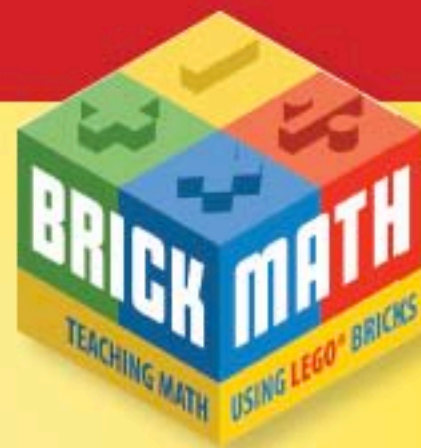
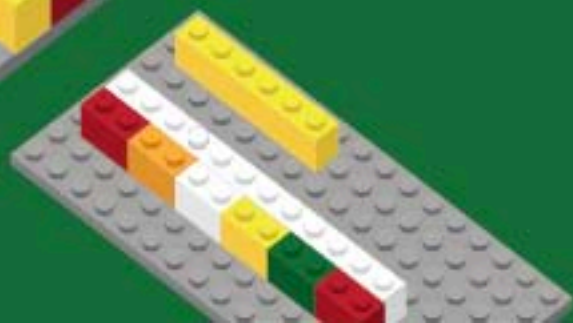
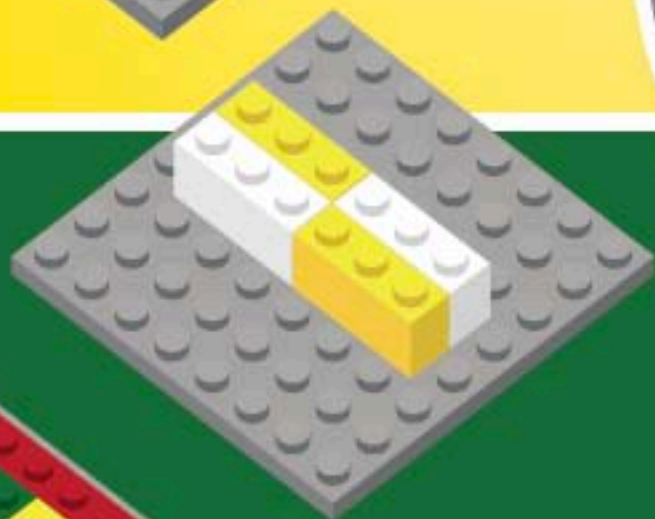
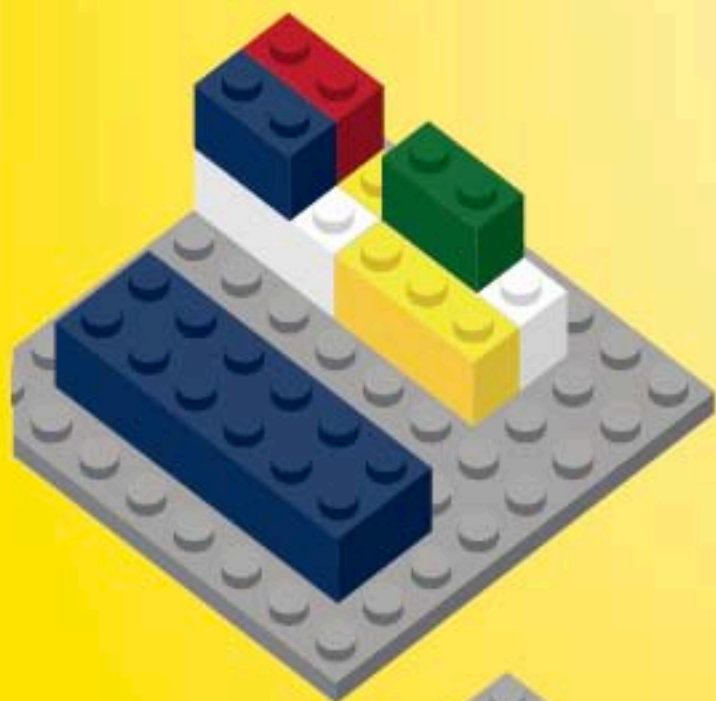


TEACHER EDITION

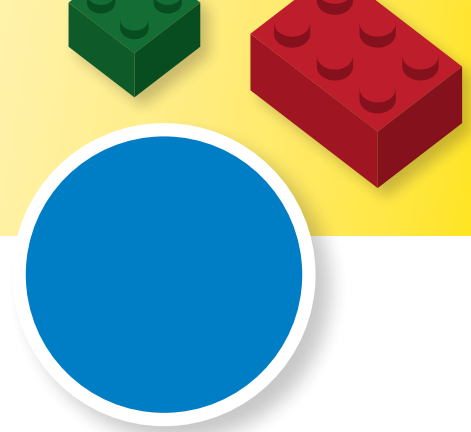


FRACTION MULTIPLICATION

USING LEGO® BRICKS



Dr. Shirley Disseler



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MULTIPLYING FRACTIONS USING ITERATION

Students will learn/discover:

- How the product of two fractions is determined and what each part of the math sentence means
- Why the procedure of multiplying the numerators and the denominators consistently works

Why is this important?

