



Building Skills with Brick Math

An 8-Day Program to Sharpen Basic Math Skills

Fraction Multiplication

Program Overview

During this **Building Skills with Brick Math** program, students dive deeply into multiplying fractions. They use a variety of learning techniques including manipulatives, drawing, verbal explanation, physical movement, and song. Students work with a partner, use the vocabulary fluently in math conversations, and assess themselves on their abilities.

The program is written in the following daily format:

1. Introduction to the topic
2. Teacher and students work together on the new concepts
3. Student practice
4. Movement related to concepts
5. Student independent practice
6. Content assessment
7. Story problems
8. Self-assessment on content and partnering

The Brick Math program is successful because students transfer knowledge from using manipulatives to drawing and to verbal explanations.

Take the time your students need to learn each concept. Some classes will find one concept easily learned and a second concept much harder, requiring a slower pace. If all the daily activities are not completed during a session, you can choose to move the remaining activities to the following day or truncate an activity if you feel the students have fully learned the math concepts.

Schedule

8 Days

1.5 – 2 Hours Per Day

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|-------|--|--|
| Day 1 | Multiplying Fractions Using Iteration <ul style="list-style-type: none">• Determine the product of two fractions• Know what each part of the math sentence means• Learn why the procedure for multiplying numerators and denominators consistently works | Vocabulary <ul style="list-style-type: none">• Fraction• Factors• Multiples• Iteration |
| Day 2 | Multiplying Fractions by Whole Numbers <ul style="list-style-type: none">• Multiply a fractional part by a whole number• Discover the result of multiplying a fractional part by a whole number will never be larger than the whole number | Vocabulary <ul style="list-style-type: none">• Product• Mixed number |
| Day 3 | Multiplying Unit Fractions by Fractions <ul style="list-style-type: none">• Discover how the result changes when a unit fraction is multiplied by a fractional part• Define unit fraction• Use repeated addition to multiply | Vocabulary <ul style="list-style-type: none">• Unit fraction• Iteration• Justify• Expression |
| Day 4 | Understanding the Commutative Property <ul style="list-style-type: none">• Discover how the result (product) changes when a fraction is multiplied by a whole number• Use the commutative property when multiplying fractions• Understand how the commutative property works when multiplying fractions | Vocabulary <ul style="list-style-type: none">• Commutative property• Justify• Expression |

| | | |
|-------|--|--|
| Day 5 | Multiplying Fractions Using an Area Model <ul style="list-style-type: none"> • Use an area model to multiply two fractions • Find a part of a fraction | Vocabulary <ul style="list-style-type: none"> • Area model |
| Day 6 | Multiplying Mixed Numbers with Like Denominators <ul style="list-style-type: none"> • Multiply two mixed numbers that have the same denominators • Relate multiplication of mixed numbers to area measures | Vocabulary <ul style="list-style-type: none"> • Product • Mixed number • Area • Square unit |
| Day 7 | Review of Multiplying Fractions <ul style="list-style-type: none"> • Multiply whole numbers by fractions • Multiply mixed numbers by fractions • Multiply mixed numbers by mixed numbers • Take numbers to lowest terms | Vocabulary <ul style="list-style-type: none"> • Fractions • Mixed numbers • Lowest terms |
| Day 8 | Story Problems for Multiplying Fractions <ul style="list-style-type: none"> • Add fractions • Subtract fractions • Order fractions • Multiply fractions • Take numbers to lowest terms | Vocabulary <ul style="list-style-type: none"> • Fractions • Mixed numbers • Lowest terms |

Common Core Math Standards addressed in the program:

CCSS.MATH.CONTENT.4.NF.B.4.A

Understand a fraction a/b as a multiple of $1/b$. For example, use a visual fraction model to represent $5/4$ as the product $5 \times (1/4)$, recording the conclusion by the equation $5/4 = 5 \times (1/4)$.

CCSS.MATH.CONTENT.4.NF.B.4.B

Understand a multiple of a/b as a multiple of $1/b$, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express $3 \times (2/5)$ as $6 \times (1/5)$, recognizing this product as $6/5$. (In general, $n \times (a/b) = (n \times a)/b$.)

CCSS.MATH.CONTENT.4.NF.B.4.C

Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat $\frac{3}{8}$ of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?*

CCSS.MATH.CONTENT.5.NF.B.4.A

Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual fraction model to show $(\frac{2}{3}) \times 4 = \frac{8}{3}$, and create a story context for this equation. Do the same with $(\frac{2}{3}) \times (\frac{4}{5}) = \frac{8}{15}$. (In general, $(a/b) \times (c/d) = (ac)/(bd)$).*

CCSS.MATH.CONTENT.5.NF.B.4.B

Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

CCSS.MATH.CONTENT.5.NF.B.5.A

Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.

CCSS.MATH.CONTENT.5.NF.B.5.B

Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.

CCSS.MATH.CONTENT.5.NF.B.6

Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

Note: If your school uses other standards, please refer to these standards as a guide.

Materials Needed:

- Brick Math Fraction Multiplication Teacher Edition book
- Brick Math Fraction Multiplication Student Edition book (one per student)

- Brick Math brick sets (one per student or one per pair of students)
- Math journal – can be created from lined paper stapled together with tagboard cover or may be a spiral notebook (one per student – will be used daily)
- Chart paper
- Markers (one set per student or pair of students)
- Colored pencils or crayons (one set per student or pair of students)
- Pencils (one per student)
- Sticky notes
- Cardstock
- Yarn
- Scissors (one per student)
- Optional: Foam sheets or shelf liner cut into rectangles approximately 12" x 18" (one sheet per student)

Before the first day:

1. Read the Introduction and How to Teach with Brick Math on pages 5-10 in the Fraction Multiplication Teacher Edition.
2. Label all the Brick Math brick sets your students will use. Choose a system such as: Set 1, Set 2, Set 3, etc., or Zebra, Elephant, Tiger, etc.
3. Assign one brick set to each student or pair of students. They will use this same set every day. This materials' management step allows the student or the pair to be responsible for their own pieces. At the end of each day the students will inventory one compartment of bricks in the box at your direction.
4. Students will need the following supplies:
 - One Brick Math Fraction Multiplication Student Edition book per student. If you are using PDFs, you will need to make copies of all the specific pages in each day's lesson so students can correctly show and explain their work and make the knowledge transfer from manipulatives to drawings and verbal explanations.
 - Crayons or colored pencils (one set per student or pair of students)
 - Math journals and pencils (one per student)
 - Cardstock
 - Tagboard or cardstock (3-4 per student)
 - Yarn
 - Scissors (one per student)
 - Optional: One foam sheet or shelf liner cut into 12" x 18" rectangles per student. These sheets help keep the bricks from sliding off desks and tables.

Note: There are blank baseplate paper templates on pages 71-72 in the Decimal Teacher Edition book. They may be helpful for the daily story problem activities. Make additional copies of blank baseplate paper as needed.

Day 1 – Multiplying Fractions Using Iteration

Preparation:

- Read pages 11-12 in the Brick Math Fraction Multiplication Teacher Edition
- Chart paper or white board and markers. Write $\frac{1}{2}$ large enough to be seen by the class.

Welcome

Tell the students something similar to the following:

Welcome! We are going to do a lot of interesting activities this week. We are going to build with bricks, work with a partner, create a team name, exercise with numbers, and more. Are you ready to get started?

Show the students a Brick Math brick set.

Say:

First, I want to show you the brick set. What colors do you see? Each color has a name. Each of you has a name. We need to learn all the names of the people in our class and the names of the bricks. I would like you to sit in a large circle. Each person will say his or her name. Then, please choose one brick from the set. Tell us which color brick you chose and something about the piece.

I will start.

My name is _____. I chose a purple brick because purple is the same color as my favorite flower.

Go around the room with the brick set so each student can select a brick. After each person has said his or her name and chosen a brick, have the class repeat the names. For example: “Mrs. Smith, Paula, Alan, Rebecca.” Then, if the next child is Ben, you would all say together: “Mrs. Smith, Paula, Alan, Rebecca, Ben.” When all the students have said their names, have the students who chose a particular color stand with their brick in their hands.

Say:

Everyone who chose a purple brick, please stand. Let’s see if we can remember their names. Together, let’s say the names of the children who are standing.

