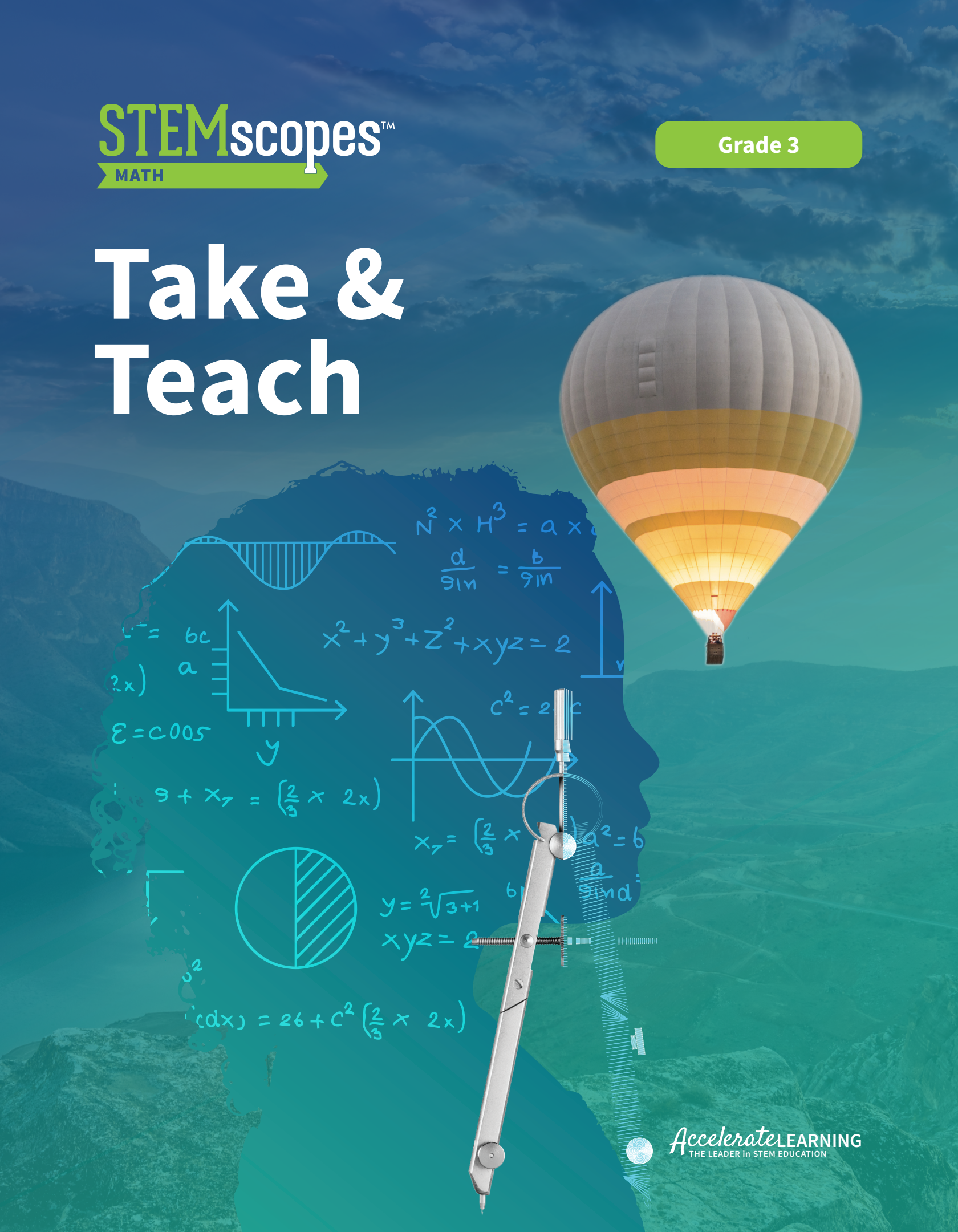
STEMscopes™ MATH

Grade 3

Take & Teach



Accelerate LEARNING
THE LEADER in STEM EDUCATION

What's Inside This Sample Lesson?

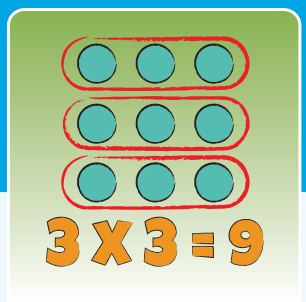
- A fully guided **Explore activity** written to meet rigorous state and national standards
- **Teacher Edition** pages, **Student Workbook** pages, and **other helpful resources** to fully experience a STEMscopes Math Explore activity

Table of Contents

Grade 3, Multiplication Models - Explore 1

Go Online!