Students must understand how the procedure of multiplying a fraction by a fraction actually works, not simply memorize a rote process. When students know where the numerator and denominator of a fraction product come from, they are more likely to understand future types of fraction problems. Students will use their ability to identify factors and multiples of whole numbers as the process applies to fractions.

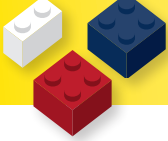
Vocabulary:

- Fraction: A whole divided into equal parts (e.g., $\frac{1}{4}$ represents one of four equal parts)
- Factors: Two or more numbers that can be multiplied together to get a given number (e.g., 6 and 2 are factors of 12)
- Multiples: A number that can be divided by another number without any remainders (e.g., 12 and 16 are multiples of 4)
- Iteration: Repeating a step over and over. Iteration with bricks involves using the same size of brick a number of times to model the denominator.

SUGGESTED BRICKS

Size	Number
1x1	20
1x2	20
1x3	8
1x4	6
1x6	6
1x8	2
1x16	2
2x2	8
2x3	6
2x4	6
2x6	2
2x8	2
2x10	1

Note: Using a baseplate helps keep the bricks in place. One large baseplate is suggested for these activities.



How to use the companion student book, *Fraction Multiplication Using LEGO® Bricks—Student Edition*:

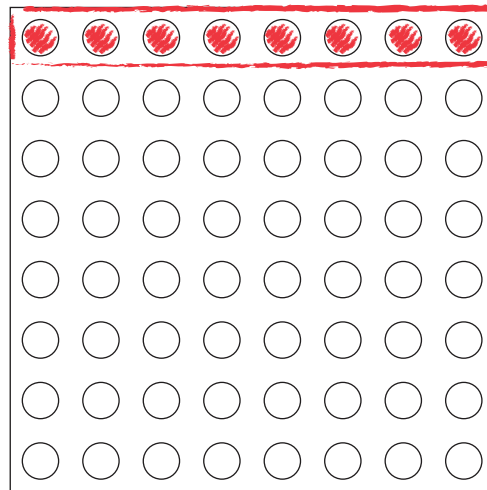
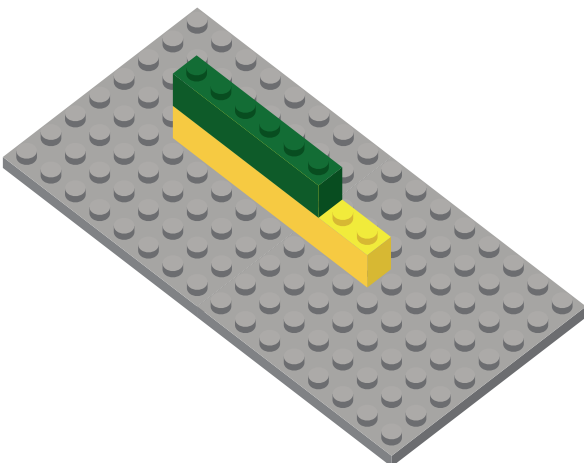
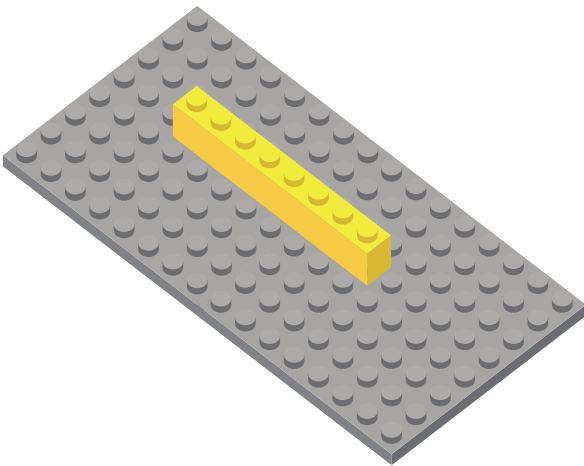
- After students build their models, have them draw the models and explain their thinking in the student book. Recording the models on paper after building them with bricks helps reinforce the concepts being taught.
- Discuss the vocabulary for each lesson with students as they work through the student book.
- Use the assessment in the student book to gauge student understanding of the content.

Part 1: Show Them How

Ask students to define the word *fraction*. Have a discussion about what it means to have $\frac{1}{2}$ of something, $\frac{1}{4}$ of something, and $\frac{2}{4}$ of something. Make sure students understand different sized wholes.