Say all the students’ names, then have them sit down. Continue with different colors until all the children have stood and been called by name.

Look at the shapes of the bricks chosen. Explain to the students how the shapes also have names.

Explain to students how to name the bricks. Start with your brick. Perhaps you chose a 2x2 brick. Show students your brick. If you want, pass it around.

Say:

This is called a 2x2 brick because it is a square with 2 studs or bumps on one side (width) and 2 studs or bumps on another side (length).

Show students a 1x1 brick.

Say:

Can you guess what this brick is called? It has 1 stud in width and 1 stud in length – but it has a total of only 1 stud.

Make sure students understand that it is a 1x1 brick. Then show students a 1x6 brick. Continue to go through the bricks until students can do a good job of naming the bricks.

Ask the students to go around the circle and tell the name of the brick they chose. If a student is not sure or names it incorrectly, ask the student to count the width and length in studs, then help with the correct name.

When all the bricks have been named, ask the students to put the bricks into the proper location in the set. Their pieces should match the compartment or area in the container so the brick “family” will be all together.

Ask students to name a fraction. (You will likely get several answers, including $1/2$.)

Write $1/2$ on the chart paper or the board.

Tell students to think about $1/2$. What does $1/2$ mean? [something is equally divided into two parts, each of which is $1/2$]

Tell students a fraction is a part of something. Each fraction shows how many parts one whole has been divided into. $1/2$ means that there are two parts. The 2 is in the denominator. The denominator shows how many parts the whole has been divided. The 1 is the numerator. It shows how many of the parts you have.

Look at another fraction - $2/3$. Ask students how many parts has the whole been divided into. [3]

Ask students how many of the parts do we have. [2]

Today you will multiply fractions. You will use bricks to help you model, a journal to help you write your ideas, and a student edition of Fraction Multiplication so you can take what you learn from the model and draw it, then explain in words.

Are you ready to work with a partner and do some fun building and work with Fraction Multiplication?

Math Journals

Give each student a spiral notebook or lined paper that has been stapled together with a tagboard cover.

Give students 5-10 minutes to decorate the covers with markers or colored pencils.

Tell students they will be using the math journal every day.

Working with a Partner

Ask students their favorite thing about working with a partner. Then ask them what is the *best* way to work with a partner. Help students create answers like the following:

- Partners share the work, but neither person does the other one's work.
- Partners learn together and can help each other learn.
- Partners communicate (talk) kindly with each other.
- Partners care about each other.
- Partners do not give each other the answers, but help the other person understand how to find an answer.

Create a set of Partner Rules and put them on chart paper and display them in the classroom so you can refer to them as needed.

Choose two students to be partners and assign them a place to sit at desks or tables. Students of the same ability level tend to work well together. Have each set of partners move to that location as you assign them. Give the pair of students their Brick Math materials (either one set for two people or one set per person.) Tell each group that they always get set #X when it is time to gather materials. Tell the class that each team is responsible for all the bricks being returned to the set every time the set is used.

When all the students have their sets, give every student a 20x20 baseplate.

Say:

You will work together every day. Being a partner is an important responsibility. You need to help one another and be kind to your partner.

Students take bricks from the divided box as needed.

Introducing Fraction Multiplication

Part 1: Show Them How

Place Value Model

Follow the instructions on pages 12-14 in the Brick Math Fraction Multiplication Teacher Edition. Complete Problem #1, 1-6.

Students complete pages 5-7, Problem #1, 1-6 in the Brick Math Fraction Multiplication Student Edition.

Follow the instructions on pages 14-16 in the Brick Math Fraction Multiplication Teacher Edition. Complete Problem #2, 1-8.

Students complete pages 7-9, Problem #2, 1-8 in the Brick Math Fraction Multiplication Student Edition.

Move with Music

Time for some music!

Have students stand and find places with enough room to move around a bit.

Use a song like **Multiplying Fractions by Numberock** to help students have another visual and auditory experience to help them learn. Allow movement in the classroom as they watch and encourage them to sing/rap along.

The idea is for students to move and sing and have a chance to get their brain ready to work again after a short brain break.

Have students return to their desks/tables with their partners.

Part 2: Show What You Know

Read aloud the instructions on page 16-18 in the Brick Math Fraction Multiplication Teacher Edition.

Students complete page 10, #1 in the Brick Math Fraction Multiplication Student Edition.

Read aloud the instructions on page 19 in the Brick Math Fraction Multiplication Teacher Edition.

Students complete page 11, #2 in the Brick Math Fraction Multiplication Student Edition.

Read aloud the instructions on page 20 in the Brick Math Fraction Multiplication Teacher Edition.

Students complete page 12, #3 in the Brick Math Fraction Multiplication Student Edition.

Content Assessment

Tell students the following:

Students will complete the Content Assessment on their own. However, they will ask their partners to check the work *after* they have completed the assessment. Partners check the work but they should not change their partner's models nor write anything on another person's paper. Partners discuss the differences they might have on an answer.

Students complete Assessment #1 on page 13 in the Brick Math Fraction Multiplication Student Edition.

Students complete Assessment #2 on page 13 in the Brick Math Fraction Multiplication Student Edition.

Students complete Assessment #3 on page 13 in the Brick Math Fraction Multiplication Student Edition.

Story Problem

Tell students a story problem like the following:

Juan and Tavon were working on creating a tall castle. Each person was working on half the castle. Juan's portion was $\frac{2}{3}$ complete. How much of the total castle had Juan built? [$\frac{1}{2} \times \frac{2}{3} = \frac{2}{6}$ of the total castle is complete]

Help students complete the story problem.

Have each pair work together to create a new story problem and a brick model that uses the place value model and/or the decimal grid model. As time allows, have students share their stories and models with at least one other team.

Inventory Check

Have students place all the bricks they have used today back into the correct compartments of the Brick Math box.

Have the students remove all the 1x2 bricks from the box and count them. After the students have verified the number (30), they replace those bricks into the compartment and give you a thumbs-up. The brick set is ready for collection and storage.

Self-Assessment

Remind students about the partner's rules they created earlier today. Refer to the Partner's Rules Chart to refresh their memories.

Ask students to use their journals to complete the self-assessment. Students need colored pencils to complete the self-assessment.

Ask students to write the word "partner" in the journals. Read aloud the statements to the students and have them draw the correct color brick.

Students should draw a specific color brick after the word "partner" based on the following:
Say:

I need to work on being a better partner. I did not listen to and help my partner like I should have.

If this describes you today, draw an orange brick after the word "partner."

I was a good partner today. I helped my partner but sometimes I did their work for them or I let them do my work.

If this describes you today, draw a green brick after the word "partner."

I was a very good partner today. I helped my partner by checking their work and not by doing their work. If this describes you today, draw a blue brick after the word "partner."

Ask students to write "I can multiply fractions" in their journals.

Students should draw a specific color brick after the words "I can multiply fractions" based on the following self-assessment.

Say:

I need help modeling multiplying fractions. If this describes you today, draw an orange brick after the words "I can multiply fractions."

I can multiply fractions. If this describes you today, draw a green brick after the words "I can multiply fractions."

I can help others multiply fractions. If this describes you today, draw a blue brick after the words "I can multiply fractions."

Day 2 – Multiplying Fractions by Whole Numbers

Preparation:

- Read pages 21-22 in the Brick Math Fraction Multiplication Teacher Edition
- Find a video about multiplying fractions and whole numbers to use with the class. [Multiplying Whole Numbers by Fractions by Numberock](#) is one example.
- One piece of tagboard for each team of students
- Markers (one per pair of students)
- Charter paper or Board and marker
- Paper or tagboard or index cards with one of the following written on each. (One per student needed) These will be used again.
 - $2 \times \frac{1}{3}$
 - $\frac{2}{3}$
 - $3 \times \frac{2}{3}$
 - 2
 - $4 \times \frac{1}{5}$
 - $\frac{4}{5}$
 - $6 \times \frac{1}{2}$
 - 3
 - $1 \times \frac{1}{2}$
 - $\frac{1}{2}$
 - $3 \times \frac{3}{4}$
 - $2 - \frac{1}{4}$
 - $6 \times \frac{2}{3}$
 - 4
 - $2 \times \frac{1}{7}$
 - $\frac{2}{7}$
 - $3 \times \frac{1}{9}$
 - $\frac{1}{3}$
 - $5 \times \frac{3}{7}$
 - $2 - \frac{1}{3}$

Welcome

Welcome students back to Day 2. Ask students if they can name fractions. Have several students name a fraction. Ask students to determine the numerator and denominator for each fraction.

