Rational Number Project

Initial Fraction Ideas Lesson 4: Overview	Materials
Students use paper folding to model and name unit and non-unit fractions. Students compare the paper-folding model to fraction circles. Students record fractions in words: one-fourth, two-thirds.	∞ Paper strips for folding for students ∞ Fraction Circles for teacher ∞ Student Pages A-L

Teaching Actions

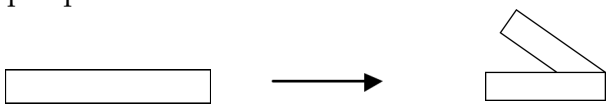
Warm Up

Name the red piece in three different ways by changing the unit. What different units did you use?

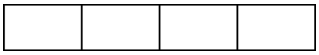
Large Group Introduction

1. Prior to using paper strips to model fractions it is necessary to practice folding strips into 2, 3, 4, 6, 8, and 12 equal parts.

   Ask students to follow along with you as you model how to fold paper strips. Fold paper strip into two equal parts:



2. Keep it folded. Now fold it again into two equal parts. Ask: how many equal parts do you think we have? Unfold:



3. Ask students to verbalize how to fold paper strips to form four equal parts.

4. Model folding into three equal parts. Form the letter "S" with a paper strip to get close to 3 equal parts. Press down on paper.

Comments

This lesson may take two class periods. Students are still recording fractional amounts using word names; symbols are introduced in lesson 5.

Cut paper strips from 8.5″ by 11″ sheets of paper about 1 inch wide and 8.5″ long.

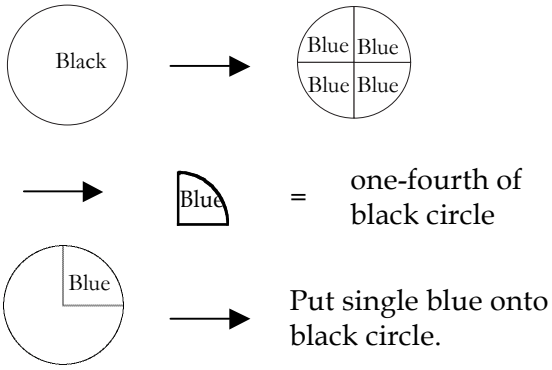
Teaching Actions

5. Model sixths. Fold paper strip into thirds and then fold into two equal parts. Have students do this and guess, before unfolding, the number of equal parts they expect.

6. Ask students if they could have obtained sixths by folding first in halves and then in thirds? Try it.

7. Ask students to think of strategies for folding 8ths and 12ths. Encourage trial and error strategy. Have them verbalize successful ways. For 12ths reinforce multiple ways.

8. Students can shade equal parts of paper strips to show fractions. Using fraction circles, show one-fourth using a black circle as the unit.



   Say: To show one-fourth of a black circle I divided it into four equal parts. Pick up one of the parts to show one-fourth.

9. Ask: How can you show me one-fourth with a paper strip? Have students fold into 4 equal parts and shade in one of the 4 equal parts. Record fraction name as 1-fourth.

10. Discuss how the two displays for one-fourth are alike and different.

11. Repeat for 1-third, 1-eighth, 1-twelfth.

Comments

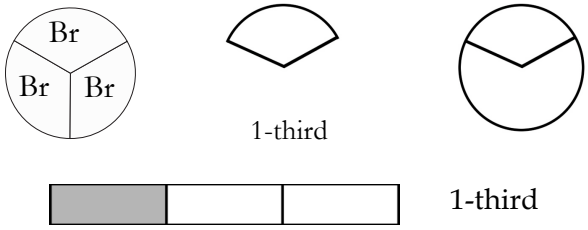
Students often will expect 5 equal parts (3+2). They are more apt to think additively than multiplicatively.

<u>To get 12ths</u>
Halves → halves → thirds
Thirds → halves → halves
Halves → thirds → halves

The similarity between the two displays is what's important. A unit is divided into <u>equal</u> parts and one or more equal parts are highlighted in some way. This is a *manipulative to manipulative* translation.