Explore the digital resources for this lesson.



GRADE 3 | OPERATIONS AND ALGEBRAIC THINKING

MULTIPLICATION MODELS

FOCUS STANDARDS

Represent and solve problems involving multiplication and division.

- Interpret products of whole numbers, e.g., interpret 5 × 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 × 7. For example, describe a context in which a total number of objects can be expressed as 5 × 7.

ENGAGE ACTIVITIES

ACCESSING PRIOR KNOWLEDGE

Students will explore addition through arrays to deepen their understanding of mathematical concepts.

- Students will use addition to determine the total number of objects in arrays with up to five rows and columns.
- They will write equations to express the total as a sum of equal addends.
- Through discussion, students will evaluate different multiplication sentences and justify their reasoning.
- The activity includes opportunities for collaborative learning and addresses gaps in prior knowledge if needed.

HOOK PARTY FAVORS

Students use multiplication to determine the total number of party favors available for a birthday party. Students are introduced to a scenario involving party favors and are encouraged to identify mathematical concepts within the context.

- They work in groups to calculate the total number of each type of party favor using multiplication, based on the number of items per bag and the number of bags.
- Students share their methods and solutions with the class, discussing different strategies for finding totals.
- As an extension, students calculate how many bags are needed to provide one of each type of party favor for 30 children.

JUMP IN HERE

EXPLORE ACTIVITIES

EXPLORE 1 EQUAL GROUPS

Students explore the concept of multiplication through hands-on practice with equal groups.

- Students work in groups to model multiplication scenarios using counters and paper plates at various stations.
- They write multiplication sentences to represent the equal groups and identify factors and products.
- Students rotate through stations, solving problems and creating real-world scenarios for given expressions.
- The lesson concludes with a Math Chat to discuss observations and reinforce understanding of multiplication concepts.

EXPLORE 2 UNDERSTANDING MULTIPLICATION WITH ARRAYS

Students explore multiplication through the use of arrays to determine the total number of objects in a given scenario.

- Students work in groups to arrange colored tiles into arrays based on instructions from Aisle Station Cards.
- Each group records their findings by drawing array models and writing corresponding multiplication equations in their Student Journals.
- The activity includes guided questions to help students understand the relationship between rows, columns, and multiplication.
- Students conclude by discussing their strategies and completing an Exit Ticket to assess their understanding.

EXPLORE 3 MULTIPLICATION WITH TAPE DIAGRAMS

Students explore multiplication concepts using tape diagrams to interpret products of whole numbers.

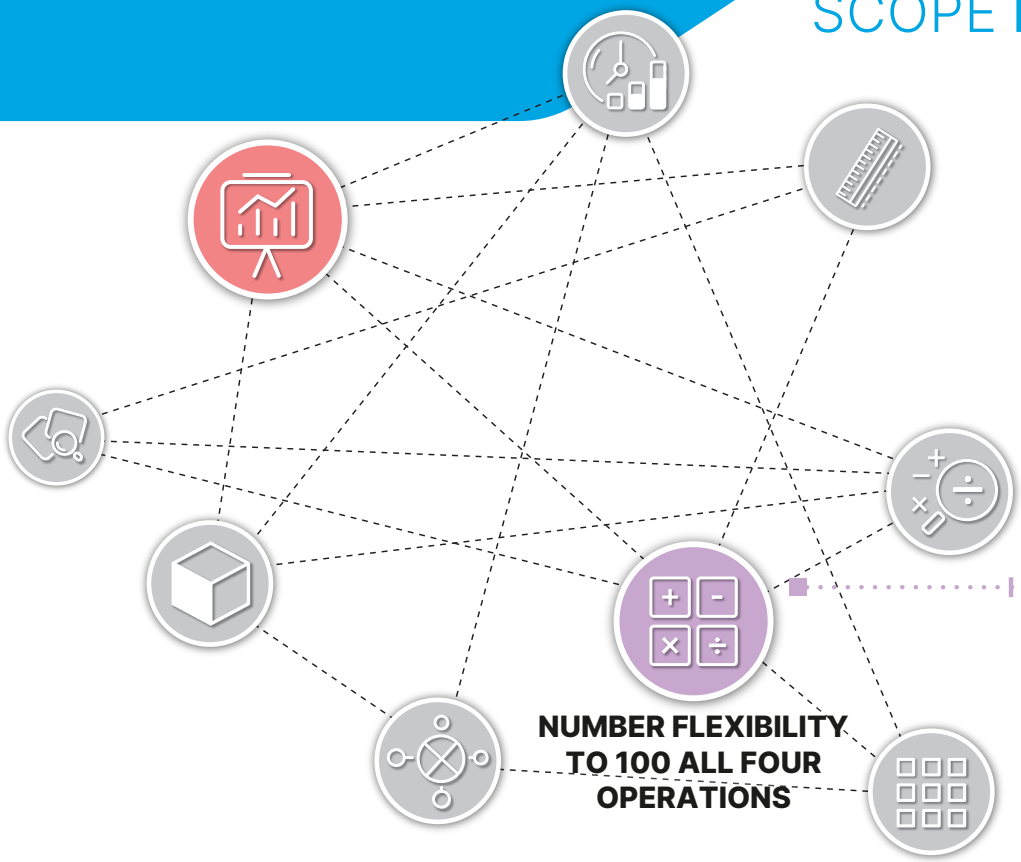
- Students work in pairs to model multiplication scenarios using linking cubes and tape diagrams.
- They create and analyze tape diagrams to represent multiplication problems, recording their findings in Student Journals.
- The activity encourages discussion and collaboration, with students sharing strategies and observations.
- An Exit Ticket is used to assess students' understanding of the multiplication concepts explored.

