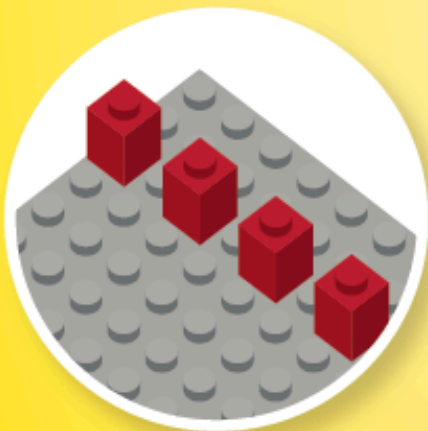


Brick Math Series

TEACHING COUNTING AND CARDINALITY

USING LEGO® BRICKS



Dr. Shirley Disseler
Math Curriculum Expert

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SUGGESTED BRICKS

Size	Number
1x1	40 (10 each of 4 different colors)

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

WHAT IS A NUMBER?

Students will learn/discover:

- How to identify a number and link it to an object
- Basic counting of natural numbers 1 to 10

Why is this important?

Being able to assign a quantity or value to a numerical digit is a precursor to understanding numbers. This skill leads to understanding quantities that are “more than” or “less than” given amounts.

Vocabulary:

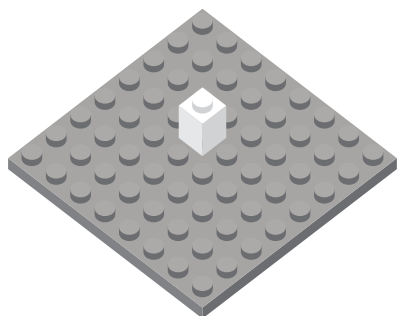
- Counting numbers: the list of natural numbers used to name objects one by one
- One-to-one correspondence: assigning or matching one item to one other item, or assigning one number to each object
- Studs: the round “bumps” on LEGO® bricks that are used as the counting unit

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. Place one 1x1 brick on a baseplate and display it to the students. *Note:* Use any color of 1x1 brick.

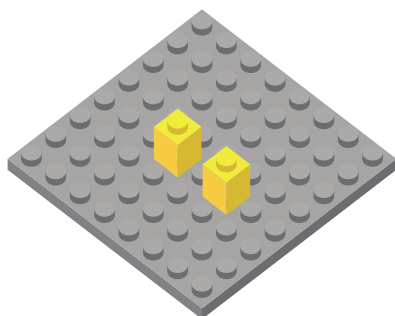
Ask students what they see. For this illustration, students should respond that they see one white brick.

Ask students how they know that the number represented is one. Answers may vary, but students should say that they can count only one stud, not simply one brick.

Discuss the brick vocabulary. Explain that the knobs on the top of the bricks are called *studs* and that the stud is the counting tool.

Have students place one finger on the top of the single stud and say “one stud.” If you are using a document camera to display your model, ask one student to come up to the camera and show the class. If you are not using a document camera, have each student build the model with bricks.

Discuss the vocabulary term *one-to-one correspondence*. Explain that it means assigning one value or one description to each number of items.



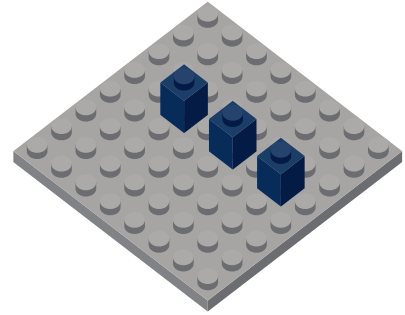
2. Place two 1x1 bricks on a base plate and display the model to the students. *Note:* The two bricks should both be the same color. Use a different color from your model in step 1.

Have the students build the same model. Ask students to count and give a quantity for this model. For this illustration, students should respond, “two yellow studs” or “two yellow bricks.”

Ask students what they notice that is different between the first model and this model. Students should notice there is one more brick and stud than the first model, and that the colors of bricks in the two models are different. They should talk about both the colors and the number of bricks and studs.



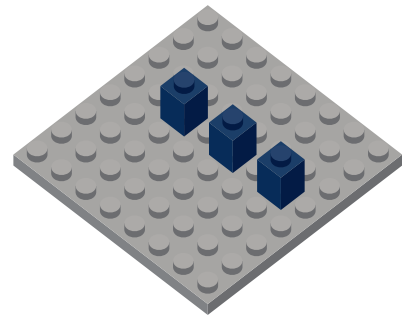
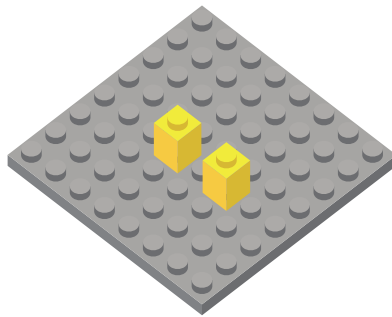
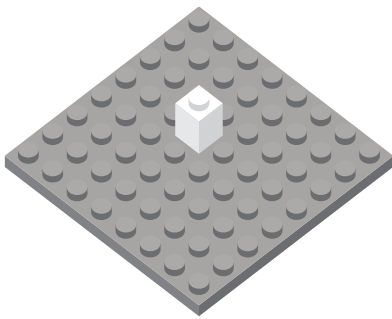
- 3.** Place three 1x1 bricks on a base plate and display the model to the students. *Note:* These three bricks should all be the same color. Use a different color from your models in steps 1 and 2.