Ask students if they can remember who their partner is.

Tell students that today they will create team names and choose fractions to multiply.

Have students find their partner and get markers or colored pencils and one piece of tagboard per team.

Show students an example of a team name and an addition problem. For example,

All Stars

$$\frac{4}{5} \times \frac{7}{9}$$

Partners work together to determine a team name and then write the name in the middle of the tagboard. Partners should determine fractions to multiply to represent each person on the team.

Have students draw a representation of each fraction, one on the left and one on the right of the tagboard. Have students write the answer to their fraction name under the problem.

Ask students to think about multiplying 1 x a fraction. One is a whole number. Tell students any number multiplied by a fraction creates a product that is smaller than the original number. Ask students why? [because you are multiplying by a part]

Write $1 \times \frac{1}{2}$ on the board or on chart paper.

Start with 1. $1 \times \frac{1}{2}$ would equal $\frac{1}{2}$. Why? [Anything multiplied by 1 stays the same. 1 is the identity multiplier.] [Change 1 into a fraction, $\frac{1}{1}$ and then multiply it by $\frac{1}{2} = \frac{1}{2}$] The product is less than the original whole number of 1.]

Let's look at $2 \times \frac{1}{2}$.

Make 2 into a fraction, $\frac{2}{1}$. Multiply $\frac{2}{1} \times \frac{1}{2}$. The product is $\frac{2}{2}$ which reduces to 1. The product is less than the original whole number, 2.]

Working with a Partner

Remind students of the partner rules created on Day 1. Have students share one good thing they saw a partner do yesterday.

Have students get the correct Brick Math set(s) and 2 baseplates for their team.

Part 1: Show Them How

Follow the instructions on page 22 in the Brick Math Fraction Multiplication Teacher Edition. Students complete page 14, Part 1.

Follow the instructions on pages 22-23 in the Brick Math Fraction Multiplication Teacher Edition. Complete Problem #1, 1-4.

Students complete pages 14-16, Problem #1, 1-4 in the Brick Math Fraction Multiplication Student Edition.

Follow the instructions on pages 24-25 in the Brick Math Fraction Multiplication Teacher Edition. Complete Problem #2, 1-6.

Students complete page 16-18, Problem #2, 1-6 in the Brick Math Fraction Multiplication Student Edition.

Follow the instructions on pages 26-27 in the Brick Math Fraction Multiplication Teacher Edition. Complete Problem #3, 1-6.

Students complete pages 18-19, Problem #3, 1-6 in the Brick Math Fraction Multiplication Student Edition.

Move with Fraction Multiplication

Have students get up from their places at the tables/desks because it is time for some movement.

Have students watch and sing and move to [Multiplying Fractions by Whole Numbers by Numberock](#) or another suitable video.

Give half the class papers with whole numbers multiplied by fraction equations.

Give the other half solutions. Have students walk around the room to find the correct pairing.

Have students return to their desks/tables with their partners.

Part 2: Show What You Know

Read aloud the instructions on pages 27-28 in the Brick Math Fraction Multiplication Teacher Edition.

Students complete page 20, Part 2, #1, Steps 1-6 in the Brick Math Fraction Multiplication Student Edition.

Read aloud the instructions on pages 29-30 in the Brick Math Fraction Multiplication Teacher Edition.

Students complete page 21, #2, Steps 1-6 in the Brick Math Fraction Multiplication Student Edition.

Read aloud the instructions on pages 30-31 in the Brick Math Fraction Multiplication Teacher Edition.

Students complete page 22, #3 in the Brick Math Fraction Multiplication Student Edition.

Read aloud the instructions on pages 31-32 in the Brick Math Fraction Multiplication Teacher Edition.

Students complete page 23, #4 and the Challenge in the Brick Math Fraction Multiplication Student Edition.

Content Assessment

Tell students the following:

Students will complete the Content Assessment on their own. However, they will ask their partners to check the work *after* they have completed the assessment. Partners check the work but they should not change their partner's models nor write anything on another person's paper. Partners discuss the differences they might have on an answer.

Students complete Assessment #1 on page 24 in the Brick Math Fraction Multiplication Student Edition.

Discuss the answers with the class. Help students to improve their answers as needed.

Students complete Assessment #2 on page 25 in the Brick Math Fraction Multiplication Student Edition.

Students complete Assessment #3 on page 26 in the Brick Math Fraction Multiplication Student Edition.

Story Problem

Tell students a story problem like the following:

Julia and Donata were playing a game with fractions. They would roll dice and create fractions. When they each had a fraction, Julie and Donata would roll the dice to get a whole number. Each of them would multiply

her own fraction by her whole number and move along a game board accordingly.

Julie rolled $\frac{4}{6}$ and the whole number 3.

Donata rolled $\frac{2}{3}$ and the whole number 4.

What are the two products for Julie and Donata? [Julie $3 \times \frac{4}{6} = \frac{12}{6}$ or 2;

Donata $4 \times \frac{2}{3} = \frac{8}{3}$ or $2\frac{2}{3}$]

Help students complete the story problem.

Have each pair work together to create a new story problem that they can model with bricks. As time allows, have students share their stories and models with at least one other team.

Inventory Check

Have students place all the bricks they have used today back into the correct compartments of the Brick Math box.

Have the students remove all the 2x2 bricks from the box and count them. After the students have verified the number (20), they replace those bricks into the compartment and give you a thumbs-up. The brick set is ready for collection and storage.

Self-Assessment

Students need colored pencils or crayons to complete.

Ask students to write the word “partner” in their journals. Read aloud the statements to the students and have them draw the correct color brick.

Students should draw a specific color brick after the word “partner” based on the following:

Say:

I need to work on being a better partner. I did not listen to and help my partner like I should have.

If this describes you today, draw an orange brick after the word “partner.”

I was a good partner today. I helped my partner but sometimes I did their work for them or I let them do my work.

If this describes you today, draw a green brick after the word “partner.”

I was a very good partner today. I helped my partner by checking their work and not by doing their work. If this describes you today, draw a blue brick after the word "partner."

Ask students to write "I can multiply fractions by whole numbers" in their journals. Students should draw a specific color brick after the words "I can multiply fractions by whole numbers" based on the following:

Say:

I need help multiplying fractions by whole numbers. If this describes you today, draw an orange brick after the words "I can multiply fractions by whole numbers."

I can multiply fractions by whole numbers. If this describes you today, draw a green brick after the words "I can multiply fractions by whole numbers."

I can help others multiply fractions by whole numbers. If this describes you today, draw a blue brick after the words "I can multiply fractions by whole numbers."

Day 3 – Multiplying Unit Fractions by Fractions

Preparation:

- Read pages 33-34 in the Brick Math Fraction Multiplication Teacher Edition
- Paper or tagboard or index cards with one of the following written on each. (Two or three per student needed for groups of 5-6) Note: half of these cards were created previously.
 - $4/6$
 - $2/3$
 - $8/4$
 - 2
 - $16/20$
 - $4/5$
 - $27/9$
 - 3
 - $10/5$
 - $1/2$
 - $9/4$
 - $2-1/4$
 - $20/5$
 - 4
 - $6/21$
 - $2/7$
 - $6/18$
 - $1/3$
 - $14/6$
 - $2-1/3$

Welcome

Welcome students to Day 3.

Review the parts of a fraction – numerator and denominator.

Introduce the term “unit fraction” which is a fraction with a numerator of one. $1/2$, $1/3$, $1/10$, $1/25$ and so forth.

Working with a Partner

Remind students of the partner rules created on Day 1. Have students share one good thing they did as a partner yesterday.

Have students find their partners and go to their places at the desks or table. Have students get the correct Brick Math set(s) and two baseplates for their team.

Part 1: Show Them How

Follow the instructions on page 34 in the Brick Math Fraction Multiplication Teacher Edition. Have students complete Part 1 on page 27.

