UNIT 1
Multiplying and Dividing Whole Numbers

MULTIPLICATION

A

Today's Destination

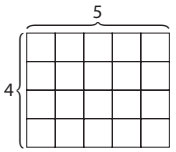
What does multiplication represent?

Vocabulary

Array A grid of squares or other objects arranged in equal rows

Multiplication An operation that represents putting equal groups together to get a total

For example:



$4 \times 5 = 20$

factors the numbers you multiply

product the total in a multiplication sentence

4 rows of 5 equals 20

Problem of the Day

How many markers does Matt have in total? 8 markers

MULTIPLICATION

Objectives

By the end of this lesson:

- Students will understand that multiplication represents putting together groups of equal size to get a total.
- Students will be able to represent factors and products using multiplication, repeated addition, and arrays.

Vocabulary

Review the term *multiplication.* Ask students to describe the way they think about multiplication. Some students may say that multiplication is repeated addition. Others may describe it as a fast way of counting equal groups or amounts. Help students connect the visual model (known as an *array*) with the multiplication sentence ($4 \times 5 = 20$).

Problem of the Day

Invite students to try this problem; assess their responses.

Ask students how they solved the problem. Emphasize that all of the strategies below will lead to the same total:

- Count all eight markers one at a time.
- Add $2 + 2 + 2 + 2 = 8$.
- Multiply $4 \times 2 = 8$.

Introduce the lesson question: "What does multiplication represent?"

Connect the Problem of the Day to the lesson by explaining that it shows that counting, addition, and multiplication are all related. Then explain that students will learn more about the relationships between counting, addition, and multiplication in this lesson.

RULES OF THE ROAD
Instruction

approx. 20 min.

Delivery

Define *multiplication* as the repeated addition of equal groups.

- Read the introductory text and examples with students.
- Contrast the two examples. The first illustration shows addition of *unequal* groups of magazines, while the second illustration shows three *equal* groups.
- Emphasize that addition involves putting together groups, but multiplication always involves putting together *equal* groups.

Monitor students while they complete the Try It Out exercise.

Ask students to explain what helped them decide whether each situation represented addition or multiplication.

- The first comic represents multiplication (5×3) because it involves repetition of an equal number of words several times.
- The middle comic represents addition ($8 + 4$) because 8 and 4 are unequal amounts.
- The final comic represents multiplication (2×3) because there are two equal groups of three pieces of gum each.

Strategies for Differentiation
Support for English Language Learners and Students with Special Needs

Developing Vocabulary

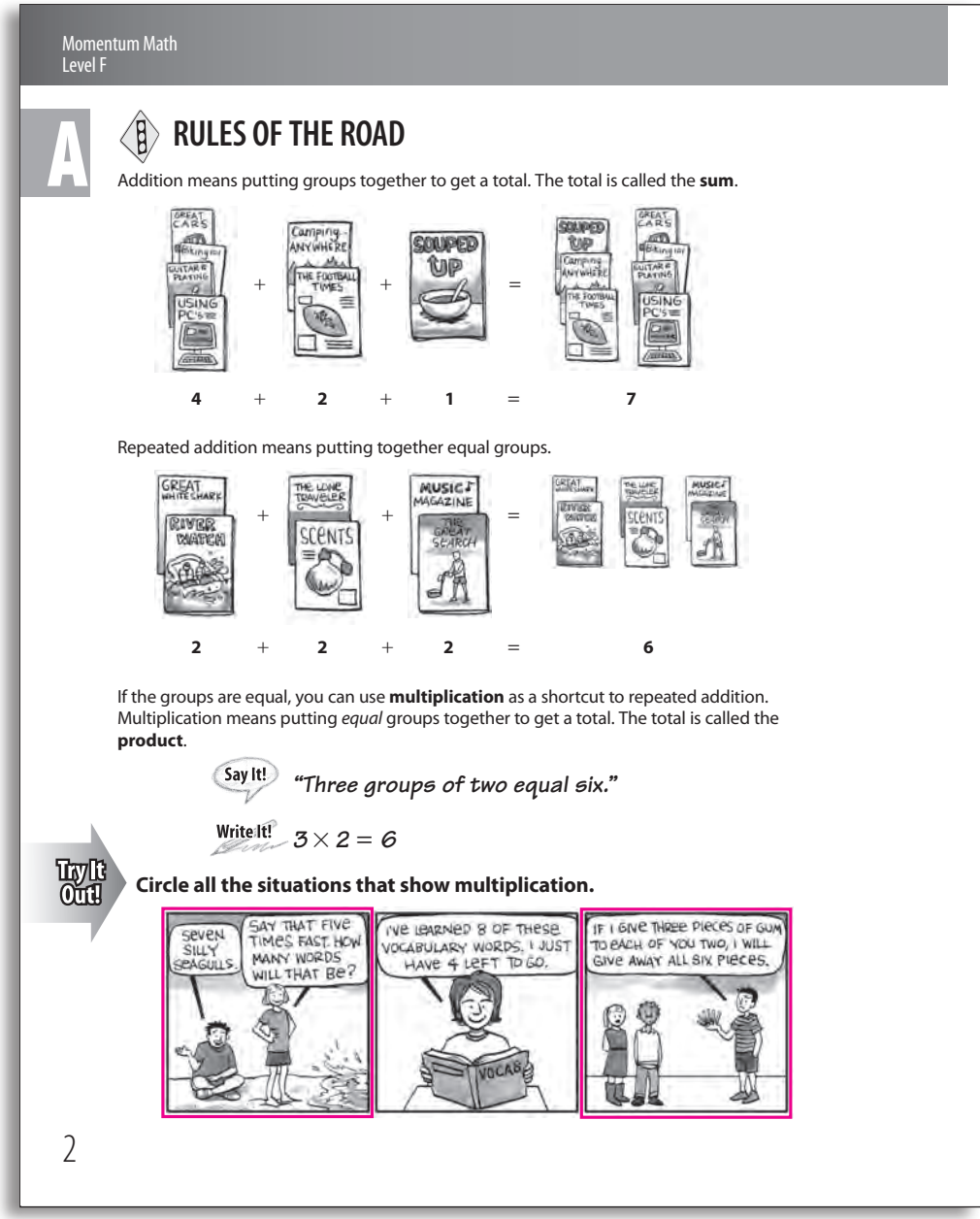
The word *product* has everyday meanings that students may feel are dissimilar from its mathematical meaning. However, there is a connection: the equal groups *produce* a total, or product. Be sure to use *product* instead of *answer* when students multiply in this lesson and in other lessons.

