Rational Number Project

Initial Fraction Ideas
Lesson 17: Overview

Students name fractions greater than 1 with fraction circles. Students name fractions using both mixed numbers and improper fractions.

Materials

∞ Fraction Circles for students and teacher
∞ Transparency 1
∞ Student Pages A, B, C

Teaching Actions

Warm Up

Imagine a tower made of 1-inch cubes. You can’t see my tower but I will tell you that 12 cubes would be \(\frac{2}{3}\) the height of my tower. How many cubes in my tower?

Large Group Introduction

1. Ask students to use their fraction circles with the black circles as the unit to show \(\frac{2}{2}, \frac{4}{4}, \frac{5}{5}, \text{and} \ \frac{12}{12}\). In each example, ask for another name for the amount shown (1 whole or just 1).

2. Have students show \(\frac{6}{8}\) using the whole circle as the unit. Ask if \(\frac{6}{8}\) is greater or less than 1 whole or 1?

3. Present this story and ask students to model it with their circles. Again, use whole circles as the unit.

   Last night Margo ate \(\frac{3}{4}\) of a large pizza. (Show that with circles). In the morning she ate some leftover pizza that equaled \(\frac{2}{4}\) of a pizza.

4. Ask students to try and show the extra \(\frac{2}{4}\). They realize that they don not have enough pieces. Have them work with a partner and use 2 sets of fraction circles to model the story.

Comments

Modeling fractions greater than one using fraction circles, is easier than with chips, so we concentrate on developing the concept of changing improper fractions and vice versa with fraction circles.

Accept both names: 1 and \(\frac{1}{4}\) or \(\frac{5}{4}\). Do not rush any rules about changing improper fractions to mixed fractions. Our goal is for students to change from one notation to another using circles and then just with mental images of circles. No paper/pencil rules.
Teaching Actions

5. Continue with the story: How much pizza did Margo eat altogether?

Questions to lead discussion for naming amount of pizza:

- Did Margo eat more than 1 whole pizza? How do you know?
- Let’s count how many fourths she ate: \( \frac{1}{4}, \frac{2}{4}, \frac{3}{4}, \frac{4}{4}, \frac{5}{4} \).
- From the picture I see that \( \frac{5}{4} \) equals \( \frac{4}{4} \) and _________.
- What’s another name for \( \frac{4}{4} \)?
- What’s another way of describing the amount of pizza Margo ate?

6. Draw a picture of what you did and restate how \( \frac{5}{4} = 1\frac{1}{4} \).

Comments

You may want to label 1 and \( \frac{1}{4} \) a “mixed fraction;” \( \frac{5}{4} \) an “improper fraction.” Ask students why these names “make sense.”

Students may try to name the picture of two circles with 5 parts shaded as \( \frac{5}{8} \). If they do this, ask: What is the unit?

Since the unit is one pizza, each part is named by comparing it to one pizza or one circle.
### Teaching Actions

6. Ask students to use their fraction circles to show these amounts. In each case, have the students name the amount in another way.

<table>
<thead>
<tr>
<th>Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{8}{6}$</td>
</tr>
<tr>
<td>$\frac{3}{4}$</td>
</tr>
<tr>
<td>$\frac{3}{2}$</td>
</tr>
<tr>
<td>$1\frac{1}{3}$</td>
</tr>
<tr>
<td>$2\frac{2}{4}$</td>
</tr>
<tr>
<td>$2\frac{2}{3}$</td>
</tr>
</tbody>
</table>

7. As students explain their models, ask if the amount is greater or less than one. Try to get them to verbalize concrete actions that show when a fraction is greater than one.

8. Select students draw pictures for a few examples showing two ways to name the fraction.

Ex: $\frac{8}{6}$

![Fraction Circles Diagram](image)

10. To name fractions greater than 2, use pictures. Show transparency 1 and ask students to name each picture. [In each case, the unit is one circle or one rectangle.]

### Small Group/Partner Work

11. Assign Student Pages A, B, C.

### Comments

We want students to verbalize that, for example, $\frac{8}{6}$ is greater than 1 because they need more than 1 whole circle to model it. $\frac{4}{5}$ is less than 1 because they needed only 1 unit to model it.

