited to enjoy their special day with them. Students will figure out the cost of how much food, drinks and items they will need per guest. They have the choice of planning for a small group with a lot of items or a large group with not as many items. The goal is to see which students use multiplication and division to determine the cost of the day and which students are using repeated addition or subtraction.



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**FORMATIVE ASSESSMENT QUESTIONS**

- How did you determine how many guests you were going to invite?
- How did you make sure that you stayed within your allotted budget?
- How did your understanding of multiplication and division help you with planning?

**DIFFERENTIATION**

**Extension:**

- Students could be challenged to create their own list of supplies using a newspaper advertisement for a local party supply store. Increase the amount of the budget for the day.

**Intervention:**

- Provide the amount of guests that are coming for the day and then challenge the students to figure out what they could need for their day.

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Name \_\_\_\_\_

Date \_\_\_\_\_

**Planning Sheet**  
**Student Recording Sheet**

You get to plan a special day just for you! You parents are letting you pick what you want to do, eat, drink and who you will invite to share your special day with! Your task is to keep a budget under \$100. You can invite whomever you want. You get to make all the decisions!

Use the price lists to find out how much you will spend. You must use at least one item in each category.

FOOD	Cost per guest
Pizza	\$2
Hamburgers	\$2
Chicken Fingers	\$3
Ribs	\$5
Steak	\$7
Crab Legs	\$8
Japanese Steakhouse	\$10

DRINK	Cost per guest
Bottled water	\$1
Kool Aide	\$1
Lemonade	\$2
Fruit punch	\$2
Soda	\$2
Milkshakes	\$3
Root beer Floats	\$4

ACTIVITY	Cost per guest
Swimming	\$3
Roller skating	\$3
Bowling	\$4
Lazer tag	\$6
Limo ride	\$8
Waterpark	\$10
Amusement Park	\$10

FAVORS for GUESTS	Cost per guest
Stickers	\$1
Balloons	\$1
Yo yo	\$2
Frisbee	\$2
Silly string	\$2
Disposable camera	\$6
Gift card	\$10



## **UNIT TWO CULMINATING TASK**

### **PERFORMANCE TASK: ICE CREAM SCOOPS**

In this culminating task, students will use multiplication and division to show different ways they can spend \$2.00 on different flavors of ice cream.

### **APPROXIMATE TIME: 2 – 3 DAYS**

### **STANDARDS ADDRESSED**

**MCC.3.OA.1** Interpret products of whole numbers, e.g., interpret  $5 \times 7$  as the total number of objects in 5 groups of 7 objects each.

**MCC.3.OA.2** Interpret whole-number quotients of whole numbers, e.g., interpret  $56 \div 8$  as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each.

**MCC.3.OA.3** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

**MCC.3.OA.4** Determine the unknown whole number in a multiplication or division equation relating three whole numbers.

**MCC.3.MD.3.** Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*

**MCC.3.MD.4.** Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

### **BACKGROUND KNOWLEDGE**

As students begin to work on this task, they need to understand the meaning of the terms single, double, triple and double-double scoops of ice cream. The term “double-double” is another way of saying “quadruple” and you may want to ask students to explain why this is true.

If students choose to do division within this task, the conversation of remainders will naturally arise. Although remainders are not mentioned in the standards, students will encounter them naturally when dividing and should be addressed as they come up. These conversations will lead nicely into the fourth grade standard OA3 when the remainder must be interpreted.

### **ESSENTIAL QUESTION**

- How do estimation, multiplication, and division help us solve problems in everyday life?

MATHEMATICS • GRADE 3 • UNIT 2: Operations and Algebraic Thinking: the Relationship Between Multiplication and Division

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**MATERIALS**

- “Ice Cream Scoops” recording sheet

**GROUPING**

Independent Task

**NUMBER TALK**

By now number talks should be incorporated into the daily math routine. Continue utilizing the different strategies in number talks and revisiting them based on the needs of your students. In addition Catherine Fosnot has developed “strings” of numbers that could be included in a number talk to further develop mental math skills. See Minilessons for Early Multiplication and Division by Willem Uittenbogaard and Catherine Twomey Fosnot (2007).

**TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION**

In this culminating task, students will use multiplication and division to show different ways they can spend \$2.00 on different flavors of ice cream. In the process, they will double, triple, or quadruple the price for a single scoop of ice cream. Students can use manipulatives as needed.

Have students follow the directions on the “Ice Cream Scoops” Recording Sheet.

**Part I. Picture Graph (SMP 1, 2, 4, and 6)**

Using the flavors in the table able, survey your classroom to see which flavor is the most liked in your class. Display your data in a picture graph. Be sure to add all elements of a picture graph.

**Part II. Multiplication and Division (SMP 1, 2, 3, 4, 5, 6, 7, and 8)**

The Super Delicious Ice Cream Shop has the very best ice cream in town. They sell their ice cream in double scoops, triple scoops, or double-double (that’s four) scoops. The top selling ice creams are listed on the sign below. You have \$1.00 to spend. Don’t worry about tax.

Use words, pictures, and numbers to show all your work as you answer the questions below. Think about using estimation to help you consider your choices.

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Be sure to show your estimation work.

**Ice Cream Flavors and Prices for a Single Scoop**

Varoom Vanilla	\$0.50
Cha-cha Chocolate	\$0.10
Cheery Cherry	\$0.20
Rockin' Rocky Road	\$0.30
Striped Strawberry	\$0.17
Kid's Delight	\$0.12

1. With \$1.00, which flavor can you buy, triple Varoom Vanilla, or triple Cheery Cherry? Would you have any money left?
2. To spend most of your money, should you buy a double, triple, or double-double scoop of Rockin' Rocky Road? How much money would you have left?
3. Which ice cream flavors can you buy if you order a double-double scoop?
4. On a different day, you and 5 of your friends decide to all order a double scoop of Cha-Cha Chocolate. How much money will the group spend in all?
5. You have been saving pennies for a whole month! You have saved 96 pennies. If you and two of your friends share the pennies fairly, how many pennies will each of you have to buy ice cream? Which flavor could you buy and how many scoops can you get?

**FORMATIVE ASSESSMENT QUESTIONS**

- What strategies are you using to help you solve this task?
- What math facts would help you solve this problem?
- Can you use an inverse operation to be sure your solution is correct?

**DIFFERENTIATION**

**Extension**

Have students make up their own flavors and prices, use different amounts of money, and write their own Ice Cream Scoops stories to share with their classmates.

**Remediation**

While fluency with multiplication facts is required of third graders, it is not required that all facts will be acquired in the second marking period of the school year. You may want to allow students to use cueing devices like a times table chart during this performance assessment as needed.

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Name \_\_\_\_\_ Date \_\_\_\_\_

## Ice Cream Scoops

The Super Delicious Ice Cream Shop has the very best ice cream in town. They sell their ice cream in double scoops, triple scoops, or double-double (that's four) scoops. The top selling ice creams are listed on the sign below. You have \$1.00 to spend. Don't worry about tax.

Use words, pictures, and numbers to show all your work as you answer the questions below. Think about using estimation to help you consider your choices. Be sure to show your estimation work.



### Ice Cream Flavors and Prices for a Single Scoop

Varoom Vanilla	\$0.50
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Cheery Cherry	\$0.20
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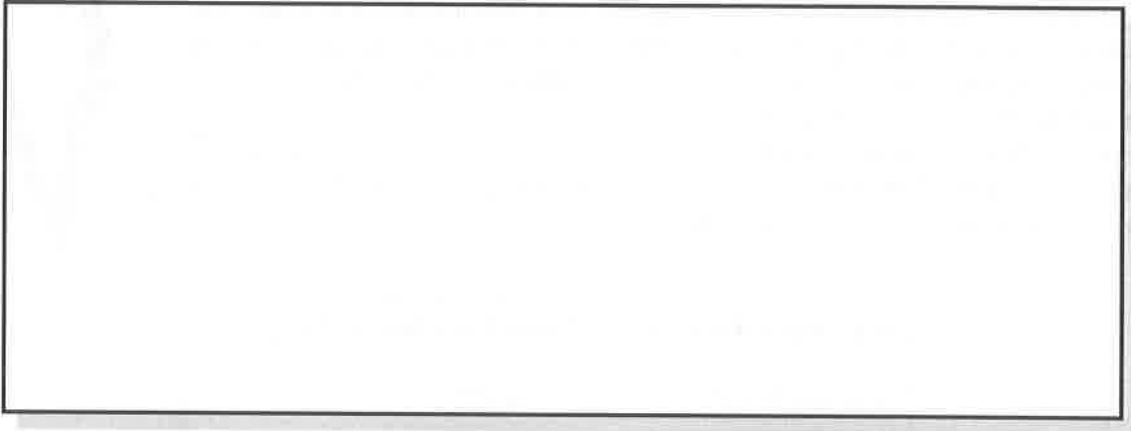
### Part I. Picture Graph

