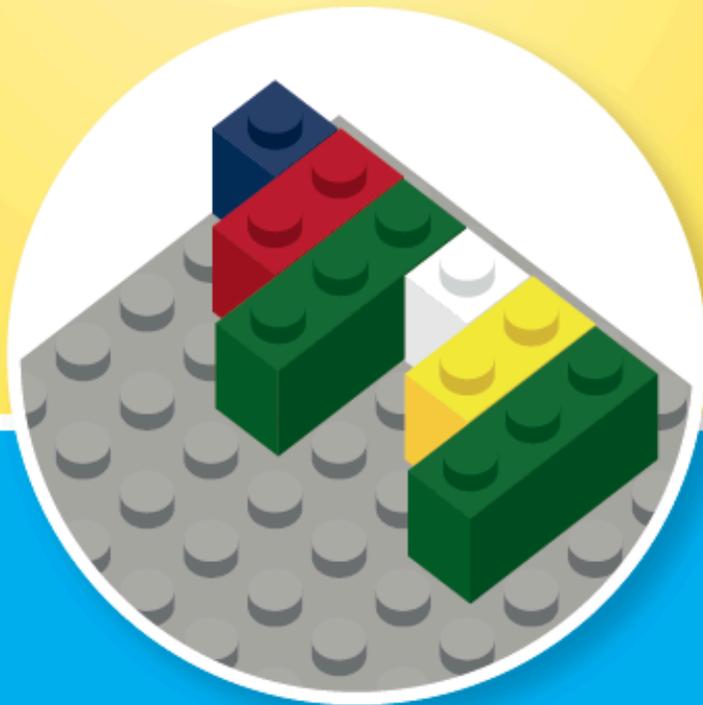
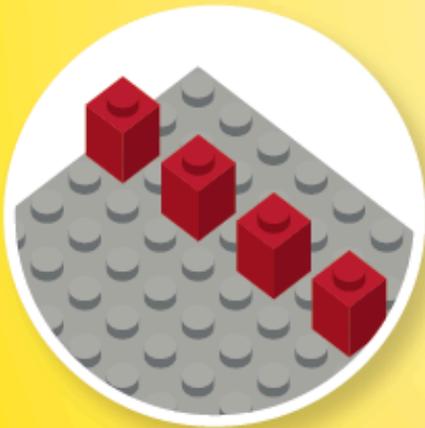


Brick Math Series

TEACHING COUNTING AND CARDINALITY

USING LEGO® BRICKS



Dr. Shirley Disseler
Math Curriculum Expert

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JUMP NUMBERS

Students will learn/discover:

- How to count forward and backward from a given number (sometimes called “counting on” and “counting back”)
- Skip-counting and jump numbers
- Patterns of even and odd numbers

Why is this important?

A true understanding of cardinality depends on one’s ability to understand absolute location of a number on a number line. Students need to understand how to count forward and backward from any given number. One way to learn this is by counting the number of “jumps” by a specific number (called “skip-counting” if the jumps are all the same).

Vocabulary:

- Odd: numbers that are not divisible evenly by two and always have leftover studs when modeled with bricks
- Even: numbers divisible by two or ending in zero
- Skip-counting: counting by the same number (greater than 1) each time
- Jump numbers: the number of skip-counts needed to reach a solution, which can include adding leftovers as jumps at the end
- More than: comparison of amounts that includes a greater number of items than the original amount
- Less than: comparison of amounts that includes fewer items than the original amount

SUGGESTED BRICKS

Size	Number
1x1	10
1x2	6
1x3	2
2x2	4
2x3	6
2x4	8
2x6	2
2x8	2
2x10	2

Note: Using a baseplate will help keep the bricks in a uniform line. One large baseplate is suggested for these activities.