Teaching Actions

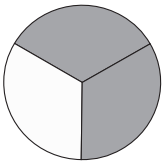
12. Look at two displays for one-third:



1-third

13. Shade in another third on the paper strip.

Ask: how many thirds are shown now? How can I show two-thirds with circles? (Pick up two browns and say these are two-thirds of black.) State that 2-thirds is 1-third and 1-third more:



14. Now draw a picture of a square. Divide it into 4 equal parts and shade 3 of 4 parts. Ask students to fold paper to show the same fraction that you drew. Record fractions as 3-fourths: 1-fourth + 1-fourth + 1-fourth.

15. Return to fraction circles. Model problems as in lesson 3, this time with non-unit fractions.

<u>Examples</u>:

- The black circle = 1. What is the value of 1 blue; 3 blues; 1 brown; 2 browns; 3 reds.
- The yellow piece = 1. What is the value of 1 blue; 2 reds; 3 grays; 2 pinks.

Comments

Non-unit fractions are introduced as sums of unit fractions: 2-fourths is 1-fourth and 1-fourth.

Students now have seen two models for fractions. Practice pages that follow this lesson give students a chance to apply their new learning to pictures of units in different shapes.

Teaching Actions

Small Group/Partner Work

16. There are several student pages in this lesson. **Select the most appropriate ones for your students.** Students may need some assistance to do some of the pages. See Comments for clarification.

Wrap Up

17. Go over problems 6 and 7 from Student Page B. Have students share their solutions. Pick and choose other problems for students to share.

Comments

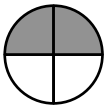
Teacher Notes for Student Pages:

B: Problems 6 and 7 provide some problem solving. Students reconstruct the unit given one part. For example if  equals 1-half, then the whole must be two of those parts:

If  equals 1-fourth, then the whole must be four of those parts:

G: Clarify with students that a picture may need to be modified to determine if 2-fourths are shaded in. For example:

Is 2-fourths shaded?



2-fourths can easily be seen once the picture is completed by drawing in the needed lines.

Translations

- Manipulative to verbal
- Manipulative to manipulative to verbal
- Manipulative to verbal to written symbols (word names)

Name the red piece in three different ways by changing the unit. What different units did you use?

1. Here is a picture of a candy bar.

Draw to show the candy bar divided into 5 equal-sized pieces.

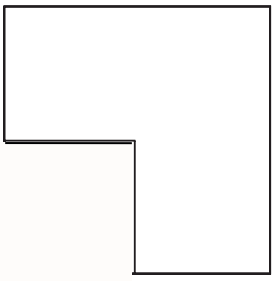
2. Here is a picture of a pan of brownies.

The pan of brownies is cut into _____ equal-sized parts.

Each piece is _____ of the whole pan.

3. O-So-Good candy bars come in the shape of a square. After Janis ate one pieces of an O-So-Good candy bar, it looked like the shape below.

The piece that Janis ate is _____ of the whole candy bar.



4. Hamdi's garden is a rectangle. Draw a picture of Hamdi's garden. Show on your drawing that the garden is in 9 equal-sized parts.

Each part is _____ of Hamdi's garden.

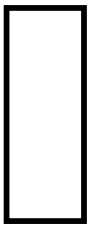
5. Devan's garden is in the shape of square. Draw a picture of Devan's garden.

   Draw on Devan's garden to show it divided into 3 equal-sized parts.

   Each part is _____ of Devan's patio.

6. One-half of a coffee cake was left after a party was over.

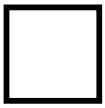
   The half looked like this:



   Draw a picture of the whole cake.

   Explain to your classmates how you solved the problem.

7. Willis, Vang, Ellen, and Marta shared part of a candy bar equally. Marta's share looked like this:

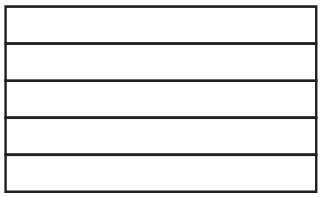


   Draw a picture to show the whole candy bar.

   Explain to your classmates how you solved the problem.

For each exercise, look at the figure and then answer the question and write the word name for each fraction.

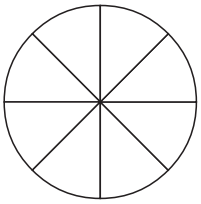
1.



_____ equal-sized parts.

Each part is _____ _____ of the whole.

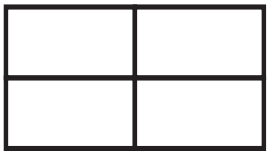
2.



_____ equal-sized parts.

Each part is _____ _____ of the whole.

