Providence Creek Academy
Third Grade Math Unit: Meanings of Multiplication

Curriculum Resource for Unit: Scott Foresman envision Math, Common Core; Pearson Education, Inc.

Key Learning(s) /Alignment to CCSS:

In this unit, students will develop an understanding of multiplication of whole numbers through a variety of activities and problems.

Big Ideas of the unit are as follows:

- **Operation Meanings and Relationships:** There are multiple interpretations of addition, subtraction, multiplication, and division of rational numbers, and each operation is related to other operations.
- **Properties:** For a given set of numbers there are relationships that are always true, called properties, and these are the rules that govern arithmetic and algebra.
- **Practices, Processes and Proficiencies:** Mathematics content and practices can be applied to solve problems.

Common Core Standards that are addressed are as follows:

- **Domain:** Operations and Algebraic Thinking
  - **3.OA.1** Interpret products of whole numbers, e.g., interpret 5 x 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 x 7.
  - **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.
  - **3.OA.5** Apply properties of operations as strategies to multiply and divide (Commutative property of multiplication, Associative property of multiplication, Distributive property of multiplication)

Unit Essential Question(s):

- What are different meanings of multiplication?
- How are addition and multiplication related?

Culminating Activity/Assessments

After all lessons are taught within the unit, students will complete a Summative Assessment. The assessment consists of 25 multiple choice questions, as well as five extended response questions. All Common Core Standards addressed in this unit are assessed on the summative. The extended response questions allow students to demonstrate their knowledge of the different strategies of multiplication. They will draw arrays, use repeated addition, and show the commutative property of multiplication through arrays. Students will also solve two multiplication word problems.

**A copy of the Summative Assessment and Scoring Guide is attached to the Unit Plan. (Appendix A)

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At the end of the unit, students will also complete a Performance Task. This task will assess students' understanding of the concepts and skills covered throughout the unit. For the assessment, students draw arrays of 24 tiles and then use one of the arrays to solve problems. Students then write multiplication sentences for the designs of tiles shown.

**A copy of the Performance Task and Rubric is attached to the Unit Plan. (Appendix B)

Concepts:

Lesson 1: Multiplication as Repeated Addition	Lesson 2: Arrays and Multiplication	Lesson 3: The Commutative Property	Lesson 4: Writing Multiplication Stories
Students will write multiplication number sentences for given equal group situations, using the X symbol.	Students will write multiplication sentences for arrays and use arrays to find products.	Students will write multiplication sentences for arrays, use arrays to find products, and use the Commutative Property of Multiplication	Students will write math stories for given multiplication facts.

Lesson Essential Questions:

Lesson 1: Multiplication as Repeated Addition	Lesson 2: Arrays and Multiplication	Lesson 3: The Commutative Property	Lesson 4: Writing Multiplication Stories
How does repeated addition related to multiplication?	What are arrays, and how do they show multiplication?	What happens when you multiply two numbers and then switch the order of the factors?	How can you write a story to describe a multiplication fact?

Vocabulary:

Lesson 1: Multiplication as Repeated Addition	Lesson 2: Arrays and Multiplication	Lesson 3: The Commutative Property	Lesson 4: Writing Multiplication Stories
• Multiplication • Factors • Product	• Array	• Commutative (Order) Property of Multiplication	

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Technology Integration:

- eTools Counters: www.pearsonsuccessnet.com
- TenMarks: www.tenmarks.com
- Smartboard
- Student videos: www.pearsonsuccessnet.com

Lesson 1: Multiplication as Repeated Addition

Mathematical Practices applied throughout lesson:

- Make sense of problems and preserve in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.

Lesson Overview:

- Activate Background Knowledge: Begin with a brief discussion about addition. Conduct a Think-Pair-Share in which students think about and discuss what they know about addition, how it works, and how it can help us. Lead discussion into the idea of "repeated addition". Ask students what they think this is, and ask them to share some examples of repeated addition.
- Set the Purpose: Tell students that that will learn how multiplication is like repeated addition and how to use multiplication to solve problems.
- Distribute math tools (counters or something similar).
- Pose the Problem: *Mrs. Witt bought 3 boxes of finger points with 5 jars of paint in each box. How can you use counters to find the total number of jars?* Allow students to work in pairs to solve the problem, and then discuss and share their methods. Record answers on the Smartboard. Students can also come up to the Smartboard to draw the model they made.
- Link to Prior Knowledge: Point out that the problem can be solved using repeated addition.
- Introduce Academic Vocabulary: Show students that because they are adding the same amount of objects over and over, they can use multiplication to add the same quantity many times. Review the problem with Mrs. Witt, and guide them to the multiplication sentence 3 x 5 = 15. Introduce 3 and 5 as the factors, and 15 as the product, or answer in multiplication sentences.
- Model/Demonstrate: Show students how to move the counters to show 3 groups of 5 counters each, to model the multiplication sentence 3 x 5 = 15. Students will do this with the counters on their desks.
- Small-Group Interaction: Students will work in pairs to complete another problem as given by the teacher. Solutions and strategies will be shared and discussed. The teacher will use the Smartboard to record student solutions and strategies.
- During small-group time, the teacher will work with any students who may be struggling. Extension problems may be given to students who seem to be grasping the concept quickly. (Example: Students can be given multiplication sentences in which they create an array, and identify the two factors and product

in the problem. Multiplication sentences with larger products can also be given as an extension, such as 5 x 7)

Guided Practice:

- Students will continue working with multiplication problems and repeated addition. They will use the counters to model the problems as they work. Students are able to work in their small groups to discuss problems and strategies. The teacher will observe student work and provide interventions or extensions as necessary.
- Materials for Guided Practice can include: Student textbook pages 100-101, Supplemental Worksheet (picture, repeated addition, and answer), Making Equal Groups worksheet, Complete the Table worksheet, Toss and Talk game (On-Level and Advanced-Appendix C)

Intervention for struggling students:

- Students will use two color counters and each student will show 4 groups of 3. Draw on a dry erase board a model of the counters. Write how many counters are in each group. Ask a volunteer to write an addition sentence to find the total.
- Have another student write a multiplication sentence to find how many counters there are and to explain what the factors and product mean.
- Repeat the activity with other groups of counters.

Lesson Closure/Formative Assessment:

- Students will share with their groups one way that repeated addition and multiplication are related. Call on students to share.
- Students will complete Quick Check 1 as a formative assessment (Appendix D)
- Leveled homework can be given based on quick check score to reinforce concepts and skills learned in this lesson (Appendix E)
    - 0-3 points Re-teaching
    - 4-5 points Practice
    - 6 points Enrichment

Lesson 2: Arrays and Multiplication

Mathematical Practices applied throughout lesson:

- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics
- Use appropriate tools strategically
- Attend to precision

Lesson Overview:

- Set the purpose: Begin by telling students that they have already learned how to model equal groups with counters and multiply to find the product. Let them know that in this lesson, they will learn how to use a different model for multiplication.
- Connect: Have students discuss other situations or examples in which items are arranged in equal rows. (Examples may include stamps, pictures in a photo album, eggs in a carton, people in a parade, etc.)

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- Pose the Problem: Give the following problem to students. *Mark puts sports cards in an album. He puts 4 rows of cards on each page. He puts 3 cards in each row. How many cards are on each page?* Students will then work in pairs or small groups using any method they choose to solve the problem. They can use counters if necessary. Discuss student strategies. Solutions can be recorded on the Smartboard by the teacher or by students.
- Link to Prior Knowledge: Remind students that in the previous lesson they learned how to write a multiplication sentence for a problem involving equal groups. Ask students what multiplication sentence they could write for 3 groups of 3. (2 x 3 = 6)
- Academic Vocabulary: Introduce arrays to students and let them know that when you put counters into equal rows you make an array. An array shows equal rows of objects.
- Model/Demonstrate: Using the previous problem about Mark and the sports cards, have all students individually use counters at their desk to show an array for 4 rows of 3. Ask students to describe their arrays to their groupmates, and to look for any similarities and/or differences in their models. As a class, agree on what the array should look like and record it on the Smartboard. Discuss what multiplication sentence goes along with the array (4 x 3 = 12)
- Small-Group Interaction: Students will work in pairs to complete another problem as given by the teacher. Solutions and strategies will be shared and discussed. The teacher will use the Smartboard to record student solutions and strategies.
- During small-group time, the teacher will work with any students who may be struggling. Extension problems may be given to students who seem to be grasping the concept quickly.