EXPLORE 4 NUMBER LINES AND SKIP COUNTING

Students explore multiplication using number lines and multiples through a collaborative, hands-on approach.

- Students work in groups to simulate packing for a camping trip, using number lines to solve multiplication problems.
- They use metersticks as number lines to skip count and find totals, recording their findings in Student Journals.
- The activity encourages sharing strategies and observations, fostering a deeper understanding of multiplication concepts.
- An Exit Ticket is used to assess students' grasp of the material, and additional supports are provided for diverse learning needs.

SCOPE **BIG IDEAS**



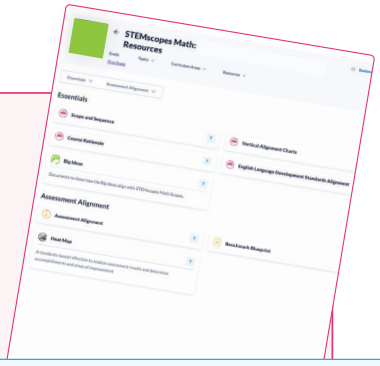
Students develop number sense by using arrays, tape diagrams, and number lines to model multiplication. These strategies help them see the structure of multiplication and build fluency with facts within 100. By exploring patterns in multiplication and making connections between models, students strengthen their ability to reason flexibly with numbers.

USING STEMSCOPES MATH

TEACHER RESOURCES

The suggested Scope and Sequence for each grade level is based on a 180-day school calendar. The natural progression of mathematics was the greatest factor in determining the order of scopes. Have your own scope and sequence? No problem. Teach the scopes in any order to meet the needs of the students in your classroom. The only activities affected are the Spiraled Review and Benchmark assessments.

Find the Scope and Sequence in your grade level Teacher Resources!



KEY CONCEPTS

- I can interpret multiplication as the total number of objects in equal groups.
- I can find the products of numbers using pictures, objects, words, numbers, and equations.
- I can describe a context for objects expressed as a multiplication expression.
- I can use the words product and factor to describe multiplication.

FUNDAMENTAL QUESTIONS

- What strategies and models can I use to represent multiplication?
- How are equal-sized groups related to multiplication?
- What context could I use to describe a multiplication expression?
- What words can I use to explain the parts within a multiplication problem?

SCAN HERE for the Teacher Prep Video

INSTRUCTIONAL LESSON

EXPLORE 1 EQUAL GROUPS

Prior to completing this Explore, have students complete **Skill Basics Use Story Problems to Represent Multiplication** so they can apply the skill to this concept.

Standard(s)

- **Represent and solve problems involving multiplication and division.** Interpret products of whole numbers, e.g., interpret 5 × 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 × 7.

