

Materials You'll Need for Unit Four

MANIPULATIVES & MATERIALS

Manipulatives

- class set of calculators
- 3 dice for each pair of students (one 0–5 and two 4–9)
- two 1–6 dice
- overhead spinner overlay
- single spinner overlay
- 1 more/less die
- class set of base ten linear pieces (optional)
- class set of base ten area pieces (optional)
- overhead geoboard and geobands
- class set of geoboards and geobands
- class set of rulers
- 12 tile per student
- 15 plastic game markers

Literature

- *Eight Hands Round: A Patchwork Alphabet* by Ann Whitford Paul

Student Books

- Bridges Student Books, Volume One
- Work Place Student Books
- Home Connections, Volume One
- Student Journals
- Number Corner Student Books

Word Resource Cards

- denominator
- dividend
- divisor
- equivalent fractions
- fraction
- quotient
- numerator

General Materials

- 2 or 3 pieces of chart paper
- piece of paper to mask portions of the overhead
- 1 1/2" × 2" sticky notes
- several blank transparencies
- class set plus a few extra, 1 1/2" × 12" construction paper strips in each of the following colors: white, light brown, purple, green, and orange
- class set of 6" × 9" manila or legal size envelopes
- half-class set of 1" × 4" red construction paper strips plus a few extra
- half-class set of 9" × 12" white construction paper
- class set of 1 1/2" × 12" construction paper strips, plus about 10 extra, in each of the following colors: pink, blue, and yellow
- students' names in a container
- overhead pens, including pens in black and blue
- marking pens
- colored pencils or fine-tip felt markers in 4 or more colors including blue

MANIPULATIVES & MATERIALS (CONT.)

General Materials (cont.)

- 1-cup measure
- 1 gallon jug
- set of measuring cups including 1/2, 1/3, 1/4, and 1/8 (optional)
- 9 measuring tapes
- six 10-inch lengths of yarn or heavy string per student
- class set of 12-egg cartons
- a few 18-egg cartons
- glue sticks

OVERHEADS & BLACKLINES

Overheads

- | | |
|-----------|---|
| 1.14 | Work Places Menu |
| 4.1 | Which Estimate Makes the Most Sense? |
| 4.2 | Estimate & Check |
| 4.3 | Multiplication Menu 1 |
| 4.4 | Multiplication Menu 2 |
| 4.5 | Division Story Problems |
| 4.6 | Multiplication Menu Grid 1 |
| 4.7 | Multiplication Menu Grid 2 |
| 4.8 | Water Use Facts |
| 4.9 | Thinking about Divisibility Rules |
| 4.10 | Lowest Remainder Wins |
| 4.11 | Sunflower Seeds |
| 4.12 | Same Dividend, Double the Divisor |
| 4.13 | Race to Two & Back |
| 4.14 | Fraction Pieces (cut out ahead of time) |
| 4.15 | Two Problems |
| 4.16 | 4 Corners Quilt Block |
| 4.17 | Geoboard Fractions |
| 4.18 | Geoboard Recording Strips (cut into strips and stored in an envelope or plastic sleeve) |
| 4.19 | 12-Egg Carton Fractions |
| 4.20 | Combining Egg Carton Fractions |
| 4.21 | Dozens of Eggs |
| 4.22–4.24 | Fraction Cards (cut apart and stored in an envelope or resealable plastic bag) |
| 4.25 | Fraction Story Problems |
| 4.26 | Target Practice |

Blacklines

- | | |
|-----|---|
| 4.1 | Quarter Inch Grid Paper (two class sets) |
| 4.2 | Large Base Ten Grid Paper (two and a half class sets, optional) |
| 4.3 | Multiplication Menu Grid 1 (class set, double-sided) |
| 4.4 | Multiplication Menu Grid 2 (class set run double-sided) |
| 4.5 | Four Traditional American Quilt Block Patterns (half-class set run dark enough to make the different shadings easy to distinguish from one another) |

Materials You'll Need for Unit Four (cont.)

