Rational Number Project

Initial Fraction Ideas
Lesson 8: Overview

Students explore fraction equivalence by naming fractions equal to 1/2 with fraction circles and by finding other fraction equivalences with fraction circles.

Materials

- Fraction Circles for students and teacher
- Large sheet of chart paper for teacher; Equivalence Chart for students
- Fraction Fill board for students and numeral cards for teacher
- Circle page divided into twelfths

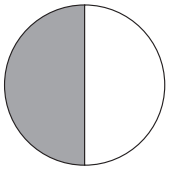
Teaching Actions

Warm Up

Use paper folding strips to show these two fractions: $\frac{3}{4}$ and $\frac{11}{12}$. Compare the strips – which fraction is larger? Why?

Large Group Introduction

1. At the overhead, cover the whole circle with 1 yellow and ask students to find different ways to cover the remaining half of the circle. Record answers by color.

Ex: 

1 blue and 2 grays
2 blues
•
•
•
•
•

2. Repeat this activity, but this time, specify that they have to use one color to cover half the circle. Record results by color and fraction name.

1 yellow	=	2 blues
1 yellow	=	3 pinks

3. Ask what each display has in common. [They all cover

Comments

The idea of equivalence is a prerequisite for fraction operations. To add $\frac{1}{2}+\frac{3}{4}$, you will explain that $\frac{1}{2}$ can be exchanged for $\frac{2}{4}$ because $\frac{1}{2}=\frac{2}{4}$.

Equality should first be developed from concrete models before explaining a rule that generates equal fractions $\left(\frac{1}{2}\times\frac{2}{2}=\frac{2}{4}\right)$

You are defining equivalent fractions by showing that fractions are equivalent if they cover the same amount of the circle. Partitioning is different so the digits in the fraction symbols are different; but 1 of 2 equal parts covers the same amount as 2 of 4 equal parts.

Teaching Actions

1-half of the black circle therefore they are all equivalent].

4. Continue to model fraction equivalences by completing the equivalence chart. Make a large classroom chart of this picture or use a transparency of student's chart.

Red	$\frac{1}{12}$	$\frac{2}{12}$	$\frac{3}{12}$	$\frac{4}{12}$	$\frac{5}{12}$	$\frac{6}{12}$	$\frac{7}{12}$	$\frac{8}{12}$	$\frac{9}{12}$	$\frac{10}{12}$	$\frac{11}{12}$	$\frac{12}{12}$
White												
Gray												
Pink												
Blue												
Brown												
Yellow												

5. Start by asking students to cover 2/12 of the whole circle. Now ask them if they can cover the same amount with whites (without cutting the pieces). Check other colors. Because 1 pink equals 2 reds, record on the chart, 1/6 under the 2/12 column across from "pink".

Red	$\frac{1}{12}$	$\frac{2}{12}$	$\frac{3}{12}$	$\frac{4}{12}$	$\frac{5}{12}$	$\frac{6}{12}$	$\frac{7}{12}$	$\frac{8}{12}$	$\frac{9}{12}$	$\frac{10}{12}$	$\frac{11}{12}$	$\frac{12}{12}$
White												
Gray			$\frac{2}{8}$									
Pink		$\frac{1}{6}$										
Blue			$\frac{1}{4}$									
Brown												
Yellow												

6. Repeat for 3/12, recording in fraction symbols 2/8 and 1/4 under the 3/12 column [see above].

Small Group/Partner Work

7. Continue, completing the rest of the chart. Students can do this in groups or with a partner.

Comments

Give students a copy of the master for the circle divided into 12ths for this activity. Students try to cover $\frac{2}{12}$ of the circle by placing fraction pieces on top of this circle page.

Teachers have found that filling in the equivalence chart to be easy for some and difficult for others. Consider completing the chart in pairs.

Teaching Actions

Red	$\frac{1}{12}$	$\frac{2}{12}$	$\frac{3}{12}$	$\frac{4}{12}$	$\frac{5}{12}$	$\frac{6}{12}$	$\frac{7}{12}$	$\frac{8}{12}$	$\frac{9}{12}$	$\frac{10}{12}$	$\frac{11}{12}$	$\frac{12}{12}$
White				$\frac{3}{9}$				$\frac{6}{9}$				$\frac{9}{9}$
Gray			$\frac{2}{8}$			$\frac{4}{8}$			$\frac{6}{8}$			$\frac{8}{8}$
Pink		$\frac{1}{6}$		$\frac{2}{6}$		$\frac{3}{6}$		$\frac{4}{6}$		$\frac{5}{6}$		$\frac{6}{6}$
Blue			$\frac{1}{4}$			$\frac{2}{4}$			$\frac{3}{4}$			$\frac{4}{4}$
Brown						$\frac{1}{2}$						$\frac{2}{2}$
Yellow												

8. Use this chart as a reference for fraction equivalencies. Students can use it as they play the following game. If you are making a classroom chart then after students complete their own charts take time to share their work to fill out the classroom chart. Discuss how the chart shows fraction equivalences.