Guided Practice:

- During Guided Practice, students will continue working in pairs or small groups to practice making arrays to solve multiplication problems. They will use the counters to model the problems as they work. Students are able to work in their small groups to discuss problems and strategies. The teacher will observe student work and provide interventions or extensions as necessary.
- Materials for Guided Practice can include: Student textbook pages 102-103, Roll an Array partner game, Teamwork game (On-Level and Advanced – Appendix F)

Intervention for struggling students:

- Use grid paper and crayons to have students color 2 rows of 7 squares yellow and 2 rows of 3 squares red. Continue with 8 rows of 4 squares blue and 8 rows of 6 squares green.
- Multiply to find the number of squares in each array.
- Students will then create and color their own 100-square pattern. Show the products for the arrays in the pattern.

Lesson Closure/Formative Assessment:

- Bring students back together and review the essential understanding, which is that arrays can help when working with multiplication. Students should be able to share with a partner or with the teacher one idea about how arrays can help them multiply two numbers. Encourage students to use academic vocabulary from the

lesson in their answers (factors, product, array)
- Students will complete Quick Check 2 as a formative assessment (Appendix G)
- Leveled homework can be given based on quick check score to reinforce concepts and skills learned in this lesson. (Appendix H)
    - 0-3 points Re-teaching
    - 4 points Practice
    - 5 points Enrichment

Lesson 3: The Commutative Property

Mathematical Practices applied throughout lesson:
- Construct viable arguments and critique the reasoning of others
- Model with mathematics
- Look for and express regularity in repeated reasoning

Lesson Overview:
- Set the Purpose: Review with students that they have already learned how to use arrays to model multiplication facts. Let them know that today they will use arrays to model and learn a property of multiplication that will help them multiply more easily.
- Connect: Bring students' attention to the desks in the room. Ask them if the desks in the room were rearranged would the numbers of desks change. Conduct a think-pair-share in which students share their reasoning.
- Pose the Problem: Share the following problem with students. Cathy has arranged some shells in two different arrays. One array has 2 rows with 6 shells in each row. The other array has 6 rows with 2 shells in each row. Do both arrays have the same number of shells? Pass out counters have students work in pairs to work on the problem. One student in each pair should model 6 x 2 with the counters and the other student should model 2 x 6. Ask them to draw each array and write the corresponding multiplication sentence on paper or a dry erase board.
- Link to Prior Knowledge: Remind students that in the previous lesson they learned how to use an array to model a multiplication fact to find its product. Ask students what the arrays have in common and how they are different. Students should share answers with their partner, and then share answers as a class.
- Academic Vocabulary: On the Smartboard, write 6 x 2 = 2 x 6. Tell students that this is an example of thee Commutative Property of Multiplication, which says you can multiply numbers in any order and the product is still the same.
- Model/Demonstrate: Once pairs of students have solved the problem using counters, work through the problem as a class. Students should identify the two arrays and multiplication sentences that they modeled. Students with then use the counters to build two new arrays that are commutative to show how Cathy could have arranged the 12 shells. (Examples: 4 x 3 and 3 x 4, 12 x 1 and 1 x 12)

Guided Practice:
- During Guided Practice, students will continue working in pairs or small groups to practice making arrays to show the commutative property of multiplication. They will use the counters to model the problems as they work. Students are able to work in their small groups to discuss problems and strategies. The teacher will

observe student work and provide interventions or extensions as necessary.
- Materials for Guided Practice can include: Student textbook pages 104-105, Teamwork game (On-Level and Advanced – Appendix I)

Intervention for struggling students:
- Have students model 3 x 2 = 6 by placing 3 counters into each of two cups
- Repeat to model 2 x 3 = 6
- Write 3 x 2 = 2 x 3 on the board and explain that the factors and products are the same even though the order of the factors is switched.
- Continue practicing with other multiplication problems showing the commutative property.

Lesson Closure/Formative Assessment
- Bring students back together and review the essential understanding for the lesson. Ask students to share with their partner/small group what the commutative property of multiplication is in their own words. Have several students share.
- Students will complete Quick 3 as a formative assessment (Appendix J)
- Leveled homework can be given based on quick check score to reinforce concepts and skills learned in this lesson. (Appendix K)
    - 0-3 points Re-teaching
    - 4 points Practice
    - 5 points Enrichment

Lesson 4: Writing Multiplication Stories

Mathematical Practices applied throughout lesson:
- Construct viable arguments and critique the reasoning of others
- Model with mathematics

Lesson Overview:
- Set the Purpose: Remind students that they have already learned how to use multiplication to solve problems. Let them know that in this lesson they will learn how to write different stories for multiplication facts.
- Connect: Point out that informal story problems are created in everyday life. Provide the scenarios that you and a friend bake muffins for a bake sale, you might say that following to find the total number of muffins you baked: *Kara and I baked 6 muffins per tin. We baked 4 tins. So we baked 24 muffins in all.*
- Pose the Problem: On the Smartboard, write 4 x 5. Have students work in pairs to try to write and solve a story problem for this multiplication sentences. Have pairs record their stories and solutions on a sheet of paper. Once pairs have finished working, have volunteers read their stories and discuss the strategies they used to write and solve their problems.
- Model: After students have shared their stories, have the class work as a whole to write an equal-groups story for 4 x 5. Suggest that students use books as the object for the story and ask volunteers to write stories involving the objects. Write sample answers on the Smartboard.

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- Link to Prior Knowledge: Ask students what some of the different ways to think about multiplication are. Sample answers may include using equal groups, arrays, and comparing quantities
- Expand Student Responses: Encourage students to write two more multiplication stories for 4 x 5 using a different strategy (equal groups, arrays or comparing). Discuss as a class why all the answers are the same even though the problems are different.
- Extension: For advanced students, have them try to write a story about 1 more than 4 x 2.

Guided Practice:

- During Guided Practice, students will continue working in pairs or small groups to practice writing and solving multiplication story problems. They will use the counters to help them if needed, and will also have dry erase boards or pencil/paper available. Students are able to work in their small groups to discuss problems and strategies. The teacher will observe student work and provide interventions or extensions as necessary.
- Materials for Guided Practice can include: Student textbook pages 106-107, Clip and Cover board game (On-Level and Advanced – Appendix L)

Intervention for struggling students:

- Write 5 x 6 on the board.
- Discuss ways to think of stories for 5 x 6, such as joining 5 equal groups of 6 objects, an array of 5 rows of 6, or one student having 6 objects and another student having 5 times as many
- Have students work together to list real life situations for each of the different story types above.
- Have each student write and solve a multiplication story for 5 x 6 using any story type. They can draw a picture to find the product.

Lesson Closure/Formative Assessment:

- Have students share with their groupmates one thing they learned about writing multiplication stories. Call on volunteers to share their answers. Discuss with students that this lesson helped students learn how to write and solve multiplication problems.
- Students will complete Quick Check 4 as a formative assessment (Appendix M)
- Leveled homework can be given based on quick check score to reinforce concepts and skills learned in this lesson. (Appendix N)
    - 0-3 points Re-teaching
    - 4 points Practice
    - 5 points Enrichment

End of Unit Review:

- envision Topic 4 Scoot Game: https://www.teacherspayteachers.com/Product/Envisions-Topic-4-Grade-3-SCOOT-1495714

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Appendix A

Multiplication Strategies

Name:_____

Date:_____

3.OA.1, 3.OA.3, 3.OA.5
3.OA.9

1 Baseballs are sold in boxes that hold 4 baseballs. How many baseballs are in 5 boxes? Use a pattern to complete the table and solve.