Using the flavors in the table, survey your classroom to see which flavor is the most liked in your class. Display your data in a picture graph. Be sure to add all elements of a picture graph.

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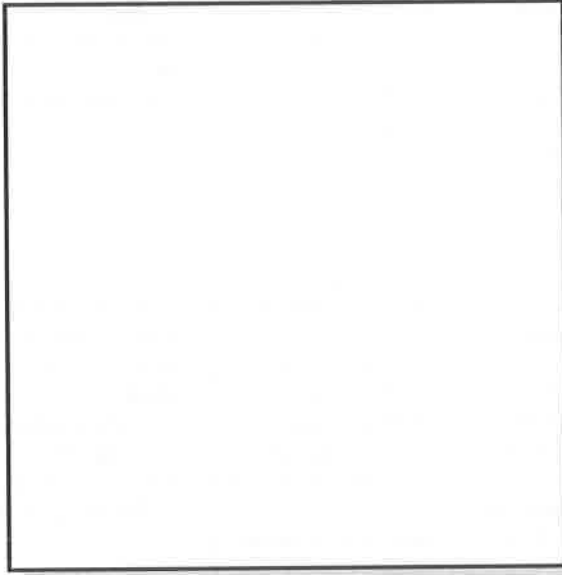
**Part II. Multiplication and Division**

1. With \$1.00, which flavor can you buy, triple Varoom Vanilla, or triple Cheery Cherry? Would you have any money left?

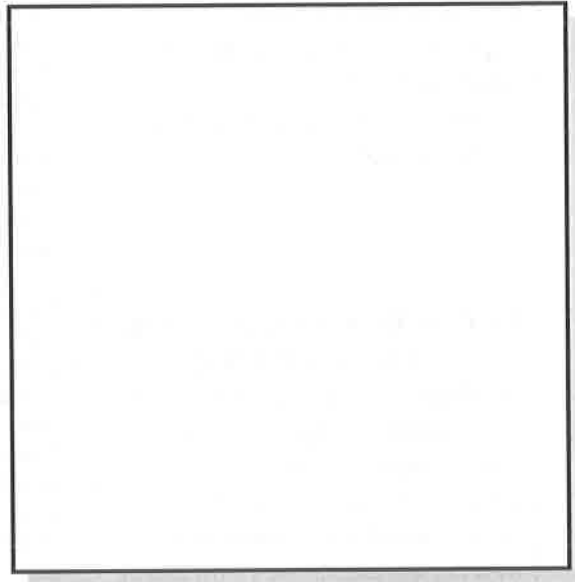


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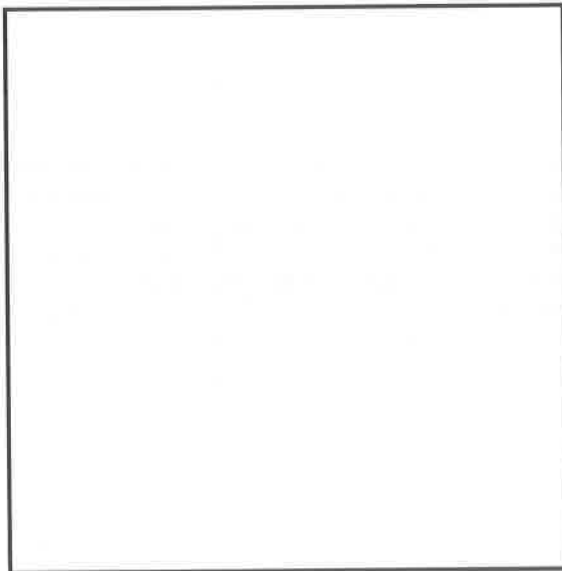
2. To spend most of your money, should you buy a double, triple, or double-double scoop of Rockin' Rocky Road? How much money would you have left?