Big Ideas	Standards for Mathematical Practice	Content Connections	Drivers of Investigation
Number Flexibility to 100 for All Four Operations	**MP.1** Make sense of problems and persevere in solving them. **MP.2** Reason abstractly and quantitatively. **MP.4** Model with mathematics. **MP.5** Use appropriate tools strategically.	**CC2** Exploring Changing Quantities	**DI1** Make Sense of the World (Understand and Explain) **DI3** Impact the Future (Affect)

DESCRIPTION

Students determine the total number of objects in a scenario using equal groups.

MATERIALS

PRINTED

- 1 Student Journal (per student)
- 1 Set of Show Me the Product! cards (per class)
- 1 Exit Ticket (per student)

REUSABLE

- 50 Two-color counters (per group)
- 1 Dry-erase marker (per student)
- 1 Dry-erase board (per student)
- 10 Small paper plates (per group)

PREPARATION

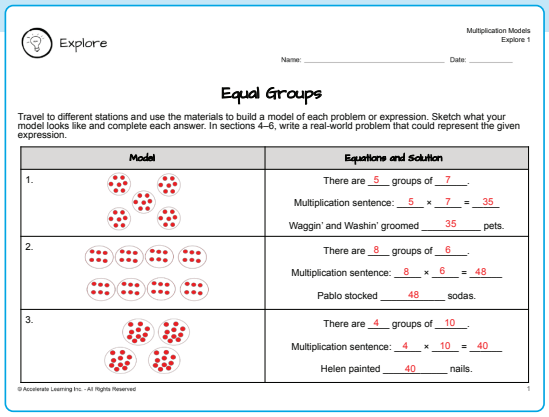
- Plan to have students work in 6 groups to complete this activity.
- Print the Student Journal and an Exit Ticket for each student.
- Print the Show Me the Product! cards for the class. If desired, laminate them for durability. Cut the cards apart.
- Set up 6 stations around the classroom. Place a Show Me the Product! card, 10 paper plates, and 50 two-color counters at each station.
- Prepare a dry-erase marker and dry-erase board for each student.
- For students who need more support in recalling information, see our Sharing Mats Supplemental Aids elements in the Intervention section.
- **Go Digital!** Have students explore or present their solutions using virtual manipulatives. The manipulatives used in this lesson can be found in the Explore drop-down menu and can be digitally assigned to students. (Two-Color Counters)

GRADE 3 MULTIPLICATION MODELS

EXPLORE > EXPLORE 1

PROCEDURE AND FACILITATION POINTS

1. Help students access the task by asking the following guiding questions:
   a. Look around the classroom. What objects are in equal groups?
   b. What are other examples of objects arranged or packaged into equal groups?
   c. What do you already know about combining equal groups?
2. Read the following scenario to the class: Many items in our world come in equal groups. Think about packs of markers, the wheels on a car, or your fingers and toes. We may want to know the total number of objects, but it would take a long time to count them all. Let's challenge ourselves to find better ways to combine equal groups!
3. Begin by combining counters in four groups of three counters. Ask the following question:
   a. **DOK-1** What do you see, and what do you think it means? *Answers will vary. We see four groups. Each group has three counters. All groups are equal. If we add all counters together, we get 12 counters.*
4. Give a dry-erase marker and a dry-erase board to each student.
5. Ask students to write a multiplication or addition sentence on their dry-erase boards that describes the groups of counters model and share their sentences. Emphasize how each time a group is added, the total increases by the same number. Ask the following question:
   a. **DOK-1** What mathematical operation does your sentence represent? *Multiplication or addition*
6. Follow the students' lead, and write a multiplication symbol. Ask the following question:
   a. **DOK-2** What does this symbol represent? *It represents "times," "multiplied by," "multiplication," "repeated addition," and "equal groups of."*
7. Have students look at the model again. Ask them the following question:
   a. **DOK-2** How could you describe the model using the phrase groups of? *Three groups of four*
8. Show how "three groups of four" can be written as 3 × 4. Ask students how many total objects there are, and complete the multiplication sentence, 3 × 4 = 12. Label the parts of the multiplication sentence, and introduce that the "factors" are the numbers being multiplied together and the "product" is the total number of objects.
9. Repeat this activity three more times with different equal groups (2 × 3, 3 × 5, 4 × 10). For each new group of counters, ask students to write the following on their dry-erase boards using their dry-erase markers:
   a. Sketch the model of equal groups.
   b. Describe it in words using "groups of" (for example, "two groups of three").
   c. Translate that into a multiplication sentence (for example, 2 × 3 = 6).