Boxes	1	2	3	4	5
Baseballs	4	8	12		

A 20
B 12
C 16
D 18

2 Chase painted 7 pictures. Lea painted 3 times the number of pictures that Chase painted. How many pictures did Lea paint?

A 3
B 7
C 10
D 21

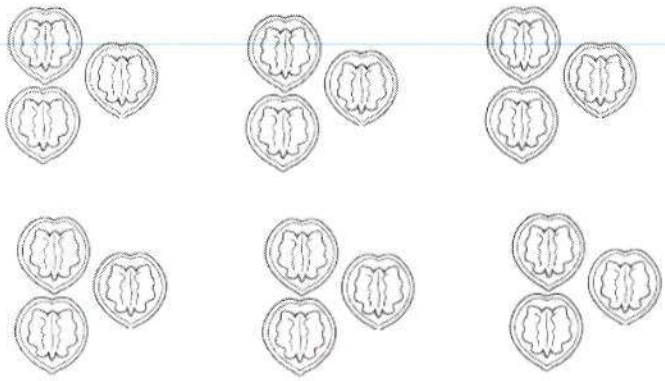
3 Which of the following is the multiplication sentence for 2 + 2 + 2 = 6?

A $3+3=6$
B $2\times2=4$
C $3\times2=6$
D $2+4=6$

4 Which has the same value as 3×5?

A 3 + 3 + 3
B 3 + 5
C 5 + 3
D 5 + 5 + 5

5 Vito ate 3 walnuts each day for 6 days. How many walnuts did Vito eat?

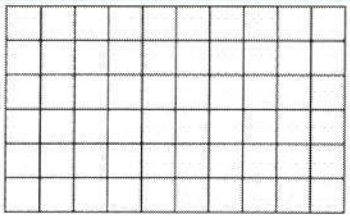


A 6
B 9
C 12
D 18

6 What multiplication sentence should Heather write for this array?

A $6 \times 6 = 36$
B $4 \times 8 = 32$
C $9 \times 4 = 36$
D $9 \times 7 = 63$

7 There are 6 rows of 10 squares. What is the total number of squares?



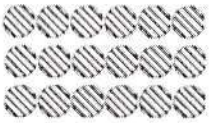
A 16
B 32
C 60
D 100

8 Which of the following shows 5×4?

A 

B 

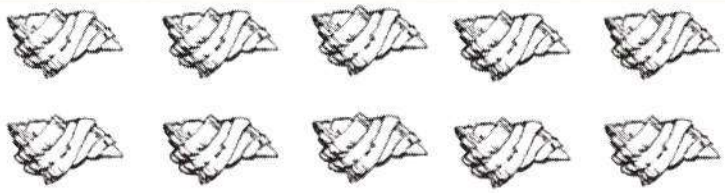
C 

D 

9 Anita is doing a mosaic decoration. In her mosaic there are 7 rows of 8 tile pieces. What multiplication sentence would describe the tile pieces in Anita's mosaic?

A $7 + 8 = 15$
B $7 \times 8 = 56$
C $8 + 8 + 8 + 8 = 32$
D $5 \times 8 = 40$

10 Lars arranged his shells in rows. Which multiplication sentence best shows how he arranged them?



A $5 \times 1 = 5$
B $2 \times 5 = 10$
C $4 \times 5 = 20$
D $5 \times 5 = 25$

11 Frederick has 33 green marbles, 18 red marbles, and 12 yellow marbles. How many marbles does he have in all?

A 63
B 53
C 36
D 73

12 Complete each multiplication sentence.

$7 \times 4 = 28$ so $4 \times 7 =$

A 28
B 21
C 14
D 11

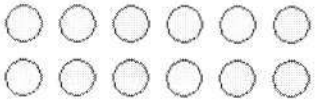
13 Which of the following is an example of the Commutative Property of Multiplication?

A $2 + 6 = 6 + 2$
B $2 \times (6 + 3) = (2 \times 6) + (2 \times 3)$
C $6 \times 2 = 2 \times 6$
D $6 \times 1 = 6$

14 Cindy puts 36 stickers in rows. She makes 4 rows with 9 stickers in each row. If she puts the same stickers in 9 equal rows, how many stickers will be in each row?

A 9
B 6
C 5
D 4

15 Emma arranged 12 balls on the floor. She arranged them in the pattern shown in the picture. What is another way Emma could arrange the the array of balls?

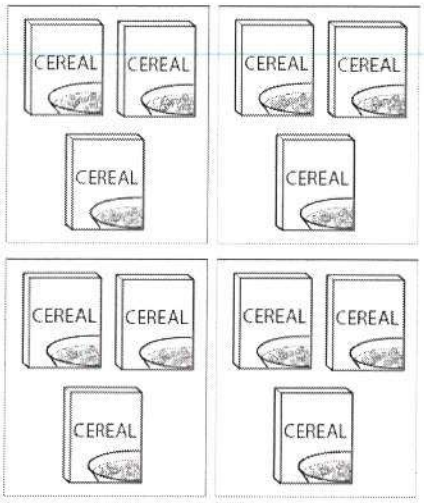


A 5 rows of 2 balls
B 4 rows of 3 balls
C 6 rows of 1 balls
D 12 rows of 2 balls

16 Which story could be solved with 9×5?

A There are 9 people at a birthday party. If 9 more people come to the birthday party, how many people will there be in all at the party?
B Jason can jog around the park in 9 minutes. How far can he jog in 5 minutes?
C One row of the choir has 9 singers. How many singers are in 5 rows?
D One van can hold 9 people. How many vans can hold 5 people?

17 Which problem could be written about the cereal boxes below?



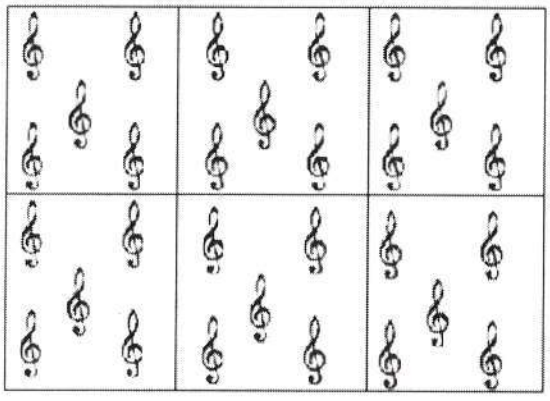
A There are 3 groups of cereal boxes. Each group has 3 cereal boxes. How many cereal boxes are there in all?

B How many cereal boxes are there in a store?

C There are 4 groups of cereal boxes. Each group has 3 cereal boxes. How many cereal boxes are there in all?

D There are 2 groups of cereal boxes. Each group has 3 cereal boxes. How many cereal boxes are there in all?

18 Which problem could be written about the treble clefs below?



A There are 6 groups of treble clefs. Each group has 5 clefs. How many treble clefs are there in all?

B There are 4 groups of treble clefs. Each group has 5 clefs. How many treble clefs are there in all?

C There are 4 groups of treble clefs. Each group has 6 clefs. How many treble clefs are there in all?

D There are 4 groups of treble clefs. Each group has 3 clefs. How many treble clefs are there in all?

19 Which problem could you write for 5×6?

A Victor had 4 crayons and a friend gave him 5 more. How many crayons does Victor have now?

B Victor bought 4 boxes of crayons with 6 crayons in each box. How many crayons does Victor have in all?

C Victor had 5 groups of crayons with 6 crayons in each group. How many crayons are there in all?

D Victor had 6 crayons and gave 5 away. How many crayons does Victor have left?