Follow the instructions on pages 34-35 in the Brick Math Fraction Multiplication Teacher Edition. Complete Problem #1, 1-3.

Students complete pages 27-28, Problem #1, 1-3 in the Brick Math Fraction Multiplication Student Edition.

Follow the instructions on pages 35-36 in the Brick Math Fraction Multiplication Teacher Edition. Complete Problem #2, 1-3.

Students complete page 29, Problem# 2, 1-3 in the Brick Math Fraction Multiplication Student Edition.

Follow the instructions on pages 36-37 in the Brick Math Fraction Multiplication Teacher Edition. Complete Problem #3, 1-3.

Students complete pages 30-31, Problem #3, 1-4 in the Brick Math Fraction Multiplication Student Edition.

Move to Simplify Fractions

Have students stand. Group students into teams of 5-6.

Give each group index cards/paper with fractions written on them. Each person gets 2-3 cards/sheets/tagboard.

- $4/6$
- $2/3$
- $8/4$
- 2
- $16/20$
- $4/5$
- $27/9$
- 3
- $10/5$
- $1/2$
- $9/4$
- $2-1/4$
- $20/5$

- 4
- $\frac{6}{21}$
- $\frac{2}{7}$
- $\frac{6}{18}$
- $\frac{1}{3}$
- $\frac{14}{6}$
- $2\frac{1}{3}$

Ask students to pair the fractions so that the simplified version and the original fraction are together. Everyone in the group must agree.

Collect the cards/sheets for later use.

Have students return to their tables or desks with their partners.

Part 2: Show What You Know

Read aloud the instructions on page 37 in the Brick Math Fraction Multiplication Teacher Edition

Students complete page 31, Part 2, #1 in the Brick Math Fraction Multiplication Student Edition.

Read aloud the instructions on page 38 in the Brick Math Fraction Multiplication Teacher Edition.

Students complete page 32, #2 in the Brick Math Fraction Multiplication Student Edition.

Read aloud the instructions on page 38 in the Brick Math Fraction Multiplication Teacher Edition.

Students complete page 33, #3 in the Brick Math Fraction Multiplication Student Edition.

Content Assessment

Tell students the following:

Students will complete the Content Assessment on their own. However, they will ask their partners to check the work *after* they have completed the assessment. Partners check the work but they should not change their partner's models nor write anything on another person's paper. Partners discuss the differences they might have on an answer.

Students complete Assessment #1 on page 34 in the Brick Math Fraction Multiplication Student Edition.

Students complete Assessment #2 on page 35 in the Brick Math Fraction Multiplication Student Edition.

Students complete Assessment #3 on page 35 in the Brick Math Fraction Multiplication Student Edition.

Students complete Assessment #4 on page 36 in the Brick Math Fraction Multiplication Student Edition.

Story Problem

Tell students a story problem like the following:

Cecilia and Erin were cutting a recipe in half, because it made too much.

The recipe called for the following:

1/2 teaspoon salt

1 teaspoon cinnamon

1/8 teaspoon cloves

1/4 teaspoon allspice

What are the new amounts that Cecilia and Erin should use?

Help students to complete the story problem.

As time allows, have students share their stories and models with at least one other team.

Inventory Check

Have students place all the bricks they have used today back into the correct compartments of the Brick Math box.

Have the students remove all the 2x3 bricks from the box and count them. After the students have verified the number (10), they replace those bricks into the compartment and give you a thumbs-up. The brick set is ready for collection and storage.

Self-Assessment

Ask students to use the blank space at the bottom of page 36 in the Brick Math Fraction Multiplication Student Edition. Students need colored pencils or crayons to complete.

Ask students to write the word “partner” in the blank space at the bottom of page 34. Read aloud the statements to the students and have them draw the correct color brick.

Students should draw a specific color brick after the word “partner” based on the following:
Say:

I need to work on being a better partner. I did not listen to and help my partner like I should have.

If this describes you today, draw an orange brick after the word “partner.”

I was a good partner today. I helped my partner but sometimes I did their work for them or I let them do my work.

If this describes you today, draw a green brick after the word “partner.”

I was a very good partner today. I helped my partner by checking their work and not by doing their work. If this describes you today, draw a blue brick after the word “partner.”

Ask students to write “I can multiply unit fractions” in the blank space at the bottom of page 34. Students should draw a specific color brick after the words “I can multiply unit fractions” based on the following:

Say:

I need help multiplying unit fractions. If this describes you today, draw an orange brick after the words “I multiply unit fractions.”

I can multiply unit fractions. If this describes you today, draw a green brick after the words “I can multiply unit fractions.”

I can help others multiply unit fractions. If this describes you today, draw a blue brick after the words “I can multiply unit fractions.”

Ask students to write “I can simplify fractions” in the blank space at the bottom of page 34. Students should draw a specific color brick after the words “I can simplify fractions” based on the following:

Say:

I need help simplifying fractions. If this describes you today, draw an orange brick after the words “I simplify fractions.”

I can simplify fractions. If this describes you today, draw a green brick after the words "I can simplify fractions."

I can help others simplify fractions. If this describes you today, draw a blue brick after the words "I can simplify fractions."

Day 4 – Understanding the Commutative Property

Preparation:

- Read pages 39-40 in the Brick Math Fraction Multiplication Teacher Edition
- Chart paper or board with $1/2 \times 4/5$ and $4/5 \times 1/2$ shown.
- Chart paper or board with markers.
- Index cards/paper with fractions written on them. (one per student) These were created previously.
 - $4/6$
 - $2/3$
 - $8/4$
 - $16/20$
 - $4/5$
 - $27/9$
 - $10/5$
 - $1/2$
 - $9/4$
 - $2-1/4$
 - $20/5$
 - $6/21$
 - $2/7$
 - $6/18$
 - $1/3$
 - $14/6$
 - $2-1/3$

Welcome

Welcome students to Day 4. Ask students what a fraction represents. [A part of a whole]

Ask students which number in a fraction is the denominator. [number under the line]

Ask students what the denominator represents. [into how many parts one whole is divided]

Ask students which number in a fraction is the numerator. [number above the line]

Ask students what the numerator represents. [the number showing the amount of the whole]

Tell students there is a math property called Commutative Property of Multiplication that shows you can multiply numbers, including fractions, in any order and still get the same result.

Show chart paper or board with $1/2 \times 4/5$ is the same as $4/5 \times 1/2$.

Write two fractions and have them tell you the two ways it could be worked.

$2/3 \quad 6/7 \quad [2/3 \times 6/7; 6/7 \times 2/3]$

Write three fractions and have them tell you the six ways it could be worked.

$1/2, 7/8, 3/4$ [$1/2 \times 7/8 \times 3/4$; $1/2 \times 3/4 \times 7/8$; $7/8 \times 1/2 \times 3/4$; $7/8 \times 3/4 \times 1/2$; $3/4 \times 1/2 \times 7/8$; $3/4 \times 7/8 \times 1/2$]

Have students find their partners and go to their places at the desks or table.

Working with a Partner

Remind students of the partner rules created on Day 1. Have students share something with their partners that they like about working with that person.

Have students find their partners and go to their places at the desks or table. Have students get the correct Brick Math set(s) and two baseplates for their team.

Part 1: Show Them How

Follow the instructions on page 40 in the Brick Math Fraction Multiplication Teacher Edition. Complete Part 1 multiplying whole numbers and compare it with multiplying a whole number by a fraction.

Students complete page 37, Part 1 in the Brick Math Fraction Multiplication Student Edition.

Follow the instructions on pages 40-42 in the Brick Math Fraction Multiplication Teacher Edition. Complete Problem #1, Steps 1-3.

Students complete pages 37-38, Problem #1, Steps 1-3 in the Brick Math Fraction Multiplication Student Edition.

Follow the instructions on pages 42-43 in the Brick Math Fraction Multiplication Teacher Edition. Complete Problem #2. Steps 1-2.

Students complete pages 38-39, Problem #2, Steps 1-2 in the Brick Math Fraction Multiplication Student Edition.

Follow the instructions on pages 43-44 in the Brick Math Fraction Multiplication Teacher Edition. Complete Problem #3, Steps 1-2.

Students complete pages 39-40, Problem #3, Steps 1-2 in the Brick Math Fraction Multiplication Student Edition.