3.



_____ equal-sized parts.

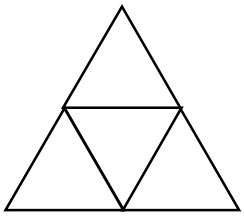
Each part is _____ _____ of the whole.

4.

_____ equal-sized parts.

Each part is _____ _____ of the whole.

5.

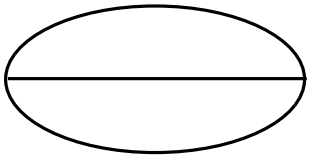


_____ equal-sized parts.

Each part is _____ _____ of the whole.

Name_____ Lesson 4 / Student Page D

6.



_____ equal-sized parts.

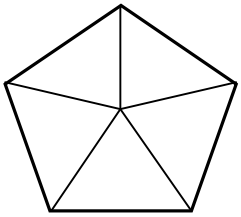
Each part is _____ _____ of the whole.

7.

_____ equal-sized parts.

Each part is _____ _____ of the whole.

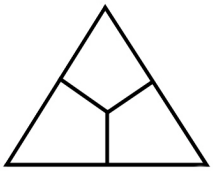
8.



_____ equal-sized parts.

Each part is _____ _____ of the whole.

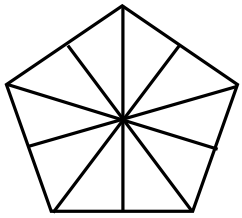
9.



_____ equal-sized parts.

Each part is _____ _____ of the whole.

10.



_____ equal-sized parts.

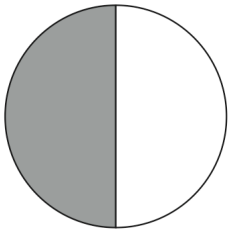
Each part is _____ _____ of the whole.

Name_____ Lesson 4 / Student Page E

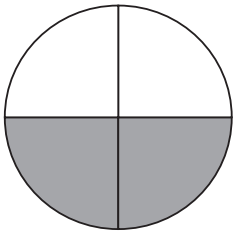
Directions:

You'll need paper strips for folding. For any four of the figures shown below, fold paper strips to model the fraction that the figure models. After you have folded and shaded your paper, write on it the fraction you have shown (use words, not symbols).

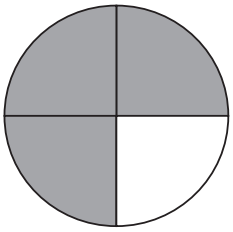
1.



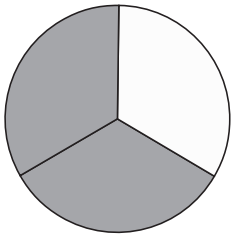
2.



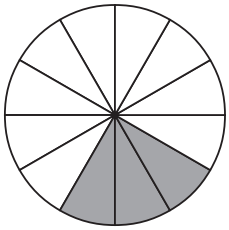
3.



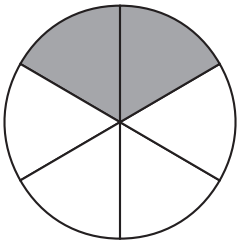
4.



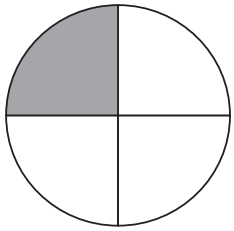
5.



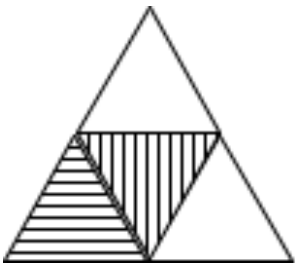
6.



7.



8.



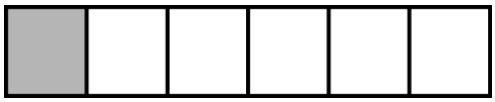
Directions:

You'll need paper strips for folding. For any four of the figures shown below, fold paper strips to model the fraction that the figure models. After you have folded and shaded your paper, write on it the fraction you have shown (use words, not symbols).

1.

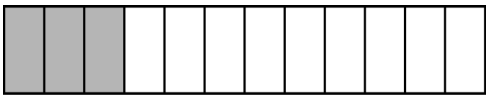
2.

3.

