Rational Number Project

Initial Fraction Ideas
Lesson 18: Overview

Students will continue to build meaning for a fraction as a number on the number line, the role of the unit on the number line, and how to partition a number line by making connections between fraction circles as a model and the number line as a model for fractions.

Materials
- Fraction circles
- Student Pages A - C

Teaching Actions

Warm Up
What fraction is point A?

A

Large Group Introduction

1. Ask: What other models have we used to show fractions? (Fraction circles, chips and paper folding).
2. Lead the class through a discussion that translates the actions for modeling fractions using fraction circles to modeling fractions on a number line.
3. To encourage student involvement have each student fold a sheet of paper into 4 equal parts. Each box is for them to record the Fraction circle to number line translation you present. Sample student work is below:
4. Problem 1: Use language as described here to lead the translation from fraction circles to the

Comments

In this lesson we are moving away from context to thinking of fractions as numbers on the number line. We build connections between pictures of the familiar fraction circles model for fractions and the number line. This should assist students who are still struggling with how to partition a unit length into equal parts.

As you go over the warm up, see if students correctly labeled the number line without a context. Ask: How many equal parts are there between 0 and 1? What is the value of the tick mark at the end of the length from 0 to the first tick mark? Second tick mark?

Ask students to explain why that tick mark is not 1/8? (Common error is to count the partitions between 0 and 2; there are 8 partitions so it would be 1/8.)
### Teaching Actions

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<tr>
<th>Comments</th>
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<tbody>
<tr>
<td>This whole circle is my unit. I am going to show a fraction with this unit and I want you to show the same fraction on your number line. Draw a blank number line in the upper left corner of your paper. (Do students use arrows at the end of the line?)</td>
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<tr>
<td>How can you identify 1 unit on the number line? (Use symbols 0 and 1 as points on the line. Length between the symbols is the unit.)</td>
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<tr>
<td>To show the fraction I am thinking of I need to partition my unit circle into 4 equal parts. What fraction is each equal part?</td>
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<tr>
<td>How can you partition your unit on the number line into 4 equal lengths? (Ask for volunteers to explain their way to partition into 4ths. Do students partition into $\frac{1}{2}$ first and then halves again?)</td>
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<tr>
<td>Look at your number line. Let’s label each tick mark.</td>
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<tr>
<td>Now I am going to show my fraction on the fraction circle. (Shade 3 of the 4 equal parts).</td>
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In this lesson students are translating from a familiar model to the number line model. Looking at how the different models are the same, will help students better understand the role of the unit on the number line and how to partition a number line.
Teaching Actions

Ask what fraction of the whole circle is shaded?

• Put a point at the number $\frac{3}{4}$ on your number line. Explain that $\frac{3}{4}$ is a point at the end of the third length from zero. Because the unit is partitioned into 4 equal parts, the length is $\frac{3}{4}$ the distance from 0 to 1.

• Ask: how do both models show the number $\frac{3}{4}$? What is the same about both models? What is different between the models?

5. Repeat for these fractions: $1 \frac{1}{2}$; $2/3$; $1 \frac{1}{4}$

6. When placing a fraction on a number line students should consider first if the fraction to be shown is greater or less than 1 or greater or less than other whole units. To show a fraction greater than one students will need more than one unit. With fraction circles that is easy to show; just use two or more circles. With the number line students have to consider how to show, for example, two units by using the symbol “2” at the end of a length that is the same distance as from 0 to 1.

Comments

To make sense of the number line model, students have to bring a good understanding of the relative size of fractions as compared to whole amounts. They need to know ahead of time that, for example, $2 \frac{1}{4}$ is between two and three.

For fractions greater than one, students have to interpret the partitions on a number line correctly. With circles students have an easier time looking at this model and counting 3-halves.

With the number line, students often consider the whole line the unit even when 0, 1 and 2 are shown.

Small Group/ Partner Work

• Assign Student Pages A - C. Student Page B is optional. Students translate from other models to the number line.

Wrap Up

• Share student responses to selected problems
<table>
<thead>
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<tr>
<td>on Student Page A. Go through each example on Student Page C.</td>
<td>have if they are between 1 and 2. As ( \frac{3}{4} &lt; 1 ), the point on the line cannot be ( \frac{3}{4} ).</td>
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<td>• Guiding questions for Student Page C:</td>
<td></td>
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<tr>
<td>o Where is the unit on the number line?</td>
<td></td>
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<tr>
<td>How many units are shown on the number line?</td>
<td></td>
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<tr>
<td>o How is the length from 0 to 1 partitioned? (Or 1 to 2). How many equal parts</td>
<td></td>
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<tr>
<td>is the unit partitioned into? How does that information help you locate</td>
<td></td>
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<tr>
<td>the fractions on the number line?</td>
<td></td>
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<tr>
<td>o If a fraction is greater than one but less than 2 on which unit would you</td>
<td></td>
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<tr>
<td>locate the fraction on the number line?</td>
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**Translations**
1. Picture to symbol
2. Symbol to manipulative to picture
What fraction is point A?

A

0 1 2
1. Hamdi drew this model for a fraction. If she used the whole circle as her unit, what fraction did she model? Is that amount greater or less than 1? Show that fraction on the number line.

![Fraction Model](image1.png)

2. If the whole circle is the unit, what fraction of the circle is shaded? Is that amount greater or less than 1? Show that fraction on the number line.

![Fraction Model](image2.png)

3. If the whole circle is the unit, what fraction is shown? Show that fraction on the number line.

![Fraction Model](image3.png)

4. If the whole circle is the unit what fraction is shown below? Show that fraction on the number line.

![Fraction Model](image4.png)
<p>| | | |</p>
<table>
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</table>
| 5 | Paula folder her paper strip to show $\frac{2}{3}$.
  | ![Diagram](image1.png)  | Show that fraction on the number line.  
  | ![Number Line](image2.png)  |
| 6 | Gena showed $\frac{2}{3}$ using 6 chips as her unit. Is $\frac{2}{3}$ greater than one or less than one?  
  | ![Chips](image3.png)  | Show the number $\frac{2}{3}$ on the number line.  
  | ![Number Line](image4.png)  |
| 7 | Sophia measured her lima bean plant. It measured 1½ inches high. Show that amount on the number line.  
  | ![Number Line](image5.png)  |
| 8 | Joe drew this picture to model $1 \frac{1}{3}$. Show this fraction on the number line.  
  | ![Diagram](image6.png)  | ![Number Line](image7.png)  |
1. Circle the letter that represents the location for the number \( \frac{1}{2} \) on the number line. (Is \( \frac{1}{2} \) greater or less than 1?) Cross out the letter that represents \( 1 \frac{1}{2} \) on the number line.

   A   B   C   D
   0   1   2

2. Circle the letter that represents the number \( 1 \frac{3}{4} \) on the number line. Is \( 1 \frac{3}{4} \) greater or less than 1?

   A   B   C   D
   0   1   2

3. Place the following numbers on the number line: \( \frac{1}{3} \) \( \frac{2}{3} \)

   0   1   2

4. What fraction names this point on the number line? Is the fraction greater or less than 1?

   0   1   2

5. What fraction names this point on the number line?