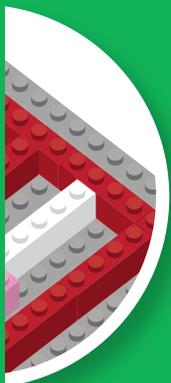
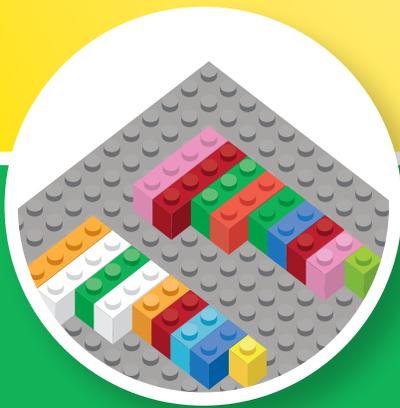
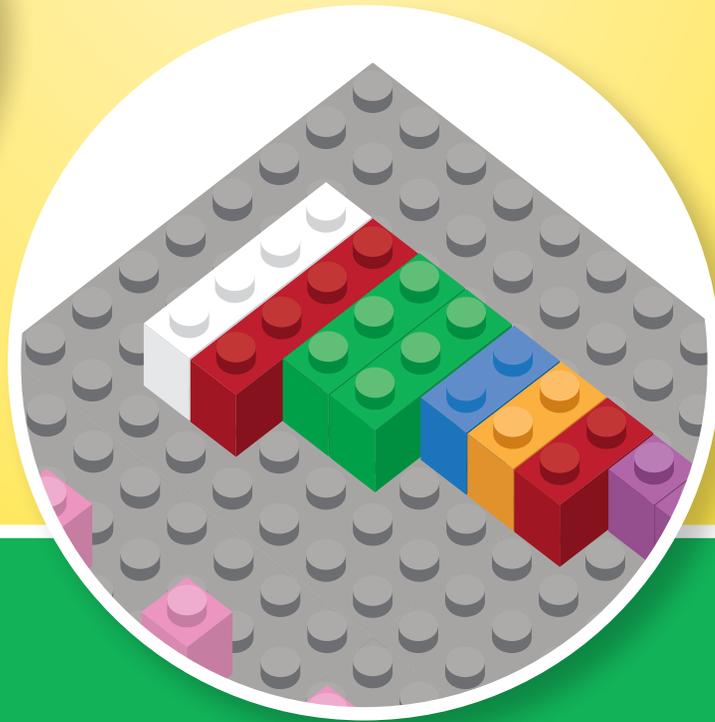
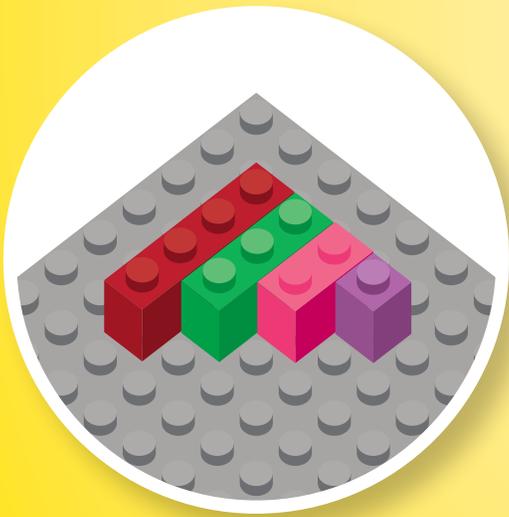


TEACHING MULTIPLICATION USING LEGO® BRICKS



Dr. Shirley Disseler
Math Curriculum Expert

Brick Math Series

TEACHING MULTIPLICATION USING LEGO® BRICKS

Dr. Shirley Disseler





SUGGESTED BRICKS

| Size | Number |
|------|--------|
| 1x1 | 30 |
| 1x2 | 20-30 |
| 1x3 | 10 |
| 1x4 | 10 |
| 1x6 | 10 |
| 1x10 | 4-8 |

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

MULTIPLYING TWO-DIGIT NUMBERS BY TWO-DIGIT NUMBERS

Students will learn/discover:

- How to use both the place value and the array models to determine products when multiplying a two-digit number by another two-digit number

Why is it important?

When students learn to relate larger multiplication problems to place value it becomes easier to do mental multiplication. Being able to do mental math makes the application of math in everyday activities easier.

This technique gives students a visual connection between previously learned content and larger multiplication problems.

Brick Math journal:

After students build their models, have them draw the models on base plate paper and keep them in their Brick Math journals (see page 7 for more about the Brick Math journal). Recording the models on paper after building with the LEGO® bricks helps reinforce the concepts.