Move with Commutative Property

Give each group index cards/paper with fractions written on them. Each person gets 1 cards/sheets/tagboard.

- $4/6$
- $2/3$
- $8/4$
- $16/20$
- $4/5$
- $27/9$
- $10/5$
- $1/2$
- $9/4$
- $2-1/4$
- $20/5$
- $6/21$
- $2/7$
- $6/18$
- $1/3$
- $14/6$
- $2-1/3$

Have students form groups of 3. Have students create the 6 ways you can solve the multiplication problem using each of their fractions. Write all six ways in their journals. Remind students who have mixed numbers that they should change their mixed number into an improper fraction (numerator is greater than the denominator).

Have students solve the multiplication problem. Write the problem and the product in their journals.

Have students change groups. No two people who worked together previously can be in the same group. Write the six way the problem could be set up. Then, solve the multiplication problem and write the product in their journals.

Collect the fraction sheets.

Have students return to their tables or desks with their partners.

Part 2: Show What You Know

Read aloud the instructions on pages 44-45 in the Brick Math Fraction Multiplication Teacher Edition.

Students complete pages 40-41, #1 in the Brick Math Fraction Multiplication Student Edition.

Read aloud the instructions on pages 45-46 in the Brick Math Fraction Multiplication Teacher Edition.

Students complete page 42, #2 in the Brick Math Fraction Multiplication Student Edition.

Read aloud the instructions on pages 46-47 in the Brick Math Fraction Multiplication Teacher Edition.

Students complete pages 42-43, #3 in the Brick Math Fraction Multiplication Student Edition.

Read aloud the instructions on page 47, Challenge, in the Brick Math Fraction Multiplication Teacher Edition.

Students complete page 43, the Challenge, in the Brick Math Fraction Multiplication Student Edition.

Content Assessment

Tell students the following:

Students will complete the Content Assessment on their own. However, they will ask their partners to check the work *after* they have completed the assessment. Partners check the work but they should not change their partner's models nor write anything on another person's paper. Partners discuss the differences they might have on an answer.

Students complete Assessment #1 on page 44 in the Brick Math Fraction Multiplication Student Edition.

Students complete Assessment #2 on page 45 in the Brick Math Fraction Multiplication Student Edition.

Students complete Assessment #3 on page 46 in the Brick Math Fraction Multiplication Student Edition.

Story Problem

Tell students a story problem like the following:

Davie and Howie were folding papers. First, they folded the paper in half. Then, they folded the paper again into thirds. Finally, they folded the paper once more into thirds. They opened the paper and saw many small boxes created by the folding. What part of the whole is one small box?

$$[1/2 \times 1/3 \times 1/3 = 1/18]$$

Help students complete the story problem.

Have each pair work together to create a new story problem that they can model with bricks.

As time allows, have students share their stories and models with at least one other team.

Inventory Check

Have students place all the bricks they have used today back into the correct compartments of the Brick Math box.

Have the students remove all the 1x3 bricks from the box and count them. After the students have verified the number (20), they replace those bricks into the compartment and give you a thumbs-up. The brick set is ready for collection and storage.

Self-Assessment

Ask students to use their journals to complete the self-assessment. Students need crayons or colored pencils to complete.

Ask students to write the word “partner” in their journals. Read aloud the statements to the students and have them draw the correct color brick.

Students should draw a specific color brick after the word “partner” based on the following:
Say:

I need to work on being a better partner. I did not listen to and help my partner like I should have.

If this describes you today, draw an orange brick after the word “partner.”

I was a good partner today. I helped my partner but sometimes I did their work for them or I let them do my work.

If this describes you today, draw a green brick after the word “partner.”

I was a very good partner today. I helped my partner by checking their work and not by doing their work. If this describes you today, draw a blue brick after the word “partner.”

Ask students to write “I can use the commutative property of multiplication for fractions” in the blank space at the bottom of page 44.

Students should draw a specific color brick after the words “I can use the commutative property of multiplication for fractions” based on the following:

Say:

I need help using the commutative property of multiplication for fractions. If this describes you today, draw an orange brick after the words “I can use the commutative property of multiplication for fractions.”

I can use the commutative property of multiplication for fractions. If this describes you today, draw a green brick after the words “I can use the commutative property of multiplication for fractions.”

I can help others use the commutative property of multiplication for fractions. If this describes you today, draw a blue brick after the words “I can use the commutative property of multiplication for fractions.”

Day 5 – Multiplying Fractions Using an Area Model

Preparation:

- Read page 48 in the Brick Math Fraction Multiplication Teacher Edition
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Welcome

Welcome students to Day 5. Tell them how proud you are of the work they have done so far.

Ask students if they can remember the name of the property for multiplication they used yesterday. [Commutative]

Tell students to look at a desk or table in the room and think about the area of the table/desk top. Ask if anyone knows how to determine the area? [length x width]

Tell students that today they are going to use area to solve problems that multiply fractions.

Have students find their partners and go to their places at the desks or table.

Working with a Partner

Remind students of the partner rules created on Day 1. Have students share which rule they think is the most important.

Have students get the correct Brick Math set(s) and two baseplates for their team.

Part 1: Show Them How

Follow the instructions on page 49 in the Brick Math Fraction Multiplication Teacher Edition. Complete the Reviews.

Students complete page 47, Part 1 in the Brick Math Fraction Multiplication Student Edition.

Follow the instructions on pages 49-51 in the Brick Math Fraction Multiplication Teacher Edition. Complete Problem #1, 1-7.

Students complete pages 47-49, Problem #1, 1-7 in the Brick Math Fraction Multiplication Student Edition.

Follow the instructions on pages 51-54 in the Brick Math Fraction Multiplication Teacher Edition. Complete Problem #2, 1-7.

Students complete pages 49-50, Problem #2, 1-7 in the Brick Math Fraction Multiplication Student Edition.

Move to Multiply Fractions

Place students into groups of four, but no current partners should be in the same group.

Have students work together to write a rap or rhyme that helps them remember how to multiply fractions. Allow students no more than 10 minutes to create. All students write their creation in their journals.

Select groups to present to the class.

Have students return to their tables or desks with their partners.

Part 2: Show What You Know

Read aloud the instructions on pages 54-56 in the Brick Math Fraction Multiplication Teacher Edition.

Students complete pages 51-54, Problem #1, Steps 1-7 in the Brick Math Fraction Multiplication Student Edition.

Read aloud the instructions on pages 57-58 in the Brick Math Fraction Multiplication Teacher Edition.

Students complete pages 54-57, #2, Steps 1-6 in the Brick Math Fraction Multiplication Student Edition.

Content Assessment

Tell students the following:

Students will complete the Content Assessment on their own. However, they will ask their partners to check the work *after* they have completed the assessment. Partners check the work but they should not change their partner's models nor write anything on another person's paper. Partners discuss the differences they might have on an answer.

Students complete Assessment #1 on page 58 in the Brick Math Fraction Multiplication Student Edition.

Students complete Assessment #2 on page 58 in the Brick Math Fraction Multiplication Student Edition.

Students complete Assessment #3 on page 59 in the Brick Math Fraction Multiplication Student Edition.

Story Problem

Tell students a story problem like the following:

Tonica and Gerri were keeping track of time. Both girls spent $\frac{2}{3}$ of an hour working on a school project. How much total time did they spend on the project? [$2 \times \frac{2}{3} = \frac{4}{3}$ hour; $\frac{4}{3} = 1 \frac{1}{3}$ hour; *bonus for students that say 1 hour and 20 minutes]

Help students to complete the story problem.

Have each pair work together to create a new story problem that they can model with bricks. As time allows, have students share their stories and models with at least one other team.

Inventory Check

Have students place all the bricks they have used today back into the correct compartments of the Brick Math box.

Have the students remove all the 1x1 bricks from the box and count them. After the students have verified the numbers (100, or 25 of each color), they replace those bricks into the compartment and give you a thumbs-up. The brick set is ready for collection and storage.

Self-Assessment

Ask students to use their journals. Students need crayons or colored pencils to complete.

Ask students to write the word “partner” in their journals. Read aloud the statements to the students and have them draw the correct color brick.

Students should draw a specific color brick after the word “partner” based on the following: Say:

I need to work on being a better partner. I did not listen to and help my partner like I should have.