Explore

Multiplication Models
Explore 1

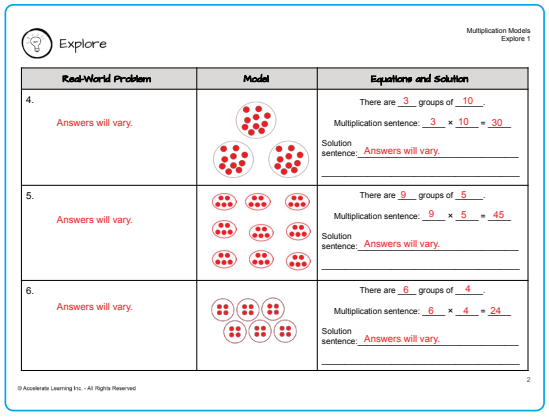
Name: _____ Date: _____

Equal Groups

Travel to different stations and use the materials to build a model of each problem or expression. Sketch what your model looks like and complete each answer. In sections 4–6, write a real-world problem that could represent the given expression.

	Model	Equations and Solution
1.		There are 5 groups of 7. Multiplication sentence: 5 × 7 = 35 Waggin' and Washin' groomed 35 pets.
2.		There are 8 groups of 6. Multiplication sentence: 8 × 6 = 48 Pablo stocked 48 sodas.
3.		There are 4 groups of 10. Multiplication sentence: 4 × 10 = 40 Helen painted 40 nails.

1

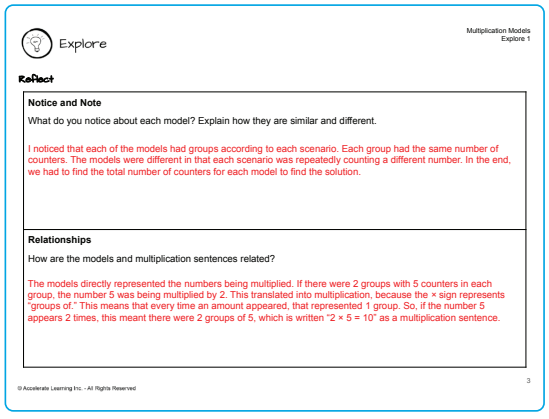


Explore

Multiplication Models
Explore 1

	Real-World Problem	Model	Equations and Solution
4.	Answers will vary.		There are 3 groups of 10. Multiplication sentence: 3 × 10 = 30 Solution sentence: Answers will vary.
5.	Answers will vary.		There are 9 groups of 5. Multiplication sentence: 9 × 5 = 45 Solution sentence: Answers will vary.
6.	Answers will vary.		There are 6 groups of 4. Multiplication sentence: 6 × 4 = 24 Solution sentence: Answers will vary.

2



Explore

Multiplication Models
Explore 1

ReFlect

Notice and Note

What do you notice about each model? Explain how they are similar and different.

I noticed that each of the models had groups according to each scenario. Each group had the same number of counters. The models were different in that each scenario was repeatedly counting a different number. In the end, we had to find the total number of counters for each model to find the solution.

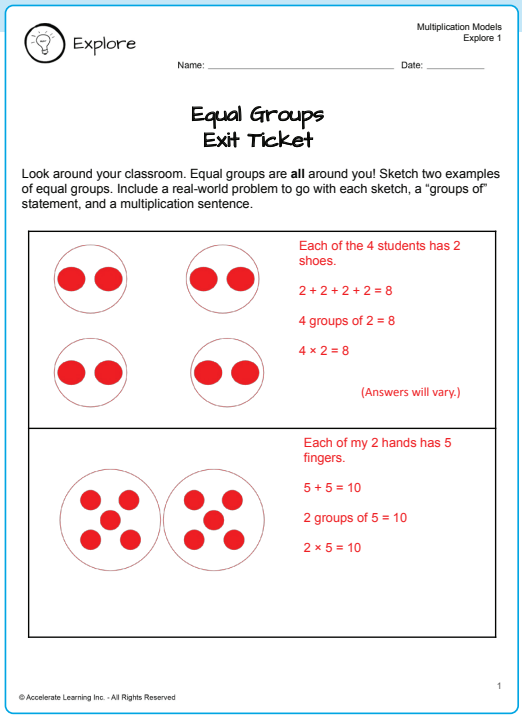
Relationships

How are the models and multiplication sentences related?

