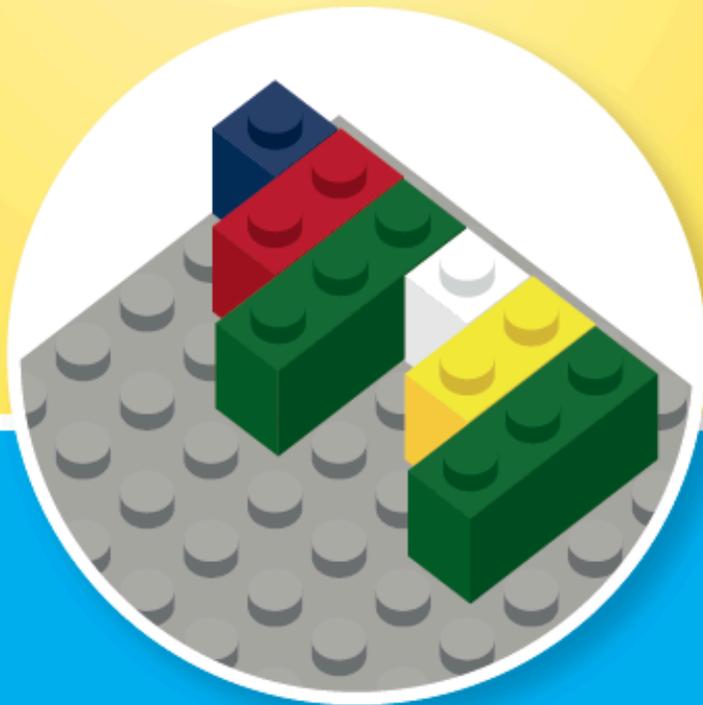
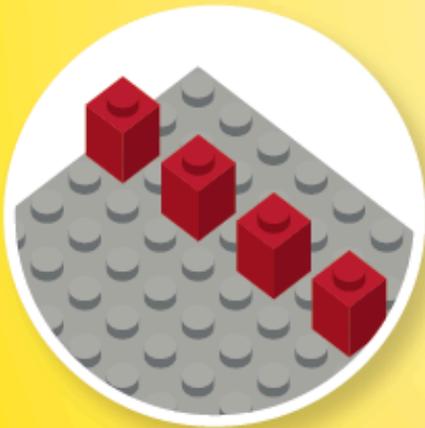


Brick Math Series

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	20 (5 each of 4 different colors)
1x2	5
1x3	10
1x4	5
2x2	5
2x4	5
2x6	2

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

MORE THAN/ LESS THAN

Students will learn/discover:

- The meaning of the words *more than* and *less than*
- The link between *more than* and *greater than*
- The link between *less than* and *fewer than*

Why is this important?

The ideas of *more than* and *less than* help students progress toward the concepts of addition and subtraction. Understanding sets that have *more than* or *less than* are important for comparing numbers throughout the mathematics curriculum.

Vocabulary

- More than
- Less than
- Compare

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.

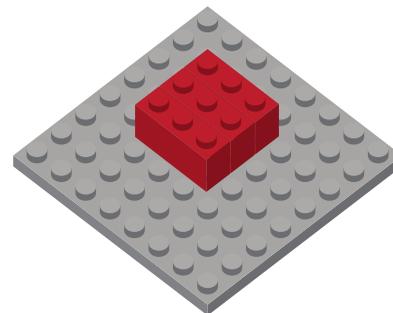


Part 1: Show Them How

1. Build a model of a 9-stud square and label it *A*. Display your model to the class using a document camera or have students build the model themselves. Ask students to identify the number of studs in model A.

Have students write the number of studs. Show students how to record evidence. Students should write, “Model A has 9 studs.”

As a review, ask students to describe the shape of the model. Students should recognize that the model is in the shape of a square.

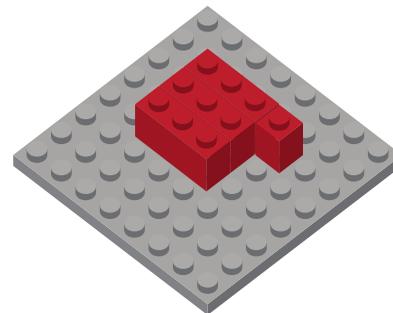


Model A

2. Build another model that shows 10 by adding one 1x1 brick to the 9-stud square model, and label it *B*. Show it to the students or have them build their own models.

Ask students to describe this model. Students might answer that it has one more stud than the previous model or that it has one stud left over.

Have students draw the model and describe it in writing. Students should write, “Model B has 10 studs.”