Have the students build the same model. Ask students how many studs they count on this model, and how this model is different from the previous model.

For this illustration, students should answer that there are three blue studs or bricks, with one more stud than on the previous model. Again, students should reference both color and number of studs and bricks in their answers.

- 4.** Show the three models side by side.

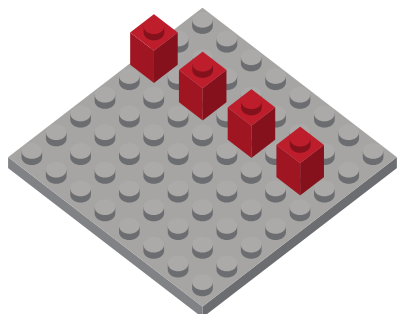


Ask students what they can say about these three models together.

Possible answers:

- Each model has one more than the one before it.
- The first model has 1 white stud, the second model has 2 yellow studs, and the third model has 3 blue studs.
- There is a space between each brick on the base plates with two and three bricks.

Count the models in order based on the number of studs: 1 stud, 2 studs, 3 studs. *Note:* It is important to count using the frame of reference (studs), not the numerical digit alone.



5. Ask students what they think the next model should look like.

Have students each build a model. Students should use four 1x1 bricks and put a space between each one. The students should use a fourth color of bricks, and the bricks in this model should all be the same color. Have each student draw his/her model.

Ask students: “How many studs are in this model?”

Students should answer: “Four studs.”

Ask students if this model has more studs or fewer studs than the other models. Students should answer: “More studs.”

Have students say and write statements comparing the numbers of studs on each model.

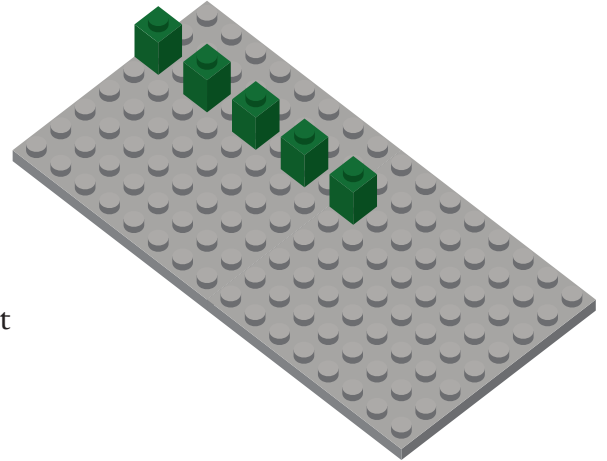
Possible answers:

- The last model has one more than the model before it.
- The last model has two more than the second model.
- The last model has three more than the first model.
- All together there are 10 studs. (*Note:* This is an advanced answer and is not expected.)



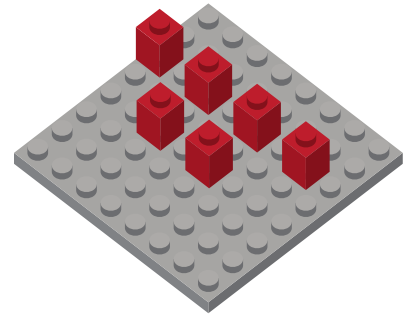
Part 2: Show What You Know

1. Can you build a model that shows five studs? Use bricks that are all the same color. Build and draw your model. Describe your model and label each number.



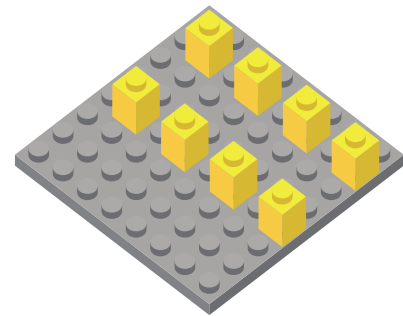
Answer: The model has five 1x1 bricks. They show that the number is 5 studs.

2. Can you build a model that shows one more stud than the model you just made? Build and draw your model and describe it.



Answer: The model has 6 red bricks. Each brick has one stud. There are 6 studs altogether.

3. Can you build a model that has three more studs than the model you made in problem 1? Build and draw your model and describe it.



Answer: The model has eight 1x1 bricks. There are 8 studs in the model.

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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