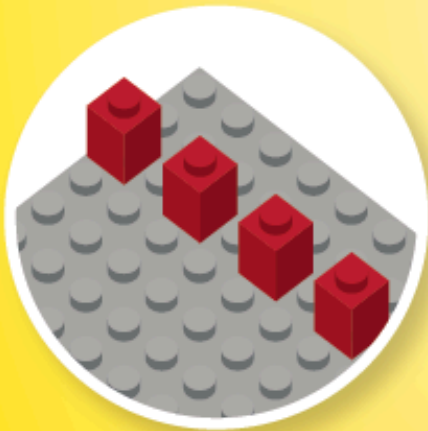


Brick Math Series

# 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





# PATTERNS

## Students will learn/discover:

- The meaning of the word *pattern*
- The link between different types of patterns

## Why is this important?

Understanding patterns is a precursor to learning the mathematical concepts of addition, subtraction, and multiplication. Utilizing the teaching tools of color patterns, size patterns, and number patterns will lead to better understanding of skip-counting and jump numbers.

## Vocabulary

- Pattern: a recurring form, design, or number representation

## How to use the companion student book, *Learning Counting and Cardinality Using 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.

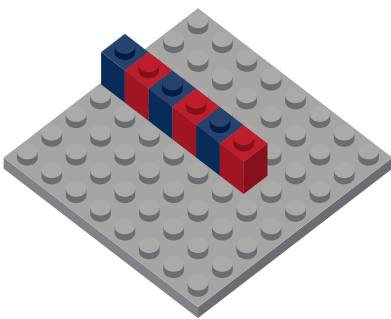
### SUGGESTED BRICKS

Size	Number
1x1	20 of various colors (at least 5 of each color)
1x2	5
1x3	5
1x4	5
2x2	5
2x3	5
2x4	5

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



## Part 1: Show Them How

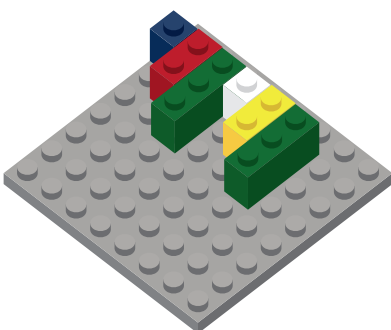


1. Build a **color pattern** model showing alternating colors and display it to the students.

Have students build and draw the model. Ask students to describe the model.

Discuss the word *pattern* with students. Have them identify your pattern. Using this illustration, students should identify it as blue, red, blue, red, blue, red, blue.

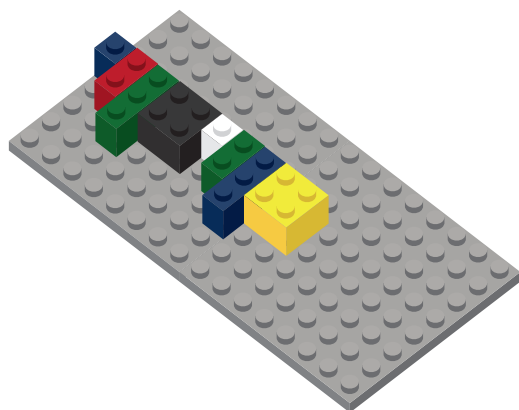
Ask students to describe what would be the next three colors in the pattern. Using this illustration, students should answer: blue, red, blue.



2. Build a **size pattern** model as shown in the illustration and display it to the students. *Note:* The colors of the bricks used for this pattern is not the critical element.

Have students build and draw the model. Ask students to describe the model.

Discuss the idea of different kinds of patterns. Explain that this pattern is based on brick size and the number of studs on each brick. Talk about this pattern using the brick vocabulary: this pattern shows 1 stud, 2 studs, and 3 studs with a 1x1 brick, a 1x2 brick, and a 1x3 brick, and is repeated once.



3. Build a **number pattern** model as shown in the illustration and display it to the students. *Note:* The colors of the bricks used for this pattern is not the critical element.

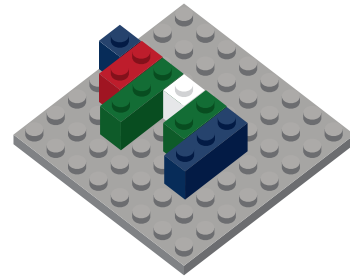
Ask students to describe the pattern.

Have students build and draw the model.

Discuss how the studs represent a number that can be counted. Practice counting using this model, having students point to each set of bricks that represent a term. Discuss that this pattern shows the terms 1, 2, 3, and 4, which are repeated once.



4. Build a **number and color pattern** model similar to the model shown in the illustration and display it to the students. *Note:* the colors and sizes of bricks used for this pattern are both important to the concept. Your model does not have to show these exact colors and sizes as illustrated, but should show a size progression and a specific color pattern.



Have students build the model, then draw their model. Ask students to describe the model. Students should understand that the pattern in this illustration shows the terms 1 white, 2 yellow, and 3 green, and is repeated once.

*Note:* This is a difficult task for students because it involves bringing two concepts together—number and color. This will likely require more discussion and additional modeling of similar patterns.



## Part 2: Show What You Know

1. Can you build a pattern model that has four colors? Draw your model and describe the pattern.

Solutions will vary.

2. Can you build a pattern model that has at least three different sizes of bricks? Draw your model and describe the pattern.

Solutions will vary.

3. Can you build a number pattern model that shows 2, 4, 6, 2, 4, 6? Draw your model and describe the pattern.

4. Can you design and build a pattern model that is both a color pattern and a number pattern? Draw your model and describe the pattern.

Solutions will vary.

### Challenge:

Design and build a pattern model. Find a partner. Exchange pattern models. Draw your partner's model and describe the pattern.

Solutions 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*

Copyright ©2016 by Shirley Disseler  
Published by Brigantine Media/Compass Publishing  
211 North Avenue, St. Johnsbury, Vermont 05819

Cover and book design by Anne LoCascio  
Illustrations by Curt Spannraft  
All rights reserved.

Your individual purchase of this book entitles you to reproduce these pages as needed for your own classroom use only. Otherwise, no part of this book may be reproduced or utilized in any way or by any means, electronic or mechanical, including photocopying, recording, or information storage or retrieval system, without prior written permission from the publisher. Individual copies may not be distributed in any other form.

Brigantine Media/Compass Publishing  
211 North Avenue  
St. Johnsbury, Vermont 05819  
Phone: 802-751-8802  
Fax: 802-751-8804  
E-mail: [neil@brigantinemedia.com](mailto:neil@brigantinemedia.com)  
Website: [www.compasspublishing.org](http://www.compasspublishing.org)

LEGO®, the LEGO® logo, and the Brick and Knob configurations are trademarks of the LEGO® Group, which does not sponsor, authorize, or endorse this book. All information and visual representations in this publication have been collected and interpreted by its author and do not represent the opinion of the LEGO® Group.

### ORDERING INFORMATION

#### **Quantity sales**

Special discounts for schools are available for quantity purchases of physical books and digital downloads. For information, contact Brigantine Media at the address shown above or visit [www.compasspublishing.org](http://www.compasspublishing.org).

#### **Individual sales**

Brigantine Media/Compass Publishing publications are available through most booksellers. They can also be ordered directly from the publisher.  
Phone: 802-751-8802 | Fax: 802-751-8804  
[www.compasspublishing.org](http://www.compasspublishing.org)  
ISBN 978-1-9384065-7-7