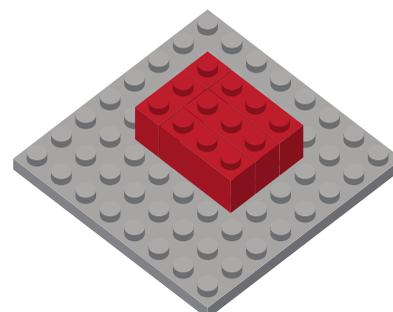


Model B

3. Discuss the concept of *more than* with the class. Build a model that has 12 studs and label it *C*. Show it to the students or have them build their own models.

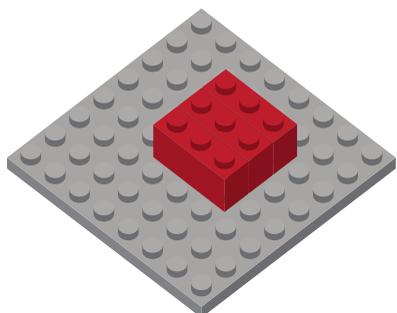
Ask students to describe how many more studs this model shows than the first model. Students should answer that Model C has 3 more studs than Model A.

Discuss that the word *studs* gives the number 3 a frame of reference.

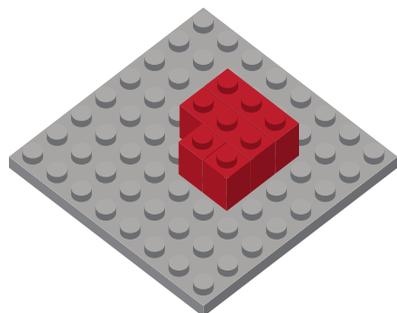


Model C

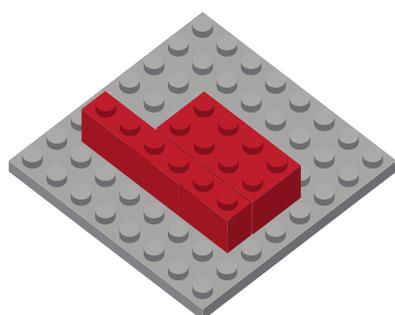
If students are ready for math symbols, show them the *greater than* symbol ($>$). Have students write a math sentence in their journal using the symbol.
(*Answer:* $C > A$ or $12 \text{ studs} > 9 \text{ studs}$)



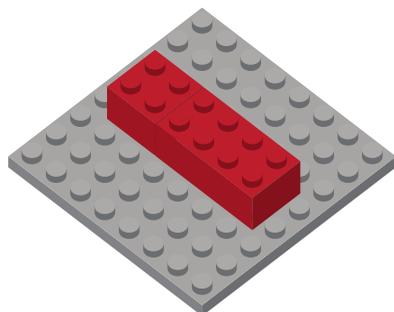
Model A



Model D



Model E



Model F

4. Show students model A again. Build a model that shows one less than the original model and label it *D*. Ask students what they can say about this model.

Students could answer that it has one less than the first model, or note that it is not a square number because it has leftovers.

Ask students to describe how they know Model D has less than Model A. Have students justify and provide evidence of understanding by drawing the model and writing about it.

If students are ready, show them the *less than* symbol ($<$). Have students write a math statement using the symbols for these models. (Answer: $D < A$ or $8 \text{ studs} < 9 \text{ studs}$)

5. Introduce the word *compare*. Tell students that by looking at the number of studs on the models we can compare the amounts they represent or show. Using the math symbols is the way to show comparisons between numbers. Tell students that when we use the symbols in math for comparing, we call them *greater than* ($>$) and *less than* ($<$).

6. Build a model of 14 studs and a model of 12 studs as illustrated. Label the model of 14 studs *E*. Label the model of 12 studs *F*. Show the models to the students or have them build their own models. Have them write one *more than* statement and one *less than* statement about the models.

Possible answers include:

- Model E is greater than (more than) model F; 14 is greater than 12; $E > F$; or $14 > 12$.
- Model F is less than model E; 12 is less than 14; $F < E$; or $12 < 14$.



Part 2: Show What You Know

1. Build models of two numbers. Label your models A and B. Draw your models.

Can you write a *more than* statement about your models?

Answers will vary.

2. Build models of two numbers you did not use in problem 1. Label your models C and D. Draw your models.

Can you write a *less than* statement about your models?

Answers will vary.

3. Build a comparison model using two different numbers. Draw your model.

Can you write two math statements using symbols for these models that show *less than* and *greater than*?

Answers will vary.

Challenge:

Make a model of three different numbers. Draw your models.

Write as many math sentences as you can about these number models.

Answers will vary. Note: Most students will compare their first and second models, their second and third models, and their third and first models in three separate statements. Students will only write a sentence that uses two symbols if they are ready.

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
Website: 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.

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
ISBN 978-1-9384065-7-7