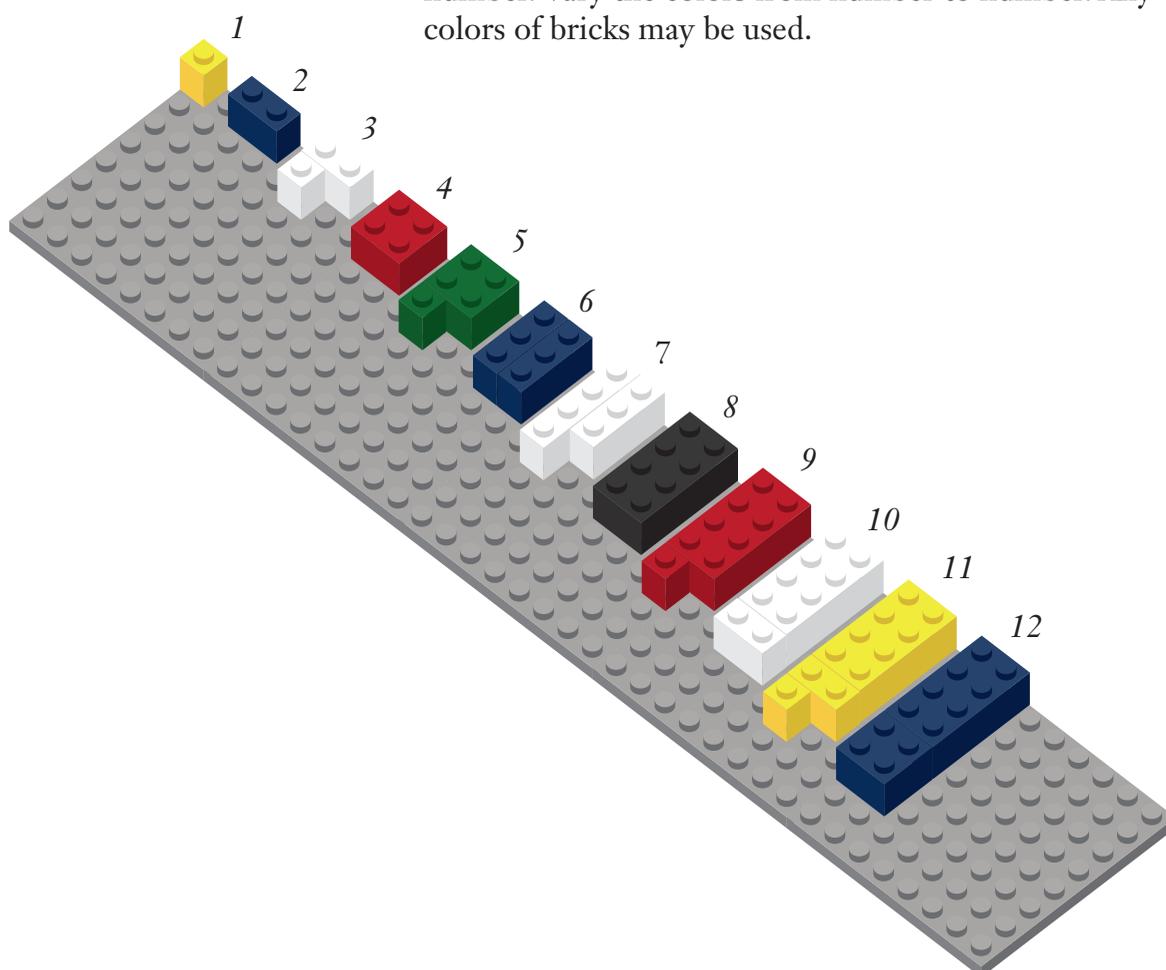
How to use the companion student book, *Learning Counting and Cardinality with LEGO® Bricks*:

- After students build their models, have them draw the models and explain their thinking in the student book. Recording the models on paper after building them with bricks helps reinforce the concepts being taught.
- Discuss the vocabulary for each lesson with students as they work through the student book.
- Use the assessment in the student book to gauge student understanding of the content.

Part 1: Show Them How

1. Build a brick number line model and show it to the students.

Note: Use the same color of bricks to represent a given number. Vary the colors from number to number. Any colors of bricks may be used.

