Fractional Parts of the Whole

Objective To extend fraction concepts to fractions other than unit fractions.

Key Concepts and Skills
- Divide shapes into fractional parts. [Number and Numeration Goal 4]
- Model fractional parts of a region. [Number and Numeration Goal 4]
- Identify halves and fourths. [Number and Numeration Goal 4]
- Identify equivalent names for fractional parts of a region. [Number and Numeration Goal 4]

Key Activities
Children fold square pieces of paper in different ways to show that equal fractional parts of the same whole can be different shapes. They shade fractional parts of pattern-block shapes and divide circles into fractional parts.

Ongoing Assessment:
Recognizing Student Achievement
Use journal page 186. [Number and Numeration Goal 4]

Ongoing Assessment:
Informing Instruction
See page 770.

Materials
- Math Journal 2, p. 186
- Home Link 9-5
- Math Masters, pp. 267, 267A, and 267B
- Math Masters, p. 268
- Math Boxes 9-6
- Math Journal 2, p. 187
- Math Masters, p. 269

Advance Preparation
For Part 1, make one copy of Math Masters, page 267 per child. On pink paper, make one copy per child of Math Masters, pages 267A and 267B. Place all of the copies near the Math Message.

You may wish to obtain a copy of Fraction Action by Loreen Leedy (Holiday House, 1996), as it relates to lesson content.

Teacher's Reference Manual, Grades 1–3 pp. 60, 61
Getting Started

Mental Math and Reflexes
Tell number stories. Children may use coins or counters, or draw pictures to help them solve the problems. Children record answers on their slates.
Suggestions:
- Pam shared 20 pennies equally with her sister. How many pennies did each girl get? 10 pennies
- Luis divided his fruit bar into 4 equal pieces so that he could share it with 3 of his friends. What fraction of the fruit bar did each child get? \( \frac{1}{4} \) of the fruit bar
- Anne planted daisies in the garden. When they bloomed, there were 8 flowers. Four of the flowers were white. What fraction of the flowers were white? \( \frac{1}{2} \) or \( \frac{4}{8} \) of the flowers

Math Message
Take a copy of Math Masters, pages 267, 267A, and 267B. Cut out each of the squares and the two circles.

Home Link 9-5
Follow-Up
Briefly review completed designs.

1 Teaching the Lesson

Math Message Follow-Up
(Math Masters, pp. 267, 267A, and 267B)

Check that children have cut the shapes from Math Masters, pages 267, 267A, and 267B.

Folding Squares to Make Fourths

Review the following terms used in discussing fractions: half, fourths, fraction, and fractional part. Write each term on the board with an example.

Children use the six squares they cut out for the following activities:

1. Fold two of the squares in half, each in a different way. Label each part with the fraction \( \frac{1}{2} \).

2. Fold three of the other squares into fourths, each in a different way. (Most children will probably be able to come up with at least two ways. Give them a little extra time to find out a third way.) Ask volunteers to display their work for the class.

Teaching Master

Lesson 9-6 769
● Pretend that the squares are granola bars that are divided into fourths in three different ways. If you wanted to eat one-fourth of a granola bar, would it matter which granola bar piece you chose? **no** Make sure children understand that even though the fractional parts of each square have different shapes, each part is the same amount, one-fourth of the square.

3. Take one of the fourths-squares and label each part with the fraction \( \frac{1}{4} \).

4. Take another fourths-square and shade three of the parts.
   - *What fractional part of the square is shaded? Three-fourths*
   - *How do you write the fraction for the shaded part?* \( \frac{3}{4} \)

Discuss what the numbers 3 and 4 stand for in the fraction \( \frac{3}{4} \): The 4 (the denominator) stands for the number of equal parts into which the square has been divided. The 3 (the numerator) stands for the number of shaded parts.

**NOTE** Children are not expected to learn the words **numerator** and **denominator** at this time.

5. Take the third fourths-square and shade two of its parts.
   - *What fractional part of the square is shaded? Two-fourths or one-half*
   - *What is the fraction for the shaded part?* \( \frac{2}{4} \) or \( \frac{1}{2} \)

Point out that two-fourths is another way of showing and saying one-half.

6. Fold the last unfolded square into eight equal parts and shade five of the parts.
   - *What fractional part of the square is shaded? Five-eighths*
   - *How do you write the fraction for the shaded part?* \( \frac{5}{8} \)

**Making Fractions of a Circle**

(**Math Masters,** pp. 267A and 267B)

Have children take out one circle cutout. Explain that the circle is meant to look like a round slice cut from a watermelon. Tell children that two friends will share this slice. Have children fold the circle into fair shares for two people. Discuss how, unlike with squares and rectangles, the shape of the halves is the same no matter how you fold the circle in half. Remind children that the shape is called a half circle.
Tell children that the whole slice is both of (or two of) the shares. Ask: If you shared this watermelon slice with a friend, how much would each person get? One-half of the slice Have children write $\frac{1}{2}$ in each share. Have children draw seeds in half of the slice.

Have children take out the second circle cutout. Explain that four friends will share this slice. Have children fold the paper into four shares. Discuss how the shape of the four quarters is the same no matter how the circle is folded. Remind children that this shape is called a quarter circle. Tell children that the whole slice is all of (or four of) the shares. Ask: How much watermelon will each person get? One-fourth of the slice Children write $\frac{1}{4}$ in each share. Remind children another way to say “fourths” is “quarters.” Ask children to draw seeds in three-quarters of the slice.

