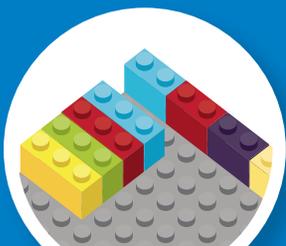
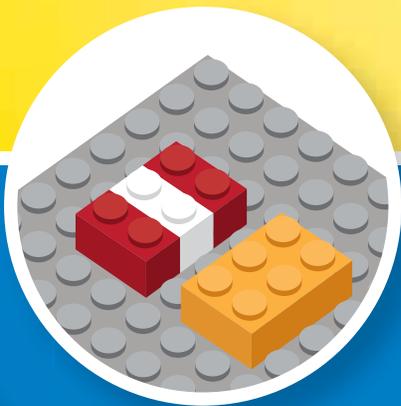


Brick Math Series

TEACHING FRACTIONS

USING LEGO® BRICKS



Dr. Shirley Disseler
Math Curriculum Expert

Brick Math Series

TEACHING FRACTIONS USING LEGO® BRICKS

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SUBTRACTING FRACTIONS WITH UNLIKE DENOMINATORS

Students will learn/discover:

- How to subtract two fractions whose denominators are not the same

Why is this important?

Once students have a firm understanding of how to simplify and find equivalents for fractions, they are ready to subtract fractions of varying sizes. It is not possible to add two fractional values that have different wholes as a base, such as $\frac{1}{3}$ and $\frac{2}{5}$. Students need to be able to find a common base number in order to subtract fractional parts of a whole. A real-life example helps to show why this skill is important to learn: Sue ate $\frac{2}{5}$ of her container of yogurt and Tom ate $\frac{1}{3}$ of his yogurt. Who ate more yogurt? How much more did one eat than the other? In order to compare, students must first find a common denominator. Then the student must be able to subtract the two fractions to find the solution.

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 instructions). Recording the models on paper after building with the LEGO® bricks helps to reinforce the concepts.



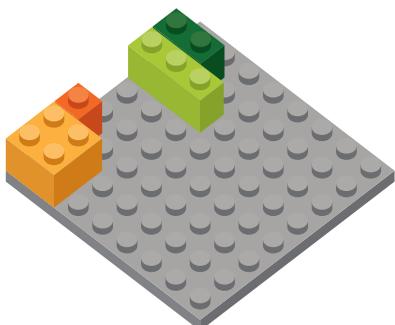
SUGGESTED BRICKS

Size	Number
1x1	10-20
1x2	8-10
1x3	15-20
2x2	15-20
2x8	4 (or eight 2x4 bricks if necessary)

Note: Using a base plate will help keep the bricks in a uniform line. Use two small base plates or one large base plate for these activities.

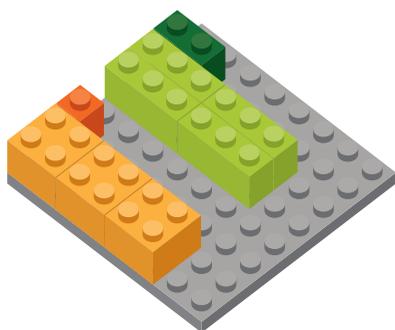


Part 1: Show Them How Model subtracting two fractions: $\frac{2}{3} - \frac{1}{4}$



1. Place one 1x3 brick on the base plate with one 1x2 brick above it to model $\frac{2}{3}$. Place one 2x2 brick on the base plate with one 1x1 brick above it to model $\frac{1}{4}$.

Note: Use different colors of LEGO® bricks for numerator and denominator of both fractions to help demonstrate that they are different.



2. Since both denominators are different, add bricks to each denominator until both denominators have an equal number of studs.

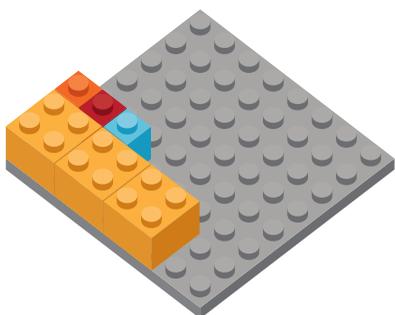
Add three 1x3 bricks to the $\frac{2}{3}$ fraction's denominator to total 12 studs. Add two 2x2 bricks to the $\frac{1}{4}$ fraction's denominator to total 12 studs.

3. Ask students: how many bricks were added to each side?

Three 1x3 bricks were added to the $\frac{2}{3}$ fraction's denominator (top) and two 2x2 bricks were added to the $\frac{1}{4}$ fraction's denominator (bottom).

$\frac{2}{3}$ fraction = 3 bricks added

$\frac{1}{4}$ fraction = 2 bricks added



4. To find the numerator, add the same number of bricks to the top of each fraction.

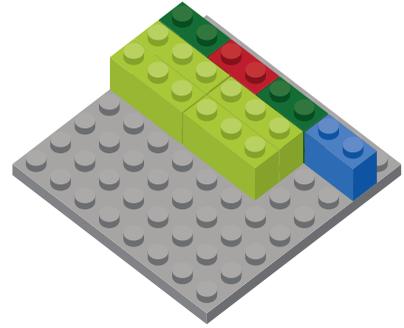
For the $\frac{1}{4}$ fraction, add two 1x1 bricks to the numerator.