20 Which problem could you write for 5×3?

A Marc put 5 toy trains in 3 groups. How many toy trains are in each group?

B Marc bought 3 boxes with 5 toy trains in each box. How many toy trains does Marc have in all?

C Marc had 3 toy trains and gave 5 away. How many toy trains does Marc have left?

D Marc had 5 toy trains and a friend gave him 3 more. How many toy trains does Marc have now?

21 Tawiah bought 5 packages of water. Each package contained 4 bottles of water. How many bottles of water did Tawiah buy in all? Use a pattern to complete the table and solve.

Packages	1	2	3	4	5
Bottles	4	8	12	16	■

A 18
B 20
C 30
D 36

22 A can of juice holds 9 ounces. How many ounces are in 6 cans of juice? Explain how you can solve this problem.

Cans	1	2	3	4	5	6
Ounces	9	18	27	36		

A There are 9 more ounces of juice for each additional can, so add 9 for each additional can. 36 + 9 = 45 and 45 + 9 = 54 and 54 + 9 = 63.

B There are 9 more ounces of juice for each additional can, so add 9 for each additional can. 36 + 9 = 45 and 45 + 9 = 54.

C There are 9 more ounces of juice for each additional can, so add 9 for each additional can. 36 + 9 = 45.

D There are 9 fewer ounces of juice for each additional can, so subtract 9 for each additional can. 36 - 9 = 27 and 27 - 9 = 18.

23 Julie is buying juice for a party. Each package contains 6 bottles of juice. How does the number of bottles change as the number of packages increases by 1?

Packages	1	2	3	4
Bottles	6	12	18	24

A There are 12 fewer bottles for each additional package.

B There are 12 more bottles for each additional package.

C There are 6 fewer bottles for each additional package.

D There are 6 more bottles for each additional package.

24 Each row of desks in a classroom has 4 desks. How many desks are in 6 rows? Use a pattern to complete the table and solve.

Rows	1	2	3	4	5	6
Desks	4	8	12			

A 10

B 24

C 46

D 64

25 A package holds 6 burger buns. How many burger buns are in 7 packages? Use a pattern to complete the table and solve.

Packages	1	2	3	4	5	6	7
Buns	6	12	18				

A 12
B 13
C 24
D 42

26. Draw an **array** to represent 4 x 9. Solve and write the answer below.

27. Represent 3 x 7 as **REPEATED ADDITION**. Solve and write the answer below.

28. Draw **TWO arrays** to show the different ways you can multiply the factors 5 and 6. Under each array, write the correct multiplication sentence that your array shows.

Solve the following multiplication stories with PICTURES, NUMBERS, and WORDS.

29. Laurie has 4 baskets. Each basket has 8 apples. How many apples does Laurie have?

30. James has 2 pencil boxes. Each pencil box has 10 crayons inside. How many crayons are there altogether?

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Multiplication Strategies Summative Assessment Scoring Guide

1. A
2. D
3. C
4. D
5. D
6. C
7. C
8. A
9. B
10. B
11. A
12. A
13. C
14. D
15. B
16. C
17. C
18. A
19. C
20. B
21. B
22. B
23. D
24. B
25. D
26. 2 points (1 point for correct array and 1 point for correct multiplication equation)
27. 2 points (1 point for correct array and 1 point for correct multiplication equation)
28. 4 points (1 point for each array correctly drawn and 1 point for each multiplication sentence correct)
29. 3 points (1 point for picture/model, 1 point for number sentence/equation, 1 point for written sentence giving correct answer)
30. 3 points (1 point for picture/model, 1 point for number sentence/equation, 1 point for written sentence giving correct answer)

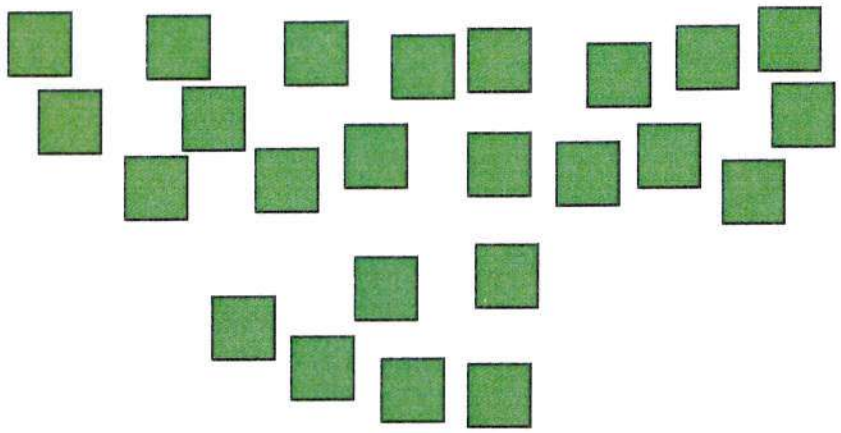
Topic 4

Performance Task

ASSESSMENT

Appendix B

You want to make a design using tiles. You have 24 tiles to use. Your design must be set up in rows and have the same number of tiles in each row.



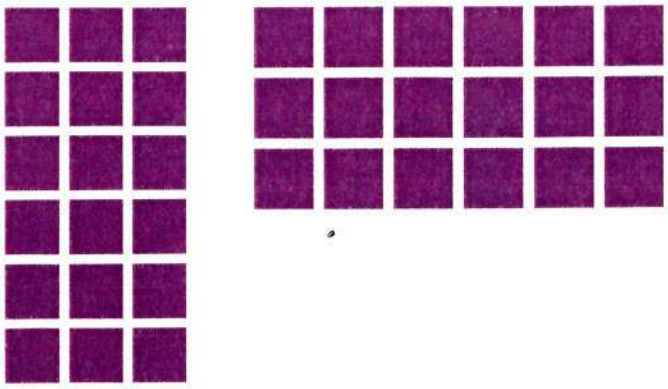
1. Draw a picture of some of the different arrangements you can make. Make at least 2 drawings.

2. Choose one arrangement that you will use for your design. Draw a circle around that design. Write a repeated addition sentence for the array.

3. Look at the repeated addition sentence that you wrote. Write the repeated addition sentence as a multiplication sentence.

4. Write a multiplication story to go with your number sentence.

5. Write a multiplication sentence for each of the tile designs shown below. Explain how the tile designs show the Commutative Property of Multiplication.



Providence Creek Academy

Third Grade Math Unit: Meanings of Multiplication

Performance Task Rubric:

3 point answer: The student accurately draws two different arrays using 24 tiles. The student correctly writes both a repeated addition sentence and a multiplication sentence for one array. The student correctly uses the factors for the multiplication sentence in a multiplication story. The student correctly writes multiplication sentences for both tile designs and gives a coherent explanation of the commutative property of multiplication.

2 point answer: The student completes only one array that is accurate. The student may have errors in the number sentences or the multiplication story. The student correctly writes multiplication sentences for both tile designs but does not give a coherent explanation of how the tile designs show the commutative property of multiplication.

1 point answer: The student draws arrays that are incomplete or inaccurate, or writes number sentences in correct format, but the sentences may not match the arrays. The student's multiplication story is incomplete. The student writes incorrect multiplication sentences and gives an incomplete explanation.

Appendix C

Toss and Talk

Get Started (or)

Get 10 squares in one color and 10 in another color.
Get two number cubes. Take turns with another player or team.
Talk about math as you play!

At Your Turn

Toss two number cubes. Add the dots. Find your toss below.
Follow the directions. Explain your thinking. Cover the answer.
If the answer is taken, lose your turn. Have fun!

Toss	Explain with repeated addition. Find the product.
2	2 times 3
3	5 × 2
4	5 groups of 3
5	8 × 3
6	6 times 3

7	9 groups of 3
8	
9	7 groups of 3
10	
11	6 times 5
12	1 × 3

6	9	24	12
18	15	21	3
24	27	30	10
12	21	18	27

How to Win

You win if you are the first to get four connected rectangles, like:

If you have more time

Play again!