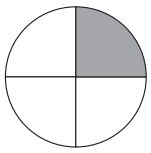
Wrap Up

9. Play the Fraction Fill game. Students use their equivalence chart to help them find equivalences.

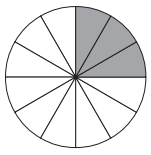
MATERIALS**:** Fraction numeral cards**
Fraction Fill Board

DIRECTIONS**:** Teacher randomly selects a numeral card and shows it to students. Students choose to shade that amount on one of the circles. They can only shade 1 representation for that fraction amount.

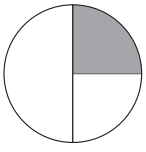
Ex: 1/4 Student can shade



or



but not both



Student cannot shade the circle divided into two equal parts by adding lines to the circle to divide it into fourths.

Comments

One-half equivalences are the most important ones for children to learn. Students with good "fraction number sense" use $\frac{1}{2}$ as a reference point for estimating the size of other fractions.

A student will use his/her concept of $\frac{1}{2}$ to estimate, for example, $\frac{2}{4}+\frac{2}{3}$: "$\frac{2}{4}$ equals $\frac{1}{2}$; $\frac{2}{3}$ is greater than $\frac{1}{2}$; so the sum is greater than 1."

This reasoning is an excellent example of thinking quantitatively. Thinking quantitatively is not rule-bound, but relies on the mental images children have for fractions. Images for $\frac{1}{2}$ are critical.

Just as students learn the basic +, -, x, ÷ facts, you want them to learn basic fraction equivalents for $\frac{1}{2},\frac{1}{3},\frac{2}{3},\frac{1}{4},\frac{2}{4},\frac{3}{4}$. On this level, they don't need rules, but many physical/visual examples with these fractions and their equivalents.

Fraction Fill is a game that can be played throughout the rest of the lessons.

Teaching Actions	Comments
Continue showing numeral cards. Students refer to equivalence chart to make selections. The first to shade two complete circles says "Fraction Fill." ** Make a set of cards for $\frac{1}{2},\frac{1}{3},\frac{2}{3},\frac{1}{4},\frac{2}{4},\frac{3}{4},\frac{1}{6},\frac{2}{6},\frac{3}{6},\frac{4}{6},\frac{5}{6},$ $\frac{1}{12},\frac{2}{12},\frac{3}{12},\frac{4}{12},\frac{5}{12},\frac{6}{12},\frac{7}{12},\frac{8}{12},\frac{9}{12},\frac{10}{12},\frac{11}{12}$	

Translations

- ∞ Written symbols to manipulative to written symbols
- ∞ Written symbols to pictures

Use paper folding strips to show these two fractions:

$$\frac{3}{4} \text{ and } \frac{11}{12}$$

Compare the strips – which fraction is larger? Why?

$\frac{1}{2}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{4}$	$\frac{2}{4}$	$\frac{3}{4}$
$\frac{1}{6}$	$\frac{2}{6}$	$\frac{3}{6}$	$\frac{4}{6}$	$\frac{5}{6}$	
$\frac{1}{12}$	$\frac{2}{12}$	$\frac{3}{12}$	$\frac{4}{12}$	$\frac{5}{12}$	$\frac{1}{12}$
$\frac{7}{12}$	$\frac{8}{12}$	$\frac{9}{12}$	$\frac{10}{12}$	$\frac{11}{12}$	

Name_____ Lesson 8 / Student Page A

Red	$\frac{1}{12}$	$\frac{2}{12}$	$\frac{3}{12}$	$\frac{4}{12}$	$\frac{5}{12}$	$\frac{6}{12}$	$\frac{7}{12}$	$\frac{8}{12}$	$\frac{9}{12}$	$\frac{10}{12}$	$\frac{11}{12}$	$\frac{12}{12}$
White												
Gray												
Pink												
Blue												
Brown												
Yellow												