The models directly represented the numbers being multiplied. If there were 2 groups with 5 counters in each group, the number 5 was being multiplied by 2. This translated into multiplication, because the × sign represents "groups of." This means that every time an amount appeared, that represented 1 group. So, if the number 5 appears 2 times, this meant there were 2 groups of 5, which is written "2 × 5 = 10" as a multiplication sentence.

3

STUDENT JOURNAL
ANSWER KEY



Explore

Multiplication Models
Explore 1

Name: _____ Date: _____

Equal Groups Exit Ticket

Look around your classroom. Equal groups are **all** around you! Sketch two examples of equal groups. Include a real-world problem to go with each sketch, a "groups of" statement, and a multiplication sentence.

Each of the 4 students has 2 shoes.

2 + 2 + 2 + 2 = 8

4 groups of 2 = 8

4 × 2 = 8

(Answers will vary.)

Each of my 2 hands has 5 fingers.

5 + 5 = 10

2 groups of 5 = 10

2 × 5 = 10

1

EXIT TICKET
ANSWER KEY

10. Ask students to identify which numbers are the factors and which is the product.
11. Give a Student Journal to each student.
12. Explain to students that at each station, they should read the scenario, make a model of the problem with the plates and counters, write a description, record the multiplication sentence, and write a solution sentence. For cards 4–6, students should also write real-world problems that could represent the given expressions.
13. Place students in six groups, and assign each group to a station.
14. When they are finished at a station, have students rotate to another station until they have completed all six stations.
15. When finished, encourage students to discuss and write the answers to the Reflect questions on their Student Journals.
16. Monitor and talk with students as needed to check for understanding by using the following guiding questions:
    a. **DOK-1** How many equal groups are there? How many are in each group? *Answers will vary.*
    b. **DOK-1** How would you describe your model? *Answers will vary.*
    c. **DOK-2** Create a similar problem that could be modeled by the expression __ × __. *Answers will vary.*
17. Ask students to share their strategies, and encourage them to ask each other questions and make connections. Encourage students to notice the similarities and differences between the strategies used to multiply using equal groups.
18. After the Explore, invite the class to a Math Chat to share their observations and learning.

MATH CHAT

- **DOK-1** What is multiplication? *Multiplication combines equal groups into a total amount.*
- **DOK-2** Why do you think we use multiplication? *Multiplication is helpful because it is a lot faster than adding the numbers one by one or counting individually.*
- **DOK-2** What are some ways we can model and solve a multiplication sentence? *We can use equal groups.*
- **Choose a Structured Conversation routine to facilitate the following question:**
    - **DOK-2** How are the models and multiplication sentences related? *The models directly represent the numbers being multiplied. If there are 2 groups with 5 counters in each group, the number 5 is being multiplied by 2. This translates into multiplication because the × sign represents "groups of." This means that every time a number appears, that number represents 1 group, so if the number 5 appears 2 times, this means there are 2 groups of 5, which is written 2 × 5 = 10 as a multiplication sentence.*

INSTRUCTIONAL SUPPORTS

1. At the beginning of the Explore, when displaying and discussing equal groups of counters, provide an alternative method to record the auditory information and offer a visual representation of the idea, such as an anchor chart. As equal groups of counters are being discussed, record student discussions of what they notice about the model and the symbol that represents the operation and what it means, and relate the phrase groups of to each model.
2. At the beginning of the Explore, students may find it helpful to have a graphic organizer of the four things they are asked to represent on their dry-erase boards. Draw a windowpane diagram to show how students can display the model, description, and multiplication sentence for each group of counters being presented.
3. Before moving to the representation phase, some students may need more opportunities to practice with the manipulatives. Allow time for them to work with a partner to focus on just building a model and using their words to explain how it represents the multiplication sentence or scenario. Once students comfortably understand how a model relates to a problem, move into drawing a representation of the model.
4. Encourage students to write the multiples for each group to help them skip count.
5. As with many other math skills, it is important to determine whether student errors are conceptual errors (missing prerequisite skills) or strategical errors (missing or confused about the task analysis involved in multiplying). If the issue is a conceptual error, the student may need to review prerequisite skills, such as

skip counting. If the issue is a strategy error, it would be helpful for the student to explain their thinking aloud while solving the problem so errors or misconceptions can be identified.

6. To begin constructing usable knowledge to refer to throughout this scope, have the class help you create an interactive word wall students can refer to during each Explore or other activities. Showcase key vocabulary with corresponding examples relating to multiplication, such as equal groups, the multiplication symbol ×, groups of, and multiplication sentence.
7. As an extension, challenge students to work with a partner to create their own multiplication model using equal groups and a real-world scenario it could represent. The partner can use that model to create a multiplication sentence and determine a solution.

