

3rd

Topic 4: Meanings of Multiplication

Lessons 1-5

MDIS:

4-1 B42

4-2 B44

4-3 B44

4-4 B46

4-5 E33

Reinforce

Envision Math Games:

Topic Game: NA

envision Online Games

Multiplication Arrays

Multiplication facts and number lines

Number jungle

Math facts practice

Computation games multiplication 1-10

Abra-ca-rabbits

Symbaloo

Guided Practice

Drawing pictures to represent situations will help students identify and extend a pattern.

- Ask students to draw nests with each containing an equal number of eggs. Have students make a table with rows labeled Number of Nests and Number of Eggs. Ask students to use their drawings to complete the table and identify the pattern.
- Ask students to draw bracelets with each containing an equal number of beads. Have them make a table with rows labeled Number of Bracelets and Number of Beads. Then have students use their drawings to complete the table and identify the pattern.

Assessments

3rd

Topic 4: Meanings of Multiplication

Lesson 4-1

Multiplication as Repeated Addition

Quick and Easy Lesson Overview



| Objective | Essential Understanding | Vocabulary | Materials |
|--|--|---|---------------------------------------|
| Students will write multiplication number sentences for given equal group situations, using the \times symbol. | Some real-world problems involving joining or separating equal groups or comparison can be solved using multiplication. Repeated addition involves joining equal groups and is one way to think about multiplication. | multiplication factors product | Two-color counters (Teaching Tool 17) |



Math Background

Research says ... that students are able to progress from using direct counting to using repeated addition when finding products (Mulligan & Mitchelmore, 1997). In this lesson, children use repeated addition to solve problems of equal groups.

The number of groups and the number of objects in each group are the **factors**. The total number of objects found when multiplying the factors is the **product**.

2 Guided Practice



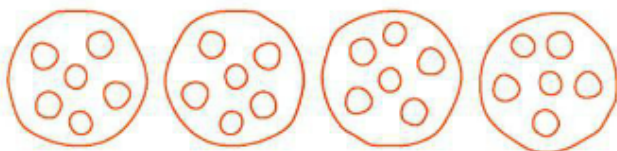
Remind students that repeated addition and multiplication work only if the groups have the same number of objects.

Exercise 5

Error Intervention

If students use the number of packages for the addition sentence rather than the number of stones,

then ask: *How many packages or groups of stones did Jessie buy?* [4 packages or groups] *How many stones were in each package?* [6 stones] *Draw a picture to help you solve. Add to find the number of stones Jessie bought.* [$6 + 6 + 6 + 6 = 24$] *How many times did you add 6? Why?* [I added 6 four times because there are 4 groups.]



$$6 + 6 + 6 + 6 = 24$$
$$4 \times 6 = 24$$

Reteaching Draw 9 groups of 2 on the board. Explain how to write an addition sentence and a multiplication sentence for the situation. For another example and more practice, assign

Reteaching Set A on p. 110.



Common Core

Domain

Operations and Algebraic Thinking

Cluster

Represent and solve problems involving multiplication and division.

Standard

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

Mathematical Practices

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

3rd

Topic 4: Meanings of Multiplication

Lesson 4-2

Arrays and Multiplication

Quick and Easy

Lesson Overview



| Objective | Essential Understanding | Vocabulary | Materials |
|--|--|--------------|---------------------------------------|
| Students will write multiplication sentences for arrays and use arrays to find products. | Some real-world problems involving joining or separating equal groups or comparison can be solved using multiplication. An array involves joining equal groups and is one way to think about multiplication. | array | Two-color counters (Teaching Tool 17) |



Math Background

Arrays are a good way to illustrate multiplication. An array shows items arranged in equal rows. Each row in an array has an equal number of items in it. The total number of items can be found by multiplying the number of rows and the number of items in each row. For all arrays, except those showing doubles, such as $3 \times 3 = 9$, turning

the array changes the number of rows and number of items in a row.



$$2 \times 3 = 6$$



$$3 \times 2 = 6$$

2 Guided Practice



Remind students that an array shows equal groups. *When objects are arranged in equal groups, what operation or operations can be used to find the total number of objects?* [Multiplication, repeated addition]

Exercise 3

Error Intervention

If students are having difficulty drawing an array

then ask: *Look at the multiplication sentence. How many rows will your array have?* [3] *Draw an array with 3 rows and 6 counters in each row. Can you write a multiplication sentence to find the product?* [$3 \times 6 = 18$]

Reteaching For another example and more practice, assign **Reteaching Set B** on p. 110.



Common Core

Domain

Operations and Algebraic Thinking

Cluster

Represent and solve problems involving multiplication and division.

Standard

3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities,... Also **3.OA.1**, **3.OA.5**

Mathematical Practices

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
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Topic 4: Meanings of Multiplication

Lesson 4-3

The Commutative Property

Quick and Easy

Lesson Overview



| Objective | Essential Understanding | Vocabulary | Materials |
|---|--|---|---------------------------------------|
| Students will write multiplication sentences for arrays, use arrays to find products, and use the Commutative Property of Multiplication. | Two numbers can be multiplied in any order and the product remains the same. | Commutative (Order) Property of Multiplication | Two-color counters (Teaching Tool 17) |



PROFESSIONAL DEVELOPMENT

Math Background

The **Commutative (Order) Property of multiplication** states that two factors can be multiplied in either order and still have the same product. This lesson comes early in the presentation of multiplication ideas because an understanding of this property can be very helpful to students when they learn to multiply. Once students understand commutativity, they know that $a \times b$ is the same as $b \times a$.