ADVANCE PREPARATION (CONT.)

Session 6

Cut two $\frac{3}{4}$ " x 8" strips of construction paper and use them to cover problems 2 and 3 on Overhead 4.8. If you tape each piece at the left-hand side, you can lift the flap as the class is ready to solve each problem and leave the flaps attached for use in future years.

Session 8

Fill out the Work Places Menu overhead as shown on page 546, modifying as needed to meet the needs of your class.

Each pair of students will need

Session 9

Fill out the Work Places Menu overhead as shown on page 552, modifying as needed to meet the needs of your class.

Session 14

A day or two before you get to Session 14, read Ann Whitford Paul's book *Eight Hands Round, A Patchwork Alphabet* to the class at a time of day other than your math period. This beautiful book looks at the connection of 26 different patchwork patterns to American pioneers' lives. Students will be examining quilt blocks in relation to fractions in Sessions 14 and 15. If you don't have time to read the whole book, read the introduction and select three quilt blocks based on students' interests and/or connections to your social studies curriculum.

Session 17

By Session 17, you'll need a class set of 12-egg cartons and about a quarter-class set of 18-egg cartons. Ask parents and colleagues to donate their empty egg cartons.

Session 18

Although you will be using the equivalent fractions Word Resource Card today, don't display it until midway through the session. Leave the other three Word Resource Cards on display from the previous session.

Session 21

Fill out the Work Places Menu overhead as shown on page 616, modifying as needed to meet the needs of your class.

Session 22

Fill out the Work Places Menu overhead as shown on page 622, modifying as needed to meet the needs of your class.

The following books may provide useful literature connections for your class. The list is by no means comprehensive, and we recommend reading each book first so that you can plan how it would best fit into this unit for your students.

Arithmetics: 50 Easy Ways to Add, Subtract, Multiply, and Divide Without a Calculator by Edward H. Julius (1995)

This book explains ways to complete calculations with all four operations mentally. Take care that students understand the underlying ideas and why these methods work, so that they do not begin to think of problem solving and calculating as trickery.

The Grapes of Math by Greg Tang (2004)

This book of 16 illustrated, rhyming math riddles encourages students to see convenient, friendly groupings of objects to count them. This book is an accessible way to review the idea of breaking problems into friendly, manageable parts.

Polar Bear Math: Learning about Fractions from Klondike and Snow by Ann Whitford Nagda (2004)

This book tells the story of polar bear twins, Klondike and Snow, who were raised by hand from birth at the Denver Zoo. The right-hand pages tell their compelling story, accompanied by engaging photographs, while the left-hand pages explain how fractions came into play as their handlers tried to perfect a milk recipe for optimal feeding of the cubs.

OPTIONAL LITERATURE CONNECTIONS

Session 10



PROBLEMS & INVESTIGATIONS



Same Dividend, Double the Divisor

Overview

Students use multiplication menus and quick sketches to investigate a set of story problems in which the dividend remains the same and the divisor doubles. After sharing observations and conjectures about the results, students work in small groups to investigate other examples.

Actions

- 1 Students work together to estimate and solve $432 \div 6$.
- 2 Students solve several related problems.
- 3 The class reconvenes to share observations about the problems.
- 4 Students investigate further to see what happens when they leave the dividend the same and double the divisor.