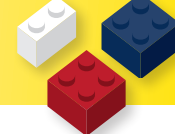
Problem #1: $\frac{1}{2} \times \frac{6}{8}$

1. Build a rectangular model of eighths using one 1x8 brick. Have students build this model, then draw and label it.



Drawing of 8 studs on a 1x8 brick

2. Stack a 1x6 brick on top of the 1x8 brick to show $\frac{6}{8}$.

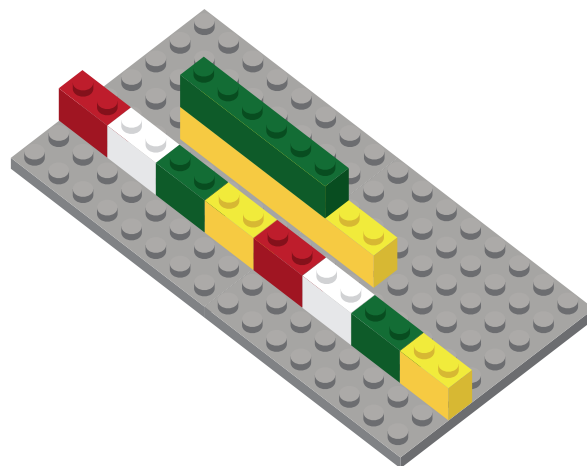


3. Discuss with students how to model $\frac{1}{2}$ of $\frac{6}{8}$, or $\frac{1}{2} \times \frac{6}{8}$, using iteration.

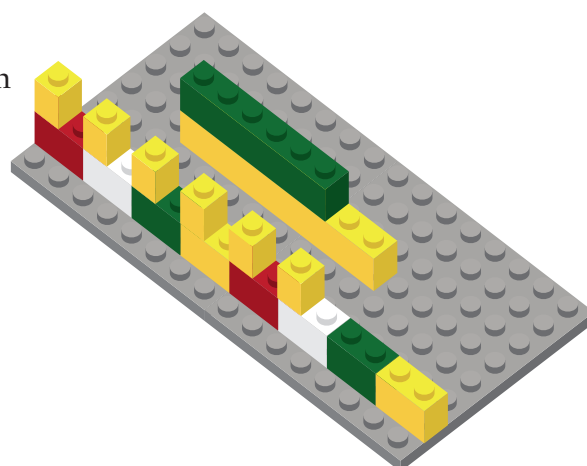
Explain to students: Take the 8 in the denominator of $\frac{6}{8}$. Since we are finding $\frac{1}{2}$ of the fraction, iterate it by 2s using eight 1x2 bricks. How many studs will there be (*answer: 16*)?

Let students respond before modeling with bricks.

Place 8 bricks (based on the denominator of $\frac{6}{8}$) that each have 2 studs (based on the denominator of $\frac{1}{2}$) on a baseplate. Use eight 1x2 bricks. Count the number of studs (*answer: 16*).

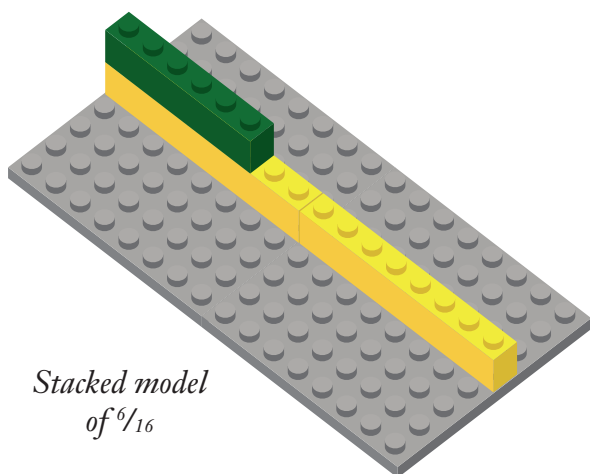


4. Because the numerator of $\frac{1}{2}$ is 1, cover one stud on each of the 6 bricks that model the numerator of $\frac{6}{8}$. Count the total number of studs that are covering studs on the eight 1x2 bricks. (*6*)

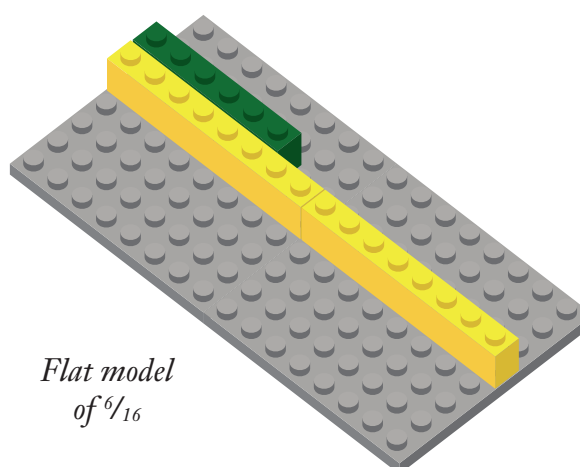


5. Model the product of $\frac{1}{2} \times \frac{6}{8}$ using one 1x6 brick above one 1x16 brick. Note: the illustrations show two different ways to model the solution.

Draw this model and explain your thinking.



*Stacked model
of $\frac{6}{16}$*



*Flat model
of $\frac{6}{16}$*

Have students write the number sentence: $\frac{1}{2} \times \frac{6}{8} = \frac{6}{16}$.