Part 1: Show Them How #1

Before introducing the method of modeling two-digit by two-digit multiplication, review the process of multiplying a two-digit number by a one-digit number, multiplying the ones by tens and the ones by ones. As an example, use 23×3 :

23

$\times 3$

breaks down into:

$20 \times 3 = 60$ (tens \times ones)

$3 \times 3 = 9$ (ones \times ones)

Product: $60 + 9 = 69$

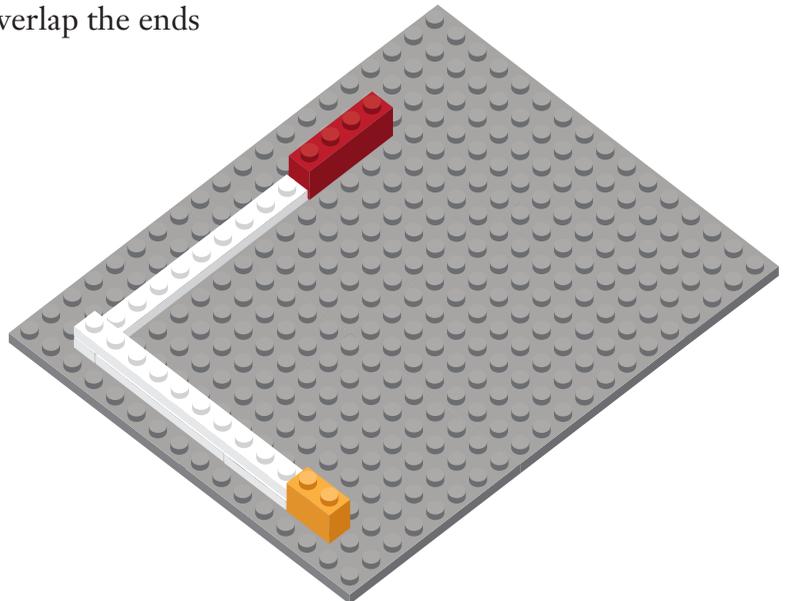
Using this idea, introduce the modeling method for multiplying a two-digit number by another two-digit number using a rectangular array model of bricks.

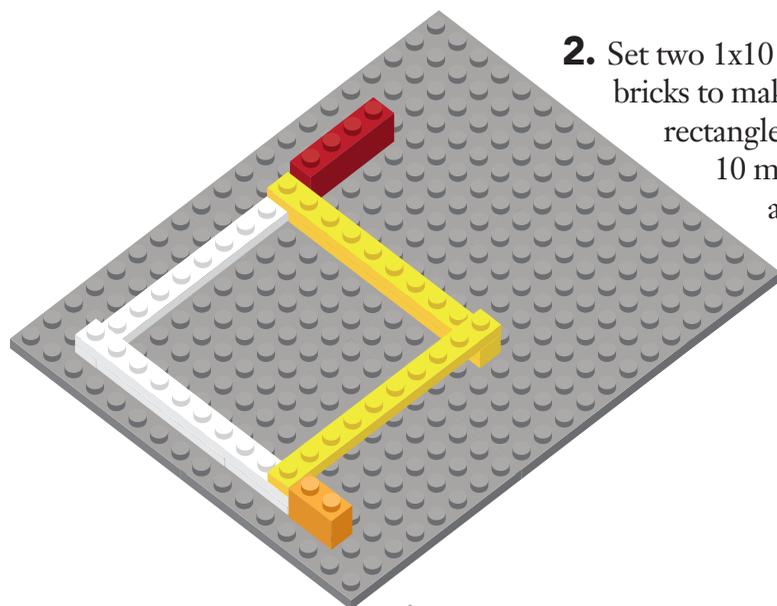
Model 14×12 using an array model

1. Think of 14 as $10 + 4 = 14$ and think of 12 as $10 + 2 = 12$.

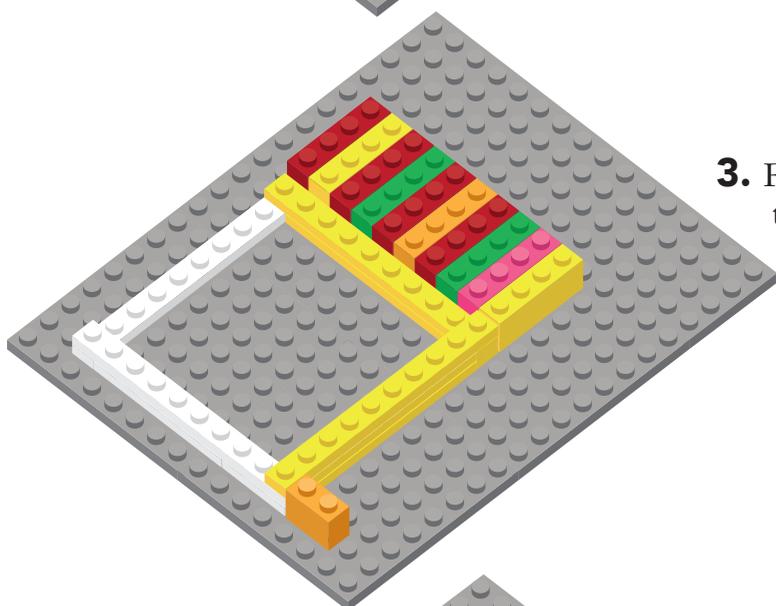
Model 14 with one 1×10 brick and one 1×4 brick.

