



# Building Skills with Brick Math

A 12-Day Program to Sharpen Basic Math Skills

## Basic Fractions

## Program Overview

During this **Building Skills with Brick Math** program, students dive deeply into basic 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 building models with 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.

## Day 1 – Parts of a Fraction

### Preparation:

- Read page 9 in the Brick Math *Basic Fractions Teacher Edition*
- Find the video online: [Let's Learn Fractions – Understanding Math for Kids](#), which helps students begin to learn fractions.

### 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 LEGO® 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 piece from the set. Tell us which color piece 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.

### **Fractions of a Whole**

Have students sit in two groups. Ask the class to look around the room.

Tell students the *whole* class has been *divided* into *two groups*. (You may need to be part of one group to make it even.) The class has been divided in half or into two groups. The two is the *denominator* or the number that represents *how many groups* one whole is divided into. The denominator is the bottom number of a fraction.

Have students look around the room and see things that they could divide into two or three equal parts. For example, the windows in the room might be divided in half (two equal panes). Or they could divide the number of desks or tables evenly into two or three groups. If the desks or tables were divided into three groups, the fraction would be  $\frac{1}{3}$  instead of  $\frac{1}{2}$ .

Help students think about the concept of fractions by having them explain their ideas of dividing items in the room. What items are easily divided into two groups? What items are more easily divided into three groups?

### **Math Journals**

Give each student a journal. Tell students they will be using the math journal every day. Give students 5-10 minutes to decorate the covers with markers or colored pencils.

Tell students that they will be working with a partner during the program and that they can learn from each other.

Say:

*Are you ready to work with a partner and do some fun building and learn about fractions?*

### **Working with a Partner**

Ask students their favorite thing about working with a partner. Then ask them what the best way is 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.

Work with the class to 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.

## **Parts of a Fraction**

### **Part 1: Show Them How**

Follow the instructions on page 10 in the Brick Math Basic Fractions Teacher Edition. Complete #1. Students complete page 5, #1 in the Brick Math Basic Fractions Student Edition.

Follow the instructions on page 11 in the Brick Math Basic Fractions Teacher Edition. Complete #2. Students complete page 6, #2 in the Brick Math Basic Fractions Student Edition.

Follow the instructions on page 11 in the Brick Math Basic Fractions Teacher Edition. Complete #3. Students complete page 7, #3 in the Brick Math Basic Fractions Student Edition.

## **Move with Music**

Time for some movement! Show students the video [Let's Learn Fractions – Understanding Math for Kids](#). Then, have students stand and move into small groups of their choice.

As you move around the room to each group, ask the class to tell how many students are in each group – they should not all be the same number. If groups appear to all have the same number of students, please combine a couple of groups. The intent is to have more than one denominator. Then talk about that group as a whole and ask how many parts would be in the whole. [The number of students]

Ask them what the number of students in the group would be called as part of a fraction.

[Denominator]

Ask students if it makes sense to have a 0 in the denominator. [No – that means there isn't a whole, which is impossible to divide into parts.]

Ask each group to give the fraction of how many people wearing jeans are in the group.

Ask them what that number (the number wearing jeans) would be called as part of a fraction.

[Numerator]

Ask each group to give the fraction of how many people have some purple in any of their clothing are in the group.

Ask them what that number (the number of people that have purple on their clothing) would be called as part of a fraction. [Numerator] Remind students that a numerator can be 0.

Repeat the activity after having at least two groups merge into one whole.

Have students return to their desks/tables with their partners. Have students work in small groups of 4 (two teams combined). These groups will continue to work together throughout the program to create a song, rap, or rhyme to help them with fractions. Have them start their group's song, rap, or rhyme today with a way to remember the definition of numerator and denominator. All students in the group write the words they create in their journals.

### **Part 2: Show What You Know**

Read aloud the instructions for Part 2, #1 on page 11 in the Brick Math Basic Fractions Teacher Edition. Students complete page 7, Part 2, #1 in the Brick Math Basic Fractions Student Edition.

Read aloud the instructions for #2 on page 12 in the Brick Math Basic Fractions Teacher Edition. Students complete page 8, #2 in the Brick Math Basic Fractions Student Edition.

Read aloud the instructions for #3 on page 13 in the Brick Math Basic Fractions Teacher Edition. Students complete page 9, #3 in the Brick Math Basic Fractions Student Edition.

### **Challenge**

Read aloud the instructions for #4, the Challenge Problem, on page 13 in the Brick Math Basic Fractions Teacher Edition.

Students complete page 10, the Challenge Problem, in the Brick Math Basic Fractions Student Edition.

### **Content Assessment**

Tell students that they 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 10 in the Brick Math Basic Fractions Student Edition. Discuss the answers with the class. Help students to improve their answers as needed.

Students complete Assessment #2 on page 10 in the Brick Math Basic Fractions Student Edition. Ask partners to check the work. Walk around the room and check students' work.

Students complete Assessment #3 on page 10 in the Brick Math Basic Fractions Student Edition. Ask partners to check the work. Walk around the room and check students' work.

Students complete Assessment #4 on page 10 in the Brick Math Basic Fractions Student Edition. Ask partners to check the work. Walk around the room and check students' work.

Students complete Assessment #5 on page 11 in the Brick Math Basic Fractions Student Edition. Ask partners to check the work. Walk around the room and check students' work.

### **Story Problem**

Tell students a story problem like the following:

Juan had 16 bricks. He shared the bricks with his friend Antonio. He gave Antonio 5 of the bricks. What fraction of the bricks did Antonio have? Identify the numerator and denominator. [5/16; 5 is the numerator, and 16 is the denominator]

Students use their brick sets and journals to answer the story problem.

Have each pair work together to create a new story problem that they can model with bricks. Have students write the story problem they have created in their journals.

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 the journals. 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 identify the numerator and denominator" in their journals. Students should draw a specific color brick after the words "I can identify the numerator and denominator" based on the following self-assessment.

Say:

*I need help identifying the numerator and denominator. If this describes you today, draw an orange brick after the words "I can identify the numerator and denominator."*

*I can identify the numerator and denominator. If this describes you today, draw a green brick after the words "I can identify the numerator and denominator."*

*I can help others identify the numerator and denominator. If this describes you today, draw a blue brick after the words "I can identify the numerator and denominator."*