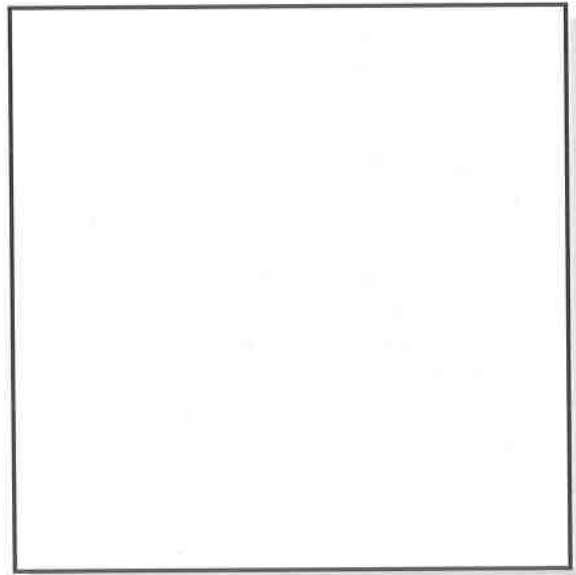
3. Which ice cream flavors can you buy if you order a double-double scoop?



5. On a different day, you and 5 of your friends decide to combine your money. You have \$10.00 total. You all want to order the same ice cream in a double scoop. Which flavors are you able to buy?



4. You have been saving pennies for a whole year! You have saved 96 pennies. If you and two of your friends share the pennies fairly, how many pennies will each of you have to buy ice cream?





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### 3<sup>rd</sup> Grade Unit 2 Performance Assessment Rubric

Standard ↓	Exceeding	Meeting	Not Yet Meeting
<b>CCGPS.3.OA.1</b> Interpret products of whole numbers, e.g., interpret $5 \times 7$ as the total number of objects in 5 groups of 7 objects each	<ul style="list-style-type: none"> <li>– Multiplication work shows use of diagrams, words, and/or other suitable representations for demonstrating mastery</li> <li>– Evidence of estimation is shown with explanations</li> </ul>	<ul style="list-style-type: none"> <li>– Multiplication calculations are correct</li> <li>– Evidence of estimation is shown</li> </ul>	<ul style="list-style-type: none"> <li>– Multiplication calculations are incorrect or omitted</li> <li>– No evidence of estimation</li> </ul>
<b>CCGPS.3.OA.2</b> Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each.	<ul style="list-style-type: none"> <li>– Work shows all division sentences correctly</li> <li>– Thorough explanation of remainders is given</li> <li>– Explanation of all the possible solutions is given with reasons for which solution is the best</li> </ul>	<ul style="list-style-type: none"> <li>– Division number sentence corresponds to the question asked in word problem.</li> <li>– Response indicates the presence or lack of a remainder and what this indicates</li> <li>– Solution to division problem is correct</li> </ul>	<ul style="list-style-type: none"> <li>– Division number sentence does not correspond to question</li> <li>– No mention is made of remainder</li> <li>– Solution to division problem is incorrect</li> </ul>
<b>CCGPS.3.OA.3</b> Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.	<ul style="list-style-type: none"> <li>– Explanations are thorough and detailed and include reasoning as well as multiple representations to support conclusions</li> </ul>	<ul style="list-style-type: none"> <li>– Explanations are logical and use specific math vocabulary to describe multiplication or division process</li> </ul>	<ul style="list-style-type: none"> <li>– Explanations are omitted or illogical</li> <li>– Explanations do not describe the process used to derive an answer to the question asked</li> </ul>
<b>CCGPS.3.MD.3.</b> Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. <i>For example, draw a bar graph in which each square in the bar graph might represent 5 pets.</i>	<ul style="list-style-type: none"> <li>– All data relevant to the solutions of both multiplication and division problems are accurately recorded in an organized fashion</li> </ul>	<ul style="list-style-type: none"> <li>– Work shown is organized and logically presented</li> <li>– Work shown supports conclusions about which ice cream to buy</li> </ul>	<ul style="list-style-type: none"> <li>– Work is not shown</li> <li>– Work shown is disorganized, inaccurate, or fails to communicate mathematical ideas</li> </ul>