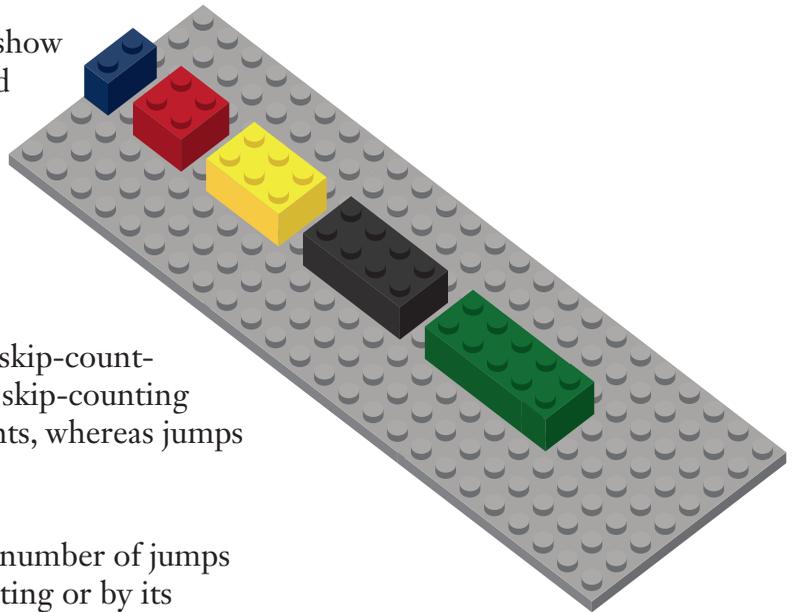




Point to each brick and count based on the number of studs shown. Have students count aloud from 1 to 12, using studs as the reference point (“one stud, two studs, three studs,” etc.).

Ask students how to count to the end if you begin with the brick that represents 8. Students should count “eight, nine, ten, eleven, twelve.” Discuss that counting forward from a given number on the number line helps with addition. Note that there are 4 spaces between 8 and 12, showing that $8 + 4 = 12$.

- 2.** Build a model of counting by 2s and show it to the students. Have students build the model, then draw and label it.
Note: Use the same color of bricks to represent a given number. Vary the colors from number to number. Any colors of bricks may be used.



Discuss how jump numbers relate to skip-counting. Students should understand that skip-counting is always done in equivalent increments, whereas jumps might not always be equivalent.

Students should be able to count the number of jumps and describe the pattern as skip-counting or by its pattern. For example, in the model of counting by 2s, there are four jumps in the skip-counting pattern of 2s. For a pattern of 2, 5, 7, 10, there are three jumps and the pattern is *jump 1 = 3, jump 2 = 2, jump 3 = 3*.

Ask students what number comes next in the model of counting by 2s, and have them explain how they know the answer. *Note:* Have students touch the bricks as they count the jumps.

Students should say that the next number in the pattern is 12. They know it is 12 because there are 2 between each number, and 2 more than 10 is 12.



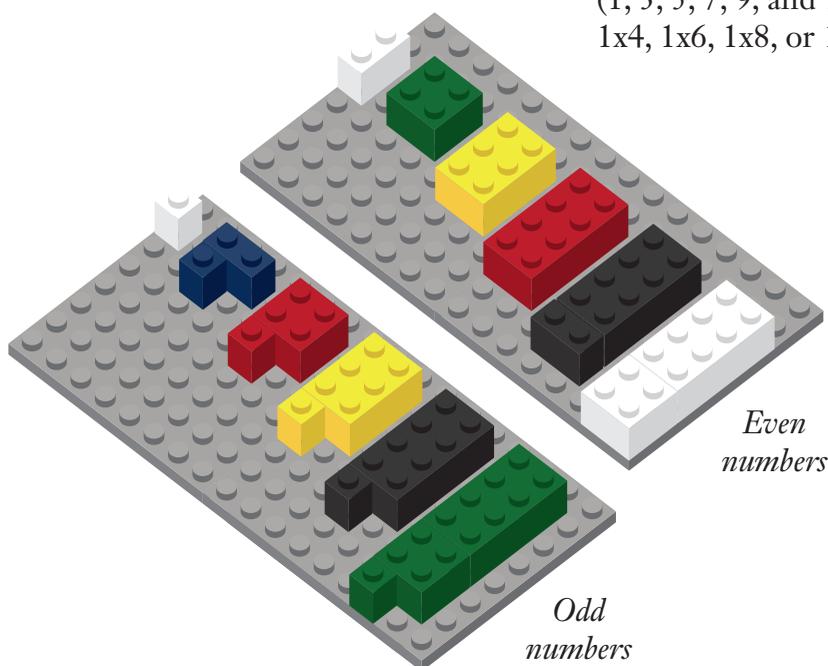
3. Build a model to show counting by 4s. Have students build a model to show counting by 4s, then draw and label it.

Ask students how many jumps there are in the pattern. Students should answer 3, and touch the bricks as they count the jumps.