Toss and Talk

Partner Talk

Share your thinking while you work.

Get Started or

Get 10 squares in one color and 10 in another color.
Get two number cubes. Take turns with another player or team.
Talk about math as you play!

At Your Turn

Toss two number cubes. Add the dots. Find your toss below.
Follow the directions. Explain your thinking. Cover the answer.
If the answer is taken, lose your turn. Have fun!

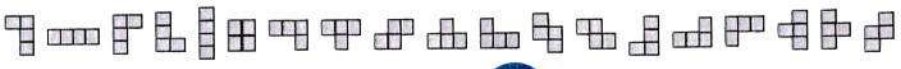
Toss	Match each product with its factors. Explain with repeated addition.
2	The product is 6.
3	The product is 30.
4	The product is 9.
5	The product is 21.
6	The product is 18.

7	The product is 24.
8	The product is 27.
9	The product is 42.
10	The product is 15.
11	The product is 10.
12	The product is 3.

8 times 3	7 groups of 6	3 × 7	6 × 5
3 × 9	3 groups of 3	6 times 3	6 times 7
3 × 8	2 × 3	5 groups of 3	3 × 6
7 groups of 3	2 times 5	9 groups of 3	1 × 3

How to Win

You win if you are the first to get four connected rectangles, like:



If you have more time

Play again!

Name _____

Appendix D

Quick Check

4-1

1. Which symbol makes the number sentence true?

   5 ■ 5 = 25

   A =

   B +

   C −

   D ×

2. Which number sentence shows the best way to find the total number of stars?

   ☆☆☆☆ ☆☆☆☆ ☆☆☆☆ ☆☆☆☆ ☆☆☆☆

   A 4 + 4 + 4 = ■

   B 5 + 4 = ■

   C 5 × 4 = ■

   D 5 + 4 + 5 + 4 = ■

3. Which picture shows 4 groups of 2?

   A ✓✓✓✓ ✓✓

   B _____

   C _ _ _ _ _ _ _ _

   D ΔΔΔΔ ΔΔΔΔ

4. **Writing to Explain** In what ways are addition and multiplication alike? In what ways are they different? Explain.

Providence Creek Academy

Third Grade Math Unit: Meanings of Multiplication

Quick Check 1 Rubric:

Questions 1-3 are worth 1 point each.
Question 4 should be scored using the following rubric:

3 point answer: The student identifies similarities and differences between addition and multiplication and gives a clear, well thought out explanation.

2 point answer: The student identifies similarities and differences between addition and multiplication and gives an adequate explanation.

1 point answer: The student identifies similarities and differences between addition and multiplication but gives no explanation.

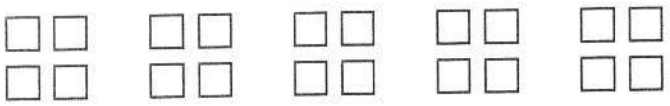
Name _____

Reteaching
4-1

Appendix E

Multiplication as Repeated Addition

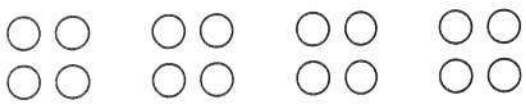
Each group below has the same number of squares. There are 5 groups of 4 squares. There are a total of 20 squares.



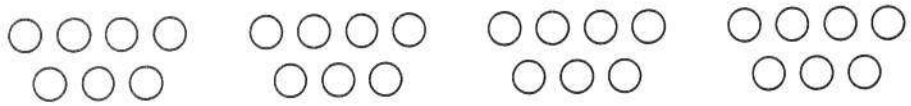
Here is the addition sentence for this problem: $4 + 4 + 4 + 4 + 4 = 20$

Here is the multiplication sentence for this problem: $5 \times 4 = 20$

Complete the addition and multiplication sentences.

1. 

4 groups of _____ $4 + 4 + 4 + 4 =$ _____ $4 \times$ _____ $= 16$

2. 

_____ groups of 7 _____ + _____ + _____ + _____ = 28

$7 \times$ _____ = _____

Write each addition sentence as a multiplication sentence.

3. $1 + 1 + 1 + 1 + 1 = 5$ _____

4. $8 + 8 + 8 = 24$ _____

Write each multiplication sentence as an addition sentence.

5. $5 \times 5 = 25$ _____

6. $6 \times 2 = 12$ _____

7. Communicate Juan says, "When you put together unequal groups, you can only add." Is he correct? Explain.

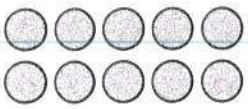
_____

Name _____

Practice
4-1

Multiplication as Repeated Addition

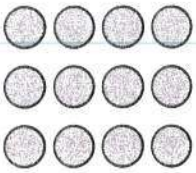
Complete.

1. 

2 groups of ____

5 + ____ = ____

2 × ____ = ____

2. 

3 groups of ____

4 + ____ + ____ = ____

3 × ____ = ____

3. 4 + 4 + 4 + 4 + 4 = 5 × ____

4. ____ + ____ + ____ = 3 × 8

5. 9 + ____ + ____ = ____ × 9

6. 7 + 7 + 7 + 7 = ____ × ____

Write +, −, or × for each ☐.

7. 5 ☐ 4 = 9

8. 6 ☐ 2 = 12

9. 7 ☐ 3 = 4

10. 3 ☐ 3 = 9

11. 8 ☐ 6 = 2

12. 3 ☐ 3 = 6

13. Reason Marlon has 4 cards, Jake has 4 cards, and Sam has 3 cards. Can you write a multiplication sentence to find how many cards they have in all? Explain.

_____

_____

14. Write a Problem Draw a picture that shows equal groups. Then write an addition sentence and a multiplication sentence for your picture.

15. Which is equal to 6 + 6 + 6 + 6?

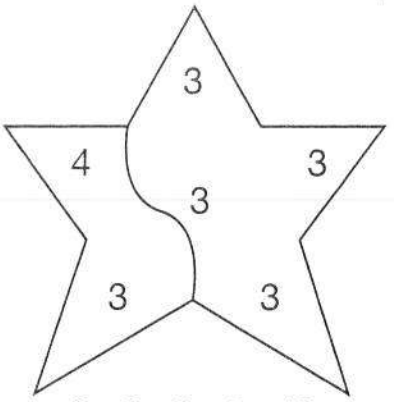
A 6 × 3 **B** 3 × 6 **C** 4 × 6 **D** 6 × 5

Name _____

Enrichment
4-1

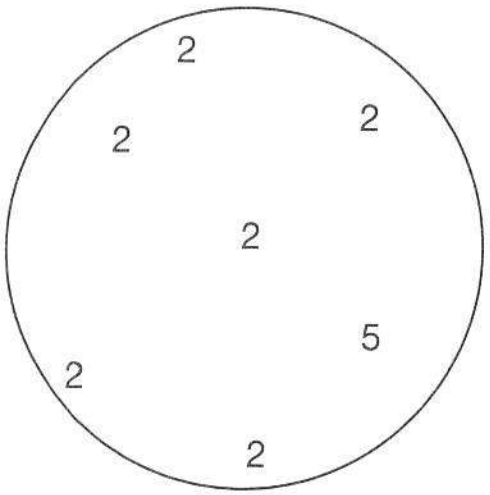
Separate the Shapes

Draw one line to separate the numbers. The sum of the numbers in one part must be equal to the product of the numbers in the other part. Then write an addition and a multiplication sentence to show the number in each part. An example has been done for you.



$3 + 3 + 3 + 3 = 12$
$4 \times 3 = 12$

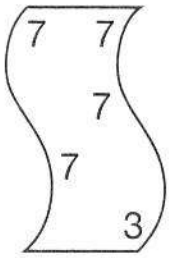
1.