Name \_\_\_\_\_ Date \_\_\_\_\_

### Mathhopper Exit Ticket

Directions: Answer each question and write at least one multiplication or division sentence to support it.

1) A +7 mathhopper started at 0 and hopped 6 times. Where did it land? \_\_\_\_\_

\_\_\_\_\_

2) A -4 mathhopper started at 24 and hopped to 0. How many times did he hop? \_\_\_\_\_

\_\_\_\_\_

3) A  $\frac{1}{2}$  mathhopper started at zero and hopped 10 times. Where did it land? \_\_\_\_\_

\_\_\_\_\_

MCC.3.OA.1 Interpret products of whole numbers MCC.3.OA.2 Interpret whole-number quotients of whole numbers	Does not meet	Approaches	Meets	Exceeds
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## Unit 2 Test

1.  $3 \times 5 = \underline{\hspace{2cm}}$

Show your work.

My Work:

2. Name another fact that you know because you know  $3 \times 5$

3. Write a word problem for the fact  $3 \times 9$

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

4. I have 21 M & M's that I want to share with my 2 friends.  
Draw a picture to show how I can divide the 21 M & M's  
among the 3 of us. Write the number sentence that goes  
with the picture.

Picture:

Number Sentence: \_\_\_\_\_

5. A bakery puts 3 chocolate cupcakes and 3 vanilla cupcakes in a box. It sells 5 of those boxes on Monday. How many cupcakes did the bakery sell on Monday?

Show your work and answer though a drawing and number sentence.

6. Write the missing number for each equation.

$10 = 2 \times \underline{\quad}$

$14 = 2 \times \underline{\quad}$

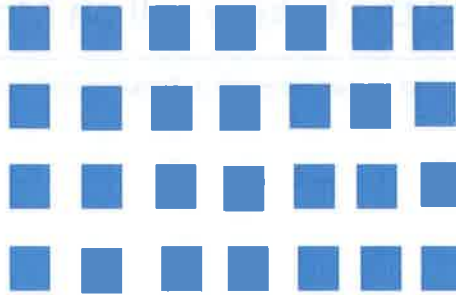
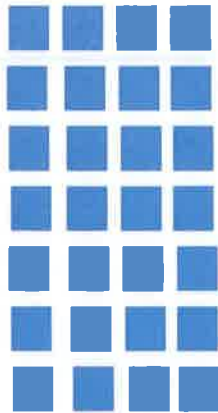
$\underline{\quad} \times 5 = 25$

$\underline{\quad} = 8 \times 5$

$60 \div \underline{\quad} = 6$

$2 = 18 \div \underline{\quad}$

7. Do the 2 arrays show the commutative property? Tell how you know.




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8. Look at each fact. Write a related multiplication or division fact.

<u>Multiplication Fact</u>	<u>Division Fact</u>
Example: $10 \times 4$	Example: $40 \div 4$
$7 \times 3$	
	$40 \div 5$
$2 \times 9$	
	$27 \div 3$





