How do number lines help us understand numbers?

You are used to seeing a number line show whole numbers.

The numbers on this number line are the same distance apart. The distance from one number to the next number is 1 whole. Each time you add another whole, you count another whole number on the number line.

Fractions show equal parts of a whole. You can see this on a number line too.

The section between 0 and 1 on a number line shows 1 whole. If you mark this section to show equal parts, it is the same as dividing a whole into equal parts.

The section between 0 and 1 is marked off into 4 equal parts, so each part shows $\frac{1}{4}$.

**Think** You can show more than whole numbers on a number line.

Fractions show equal parts of a whole. You can see this on a number line too.

The section between 0 and 1 on a number line shows 1 whole. If you mark this section to show equal parts, it is the same as dividing a whole into equal parts.

The section between 0 and 1 is marked off into 4 equal parts, so each part shows $\frac{1}{4}$. **Underline** the sentence that tells why each part of the number line shows $\frac{1}{4}$. 
Think  Number lines can help us understand fractions greater than 1.

You can count fractions on a number line just like you can count whole numbers.

\[ \frac{1}{4}, \frac{2}{4}, \frac{3}{4}, \frac{4}{4} \]

You can also use number lines to show fractions greater than 1.

To do this, mark off each section between pairs of whole numbers (like 0 and 1 and 1 and 2) into the same number of equal parts. Then count the fractions.

\[ \frac{1}{4}, \frac{2}{4}, \frac{3}{4}, \frac{4}{4} \]

The distance from zero to 2 on the number line can be named as 2, or \( \frac{8}{4} \).

Reflect

1. How many \( \frac{1}{3} \) s or “thirds” are there between 0 and 1 on a number line? How do you know?
Think About
Fractions as Equal Groups on a Number Line

Let’s Explore the Idea
Looking at the number of equal parts helps you think about fractions on a number line.

1. Look at the section between 0 and 1 on the number line below.

```
0   1
---
```

How many equal parts are there? 
What fraction does each part show? 
Write the missing labels on the number line.

2. Look at the section between 0 and 1 on the number line below.

```
0   1
---
```

How many equal parts are there? 
What fraction does each part show? 
Write the missing labels on the number line.

3. Look at the section between 0 and 1 on the number line below.

```
0   1
---
```

How many equal parts are there? 
What fraction does each part show? 
Write the missing labels on the number line.

4. Look at the section between 0 and 1 on the number line below.

```
0   1
---
```

How many equal parts are there? 
What fraction does each part show? 
Write the missing labels on the number line.
Let's Talk About It
Solve the problems below as a group.

5 Look at the number lines in problems 2–4. How is showing fractions on a number line like showing fractions using models? ______________

6 Look at the sections between the whole numbers on the number line below.

```
0 1 2 3 4
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

How many equal parts are in each section? ______

What fraction does each part show? ______

Each mark on the number line represents a fraction. What denominator will all the fractions have? ______

Write the missing labels on the number line.

7 Look at the fractions you wrote on the number line above that are greater than 1. What do you notice about the numerator and denominator in each of these fractions? ________________

Try It Another Way Work with your group to identify each fraction.

8 Look at the number line below. What fraction is at A? ________

```
0 1
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

9 Look at the number line below. What fraction is at B? ________

```
0 1 2 3
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```
Talk through these problems as a class, then write your answers below.

10 **Explain** Look at the number line below.

Amira says that \( A \) is at \( \frac{7}{8} \). Is she right? Explain why or why not.

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11 **Demonstrate** Use the number line below to show the fraction \( \frac{4}{6} \).

Explain how you knew where to label \( \frac{4}{6} \).

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12 **Illustrate** Use the number line below to show that there are 8 eighths in 1 whole.
Put It Together  Use what you have learned to complete this task.

Zara and John are hiking on a trail that is 2 miles long. There are signs to mark each eighth of a mile along the trail.

Part A  Draw a number line to show the length of the trail. Then mark the number line off to show where each sign is.

Part B  Zara stopped for water at the $\frac{3}{8}$-mile sign. Label the $\frac{3}{8}$ mark on the number line with a Z for Zara.

Part C  John stopped to rest after $\frac{12}{8}$ miles. Label the $\frac{12}{8}$ mark on the number line with a J for John.

Part D  Who stopped before the 1-mile mark? Who stopped after the 1-mile mark? Explain how you know.