If this describes you today, draw an orange brick after the word “partner.”

I was a good partner today. I helped my partner but sometimes I did their work for them or I let them do my work.

If this describes you today, draw a green brick after the word “partner.”

I was a very good partner today. I helped my partner by checking their work and not by doing their work. If this describes you today, draw a blue brick after the word “partner.”

Ask students to write “I can multiply fractions using an area model” in their journals. Students should draw a specific color brick after the word “I multiply fractions using an area model” based on the following:

Say:

I need help multiplying fractions using an area model. If this describes you today, draw an orange brick after the word “I multiply fractions using an area model.”

I can multiply fractions using an area model. If this describes you today, draw a green brick after the word “I can multiply fractions using an area model.”

I can help others multiply fractions using an area model. If this describes you today, draw a blue brick after the word “I can multiply fractions using an area model.”

Day 6 – Multiplying Mixed Numbers with Like Denominators

Preparation:

- Read pages 59-60 in the Brick Math Fraction Multiplication Teacher Edition

Welcome

Welcome students to Day 6. Tell students they have done a great job of multiplying fractions. Today they are going to multiply mixed numbers.

Ask students to explain a mixed number. [a number with two parts that shows the total number of wholes and the parts of a whole]

Ask students to give examples of mixed numbers. [Answers will vary – examples include $1\frac{1}{2}$, $2\frac{3}{4}$]

Have students find their partners and go to their places at the desks or table.

Working with a Partner

Remind students of the partner rules created on Day 1. Have students draw a picture of their team and how the two of them work well together.

Have students get the correct Brick Math set(s) and two baseplates for their team.

Part 1: Show Them How

Follow the instructions on page 60 in the Brick Math Fraction Multiplication Teacher Edition. Complete the Review.

Students complete page 60, Part 1 in the Brick Math Fraction Multiplication Student Edition.

Follow the instructions on pages 61-62 in the Brick Math Fraction Multiplication Teacher Edition. Complete Problem #1, 1-8.

Students complete pages 60-62, Problem #1, 1-7 in the Brick Math Fraction Multiplication Student Edition.

Follow the instructions on pages 62-64 in the Brick Math Fraction Multiplication Teacher Edition. Complete Problem #2, 1-7.

Students complete pages 62-64, Problem #2, 1-7 in the Brick Math Fraction Multiplication Student Edition.

Move to Multiply

Have students stand in two groups. Have a piece of chart paper or a board available for each group. All students must be able to see and move to the chart paper or board. Give each student two-three sticky notes.

Give each group two mixed numbers to multiply:

Group A – $1\frac{1}{2} \times 2\frac{1}{2}$

Group B – $2\frac{1}{3} \times 1\frac{1}{3}$

Have students use their sticky notes as studs. Have one student write on one sticky note the value of the sticky note. [Group A – $\frac{1}{2}$; Group B – $\frac{1}{3}$]

Have students place the sticky notes on the chart paper or board to complete the problems. All students should write the problem and draw the models in their journals. Students write the product of the multiplied fractions in their journal.

Have students return to their tables or desks with their partners.

Part 2: Show What You Know

Read aloud the instructions on page 65 in the Brick Math Fraction Multiplication Teacher Edition.

Students complete page 65, #1 in the Brick Math Fraction Multiplication Student Edition.

Read aloud the instructions on page 66 in the Brick Math Fraction Multiplication Teacher Edition.

Students complete page 66 #2 in the Brick Math Fraction Multiplication Student Edition.

Read aloud the instructions on page 67 in the Brick Math Fraction Multiplication Teacher Edition

Students complete page 67, #3 in the Brick Math Fraction Multiplication Student Edition.

Content Assessment

Tell students the following:

Students will complete the Content Assessment on their own. However, they will ask their partners to check the work *after* they have completed the assessment. Partners check the work

but they should not change their partner's models nor write anything on another person's paper. Partners discuss the differences they might have on an answer.

Students complete Assessment #1 on page 68 in the Brick Math Fraction Multiplication Student Edition.

Students complete Assessment #2 on page 68 in the Brick Math Fraction Multiplication Student Edition.

Students complete Assessment #3 on page 69 in the Brick Math Fraction Multiplication Student Edition.

Story Problem

Tell students a story problem like the following:

Samantha saw a store that was going out of business. The sign said everything in the store was $\frac{1}{2}$ of the ticket price. Samantha found some items with a ticket price of $1\frac{1}{2}$ dollars. How much will she pay?

$[\frac{1}{2} \times 1\frac{1}{2} = \frac{1}{2} \times \frac{3}{2} = \frac{3}{4}$; *bonus for $\frac{3}{4}$ of a dollar is \$.75]

Help students to complete the story problem.

Have each pair work together to create a new story problem that they can model with bricks.

As time allows, have students share their stories and models with at least one other team.

Inventory Check

Have students place all the bricks they have used today back into the correct compartments of the Brick Math box.

Have the students remove all the 1x6 bricks from the box and count them. After the students have verified the number (10), they replace those bricks into the compartment and give you a thumbs-up. The brick set is ready for collection and storage.

Self-Assessment

Ask students to use their journals to answer the self-assessment. Students need crayons or colored pencils to complete.

Ask students to write the word “partner” in their journals. Read aloud the statements to the students and have them draw the correct color brick.

Students should draw a specific color brick after the word “partner” based on the following:
Say:

I need to work on being a better partner. I did not listen to and help my partner like I should have.

If this describes you today, draw an orange brick after the word “partner.”

I was a good partner today. I helped my partner but sometimes I did their work for them or I let them do my work.

If this describes you today, draw a green brick after the word “partner.”

I was a very good partner today. I helped my partner by checking their work and not by doing their work. If this describes you today, draw a blue brick after the word “partner.”

Ask students to write “I can multiply mixed numbers.” in their journals.

Students should draw a specific color brick after the words “I can multiply mixed numbers” based on the following:

Say:

I need help multiplying mixed numbers. If this describes you today, draw an orange brick after the words “I can multiply mixed numbers.”

I can multiply mixed numbers. If this describes you today, draw a green brick after the words “I can multiply mixed numbers.”

I can help others multiply mixed numbers. If this describes you today, draw a blue brick after the words “I can multiply mixed numbers.”

Day 7 – Review of Multiplying Fractions

Preparation:

- Students will need copies of the baseplate templates on page 72 along with their student journals.
- Dice (one die per student)

Welcome

Welcome students to Day 7. Tell students today is a review day. They can hone their skills as they practice multiplying fractions. Today they will work with different people throughout the day. They will need their journals. Give each student one die.

Have students find their partners and go to their places at the desks or table.

Working with a Partner

Remind students of the partner rules created on Day 1. Have students share something they enjoyed with their partner yesterday.

Have students get the correct Brick Math set(s) and two baseplates for their team.

Activity 1: Multiplying Whole Numbers by a Fraction

Each student rolls the die to get a whole number. Students write his or her number in the journal as the first number in a multiplication problem.

Each student rolls the die twice, the larger number is the denominator and the smaller (or same number) becomes the numerator. The fraction becomes the second number in the multiplication problem.

Each student solves their problem, using the bricks as needed. Answers should be simplified, or shown in lowest terms. Partners check both problems and agree on the answers. They should work together to correct any errors. All students should thank their partners for working well together. Students write their partner's name near the product.

Have students trade partners and repeat the activity.

Have students trade partners again and repeat the activity.

Activity 2: Multiplying Mixed Numbers by a Fraction

Have students find a new partner.

Each student rolls the die to get a whole number. Each student rolls the die twice more, the larger number is the denominator and the smaller (or same number) becomes the numerator. Students write his or her mixed number in the journal as the first number in a multiplication problem.

Each student rolls the die twice, the larger number is the denominator and the smaller (or same number) becomes the numerator. The fraction becomes the second number in the multiplication problem.

Each student solves their problem, using the bricks as needed. Answers should be simplified, or shown in lowest terms. Partners check both problems and agree on the answers. They should work together to correct any errors. All students should thank their partners for working well together. Students write their partner's name near the product.

Have students trade partners and repeat the activity.

Have students trade partners again and repeat the activity.

Students should have worked with 6 different people as partners.