Skills & Concepts

- ★ multiplying by 10 and multiples of 10
- ★ dividing 3-digit by 1- and 2-digit numbers with and without remainders
- ★ estimating the results of operations performed on whole numbers
- ★ observing and describing patterns

You'll need

- ★ Sunflower Seeds (Overhead 4.11)
- ★ Same Dividend, Double the Divisor (Overhead 4.12)
- ★ Sunflower Seeds, pages 1 and 2 (Bridges Student Book, pages 114 and 115)
- ★ several blank transparencies
- ★ piece of paper to mask portions of the overhead
- ★ overhead pens
- ★ calculators

Advance Preparation A day or two before you get to Session 14, read Ann Whitford Paul's book *Eight Hands Round, A Patchwork Alphabet* to the class at a time of day other than your math period. This beautiful book looks at how traditional patchwork patterns reflect the connections between American pioneers' lives and nature, and students will be examining quilt blocks in relation to fractions in Sessions 14 and 15. If you don't have time to read the whole book, read the introduction and select three quilt blocks based on students' interests and/or connections to your social studies curriculum.

Estimating and Solving $432 \div 6$

Open today's session by displaying the top portion of the Sunflower Seeds overhead as students find the corresponding page in their Bridges Student Books. Read the text at the top of the sheet with the class and ask each student to record an equation to represent the problem, along with an estimate. After they've had a minute to work, have students pair-share ideas and then ask several volunteers to share their thinking with the class. (You might con-

Session 11



PROBLEMS & INVESTIGATIONS

Making Fraction Kits

Overview

First, students work with guidance from the teacher to make a set of construction paper fraction strips they will use in the next two sessions and again later in the unit. Then they discuss when they use fractions and how fractions might be related to division.

Actions

- 1 Students make construction paper fraction kits.
- 2 Students talk about using fractions in daily life and about the connection between fractions and division.
- 3 Students respond to a journal prompt.

Skills & Concepts

- ★ modeling, recognizing, and comparing fractions
- ★ recognizing equivalent fractions
- ★ adding fractions

You'll need

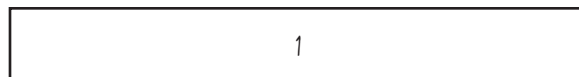
- ★ 1 1/2" x 12" construction paper strips, class set plus a few extra in each of the following colors: white, light brown, purple, green, and orange
- ★ class set of 6" x 9" manila or legal size envelopes
- ★ class set of scissors



Advance Preparation A day or two before you get to Session 14, read Ann Whitford Paul's book *Eight Hands Round, A Patchwork Alphabet* to the class at a time of day other than your math period. If you don't have time to read the whole book, read the introduction a few quilt blocks based on students' interests and/or your social studies curriculum.

Making Construction Paper Fraction Kits

Give each student a set of 5 construction paper strips, one each in the following colors: white, light brown, purple, green, and orange. Reserve a set of strips for yourself as well. Holding up the white strip, label it with a 1 as students do the same on their white strips.



Ask students to fold their light brown strip in half and cut it along the fold line as you do the same with your light brown strip. Ask students to identify the value of these two pieces relative to the white strip. Then have them label each light brown piece 1/2.



Session 14



PROBLEMS & INVESTIGATIONS



Quilt Block Fractions

Overview

Quilters often piece smaller patches into 2×2 , 3×3 , or 4×4 squares, referring to these respectively as 4-patch, 9-patch, and 16-patch quilt blocks. Some of the traditional 16-patch designs can be built on geoboards, providing students with wonderful opportunities to consider fractions using an area model. In this session, students determine the area of different sections on several different quilt blocks. A Home Connection offering practice with other common area models for fractions is assigned at the end of the session.

Actions

- 1 The class recreates a 16-patch quilt block on geoboards and then determines the area occupied by each color.
- 2 Students use their geoboards to determine the areas occupied by each color on 3 more quilt blocks, recording their work as they go.
- 3 Students complete an optional challenge quilt block that involves complex fractions.
- 4 The teacher introduces Home Connection 37, Fraction & Division Story Problems.