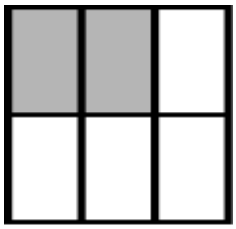


4.

5.

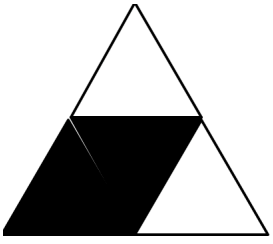


6.



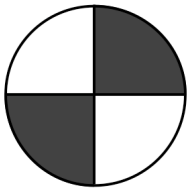
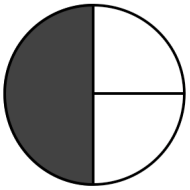
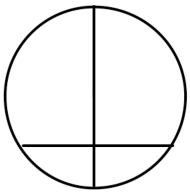
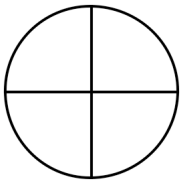
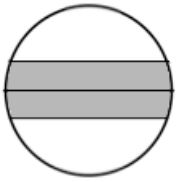
7.

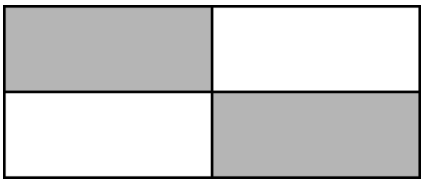
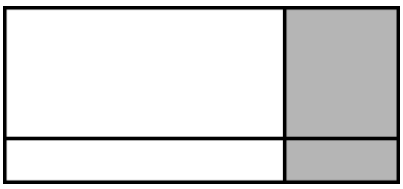
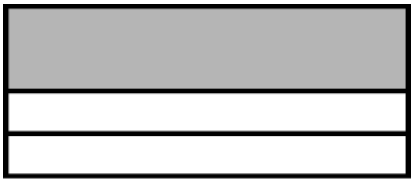
8.



Name_____ Lesson 4 / Student Page G

Look at each picture carefully. Place an "X" beside each picture that shows 2-fourths shaded in. You may need to draw in lines to determine if 2-fourths are shaded.


For each diagram, fill in the blanks to tell about the diagram.

a.

Number of equal parts _____

Number of equal parts shaded _____

The fraction shaded is _____ -sixth

b.

Number of equal parts _____

Number of equal parts shaded _____

The fraction shaded is 1- _____

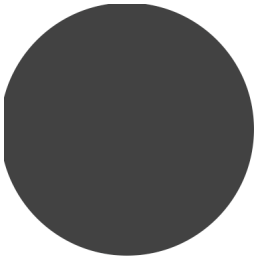
c.

Number of equal parts _____

Number of equal parts shaded _____

The fraction shaded is _____

d.

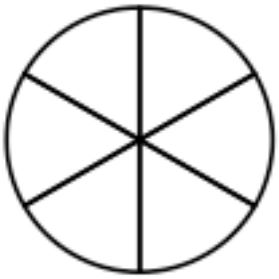


Number of equal parts _____

Number of equal parts shaded _____

The fraction shaded is _____

e.

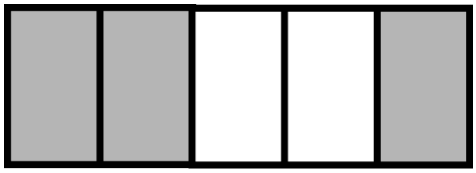


Number of equal parts _____

Number of equal parts shaded _____

The fraction shaded is _____

f.

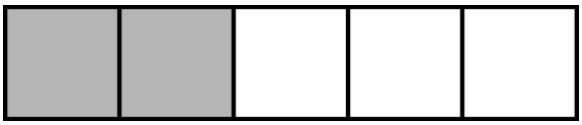


Number of equal parts _____

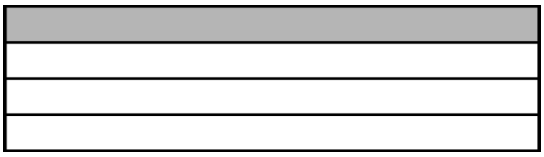
Number of equal parts shaded _____

The fraction shaded is _____

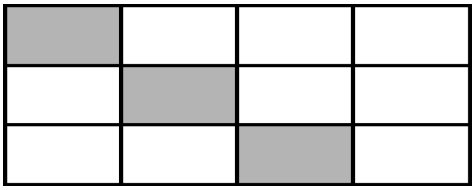
Write words like 2-fourths, 3-fifths, and so on for the fraction shaded by each diagram.