Have children cut along the folded lines of both slices. Compare the sizes of the pieces of watermelon. Ask: Which is smaller, one-half of the slice or one-fourth of the slice? one-fourth Discuss what would happen to the size of the shares if more friends shared the slice. Ask: As we make more shares, what will happen to the size of the pieces? The pieces will get smaller.

**Shading Fractional Parts of Shapes**

(Math Journal 2, p. 186)

Children use pattern blocks to divide shapes into equal parts. If necessary, do the first two problems together. Remind children that a fraction, such as $\frac{1}{2}$, means 1 out of 2 equal parts. Have children complete the rest of the page with a partner as you circulate and assist where needed.

**NOTE** This activity assumes that children have completed Exploration A in Lesson 6-7 and Exploration A in Lesson 8-9.

**Adjusting the Activity**

Ask questions such as: Is there a pattern-block shape that fits inside the rhombus so that there are two equal parts? yes; a triangle

**Ongoing Assessment:**

Use journal page 186 to assess children’s ability to divide shapes into equal parts. Children are making adequate progress if they are able to divide all of the shapes into equal parts.

Have partners share their completed journal page 186. Point out that children may have divided and shaded the shape differently but the fraction is still the same.
9. Name Date

Practicing with the Number Grid

Patterns and Pieces

Teaching Master

1. Show counts by 2s with an X. Show counts by 4s with an O.

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2. Solve the number-grid puzzles.

   33


   44
   55
   66

Math Masters, p. 268

Finding the Range and Middle Value of a Data Set

Remind children of the meaning of the range of a set of data: It is the difference between the largest and smallest numbers in the set.

Ask children to arrange their animal cards in order according to the length/heights of the animals.

- Which animal has the longest length/height? The porpoise (72 in.)
- Which animal has the shortest length/height? The rabbit (11 in.)
- What is the range of the lengths/heights? 61 in.

Have children share how they found the range. Some possible strategies:

1. “I found 72 on the number line and counted back 11 hops to 61.”
2. “I used my base-10 blocks and started with 7 longs and 2 cubes. I took 1 long and 1 cube away; then I had 6 longs and 1 cube left—that’s 61.”
3. “I used my number grid. I started on number 72. I counted up one row to 62 and back 1 to 61 to take away 11 from 72.”

Ask children to find the two animals whose lengths/heights are in the middle. What are those lengths/heights? 30 in. and 35 in.

Remind children that the middle number or numbers are one way of thinking of an “average” length/height for the set of animals.

Next, have children turn their cards over and arrange them in order according to the weight of the animals.

- What is the range of the weights? 114 lb
- What two weights are in the middle? 23 lb and 41 lb

Practicing with the Number Grid

(Math Masters, p. 268)

Use Math Masters, page 268 to provide practice with the number grid.

Largest length  Smallest length

Porpoise 72 in.

Rabbit 11 in.

The range of a set of data is the difference between the largest and smallest number in the set. See data table on page 760.

range = largest – smallest

range = 72 – 11

range = 61 inches

Note: Remember to use the Dice-Roll Activity on a regular basis to practice fact strategies. See Lesson 5-10 for detailed instructions. When your class is ready, you may wish to try some of the variations listed in Lesson 5-10.
Math Boxes 9-6
(Math Journal 2, p. 187)

Mixed Practice Math Boxes in this lesson are paired with Math Boxes in Lesson 9-8. The skills in Problem 6 preview Unit 10 content.

Home Link 9-6
(Math Masters, p. 269)

Home Connection Children match the shaded parts of circles with fractions. They shade fractional parts of circles.

3 Differentiation Options

READINESS

Identifying Unit Fractions

To explore finding fractional parts of a region, have children use the pattern-block template to draw and divide 2-dimensional shapes into equal parts. Help children identify the number of equal parts in each shape, write that number as the denominator of the fraction, and shade one part. Ask children how many parts of the shape are shaded. Write that number as the numerator of the fraction. Continue the activity until children can readily name unit fractions without teacher guidance. When children are comfortable naming the fractions, have them draw two shapes on a half sheet of paper and divide the shapes into equal parts. Have children write the fraction that tells about each part. For example, a circle divided into 4 equal parts would have each part labeled $\frac{1}{4}$.

ELL SUPPORT

Discussing Unit Fractions

To provide language support for fractions, have children draw pictures representing fractions with one in the numerator, such as $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$. Ask children to compare the different fractions and discuss similarities and differences.

Student Page

Math Boxes

1. Solve.
   \[
   \begin{array}{c}
   \frac{9}{90} + \frac{9}{90} \\
   \frac{7}{20} + \frac{60}{200}
   \end{array}
   \]

2. Divide the rectangle into fourths. Shade $\frac{2}{4}$ of the rectangle.
   Sample answer:

3. Draw and solve.
   Griffin had $\frac{1}{4}$ guppies. He gave $\frac{3}{4}$ away. How many guppies are left?
   \[
   \frac{7}{guppies}
   \]

4. Write the numbers.
   
   Sample answer:

5. Shade the circle.

6. Record the temperature.
   \[
   70^\circ F
   \]
   Odd or even? even

70

Home Connection

Home Link 269

Fractions

Mark the fraction that tells what part of the circle is shaded.

1. $\frac{1}{2}$
2. $\frac{1}{3}$
3. $\frac{1}{4}$

Shade the circles. Sample answers:

4. $\frac{1}{4}$
5. $\frac{1}{4}$
6. $\frac{1}{4}$

Practice

7. Name or draw $\frac{4}{4}$ squares you find in your home.

Answers vary.
Fractions of a Circle
LESSON 9.6
Fractions of a Circle

[Diagram of a circle with a scissors symbol]