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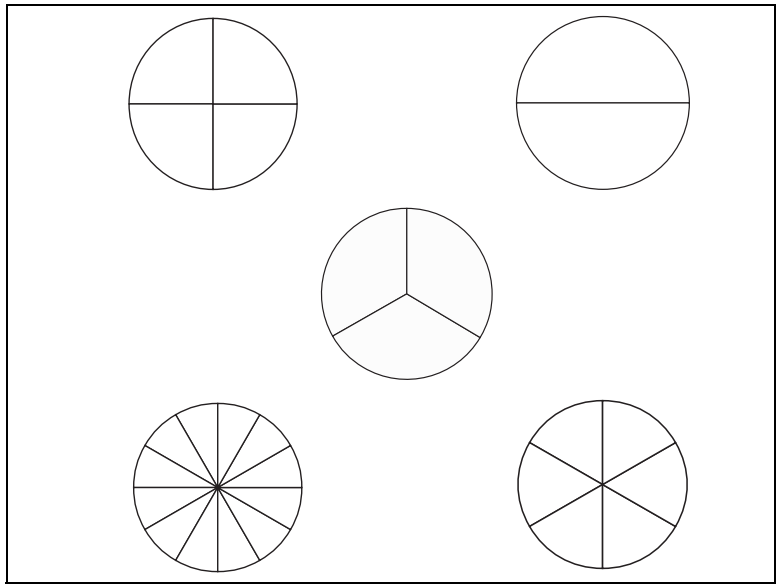
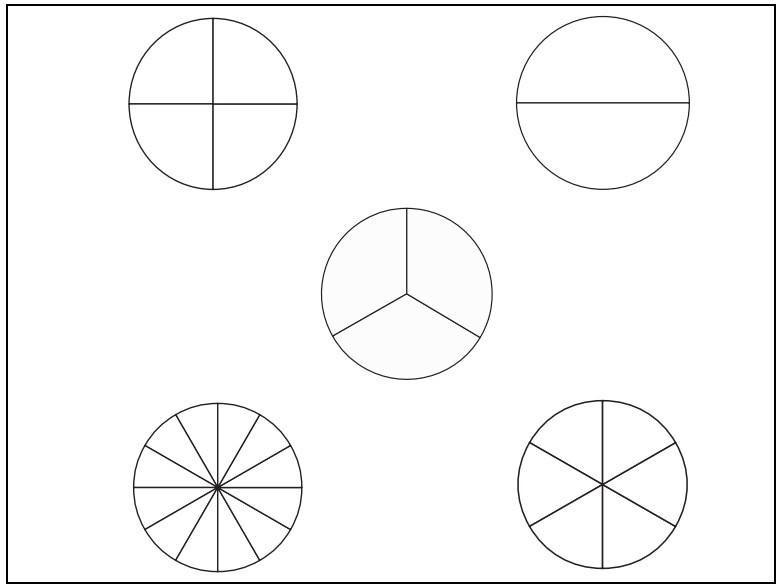
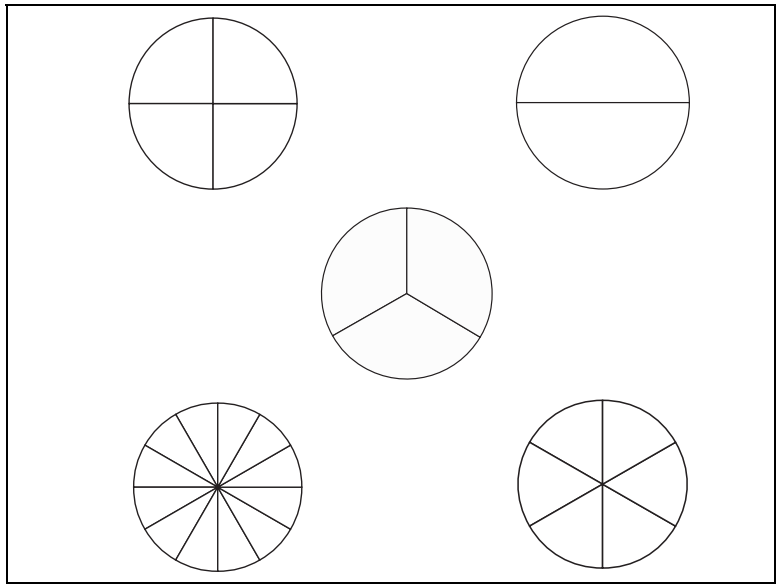
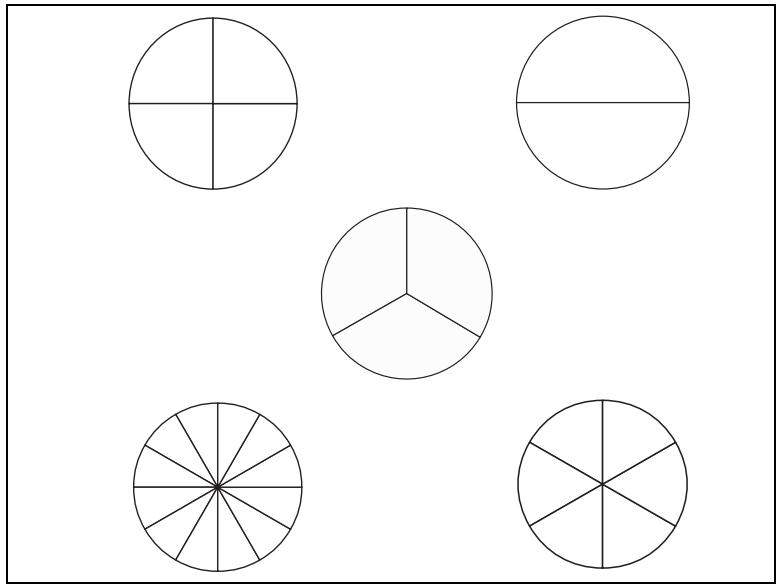
Fraction Fill









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