# Rubric for Unit 2 Test

<b>3<sup>rd</sup> Grade Standards</b>	<b>Question</b>	<b>Does Not Meet</b>	<b>Approaching</b>	<b>Meets</b>
MCC.3.OA.1 Interpret products of whole numbers.	1, 2, 3	All three questions incorrect  ( 3 points)	1-2 questions correct  (4 points)	3 questions correct  (5 points)
MCC.3.OA.2 Interpret whole-number quotients of whole numbers.	4	Picture and number sentence are not correct  (1 Point)	Either picture or number sentence is correct  ( 2 points)	Picture and number sentence are correct  (3 points)
MCC3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities.	5, 9	Picture and number sentence are not correct for both problems  (4 Point)	Either picture or number sentence is correct for one problem  ( 6 points)	Picture and number sentence are correct for both problems  (7 points)
MCC3.OA.4 Determine the unknown whole number in multiplication or division equations relating three whole numbers.	6	Less than 4 answers correct  ( 1 point)	4 answers correct  ( 2 points)	5-6 answers correct  ( 3 points)
MCC.3.OA.5 Apply properties of operations as strategies to multiply and divide.	7	Wrong Answer and wrong explanation  ( 1 point)	Right answer but wrong explanation or OR Wrong answer but right explanation  (2 points)	Right answer and explanation  (3 points)
MCC.3.OA.6 Understand division as an unknown-factor problem.	8	1-2 answers correct  ( 1 point)	3 answers correct  (2 points)	4 answers correct  ( 3 points)
MCC.3.OA.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division.	10	0-1 matched up correctly  ( 1 point)	2-3 matched up correctly  ( 2 points)	4 matched up correctly  ( 3 points)
				Total Points:

Name \_\_\_\_\_ # \_\_\_\_\_ Date \_\_\_\_\_

Find as many ways as you can to arrange 48 tiles into equal groups. Write a multiplication sentence and draw the arrangement for each way.




Name\_\_\_\_\_#\_\_\_\_\_Date\_\_\_\_\_

*One Hundred Hungry Ants*

How many ways can you organize 20 ants? For each way, draw and write number sentences that represent your work.


Choose one of your ways to explain your picture and number sentence in words.

\_\_\_\_\_

\_\_\_\_\_

Name \_\_\_\_\_ # \_\_\_\_\_ Date \_\_\_\_\_

### *One Hundred Hungry Ants*

How many ways can you organize 24 ants? For each way, draw and write number sentences that represent your work.


Choose one of your ways to explain your picture and number sentence in words.

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Name \_\_\_\_\_ # \_\_\_\_\_ Date \_\_\_\_\_

*One Hundred Hungry Ants*

How many ways can you organize 31 ants? For each way, draw and write number sentences that represent your work.


Choose one of your ways to explain your picture and number sentence in words.