This means that, as they begin to memorize multiplication facts, if they have trouble recalling 7×5 , they can be prompted with 5×7 , because the product of those two pairs is the same. This flexibility of thinking about the operation of multiplication will help students become more confident in their use of multiplication facts.

2

Guided Practice



MATHEMATICAL PRACTICES

Remind students that arrays show equal groups of objects. *When objects are arranged in equal groups, what operation can be used to find the total number of objects?* [Multiplication]

Exercise 6

Error Intervention

If students have difficulty answering the question,

then ask: *What is the Commutative Property of Multiplication?* [It says that you can multiply factors in any order and the product will be the same.] *Write a multiplication number sentence that shows the Commutative Property of Multiplication.* [Sample answer: $4 \times 5 = 5 \times 4$] *What do you notice about the order of the factors?* [The order has changed]

Reteaching For another example and more practice, assign **Reteaching** Set B on p. 110.



Common Core

Domain

Operations and Algebraic Thinking

Cluster

Understand properties of multiplication and the relationship between multiplication and division.

Standard

3.OA.5 Apply properties of operations as strategies to multiply and divide
Also **3.OA.1**, **3.OA.3**

Mathematical Practices

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
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Topic 4: Meanings of Multiplication

Lesson 4-4

Writing Multiplication Stories

Quick and Easy

Lesson Overview



| Objective | Essential Understanding | Vocabulary | Materials |
|--|---|------------|-----------|
| Students will write math stories for given multiplication facts. | Some real-world problems involving joining or separating equal groups or comparison can be solved using multiplication. | | |



Math Background

In this lesson, students recognize situations in which multiplication can be used to join equal groups, count objects in an array, or compare two quantities. Arrays are a special kind of arrangement of equal groups, and multiplication can be used to find the total.

Learning to represent multiplication involves verbal language and the symbolic language of mathematics.

3 equal groups of 5

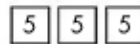


$$3 \times 5 = 15$$

5 Cards



3 times as many



$$3 \times 5 = 15$$

Common Core

Domain

Operations and Algebraic Thinking

Cluster

Represent and solve problems involving multiplication and division.

Standard

3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, Also **3.OA.1**, **3.OA.5**

Mathematical Practices

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

2

Guided Practice



Remind students that multiplication stories can be about equal groups, arrays, or comparing.

Exercise 7

Error Intervention

If students are having difficulty thinking of the multiplication story as an addition story,

then ask: *What multiplication sentence will help you solve the problem?* [Jack has 3 times as many as 6 carrots; 3×6 .] *Can you add Jack's equal groups of carrots to find the answer?* [Yes, $6 + 6 + 6 = 18$]

Reteaching Show students how to write and solve three different multiplication stories for 2×8 . 1) Equal groups: Julie bought 2 packages of hats for a birthday party. Each package has 8 hats. How many packages did Julie buy? 2) Array: An ice cube tray has 2 rows with 8 ice cubes in each row. How many ice cubes are in the tray? 3) Comparing: Gabe has 8 books. Hannah has twice as many books as Gabe. How many books does Hannah have? For another example and more practice, assign **Reteaching** Set C on p. 111.

3rd

Topic 4: Meanings of Multiplication

Lesson 4-5

Problem Solving: Writing to Explain

Quick and Easy Lesson Overview



| Objective | Essential Understanding | Vocabulary | Materials |
|--|--|------------|-----------|
| Students will use objects, words, pictures, numbers, and technology to provide a written explanation reflecting their understanding. | Mathematical explanations can be given using words, pictures, numbers, or symbols. A good explanation should be correct, simple, complete, and easy to understand. | | |



Math Background

This lesson on the problem-solving skill **Writing to Explain** helps students learn how to write a math explanation using words, pictures, numbers, or symbols. Students explain a pattern using a combination of words and numbers that reflects an understanding of operations. They draw pictures and write number sentences as part of a mathematical explanation.

In **Writing to Explain**, students can show what they know. As they develop this skill of communicating, they will see that it is necessary to be clear and complete about their understanding of the concepts. Teachers can use students' written explanations to assess both their understanding of math concepts and their ability to communicate.

2

Guided Practice



Exercise 1

Error Intervention

If students have difficulty writing explanations of their solutions, **then** help students think through some steps for writing an explanation. *Suppose there are 2 packs of cards, how many baseball cards would there be?* [8 cards] *Suppose there are 3 packs, how many cards would there be?* [12 cards] *If you had to write about a pattern in this situation, what would you say?* [For each additional pack, add 4 cards; multiply each number of packs by 4.] *Does your explanation tell everything you know about the situation?* [Yes]

Reteaching For another example and more practice, assign **Reteaching** Set D on p. 111.



Common Core

Domain

Operations and Algebraic Thinking

Cluster

Represent and solve problems involving multiplication and division.

Standard

3.OA.1 Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. . . . Also **3.OA.3**, **3.OA.5**, **3.OA.9**

Mathematical Practices

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