Ask students what number comes next in the pattern, and how they know the answer. Have students model the pattern, then draw their model and label it.

Students should know that the next number is 20, because there are 4 between each number, and 4 more than 16 is 20. Students should model 20 with bricks in a 2x10 configuration.

4. Have students work in pairs to build one even number model (2, 4, 6, 8, 10, and 12) and one odd number model (1, 3, 5, 7, 9, and 11). *Note:* Students should not use 1x3, 1x4, 1x6, 1x8, or 1x10 bricks to build these models.

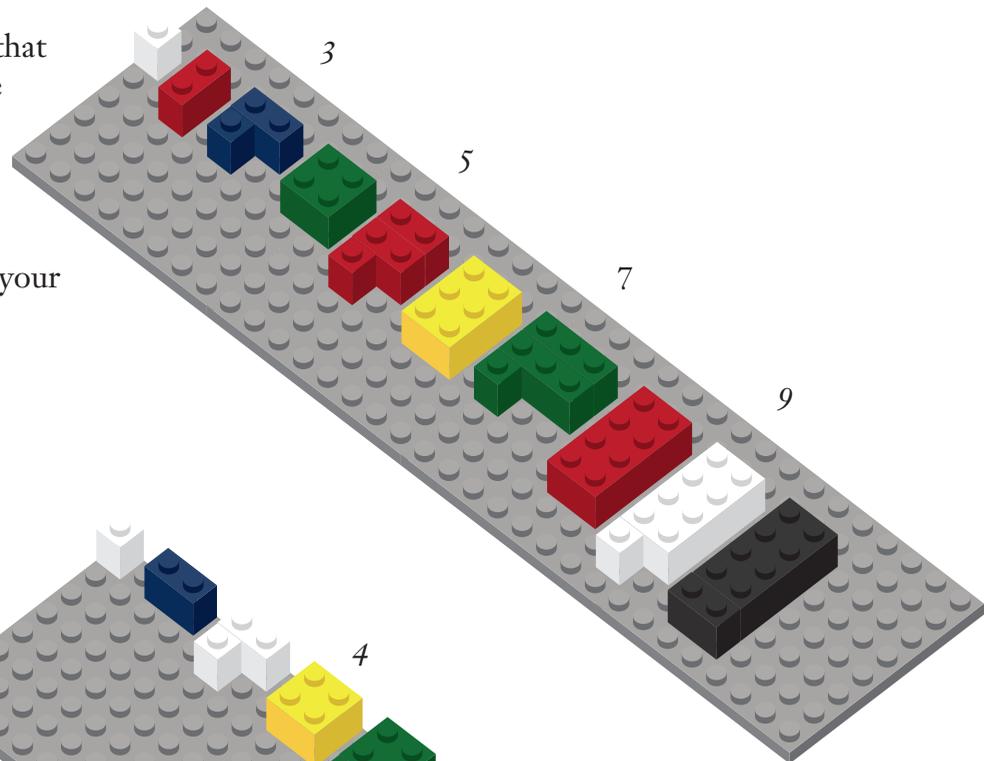




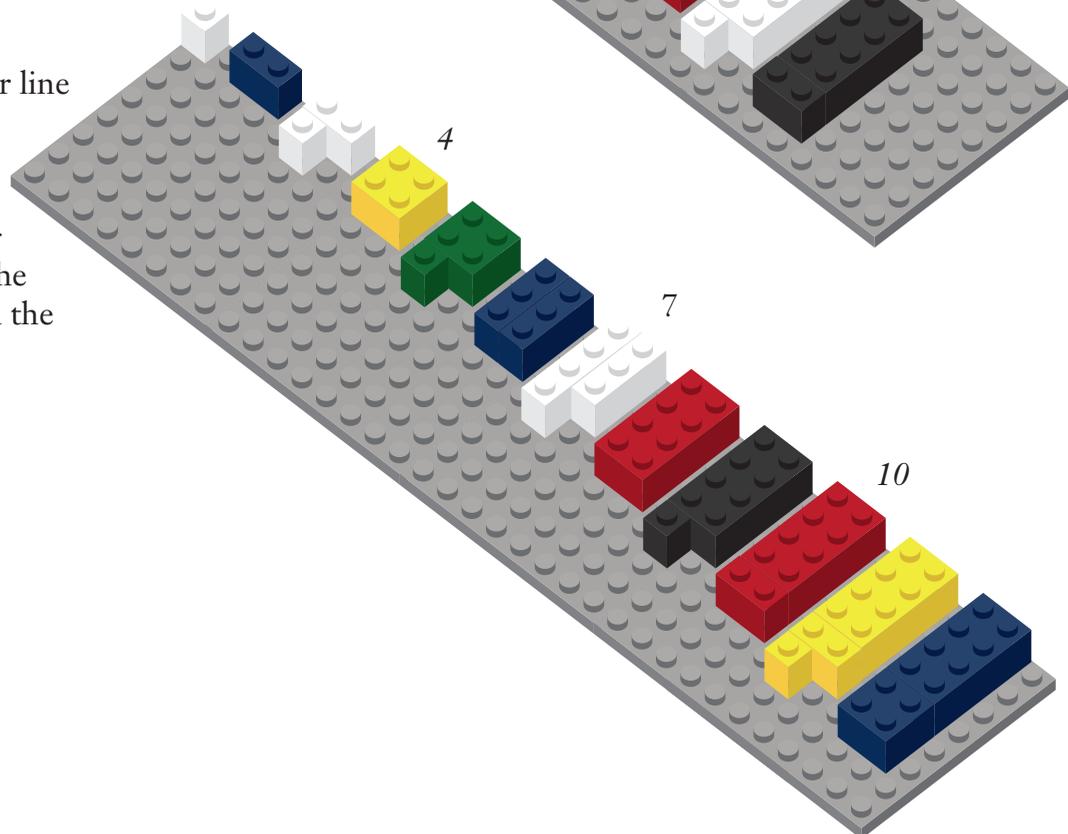