Activity 3: Multiplying Mixed Numbers

Have students find a new partner.

Each student rolls the die to get a whole number. Each student rolls the die twice more, the larger number is the denominator and the smaller (or same number) becomes the numerator. Students write his or her mixed number in the journal as the first number in a multiplication problem.

Each student rolls the die to get a whole number. Each student rolls the die twice more, the larger number is the denominator and the smaller (or same number) becomes the numerator. Students write his or her mixed number in the journal as the second number in a multiplication problem.

Each student solves their problem, using the bricks as needed. Answers should be simplified, or shown in lowest terms. Partners check both problems and agree on the answers. They should work together to correct any errors. All students should thank their partners for working well together. Students write their partner's name near the product.

Have students trade partners and repeat the activity.

Have students trade partners again and repeat the activity.

Activity 4: Multiplying Three or More Fractions

Have students find a new partner.

Each student rolls the die twice, the first number is the numerator and the second number is the denominator. Some fractions will be the equivalent of a mixed number. Each student writes his or her fraction in the journal as the first number in a multiplication problem.

Each student rolls the die twice again, the first number is the numerator and the second number is the denominator. Some fractions will be the equivalent of a mixed number. Each student writes his or her fraction in the journal as the second number in a multiplication problem.

Each student rolls the die twice a third time, the first number is the numerator and the second number is the denominator. Some fractions will be the equivalent of a mixed number. Each student writes his or her fraction in the journal as the third number in a multiplication problem.

All students write the six ways these three fractions could be multiplied together. Have students write “Commutative Property” by the math sentences.

Each student solves their problem, using the bricks as needed. Answers should be simplified, or shown in lowest terms. Partners check both problems and agree on the answers. They should work together to correct any errors. All students should thank their partners for working well together. Students write their partner’s name near the product.

Have students trade partners and repeat the activity.

Have students trade partners again and repeat the activity, this time using four fractions. However, they do not need to write the ways the fractions can be grouped.

Story Problem

Have students find a new partner.

Tell students a story problem like the following:

Jasmine and Jason have 7 apples. They plan to divide the apples into sections of $\frac{1}{4}$. How many apple sections will they have? [$7 \times \frac{4}{4}$ (four sections for each apple) = $\frac{28}{4}$; they will have 28 sections of $\frac{1}{4}$ apple]
Can you help Jasmine and Jason?

Help students to complete the story problem.

Have each pair work together to create a new story problem that they can model with bricks. Have students share their stories and models with at least one other team. Teams should verify the answer of the other teams.

Have students find a new partner and create a new team.

Tell students a story problem like the following:

Ben and Rebecca were planning a large meal. They needed to increase the recipe by $2\frac{1}{2}$ to feed everyone. They needed the following:

$1\frac{2}{3}$ cup of flour [$2\frac{1}{2} \times 1\frac{2}{3} = \frac{5}{2} \times \frac{5}{3} = \frac{25}{6} = 4\frac{1}{6}$ cups of flour]

$1\frac{1}{2}$ teaspoons of vanilla [$2\frac{1}{2} \times 1\frac{1}{2} = \frac{5}{2} \times \frac{3}{2} = \frac{15}{4} = 3\frac{3}{4}$ teaspoons of vanilla]

$1\frac{1}{4}$ teaspoon baking soda [$2\frac{1}{2} \times 1\frac{1}{4} = \frac{5}{2} \times \frac{5}{4} = \frac{25}{8} = 3\frac{1}{8}$ teaspoon baking soda]

$\frac{1}{4}$ teaspoon of salt [$2\frac{1}{2} \times \frac{1}{4} = \frac{5}{2} \times \frac{1}{4} = \frac{5}{8}$ teaspoon of salt]

What are the increased amounts of flour, vanilla, baking soda, and salt Ben and Rebecca will need?

Help students to complete the story problem.

Have each pair work together to create a new story problem that they can model with bricks. Have students share their stories and models with at least one other team. Teams should verify the answer of the other teams.

Inventory Check

Have students place all the bricks they have used today back into the correct compartments of the Brick Math box.

Have the students remove all the 2×6 , 1×12 , and 1×16 bricks from the box and count them. After the students have verified the numbers (4 2×6 , 6 1×12 , and 2 1×16), they replace those bricks into the compartment and give you a thumbs-up. The brick set is ready for collection and storage.

Self-Assessment

Ask students to use their journals to complete the self-assessment.

Students need colored pencils or crayons to complete.

Ask students to write the word “partner” in their journals. Read aloud the statements to the students and have them draw the correct color brick.

Students should draw a specific color brick after the word “partner” based on the following:

Say:

I need to work on being a better partner. I did not listen to and help my partner like I should have.

If this describes you today, draw an orange brick after the word "partner."

I was a good partner today. I helped my partner but sometimes I did their work for them or I let them do my work.

If this describes you today, draw a green brick after the word "partner."

I was a very good partner today. I helped my partner by checking their work and not by doing their work. If this describes you today, draw a blue brick after the word "partner."

Ask students to write "I can multiply fractions by whole or mixed numbers" in their journals. Students should draw a specific color brick after the words "I can multiply fractions by whole or mixed numbers" based on the following:

Say:

I need help multiplying fractions by whole or mixed numbers. If this describes you today, draw an orange brick after the words "I can multiply fractions by whole or mixed numbers."

I can multiply fractions by whole or mixed numbers. If this describes you today, draw a green brick after the words "I can multiply fractions by whole or mixed numbers."

I can help others multiply fractions by whole or mixed numbers. If this describes you today, draw a blue brick after the words "I can multiply fractions by whole or mixed numbers."

Day 8 – Story Problems with Fractions – Adding, Subtracting, Ordering, & Multiplying Fractions

Preparation:

- **Teacher Assessment of Student Performance:**
The Student Assessment Chart on page 125 of the Brick Math Fraction Multiplication Student Edition should be completed before today’s class begins. You will need to make your own assessments and make appropriate comments so parents can see the progress made. If you wish, students can complete this as a self-assessment by making a checkmark in the correct boxes, and then you can add your own assessments and comments.
- **Students will need copies of the baseplate templates on page 72 along with their student journals.**
- **Word Problem printout (one for each team)**

Welcome

Welcome students the final day of camp. Ask them if they have had fun and learned a lot about math. YES!

Tell students today they are going to work story problems about fractions. They have been working on multiplication, but today they are going to review addition, subtraction, and multiplication of fractions. They will work with their partner and others.

Have students find their partners and go to their places at the desks or table.

Working with a Partner

Remind students of the partner rules created on Day 1. Have students write a short thank-you note to their partners. They will exchange notes at the end of the day.

Have students get the correct Brick Math set(s) and two baseplates for their team.

Have students return to their tables or desks with their partners.

Word Problems

Print the following 3 pages for students to complete.

Students will work a variety of word or story problems today. Have them show their work in their journals, using brick models as needed. Check students work throughout the period.

Word Problems for Teams

Problem #1

Rei Fiona read 67 pages of her 100-page book. What fraction of the book has she read? $[67/100]$

Problem #2

Ben and Rebecca are both sharing some pizza with their friends. Ben ate $3/8$ of his pizza and gave the rest to his friend Ted. Rebecca ate $1/4$ of her pizza and her friend Katie ate the rest.

How much pizza did Ben and Rebecca eat altogether? $[3/8 + 1/4 = 3/8 + 2/8 = 5/8$ of a pizza]

How much pizza did their two friends eat? $[5/8 + 3/4 = 5/8 + 6/8 = 11/8$ or $1-3/8$ of a pizza]

Problem #3

Suzie and Carol were creating new recipes. Carol wanted to make half a batch. Suzie wanted to make twice as much as the original. The ingredients listed were:

- 1 cup flour
- $1/2$ cup sugar
- 1 teaspoon baking soda
- $1/2$ teaspoon salt
- $1-1/3$ teaspoon vanilla
- 3 tablespoons butter

How much of each ingredient did Carol need?

$[1/2$ cup flour]

$[1/2 \times 1/2 = 1/4$ cup sugar]

$[1/2$ teaspoon baking soda]

$[1/4$ teaspoon salt]

$[1-1/3 \times 1/2 = 4/3 \times 1/2 = 4/6$ or $2/3$ teaspoon vanilla]

$[3 \times 1/2 = 3/2$ or $1-1/2$ tablespoons butter]

How much of each ingredient did Suzie need?