\_\_\_\_\_

\_\_\_\_\_



Name \_\_\_\_\_ # \_\_\_\_\_ Date \_\_\_\_\_

*Multiplication Assessment*

**Directions:** For each story problem draw an array to match the story and write number sentences to show your work.

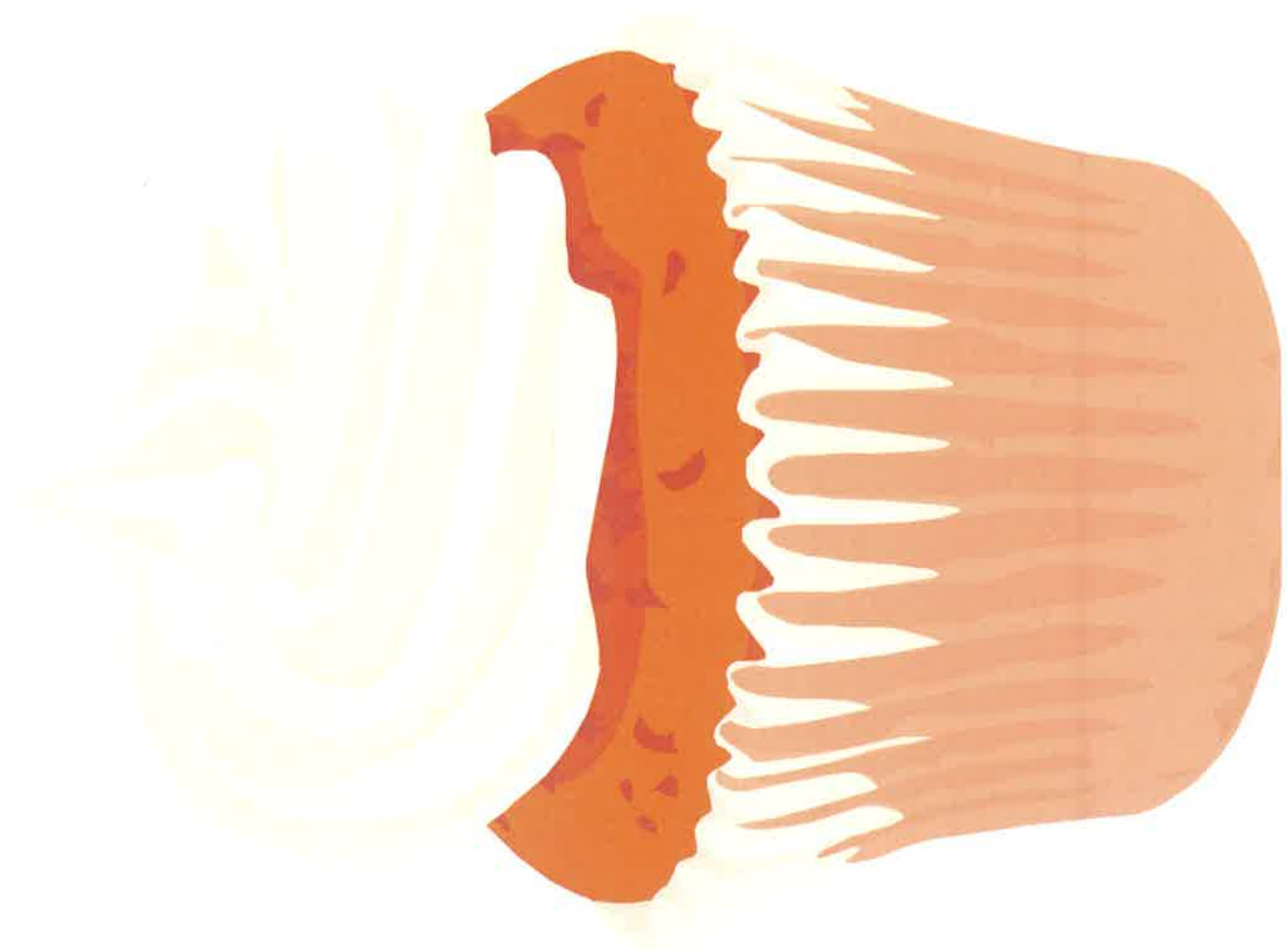
1) Martha is planting a garden. She is going to plant 4 rows and have 7 tomato plants in each row. How many tomato plants is she growing?

2) Bill is organizing his DVDs. He wants to put 12 DVDs on each shelf. He has 6 shelves. How many DVDs does he have?