ELL

ELL students may not be comfortable with phrases such as "three groups of two." Put these phrases in context by saying "three groups of two magazines."

Hands-On Activity

Use magazines or books to act out the introductory examples. Make sure that you not only represent the three equal groups of two magazines, but also represent the total of six books by combining and counting them as one group.



UNIT 1
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A

Nadia has 4 packs of pens. Each pack has 3 pens in it. How many pens does Nadia have in all?

THIS PROBLEM IS ABOUT PUTTING EQUAL GROUPS TOGETHER TO GET A TOTAL. I SEE FOUR GROUPS OF 3.

Write It!

addition sentence $3 + 3 + 3 + 3 = 12$

multiplication sentence $4 \times 3 = 12$

Try It Out!

In Kami's classroom, there are 5 tables. Each table seats 6 students. How many seats are there in all?

Write It!

addition sentence $6 + 6 + 6 + 6 + 6 = 30$

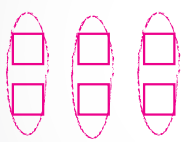
multiplication sentence $5 \times 6 = 30$

CHECKPOINT

Kenya has 3 brothers. Each brother gave her 2 presents for her birthday. How many presents did Kenya's brothers give her in all?

Draw a diagram to show the situation above.

Draw It!



Write an addition sentence and a multiplication sentence to show the situation above.

Write It! $2 + 2 + 2 = 6$

Write It! $3 \times 2 = 6$

3

Delivery

Guide students through Marta's example problem.

- Ask, "Why do both of Marta's number sentences have the same total?"
- Emphasize that even though one sentence uses addition and the other uses multiplication, they all represent the same total number of pens.
- Encourage students to conceptualize the multiplication sentences as either "four groups of three pens" or "three pens, counted four times."

Monitor students while they complete the Try It Out exercise.

Allow students to write the product as either $5 \times 6 = 30$ or $6 \times 5 = 30$. However, make sure that students do not add $5 + 5 + 5 + 5 + 5 + 5 = 30$ because this problem does not involve six equal groups of five. Encourage students to draw a diagram to represent this problem if needed.

Checkpoint

Assessment and Reteaching

Have students complete the Checkpoint independently.

Redirect struggling students with effective questions, such as:

- How can you draw each present in a simple way? *Draw a square.*
- How can you show that each brother gave two presents? *Draw the presents in pairs.*
- What is the total number of presents? *6*
- How big is each equal group of presents? *2*

If students write $3 + 3 = 6$ as the sum...

Students may already have a strong sense of the commutativity of multiplication. Reinforce this sense while emphasizing that $3 + 3$ represents two groups of three. In this problem, however, there are three groups of two.

If students draw a diagram with five squares...

Students may have added $2 + 3$. It may be helpful to make the problem more concrete by having students act out the situation with actual objects.

If students write $4 + 2 = 6$ or some other addition sentence...

Students may not have thought of using *repeated* addition to represent this problem. Ask students, "How can you represent equal groups using addition?"