$[2$ cups flour]

$[1$ cup sugar]

$[2$ teaspoons baking soda]

$[1$ teaspoon salt]

$[2-2/3$ teaspoon vanilla]

[6 tablespoons butter]

Problem #4

Ricky, Rachelle, Dora, and Juan competed in a race. Their times were as follows:

| | |
|----------|---------------|
| Ricky | 2:034 minutes |
| Rachelle | 2:012 minutes |
| Dora | 2:115 minutes |
| Juan | 1:992 minutes |

Write the participants and their times from first to fourth place.

[1:992, 2:012, 2:034, 2:115]

Determine the differences in time between first and second place, second and third place, and third and fourth place.

[2:012 – 1:992 = .02 minutes between first and second place]

[2:034 – 2:012 = .022 minutes between second and third place]

[2:115 – 2:034 = .081 minutes between third and fourth place]

Problem #5

Janet and Megan are working in a greenhouse growing orchids. They must monitor the growth and the number of flower buds on the plants in each section.

Section 1: Weekly growth: $1\frac{1}{2}$ " , 1" , $1\frac{1}{4}$ " , $1\frac{3}{8}$ " $\frac{7}{8}$ "

Section 2: Weekly growth: $\frac{7}{8}$ " , $\frac{5}{8}$ " , $1\frac{1}{4}$ " , $1\frac{1}{8}$ " , $\frac{7}{8}$ "

Section 3: Weekly growth: $\frac{5}{8}$ " , $1\frac{1}{2}$ " , $1\frac{7}{8}$ " , 1" , $1\frac{1}{4}$ "

What is the total growth for each section?

[Section 1: $1\frac{1}{2} + 1 + 1\frac{1}{4} + 1\frac{3}{8} + \frac{7}{8} = 6$ "]

[Section 2: $\frac{7}{8} + \frac{5}{8} + 1\frac{1}{4} + 1\frac{1}{8} + \frac{7}{8} = 4\frac{3}{4}$ "]

[Section 3: $\frac{5}{8} + 1\frac{1}{2} + 1\frac{7}{8} + 1 + 1\frac{1}{4} = 5\frac{5}{8}$ "]

Order the sections by growth from greatest to least.

[Section 1: $\frac{7}{8}$ " , 1" , $1\frac{1}{4}$ " , $1\frac{3}{8}$ " , $1\frac{1}{2}$ "]

[Section 2: $\frac{5}{8}$ " , $\frac{7}{8}$ " , $\frac{7}{8}$ " , $1\frac{1}{8}$ " , $1\frac{1}{4}$ "]

[Section 3: $\frac{5}{8}$ " , 1" , $1\frac{1}{4}$ " , $1\frac{1}{2}$ " , $1\frac{7}{8}$ "]

If each plant is expected to grow this week $1\frac{1}{4}$ times the growth of last week, how much should each plant in Section 1 be expected to grow?

[Section 1: Weekly growth: $1\frac{7}{8}$ ", $1\frac{1}{4}$ ", $1\frac{9}{16}$ ", $1\frac{23}{32}$ " $1\frac{3}{32}$ "]

Section 1: Number of buds: 4, 5, 3, 6, 4

Section 2: Number of buds: 6, 3, 7, 8, 5

Section 3: Number of buds: 3, 8, 2, 4, 5

What fraction of the plants had at least 5 buds? [$\frac{7}{15}$]

What fraction of the plants had 2 or 3 buds? [$\frac{4}{15}$]

Problem #6

Xavier and Tomika were playing a dice game. Each rolled twice and created a fraction. Then, they rolled once more and together created a fraction. They multiplied their individual fractions by their combined fraction and the larger of the two answers won. Who won each round?

Round 1: Xavier $\frac{3}{6}$; Tomika $\frac{4}{5}$; Together $\frac{2}{5}$

Round 2: Xavier $\frac{1}{2}$; Tomika $\frac{2}{3}$; Together $\frac{1}{3}$

Round 3: Xavier $\frac{6}{6}$; Tomika $\frac{5}{6}$; Together $\frac{1}{5}$

What were the scores in each round?

Who won each round?

[Round 1: $\frac{3}{6} \times \frac{2}{5} = \frac{6}{30}$ or $\frac{1}{5}$; $\frac{4}{5} \times \frac{2}{5} = \frac{8}{25}$, $\frac{1}{5} = \frac{5}{25}$: Xavier vs $\frac{8}{25}$: Tomika, Tomika wins]

[Round 2: $\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$; $\frac{2}{3} \times \frac{1}{3} = \frac{2}{9}$, $\frac{1}{6} = \frac{3}{18}$; Xavier and $\frac{2}{9} = \frac{4}{18}$: Tomika, Tomika wins]

[Round 3: $\frac{6}{6} \times \frac{1}{5} = \frac{6}{30}$: Xavier; $\frac{5}{6} \times \frac{1}{5} = \frac{5}{30}$: Tomika, Xavier wins]

Problem #7

Terrie, Paco, Steve, and Steffy took math tests last week.

Terri answered 32 of 35 questions correctly.

Paco answered 30 of 35 questions correctly.

Steve answered 19 of 20 questions correctly.

Steffy answered 15 of 20 questions correctly.

What fraction (in lowest terms) did each person answer correctly?

[Terri: $\frac{32}{35}$

Paco: $\frac{6}{7}$

Steve: $\frac{19}{20}$

Steffy: $\frac{3}{4}$]

Order the fraction answered correctly from least to greatest.

[$\frac{3}{4}$, $\frac{6}{7}$, $\frac{32}{35}$, $\frac{19}{20}$ using lowest terms]

[$\frac{15}{20}$, $\frac{30}{35}$, $\frac{32}{35}$, $\frac{19}{20}$ using the questions answered correctly]

If the grading scale was 90/100 or greater earned an A, who scored an A on the test?

[Terri and Steve]

Problem #8

Donna and Danielle went shopping. They were comparing prices for a few items.

Shirt 1: Original price - \$45 Discount – $\frac{2}{3}$ off [\$15 sale price]

Shirt 2: Original price - \$30 Discount – $\frac{1}{3}$ off [\$20 sale price]

Pants 1: Original price - \$65 Discount – $\frac{3}{4}$ off [\$16.25 sale price]

Pants 2: Original price - \$50 Discount – $\frac{1}{2}$ off [\$25 sale price]

Jacket 1: Original price - \$100 Discount – $\frac{3}{4}$ off with an additional 10% ($\frac{10}{100}$) off the discounted price [$\$25 - 2.50 = \22.50 sale price]

Jacket 2: Original price - \$150 Discount – 85% off ($\frac{85}{100}$) with an additional 15% ($\frac{15}{100}$) off the discounted price [$\$22.50 - 3.375$ rounds to 3.38 = \$19.12 sale price]

Calculate the sale price of each option for shirt, pants, and jacket. Help Donna and Danielle determine the best buy for each item by comparing prices and choosing the lower price.

[Shirt 1, Pants 1, Jacket 2]

Optional Parent Activity and Materials Check-In

Allow parents to come to the classroom the last 20 minutes of the day.

Each parent will work with their child. The child will be the teacher for these activities and will help their parents learn how to use the bricks.

If a parent is unable to attend, the student can do the activity on their own or with a partner.

Ask students to show their parents how to set up and solve the problem $1/6 \times 1/2$. [1/12]

Students ask their parents to set up and solve the problem $1/2 \times 3/5$. [3/10]

Students ask their parents to set up and solve the problem $1/2 \times 2/5$. [2/10]

Ask the students and parents to spot check the compartments and make sure all the bricks are in the correct locations. Have students look on the floor to find any stray bricks.

Place all the bricks back in the correct compartment of the box.

Have a cheer for the parents!

Inventory Check

Place all the bricks back in the correct compartments in the box.

Have each team bring their materials to you in numerical order so you can keep track of your sets. You should have your sets in order and organized for the next use.

Have partners exchange thank-you notes that they wrote at the beginning of class.

Give each child or parent the completed Student Assessment Chart, noting growth in Fraction Multiplication.

Tell everyone thanks for coming!