Ask students how the model for 2, 4, 6, 8, 10, and 12 is different from the model for 1, 3, 5, 7, 9, and 11. Students should recognize that all the even numbers are modeled by rectangles, and the odd number models each have an “extra” brick. Discuss the even and odd number models to be sure all students understand the differences between them.

Part 2: Show What You Know

1. Build a brick number line that shows 1 to 10. Begin at the brick that represents the number 3. Counting by 2s, can you find the next three numbers in the sequence? Draw and label your model.



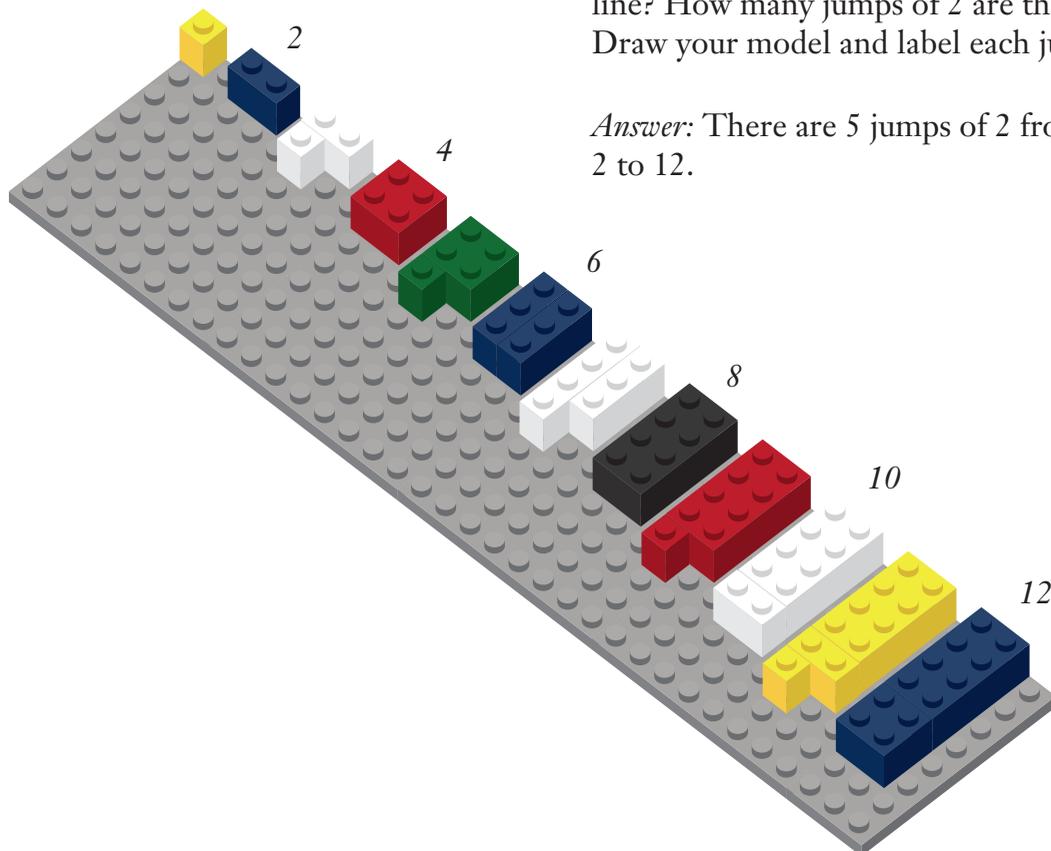
2. Build a brick number line that shows 1 to 12. Begin at the brick that represents the number 4. Counting by 3s, can you find the next two numbers in the sequence?