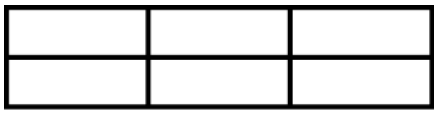
Write _____



Write _____

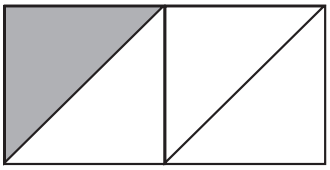


Write _____



Write _____

Write _____



Write _____

Write the fraction that is shown in words:

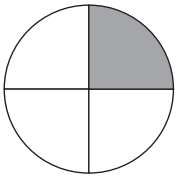
a.

_____

b.

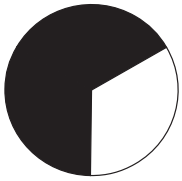
_____

c.



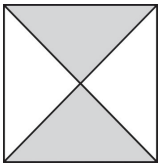
_____

d.



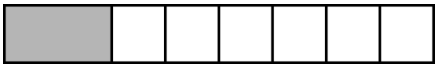
_____

e.

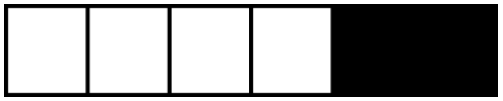


_____

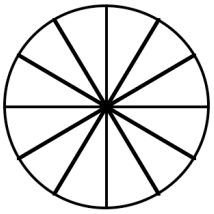
f.



_____

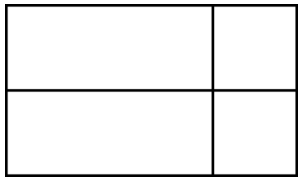
g. 

_____

h. 

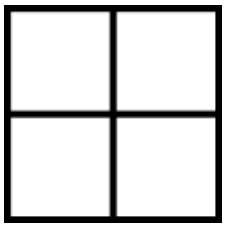
_____

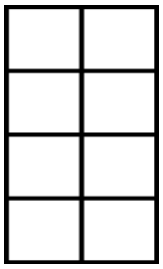
Circle the figures that have equal-sized parts.

1. 

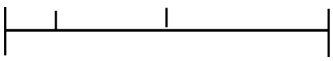
2. 

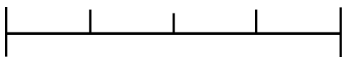
3. 

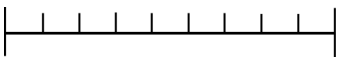
4. 

5. 

6. 

7. 

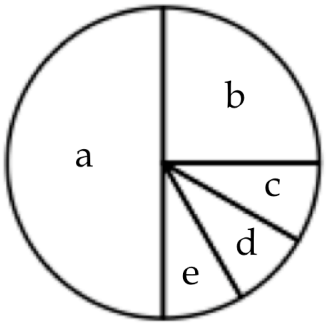
8. 

9. 

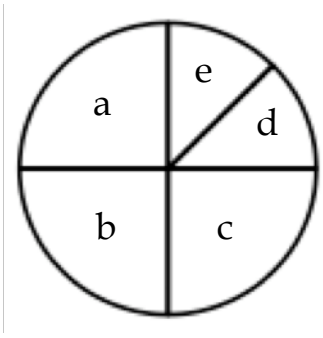
Problem Solving

Directions:

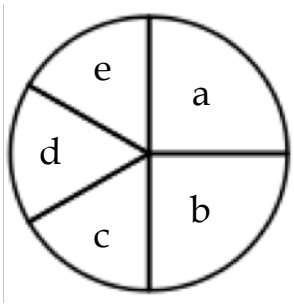
For each of the drawings write the color corresponding to the part marked a, b, c, and so on. Then write the word name for the fraction that the color represents. You can use fraction circles if you need them. Your teacher will help you with exercise 1.



Color	Fractions in Words
a. yellow	1-half
b. blue	1-fourth
c.	
d.	
e.	



Color	Fractions in Words
a.	
b.	
c.	
d.	
e.	



Color	Fractions in Words
a.	
b.	
c.	
d.	
e.	