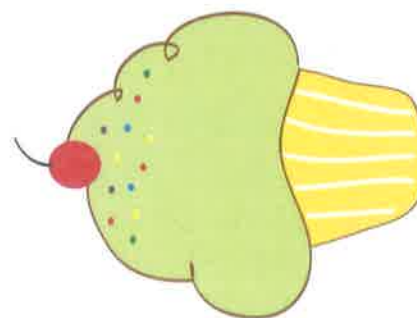
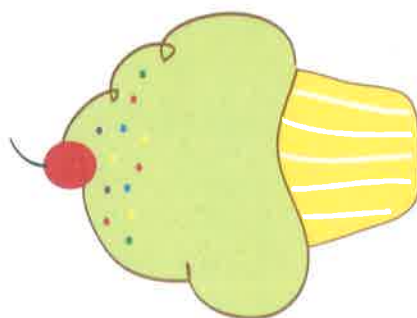
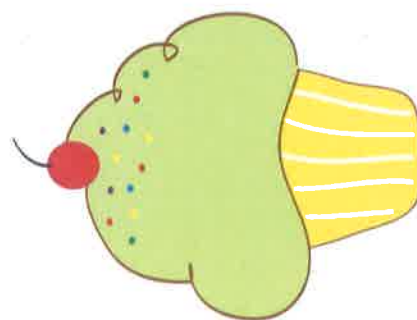
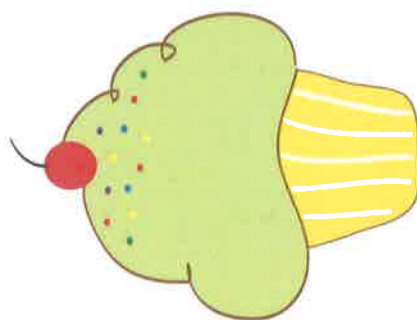
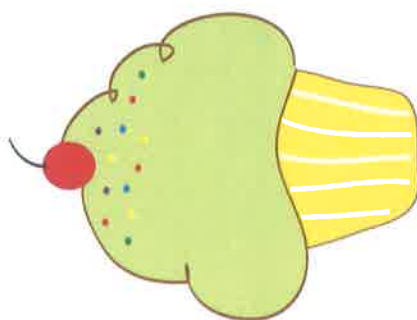
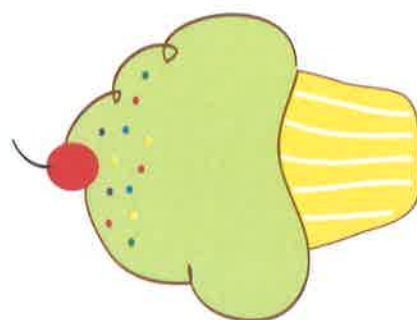
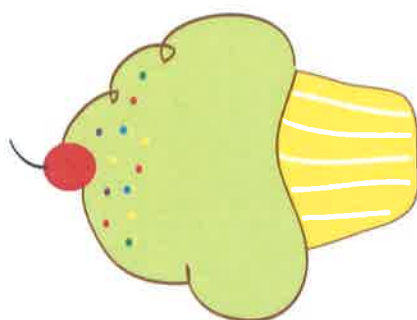
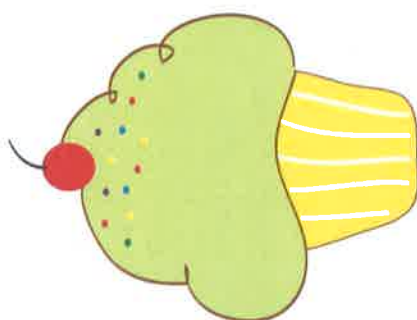
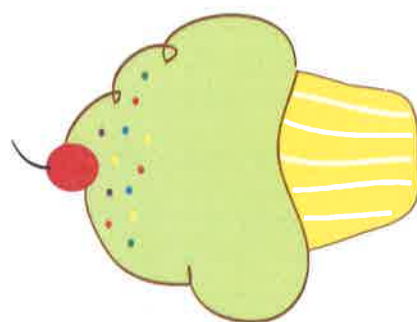
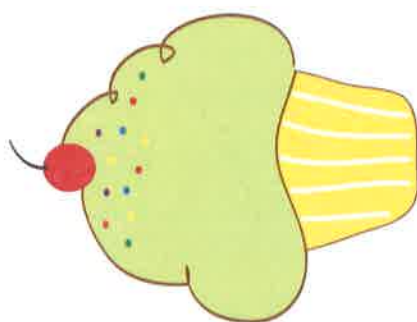
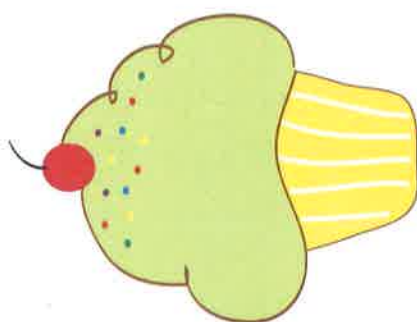
<u>3<sup>rd</sup> Grade Standards</u>	<u>Does Not Meet</u>	<u>Approaching</u>	<u>Meets</u>	<u>Exceeds</u>
MCC.3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities.				
MCC.3.OA.1 Interpret products of whole numbers.				













### Array-ning Factors/Looking at Arrays

12	18	24	28	32
23	1	31	13	17
7	29	2	5	3
30	4	10	9	14
16	15	27	22	25
8	34	6	20	21
33	26	19	35	11