Skills & Concepts

- ★ understanding meanings of fractions in an area model
- ★ adding fractions and mixed numbers

You'll need

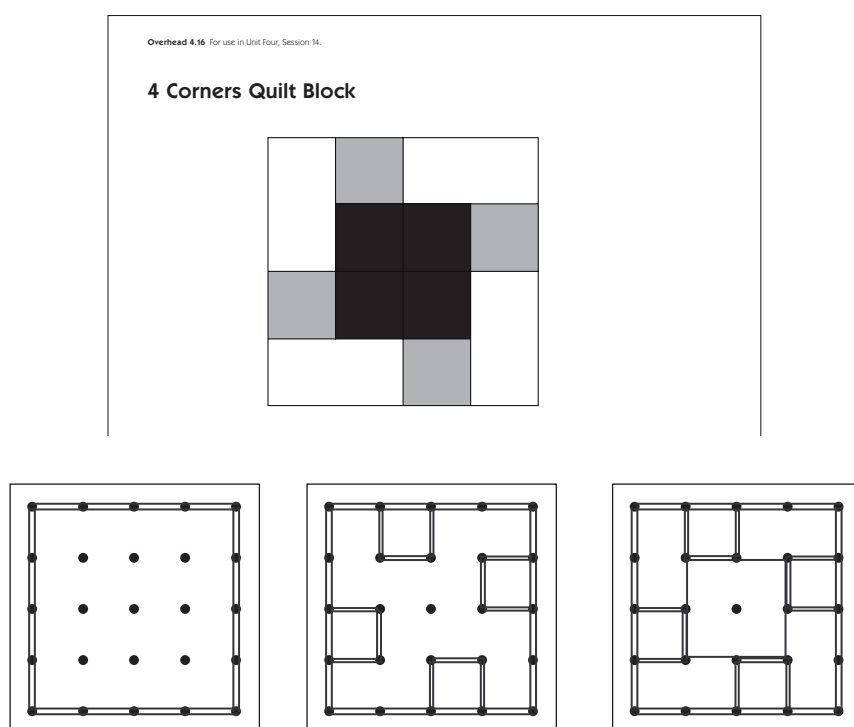
- ★ 4 Corners Quilt Block (Overhead 4.16)
- ★ Four Traditional American Quilt Block Patterns (Blackline 4.5, half-class set run dark enough to make the different shadings easy to distinguish from one another)
- ★ Quilt Block Fractions, pages 1 and 2 (Bridges Student Book, pages 119 and 120)
- ★ Home Connection 37, pages 135 and 136
- ★ *Eight Hands Round, A Patchwork Alphabet* by Ann Whitford Paul (see Advance Preparation)
- ★ class set of geoboards and geobands
- ★ rulers or straightedges
- ★ overhead pens in several different colors
- ★ colored pencils
- ★ paper to mask parts of overhead transparency

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Advance Preparation A day or two before this session, read aloud Ann Whitford Paul's book *The Seasons Sewn, a Year in Patchwork* at a time of day other than your math period.

Session 14 Quilt Block Fractions (cont.)

Finding Fractions in a Quilt Block

Open today's session by asking students to get out their geoboards and geobands as you display the 4 Corners Quilt Block overhead, masking everything below the actual quilt block. Invite students to reflect on *Eight Hands Round: A Patchwork Alphabet*, which you recently read to them. This block pattern was not in the book, but it is similar to many traditional quilt blocks. You might take a moment to invite students to share any images it evokes (e.g., windmill, busy intersection, maze). Then ask students to construct this quilt block on their geoboards, framing the largest possible square first and then using additional geobands to replicate the other shapes on the block. Ask them to compare their results with their neighbors.



When everyone has replicated the block, display the rest of the transparency and have students read the directions. At this point, students will have completed the first step and will be ready to go on to the next, which asks them to determine the area covered by each color of patch. In order to do this, students will need to know the unit of measure. For today, explain that the entire quilt block has an area of 1 square unit, and since they've replicated the quilt block on a geoboard, the geoboard too has an area of 1 square unit.

Ask students to work in pairs to determine how much area is covered by each color in the quilt block. After they have had time to work at this in pairs, invite volunteers up to the overhead with their geoboards to share their solutions and strategies.