LANGUAGE SUPPORTS

Provide examples and clarify what it means to have groups of a given amount of objects. It may be helpful to provide a visual example of this phrase along with the phrase translated into students' home languages.

Explain the nonmath terms used for the manipulatives in this activity, such as counters and plates, and how that vocabulary will be used in student discussions of models.

Provide sentence structures for students to use during discussion with their shoulder partners as well as during group work, when discussing how a model is represented:

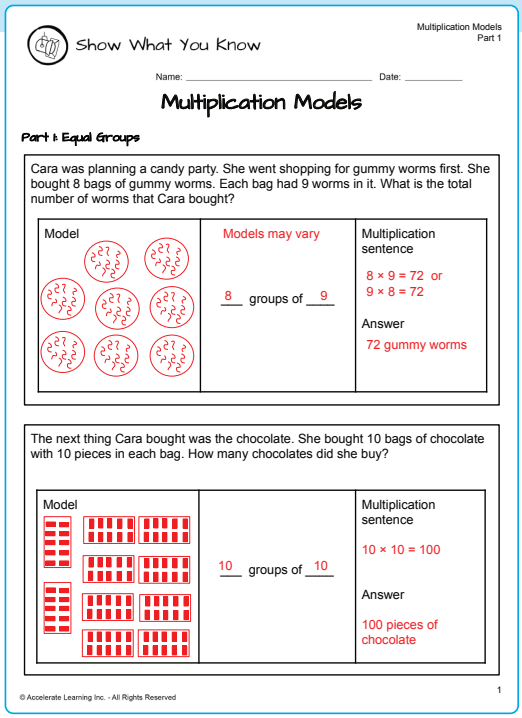
- We see ___ groups.
- Each group has ___.
- The total number of counters is ___. I know this because ___.

As students are asked to represent different types of equal groups using their counters and plates, display a visual support of these steps, chunk the directions into smaller steps, and emphasize the verb or action in each step by bolding the verb:

1. **Sketch** the model of equal groups on the screen.
2. **Describe** it in word form using "groups of" (for example, "two groups of three").
3. **Translate** that into a multiplication sentence (for example, 2 × 3 = 6).

If needed, create a physical checklist of these steps on a separate piece of paper for each group of students, and allow students to check off each step as it is performed. Encourage students to repeat each step for each equal group description you provide, focusing on the action of the verb as they solve.

Model what it means to write a multiplication sentence. Read one out loud as you write it. For example, as you write 5 × 9 = 40, say "five times nine equals forty" to emphasize the meaning of mathematical symbols. If students need additional support to symbolically represent a model with a multiplication sentence, consider annotating a student's model with numbers and modeling how symbols



Show What You Know

Multiplication Models Part 1

Name: _____ Date: _____

Multiplication Models

Part 1: Equal Groups

Cara was planning a candy party. She went shopping for gummy worms first. She bought 8 bags of gummy worms. Each bag had 9 worms in it. What is the total number of worms that Cara bought?

Model		Multiplication sentence
	Models may vary 8 groups of 9	8 × 9 = 72 or 9 × 8 = 72 Answer 72 gummy worms

The next thing Cara bought was the chocolate. She bought 10 bags of chocolate with 10 pieces in each bag. How many chocolates did she buy?

Model		Multiplication sentence
	10 groups of 10	10 × 10 = 100 Answer 100 pieces of chocolate

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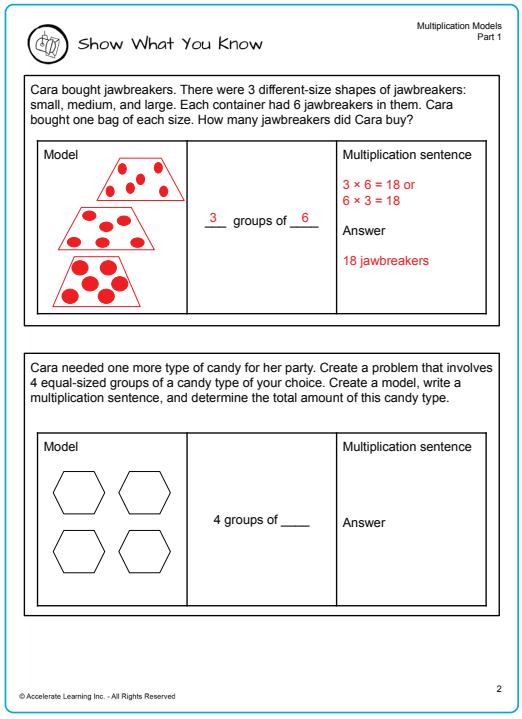

Show What You Know

Multiplication Models Part 1

Cara bought jawbreakers. There were 3 different-size shapes of jawbreakers: small, medium, and large. Each container had 6 jawbreakers in them. Cara bought one bag of each size. How many jawbreakers did Cara buy?

