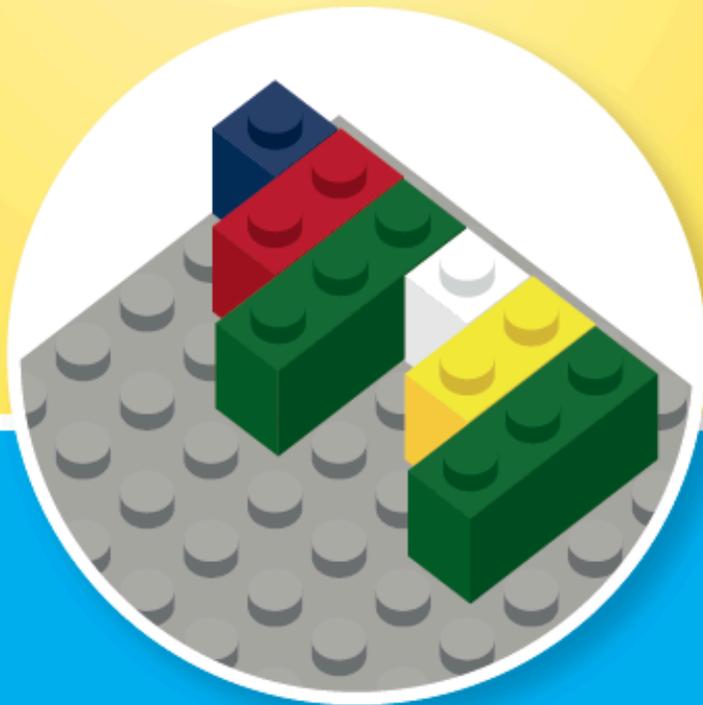
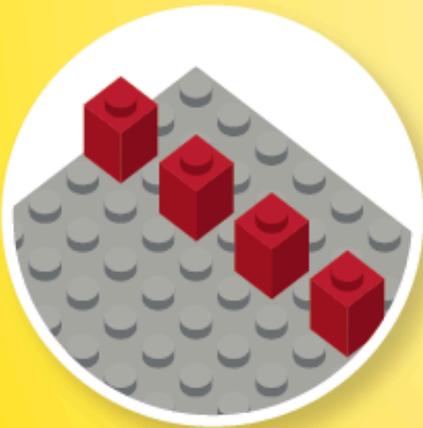


Brick Math Series

# TEACHING COUNTING AND CARDINALITY

## USING LEGO® BRICKS



Dr. Shirley Disseler  
Math Curriculum Expert

Brick Math Series

**TEACHING**  
**COUNTING AND**  
**CARDINALITY**  
**USING**  
**LEGO® BRICKS**

Dr. Shirley Disseler





### SUGGESTED BRICKS

Size	Number
1x1	40 (10 each of 4 different colors)
1x2	4 (same colors as 2x4 bricks)
1x3	8
2x2	4 (same colors as 2x3 bricks)
2x3	4 (same colors as 2x2 bricks)
2x4	4 (same colors as 1x2 bricks)

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

## TEN-FRAMES

### Students will learn/discover:

- How to model numbers in sets of ten

### Why is this important?

Being able to model numbers in the context of ten helps students formulate an understanding for number recognition. Use of the ten-frame model provides a base for seeing more than and less than ten, which is prerequisite for building conceptual understanding of addition and subtraction.

### Vocabulary:

- Ten-frame: a 2x5 model created with bricks
- More than
- Less than
- Ten

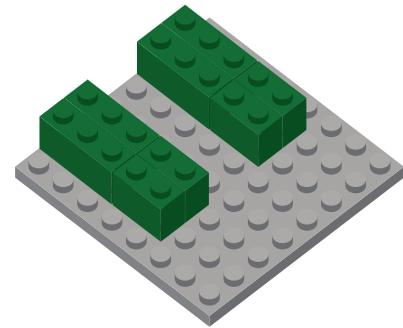
### How to use the companion student book, *Learning Counting and Cardinality with LEGO® Bricks*:

- 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

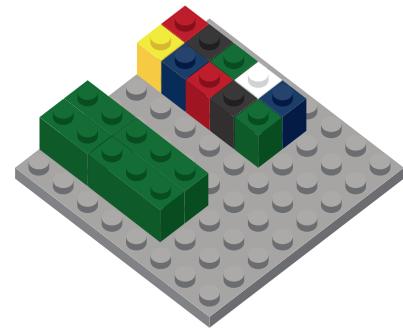
1. Build two *ten-frames* on a baseplate. Show your models to the students and have them each build two ten-frames. *Note:* A ten-frame has a 2x5-stud configuration, but there are no 2x5 LEGO® bricks. To build a ten-frame, use one 2x4 brick and one 1x2 brick of the same color or one 2x2 brick and one 2x3 brick of the same color.



Ask students to count the number of studs in each ten-frame. Students should count 10. Discuss with them that this model is called a *ten-frame* and is used to model numbers in sets of ten.

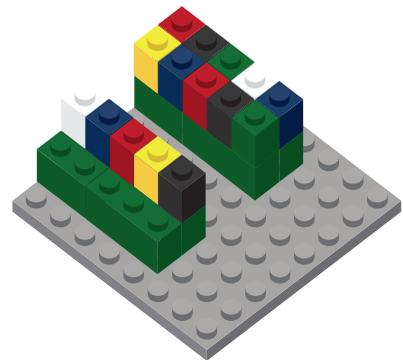
2. Ask students to place one 1x1 brick on top of each stud in the first ten-frame.