- 3.** Using the number line for 1 to 12, begin at the number 2. Can you find jumps of 2 until the end of the number line? How many jumps of 2 are there in the sequence? Draw your model and label each jump of 2.

Answer: There are 5 jumps of 2 from the numbers 2 to 12.



- 4.** Can you build one model that shows both even and odd numbers? Draw and label the model with numbers, showing which are even and odd.

Answers will vary, but check that students can make their own decisions about odd and even numbers and model them correctly.

PRAISE FOR THE BRICK MATH SERIES: TEACHING MATH USING LEGO® BRICKS

“I finally know what a fraction is. I can *see* it!”

—Student

“Why doesn’t everyone learn math this way?”

—Student

“As an elementary teacher, exploring varying methods of learning is always necessary. From the very first activity in *Teaching Multiplication Using LEGO® Bricks*, it is clear that this book is extremely useful for any student learning (or struggling with) multiplication. For example, when learning/discussing fact families, I have witnessed many students blindly memorizing the facts without truly understanding *why* there is a relationship between the facts. By using different sizes of LEGO® bricks in one of the activities in this book, students are able to build and then observe a visual representation of the fact families. The students are able to see that one 1x6 brick contains the same number of studs as two 1x3 bricks.

In my experience as an educator, students tend to deeply grasp a concept whenever they are fully immersed in the learning process. The activities in this book require students to think critically about the process of multiplication that so often becomes robotic. *Teaching Multiplication Using LEGO® Bricks* covers multiplication processes such as: bundling, repeated addition, using place value, using array models, one-to-one correspondence, and more. Rather than blindly following a set of steps, students are able to build and think critically about what is happening as the problem evolves.

This book is a must-have for any educators exploring multiplication!”

—Elementary Teacher

“As an instructional coach at an elementary school, I have been searching for a teacher-friendly text that emphasizes the educational aspects of LEGO® bricks. *Teaching Multiplication Using LEGO® Bricks* helps breathe life back into mathematics, particularly multiplication instruction. The progression from basic multiplication principles to two- and three-digit multiplication problems is seamless. The students’ understanding of these concepts is reinforced when using the LEGO® bricks, and the text encourages students to explain their findings. I recommend *Teaching Multiplication Using LEGO® Bricks* to everyone in education who wants to take the next step in hands-on learning.”

— Kelli Coons, Instructional Coach

“*Teaching Fractions Using LEGO® Bricks* is a great resource for children to learn about fractions with conceptual understanding and modeling. It’s hands-on, engaging, and overall an exciting way to learn about fractions. When you bring LEGO® bricks into the classroom the students automatically react with “ooh, cool!” and they are hooked on the activity. There is nothing better as a teacher than seeing your students enjoy learning, and using this resource, I see that. Another great feature about this resource is that it utilizes various learning modalities. Students learn physically by manipulating the LEGO® bricks, they draw the models for a visual reference, they write and describe concepts for a verbal understanding, and they are able to reason about the models and concepts to have a comprehensive understanding of fractions. Overall, this resource is phenomenal, and students are sure to be excited about math and fractions!”

—Tina Lupton, Teacher

“The visual models in *Teaching Fractions Using LEGO® Bricks* helped my students see and understand how equivalent fractions really work. The activities are super easy to follow and make learning operations with fractions fun for both the students and the teacher!”

— Jamie Piatt, Fifth Grade Teacher

Teaching Division Using LEGO® Bricks

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