_____

_____

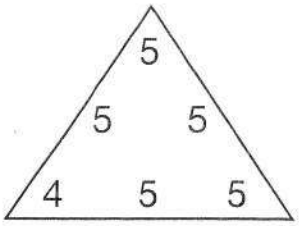
2.



_____

_____

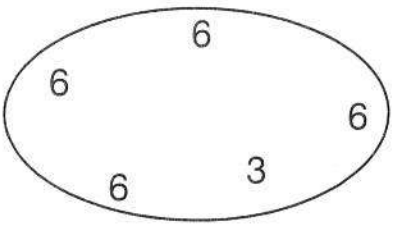
3.



_____

_____

4.



_____

_____

Teamwork

Partner Talk
Share your thinking while you work.

Get Started

Get 40 squares.
Put 2 3 4 5 6 in a bag.

Repeat for Each Round

Pick a tile. Fill the tile space on the right.
Display that many squares in one row.
Ask your partner to: **a.** Pick another tile and fill the first tile space.
b. Display your row that number of times.

☐ times ☐

Build your array here.

How many squares do you have in all?

If you have more time

Put the tiles back in the bag.
Make a new array every time you choose two tiles.

Teamwork

Get Started or

Get one paper clip, 40 squares, and 2 3 4 5 6 7 8 9 .

Repeat for Each Round

Choose a number. Mark it with a paper clip.
Build an array with that number of squares.
Ask your partner to display tiles in the tile spaces below to show what you did.

Choose a number.

40	15	24
35	16	30
12	18	28
21	20	14

Build an array with that number of squares.

☐ times ☐

If you have more time

Choose two tiles from 2 3 4 5 or 6. Fill both spaces.
Make an array. What do you have to do to your array if you change the order of the numbers?

Name _____

Quick Check
4-2

Appendix G

1. Look at the array below.
What number makes the multiplication sentence true?

$4 \times \blacksquare = 20$

A 9

B 7

C 5

D 2

2. Which fact represents an array with 9 rows and 5 objects in each row?

A 9×9

B 9×5

C 5×9

D 5×5

3. **Writing to Explain** Dana arranged some stickers in 3 rows with 6 stickers in each row. She wrote 3×6 to find the total number of stickers. Is she correct? Draw an array to explain your answer. How many stickers does Dana have?

Providence Creek Academy

Third Grade Math Unit: Meanings of Multiplication

Quick Check 2 Rubric:

Questions 1-2 are worth 1 point each.
Question 3 should be scored using the following rubric:

3 point answer: The student correctly draws the array to show 3 x 6 and explains that 3 represents the number of rows and 6 represents the number of stickers in each row. The product of the given fact is correct.

2 point answer: The student correctly draws the array to show 3 x 6 and vaguely explains that 3 represents the number of rows and 6 represents the number of stickers in each row. The product of the given fact is correct.

1 point answer: The student is unable to draw an array to represent 3 x 6 and does not explain that 3 represents the number of rows and 6 represents the number of stickers in each row. The product of the given fact is correct.

Name _____

Reteaching
4-2

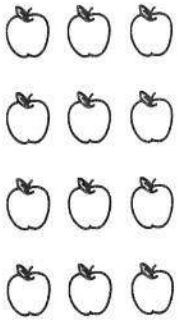
Arrays and Multiplication

Appendix H

Multiplication can be used to find the total in an array.

Scott arranged some apples in an array. He made 4 rows with 3 apples in each row. How many apples does Scott have?

Draw Scott's array.



The array shows 4 rows of 3 apples.

$3 + 3 + 3 + 3 = 12$

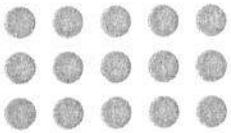
Say, 4 times 3 equals 12

Write, $4 \times 3 = 12$

Scott has 12 apples.

Write a multiplication sentence for each array.

1.



_____

2.

_____

3.

_____

4. Draw an array to show the fact 3×4.

5. Model Priya is arranging 28 chairs with 7 chairs in each row. How many rows will there be? You can use an array to help.

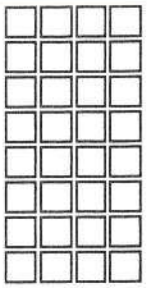
_____

Name _____

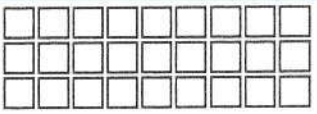
Practice
4-2

Arrays and Multiplication

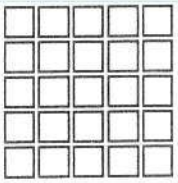
Write a multiplication sentence for each array.

1. 

_____ × _____ = _____

2. 

_____ × _____ = _____

3. 

_____ × _____ = _____

Draw an array to show each multiplication fact. Write the product.

4. $2 \times 8 =$ _____

5. $3 \times 6 =$ _____

6. **Model** Paula arranged her stamps in an album. The album has 3 rows with 7 stamps in each row. How many stamps does Paula have? Draw an array to solve your problem.

_____

7. Jonathan is arranging 36 pictures, with 9 pictures in each row. How many rows will there be?

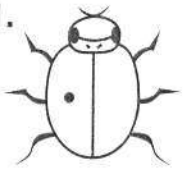
A 9 **B** 5 **C** 4 **D** 2

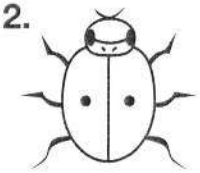
Name _____

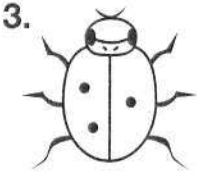
Enrichment
4-2

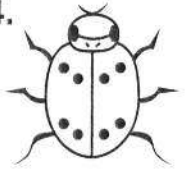
Lady Bugaboo

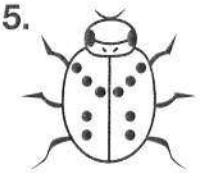
A ladybug is a type of beetle. Different types of ladybugs can have 0 or up to 20 black spots on their backs. Find the number of spots on each ladybug. Then write the letter of the ladybug at the bottom of the page that has two times the number of spots as the ladybug at the top of the page.

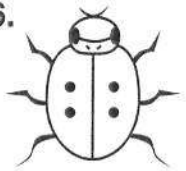
1.  ____

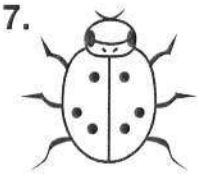
2.  ____

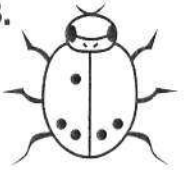
3.  ____

4.  ____

5.  ____

6.  ____

7.  ____

8.  ____

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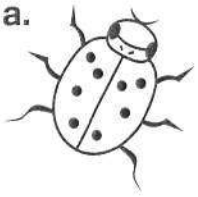
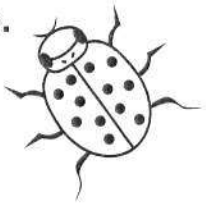
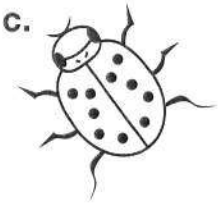
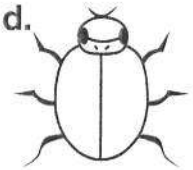
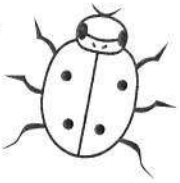
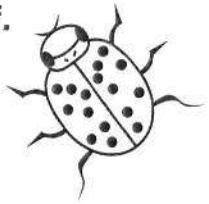
a. 

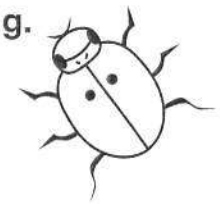
b. 

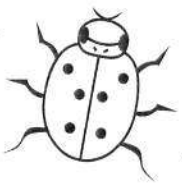
c. 