You might want to make an overhead of Student Pages A and B to facilitate the review of answers.
# Teaching Actions

## Wrap Up

12. Select students to share their pictures for problems on Student Page C at the board. Students should explain how the picture was used to solve each problem. Ask students to name the fractional answer in two ways.

13. Ask students to imagine each fraction noted below and from their mental image name the amount in another way.

<table>
<thead>
<tr>
<th>7</th>
<th>13</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

## Translations

- Real world to manipulative to verbal
- Written symbols to manipulative to written symbols
- Written symbols to picture to verbal to written symbols
- Picture to written symbols
- Written symbols to pictures
- Written symbols to verbal
Transparency 1

Write Two Fraction Names

(1) \[ \text{Diagram of a circle divided into three parts, with two parts shaded.} \]

(2) \[ \text{Three circles, each divided into three parts, with two parts shaded.} \]

(3) \[ \text{Four circles, with three circles divided into three parts, and one circle divided into two parts, with two parts shaded.} \]

(4) \[ \text{Four circles, each divided into three parts, with two parts shaded.} \]

(5) \[ \text{Four circles, each divided into two parts, with two parts shaded.} \]

(6) \[ \text{Two circles, each divided into two parts, with one part shaded.} \]

(7) \[ \text{Three rectangles, each divided into six parts, with two parts shaded.} \]

(8) \[ \text{Three rectangles, each divided into six parts, with three parts shaded.} \]
Imagine a tower made of 1-inch cubes.

You can’t see my tower but I will tell you that 12 cubes would be \( \frac{2}{3} \) the height of my tower.

How many cubes in my tower?
Write two fraction names for each picture.

<table>
<thead>
<tr>
<th>Improper Fraction</th>
<th>Mixed Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Fraction" /></td>
<td><img src="image2" alt="Mixed Number" /></td>
</tr>
<tr>
<td><img src="image3" alt="Fraction" /></td>
<td><img src="image4" alt="Mixed Number" /></td>
</tr>
<tr>
<td><img src="image5" alt="Fraction" /></td>
<td><img src="image6" alt="Mixed Number" /></td>
</tr>
<tr>
<td><img src="image7" alt="Fraction" /></td>
<td><img src="image8" alt="Mixed Number" /></td>
</tr>
<tr>
<td><img src="image9" alt="Fraction" /></td>
<td><img src="image10" alt="Mixed Number" /></td>
</tr>
</tbody>
</table>
Shade in the pictures to show each fraction. Write another name for each amount.

<table>
<thead>
<tr>
<th>Mixed Number</th>
<th>Shade In</th>
<th>Improper Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 1/2</td>
<td><img src="image" alt="Shade In" /></td>
<td></td>
</tr>
<tr>
<td>2 3/4</td>
<td><img src="image" alt="Shade In" /></td>
<td></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Shade In" /></td>
<td>11/8</td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Shade In" /></td>
<td>10/3</td>
</tr>
<tr>
<td>2 4/6</td>
<td><img src="image" alt="Shade In" /></td>
<td></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Shade In" /></td>
<td>4/3</td>
</tr>
</tbody>
</table>
Draw a picture for each story. Write the fraction name.

1. Brenda ate $\frac{2}{3}$ of a candy bar for lunch. She finished it after lunch and ate $\frac{1}{3}$ more of a second candy bar of the same type. How much candy did Brenda eat?

2. Marcia’s dad was making pancakes. He added $\frac{2}{3}$ cup milk to the pancake mix. He decided to make a bigger batch so he poured another $\frac{2}{3}$ cup of milk in. How much milk did he use?
   
   (Use [picture of a cup] as a picture of a cup)

3. The dress designer needed some yellow ribbon for 3 dresses. He needs $\frac{2}{3}$ yard for one dress, $\frac{1}{3}$ for another, and $\frac{2}{3}$ for the third. Draw a picture to show how many yards of ribbon he bought.
   
   ( [picture] = 1 yard)