Model		Multiplication sentence
	3 groups of 6	3 × 6 = 18 or 6 × 3 = 18 Answer 18 jawbreakers

Cara needed one more type of candy for her party. Create a problem that involves 4 equal-sized groups of a candy type of your choice. Create a model, write a multiplication sentence, and determine the total amount of this candy type.

Model		Multiplication sentence
	4 groups of ___	Answer

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SHOW WHAT YOU KNOW PART 1 ANSWER KEY

Explore

Multiplication Models
Explore 1

Name: _____ Date: _____

Equal Groups

Travel to different stations and use the materials to build a model of each problem or expression. Sketch what your model looks like and complete each answer. In sections 4–6, write a real-world problem that could represent the given expression.

Model	Equations and Solution
1.	There are ____ groups of _____. Multiplication sentence: _____ × _____ = _____ Waggin' and Washin' groomed _____ pets.
2.	There are ____ groups of _____. Multiplication sentence: _____ × _____ = _____ Pablo stocked _____ sodas.
3.	There are ____ groups of _____. Multiplication sentence: _____ × _____ = _____ Helen painted _____ nails.

Explore

Real-World Problem	Model	Equations and Solution
4.		There are ____ groups of _____. Multiplication sentence: _____ × _____ = _____ Solution sentence:_____ _____
5.		There are ____ groups of _____. Multiplication sentence: _____ × _____ = _____ Solution sentence:_____ _____
6.		There are ____ groups of _____. Multiplication sentence: _____ × _____ = _____ Solution sentence:_____ _____

Explore

Reflect

Notice and Note

What do you notice about each model? Explain how they are similar and different.

Relationships

How are the models and multiplication sentences related?

Explore

Multiplication Models
Explore 1

Name: _____ Date: _____

Equal Groups
Exit Ticket

Look around your classroom. Equal groups are **all** around you! Sketch two examples of equal groups. Include a real-world problem to go with each sketch, a "groups of" statement, and a multiplication sentence.

Math Chat

Math Chat
What is multiplication?
Why do you think we use multiplication?
What are some ways we can model and solve a multiplication sentence?
How are the models and multiplication sentences related?

Show What You Know

Name: _____ Date: _____

Multiplication Models

Part 1: Equal Groups

Cara was planning a candy party. She went shopping for gummy worms first. She bought 8 bags of gummy worms. Each bag had 9 worms in it. What is the total number of worms that Cara bought?

Model	___ groups of ____	Multiplication sentence Answer

The next thing Cara bought was the chocolate. She bought 10 bags of chocolate with 10 pieces in each bag. How many chocolates did she buy?

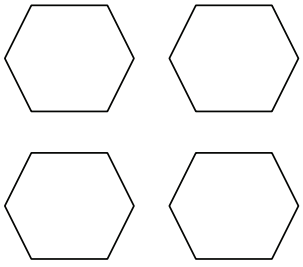
Model	___ groups of ____	Multiplication sentence Answer

Show What You Know

Cara bought jawbreakers. There were 3 different-size shapes of jawbreakers: small, medium, and large. Each container had 6 jawbreakers in them. Cara bought one bag of each size. How many jawbreakers did Cara buy?

Model		Multiplication sentence
	___ groups of ____	Answer

Cara needed one more type of candy for her party. Create a problem that involves 4 equal-sized groups of a candy type of your choice. Create a model, write a multiplication sentence, and determine the total amount of this candy type.

Model		Multiplication sentence
	4 groups of ____	Answer

Notes

Notes

Ready to see the full program?

Scan here!

Exploring this lesson with your students?

We'd love to see it in action! Snap a pic, share your classroom experience, and tag us with @AccelerateLearningInc on Facebook.

By sharing, you'll join a community of math educators who are making math meaningful. You might even get featured!

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