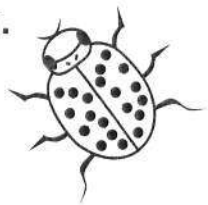
d. 

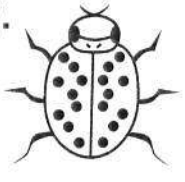
e. 

f. 

g. 

h. 

i. 

j. 

Teamwork

Get Started or

Put 1 2 3 4 in a bag.

Repeat for Each Round

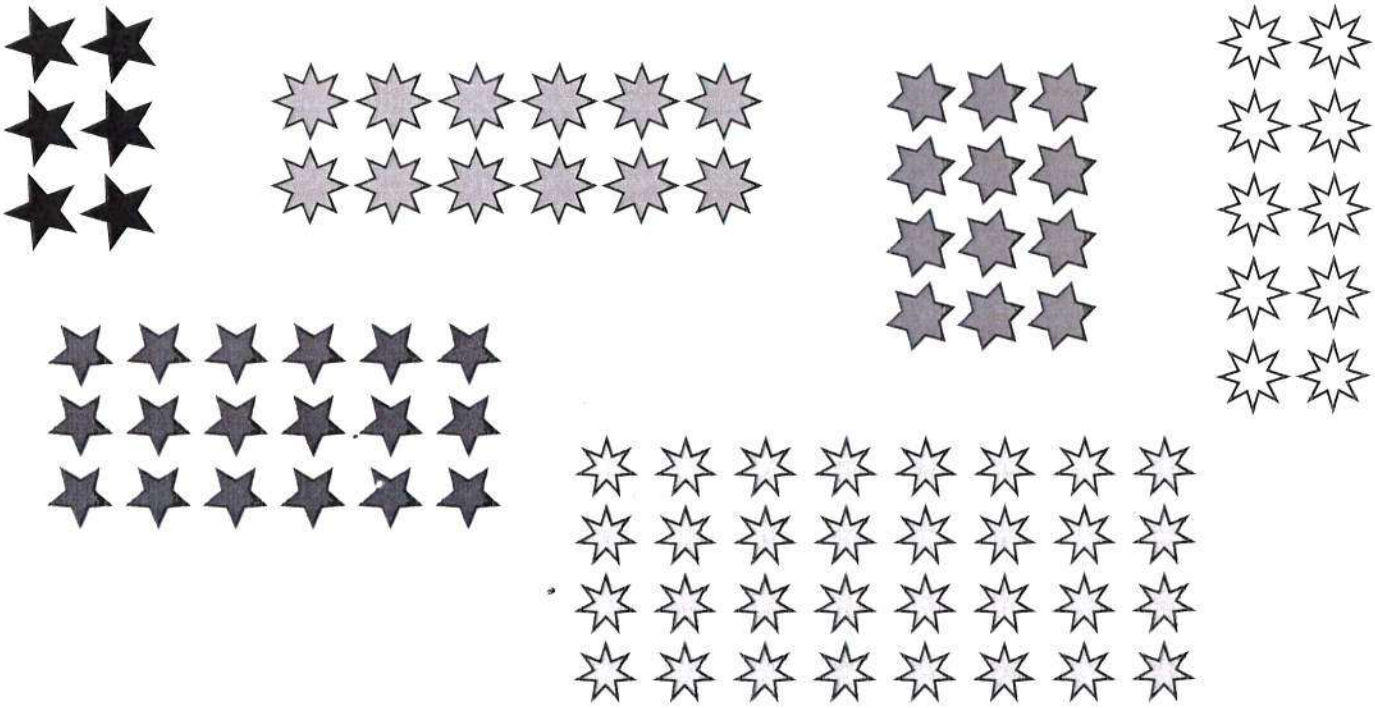
Choose an array of stars.
Pick a tile. Pick two tiles if your group has only two students.
Do the jobs listed below in order.
To find your job, find the number that matches the tile you chose.

1 **Fill in the blanks to describe the array. Say: _____ rows of _____ stars.**

2 **Fill in the blanks for the array. Say: _____ times _____ equals _____.**

3 **Turn the page sideways. Look at the array in a different way. Say: _____ rows of _____ stars.**

4 **Fill in the blanks for the second array. Say: _____ times _____ equals _____.**



If you have more time

What if each array had one more row?
Follow steps 1 – 4 to explain what you would see.

Teamwork

Get Started

Get 40 squares.
Put 1 2 3 4 5 6 7 8 9 in a bag.

Repeat for Each Round

Work together.
Pick a tile.
Display a missing factor.
Make an array of squares to explain the answer.

$3 \times \square = 27$ $\square \times 3 = 12$

$3 \times \square = 15$ $\square \times 2 = 14$

$6 \times \square = 18$ $\square \times 4 = 24$

$5 \times \square = 40$ $\square \times 8 = 8$

$9 \times \square = 18$

If you have more time

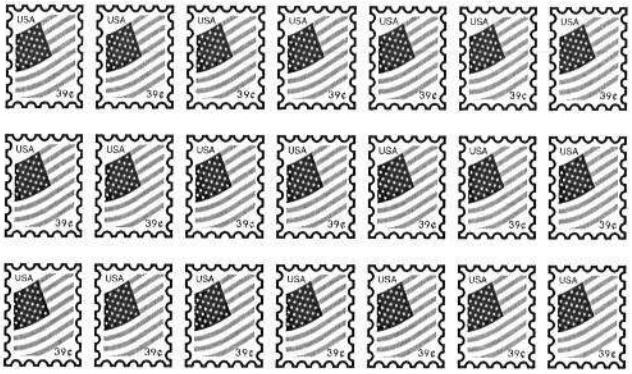
Create a missing factor puzzle.
Ask your partner to complete your puzzle.

Name _____

Quick Check
4-3

Appendix J

1. Casey bought the stamps shown below. Which number sentence shows how many stamps Casey bought?



A $3 + 7 = \blacksquare$

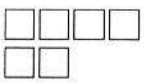
B $3 \times 7 = \blacksquare$

C $7 + 3 = \blacksquare$

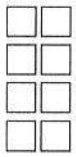
D $7 - 3 = \blacksquare$

2. Which is an array for $4 \times 2 = 8$?

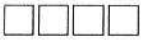
A



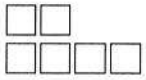
B



C



D



3. Writing to Explain What is an array? Draw an array for 3×5. Then use a related array to show your understanding of the Commutative (Order) Property of Multiplication.

Providence Creek Academy

Third Grade Math Unit: Meanings of Multiplication

Quick Check 3 Rubric:

Questions 1-2 are worth 1 point each.
Question 3 should be scored using the following rubric:

3 point answer: The student correctly describes and draws arrays and uses them in a clear well thought out explanation of the commutative property of multiplication.

2 point answer: The student correctly describes and draws arrays and uses them in an adequate explanation of the commutative property of multiplication.

1 point answer: The student gives the correct answer but no explanation.

Name _____

Reteaching
4-3
Appendix K

The Commutative Property

An array shows objects in equal rows. This array shows 3 rows of 6 pennies.

The multiplication sentence for this array is $3 \times 6 = 18$.

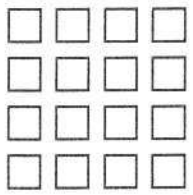
You can use the Commutative (Order) Property of Multiplication to multiply the numbers in any order: $3 \times 6 = 18$ and $6 \times 3 = 18$.

Write a multiplication sentence for each array.

1. ○○○○○○○○
○○○○○○○○

_____

2.



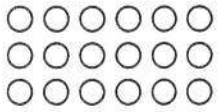
_____

Complete each multiplication sentence. You may use counters or draw a picture to help.

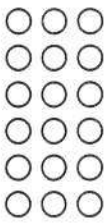
3. $3 \times 4 = 12$ _____ $\times 3 = 12$

4. $5 \times 2 = 10$ $2 \times$ _____ $= 10$

5. Number Sense How can you use the Commutative Property to know that



is equal to



?