Model 12 with one 1×10 brick and one 1×2 brick and set it at a right angle to the model of 14. Overlap the ends of the 1×10 bricks.

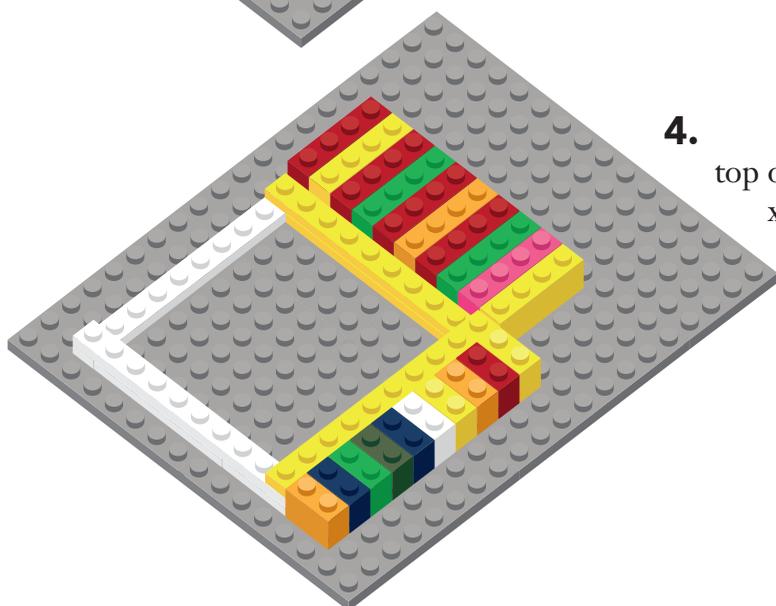




- 2.** Set two 1x10 bricks at right angles to the other 1x10 bricks to make a rectangle, overlapping the corners. This rectangle represents tens x tens, and shows that 10×10 makes a rectangle of 100 studs. The 1x4 brick and the 1x2 brick should extend outside the rectangle.



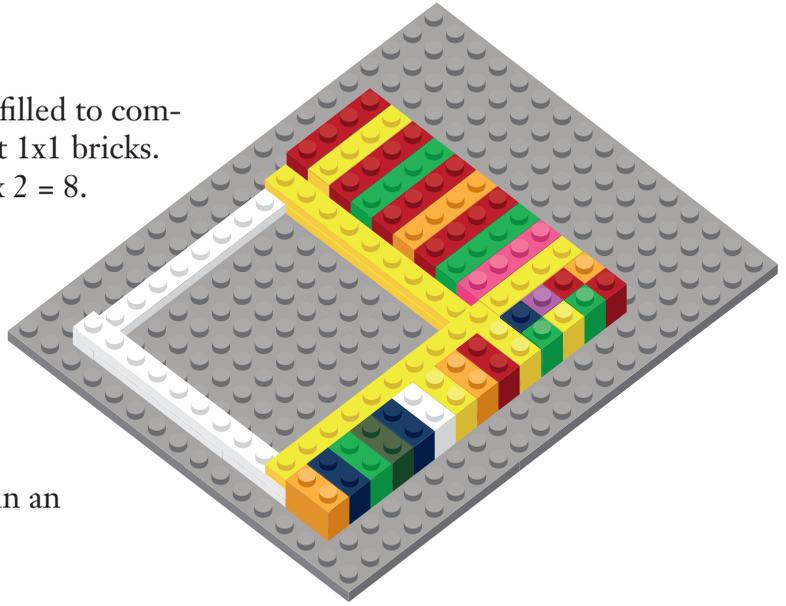
- 3.** Fill in the top with 1x4 bricks to the end of the rectangle. This represents the tens x ones, or $10 \times 4 = 40$.



- 4.** Fill in the side with 1x2 bricks to the top of the rectangle. This represents the ones x tens, or $10 \times 2 = 20$.



5. The top right corner area needs to be filled to complete the rectangle. Fill that with eight 1x1 bricks. This represents the ones x ones, or $4 \times 2 = 8$.



6. When this rectangle is completed, it shows the components of place value in an array model.

$$\begin{array}{r} 10 \times 10 = 100 \\ 10 \times 4 = 40 \\ 10 \times 2 = 20 \\ 2 \times 4 = 8 \\ \hline 168 \end{array}$$

The product of $14 \times 12 = 168$.

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 Multiplication Using LEGO® Bricks

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Published by Brigantine Media/Compass Publishing
211 North Avenue, St. Johnsbury, Vermont 05819

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Illustrations by Curt Spannraft
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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

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Phone: 802-751-8802 | Fax: 802-751-8804
www.compasspublishing.org
ISBN 978-1-9384065-5-3