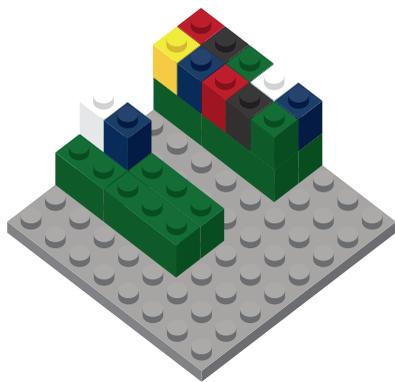
Students should be able to use one-to-one correspondence to count to ten. Have students draw their models.



3. Now work with the second ten-frame. Ask students to place enough 1x1 bricks to fill the top row of the second ten-frame. Have students write the number of studs used and draw their models. Students should count 5 studs.

Ask students to look at both ten-frames. Have students count to determine which ten-frame models the larger number and explain why. Have students record their results in writing. Students should say that the top ten-frame models the larger number because it shows 10 studs, while the bottom one shows 5 studs.



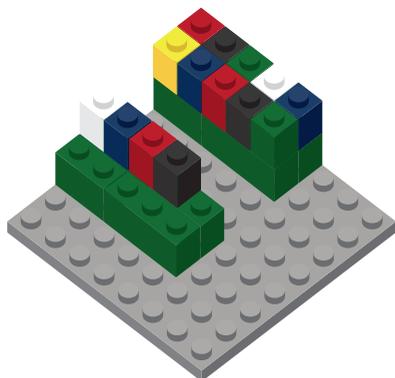


4. Clear the 1x1 bricks off your ten-frames and have the students clear their ten-frames.

Ask students to model the number 12 using two ten-frames. Have students draw their models.

Ask students how many studs are in their models. Students should answer that there are 12 studs. Discuss with students how they found 12. Did they count one by one, or did they fill in one full ten-frame, knowing that it represented the number 10, and then added 2 more? Discuss how this relates to the addition they will do later, such as 2 added to 10. Discuss how this relates to place value as 1 ten and 2 ones, which will be important as they start addition and subtraction.

5. Build another model using one or two ten-frames, but don't show it to the students. Have each student build his/her own model using one or two ten-frames. After students have completed their models, display your model and ask students whether their model is less than or more than your model.



## Part 2: Show What You Know

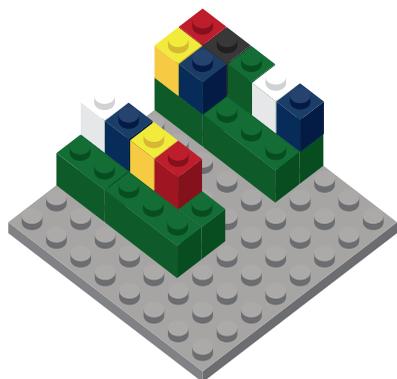
1. Can you build the number 14 using two ten-frame models? Draw your model. Label the model to show tens and ones.

2. Using two ten-frames, can you build this model:

The first ten frame should show three more than the second ten frame. You must have at least two 1x1 bricks on the second ten-frame.

Draw your model and write the numbers that your model shows.

*Answers will vary.*



*Sample solution*



### 3. Ten-Frame Game:

- Each student builds a model of any number up to 20 using no more than two ten-frames.
- Find a partner who has a model that shows a number more than yours.
- Find a partner who has a model that shows a number equal to yours.
- Find a partner who has a model that shows a number less than yours.

### Challenges:

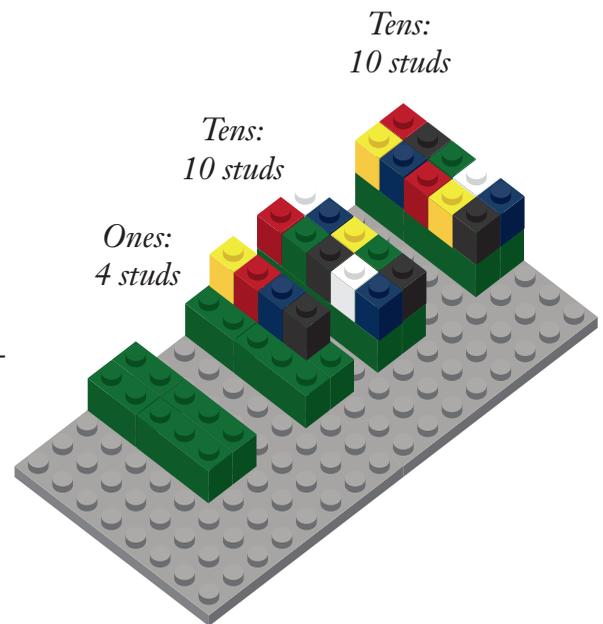
4. Build four ten-frames. Can you model the number 24? Draw your model and label the tens and ones.

*Answer:* Students should identify that each ten-frame represents a set of 10. There are 2 of those sets, which makes 20. The third ten-frame has 4 single studs to represent the 4 in 24.

*Note:* Students approaching proficiency in counting should be able to count 10, 20, 21, 22, 23, 24.

5. Choose a number greater than 24. Can you model your number? Build and draw your model. Explain your model.

*Answers will vary.*



## 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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