_____

_____

_____

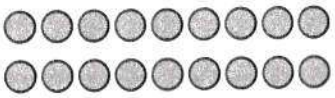
Name _____

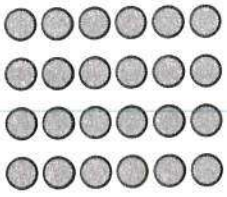
Practice
4-3

The Commutative Property

Write a multiplication sentence for each array.

1. 

2. 

3. 

_____ _____ _____

Draw an array to find each multiplication fact. Write the product.

4. $3 \times 6 =$ _____

5. $4 \times 7 =$ _____

Complete each multiplication sentence.
Use counters or draw an array to help.

6. $3 \times$ ____ $= 21$

   $7 \times$ ____ $= 21$

7. $4 \times 9 =$ ____

   $9 \times 4 =$ ____

8. $5 \times 6 =$ ____

   $6 \times 5 =$ ____

9. $4 \times 7 =$ ____

   $7 \times 4 =$ ____

10. $6 \times 8 =$ ____

    $8 \times 6 =$ ____

11. $9 \times 5 =$ ____

    $5 \times 9 =$ ____

12. **Explain It** If you know that $7 \times 8 = 56$, how can you use the Commutative (Order) Property of Multiplication to find the product of 8×7?

_____

_____

_____

_____

13. Which of the following is equal to 8×4?

A 4×8 **B** $4 + 8$ **C** $8 - 4$ **D** $8 + 4$

Name _____

Enrichment
4-3

Follow the Brick Road

Scott and Lauren are making a brick path in the school garden. Scott places 6 rows of bricks with 2 bricks in each row. Lauren places 4 rows of bricks with 3 bricks in each row. Scott turns to Lauren and says, "Look! This is what we did in math. We're using the Commutative Property of Multiplication." Lauren disagrees. Who is right?

1. Draw an array to show how Scott placed his bricks. Write a multiplication sentence for the array.

_____

2. Draw an array to show how Lauren placed her bricks. Write a multiplication sentence for the array.

_____

3. Explain who is correct.

_____

_____

_____

Appendix L

Clip and Cover

Partner Talk

Share your thinking while you work.

Get Started (or)

Get 10 squares in one color and 10 in another color, two paper clips, and two number cubes. Take turns.

At Your Turn

Toss two cubes to find your ovals. **EXAMPLE:**  Choose the 3rd oval on the left and the 5th oval on the right, **or** choose the 5th oval on the left and the 3rd oval on the right. Mark your ovals with paper clips.

How to Play

Tell a story to explain why someone might need to multiply those numbers. Explain how to find the product.
Cover the product. Lose your turn if the answer is taken.

How to Win

The first player or team to get any three connected squares in a row or column wins.

2					8
3	18	32	14	30	6
4	36	24	40	24	7
5	27	12	21	18	8
2	16	45	28	35	9
4					6

If you have more time

Play again! Talk about how and why you multiply.

Clip and Cover

Partner Talk

Share your thinking while you work.

Get Started (or)

Get 10 squares in one color and 10 in another color, one paper clip, and one number cube. Take turns.

At Your Turn

Toss one cube to find your oval. **EXAMPLE:**  Choose the 3rd oval on the left, **or** choose the 3rd oval on the right. Mark your oval with a paper clip.

How to Play

Look on the game board for factors of the number you chose. Tell a story to explain why someone might need to multiply those numbers. Cover those factors. Lose your turn if the answer is taken.

How to Win

The first player or team to get any three connected squares in a row or column wins.

32	6 × 8	4 × 9	8 × 3	5 × 6
24				30
36	5 × 7	3 × 6	8 × 5	4 × 4
40				28
45	6 × 4	8 × 6	2 × 8	4 × 8
16				48
	9 × 2	4 × 7	7 × 6	5 × 9
				42
				18

If you have more time

Play again! Talk about your strategies as you play.

Name _____

Quick Check
4-4

Appendix M

1. Neela's class went on a trip. They went in 6 cars. Each car carried 4 students, with 1 adult driving. How many students went on the trip?

   A 28

   B 24

   C 22

   D 11

2. Benjy bought a pack of stickers. Each sheet in the pack had 4 rows with 2 stickers in each row. Which array shows this situation?

   A

   B

   C

   D

3. **Writing to Explain** Suki wrote this multiplication story for 3×6:
   I have 3 brothers. I am 6 years older than Akira.
   How old am I?
   What is wrong with Suki's problem? Explain your thinking.
   Rewrite the multiplication story so that it works with 3×6.

Providence Creek Academy

Third Grade Math Unit: Meanings of Multiplication

Quick Check 4 Rubric:

Questions 1-2 are worth 1 point each.
Question 3 should be scored using the following rubric:

3 point answer: The student clearly identifies and explains Suki's errors then revises the problem to accurately reflect 3 x 6.

2 point answer: The student identifies one of Suki's errors with an adequate explanation and then revises the problem to reflect 3 x 6.

1 point answer: The student does not explain what is wrong with Suki's problem but suggests an alternative problem about 3 x 6.

Name _____

Reteaching
4-4

Writing Multiplication Stories

Appendix N

When you write a multiplication story you should:

- Always end the story with a question.
- Draw a picture to show the main idea.

Example:
Write a multiplication story for 5×9.

Josephine has 5 friends over for a snack. She gives each friend 9 grapes. How many grapes did Josephine give all together?

Josephine gave 45 grapes all together.

Write a multiplication story for each exercise. Draw a picture to find each product.

1. 4×3

_____

_____

2. 5×2

_____

_____

3. 4×6

_____

_____

4. Model Leshon has seven $5 bills. How much money does Leshon have? Write a multiplication sentence to show the answer. _____

Name _____

Practice
4-4

Writing Multiplication Stories

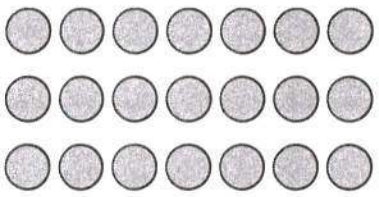
Write a multiplication story for each.

Draw a picture to find each product.

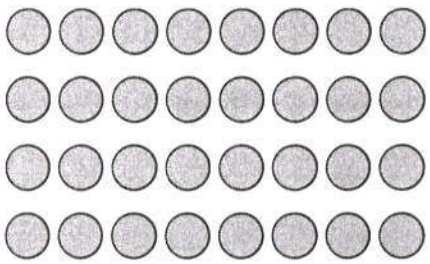
1. 3×6 **2.** 2×8 **3.** 4×3

Write a multiplication story for each picture.

4.



5.



6. Model Hot dog buns come in packages of 8. Mrs. Wilson has a total of 40 hot dog buns. Draw a picture to find how many packages of hot dog buns Mrs. Wilson has.

7. There are 9 players on a baseball team. At the park, 4 teams are playing. How many baseball players are playing at the park?

A 27 **B** 32 **C** 36 **D** 40

Name _____

Enrichment
4-4

And Then What Happened?

Finish each word problem by writing a sentence that makes it into a multiplication problem. Write a multiplication sentence to solve the problem. Then write the answer in a complete sentence. The first one has been started for you.

1. Caitlin has a puppy named Cubby Bear. Each day she brushes Cubby Bear for 5 minutes.

   How many minutes does Caitlin brush Cubby Bear in 1 week?

   Multiplication sentence: _____

   Answer: _____

   _____

2. Alexis earns money by doing lawn work. Alexis is paid $4 for every lawn she mows.

   _____

   _____

   Multiplication sentence: _____

   Answer: _____

   _____

3. John is having a party. He is going to give each person 2 party favors.

   _____

   _____

   Multiplication sentence: _____

   Answer: _____

   _____