Now the fraction is $\frac{3}{12}$, which is equivalent to $\frac{1}{4}$.



For the $\frac{2}{3}$ fraction, add three 1x2 bricks to the numerator.

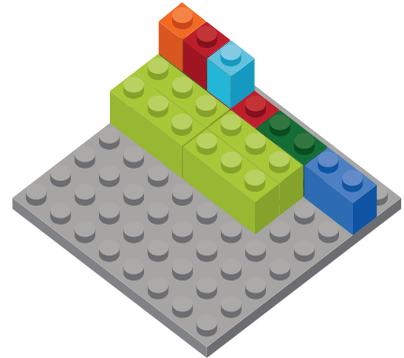
Now the fraction is $\frac{8}{12}$, which is equivalent to $\frac{2}{3}$.



5. Model the subtraction problem $\frac{8}{12} - \frac{3}{12}$.

Place the 1x3 brick (three studs) from the $\frac{1}{4}$ fraction's numerator on top of the 8 studs of the $\frac{2}{3}$ fraction's numerator.

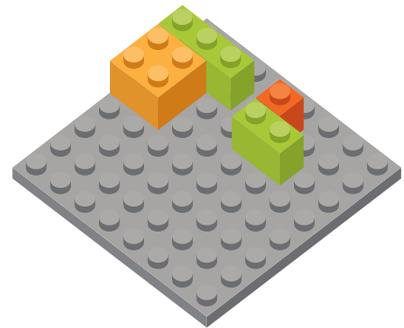
Five studs in the numerator are not covered. This shows the solution to the problem: $\frac{5}{12}$.



Part 2: Show What You Know

1. Can you model the procedures and explain how to subtract $\frac{3}{4} - \frac{1}{2}$?

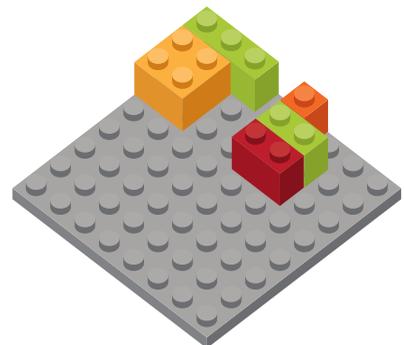
Students should first model the fractions.



Students might notice that the $\frac{1}{2}$ fraction's denominator (1x2 brick) only needs one more brick to equal the $\frac{3}{4}$ fraction's denominator (2x2 brick). If not, they will add bricks until both are equal, which is also acceptable but will result in larger denominators.

One 1x2 brick added to the $\frac{1}{2}$ fraction's denominator makes 4 studs. The $\frac{3}{4}$ fraction's denominator does not need any additional bricks. Each side now has 4 studs.

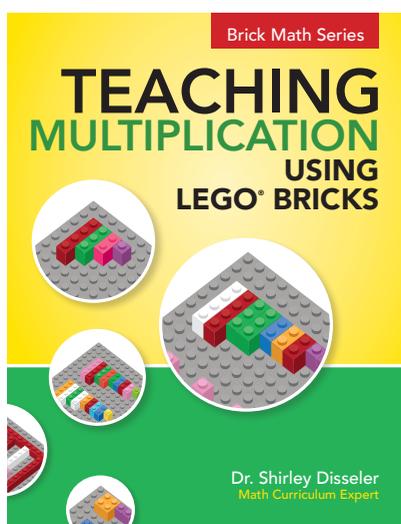
$\frac{1}{2}$ fraction's denominator = 1 brick added
 $\frac{3}{4}$ fraction's denominator = 0 bricks added



Also in the Brick Math Series:

TEACHING MULTIPLICATION USING LEGO® BRICKS

Dr. Shirley Disseler



Teaching and learning multiplication is easy using LEGO® bricks!

Teachers as well as parents can follow the step-by-step instructions to guide students as they learn multiplication facts, one-digit multiplication, and two-digit and larger multiplication. Students model hands-on math problems with LEGO® bricks using a variety of techniques—sets, arrays, and place values—to develop true understanding of the concepts of multiplication.

Math is fun when you're using LEGO® bricks to learn!

Author Dr. Shirley Disseler is Associate Professor at High Point University and Chair of the Department of Elementary and Middle Grades Education. She serves on the LEGO® Education Ambassadors Panel.

Companion student edition:

LEARNING MULTIPLICATION USING LEGO® BRICKS

Individual student book that follows the teacher's curriculum, complete with additional activities for practice and assessments.

Available on Amazon and at compasspublishing.org.

Quantity pricing and classroom packs available at 802-751-8802 or neil@compasspublishing.org.



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 Fractions Using LEGO® Bricks

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

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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 978-1-9384065-6-0