# Rational Number Project

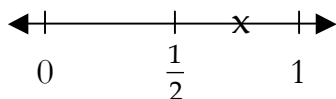| Initial Fraction Ideas<br>**Lesson 23: Overview** | Materials |
|---|---|
| | ∞ Fraction Circles for students<br>∞ Student Page A |
| This lesson helps to highlight for students how much they know about fractions: meaning for symbols as well as how to add and subtract them in a meaningful way. | |

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## Teaching Actions

**Warm Up**

Order these fractions:

$$\frac{1}{8} \quad \frac{1}{4} \qquad \frac{2}{3} \quad \frac{5}{12} \qquad \frac{11}{12} \quad \frac{8}{9}$$

**Large Group Introduction**

1. Show students this problem and ask them to write a paragraph explaining how they could estimate a reasonable answer.

   *Marge ran $\frac{3}{4}$ mile and stopped to catch her breath. She then ran another $\frac{1}{8}$ mile. Did Marge run more or less than one mile? Did Marge run $\frac{4}{12}$ mile?*

2. Have students share their paragraph with others in their group and then select a sample for large group sharing.

3. Have students act out the problem with fraction circles.

4. Repeat for this subtraction story.

   *Allie ran $\frac{2}{3}$ of a mile. Mark ran $\frac{5}{12}$ of a mile. Who ran the farthest? How much further?*

   (Don't be surprised if students can mentally find the exact answer).

## Comments

The estimation problems here allow you to assess to what extent students' mental images of fractions help them reason about adding and subtracting fractions.

First problem looks at students' understanding of fractions $> \frac{1}{2}$ as well as comparing fractions with the same numerator ($\frac{1}{4}$ vs. $\frac{1}{8}$).

Possible student response:

∞ It has to be greater than $\frac{1}{2}$ but less than 1. To make one whole you'd need to add $\frac{1}{4}$ more. But $\frac{1}{8} < \frac{1}{4}$ so it's not 1 mile.

∞ $\frac{4}{12}$ doesn't make sense because $\frac{4}{12} < \frac{1}{2}$.

| Teaching Actions | Comments |
|---|---|
| **Small Group/Partner Work**<br><br>5.  In groups have students estimate a reasonable answer to each problem on Student Page A.  They can show their estimates by marking the interval on the number line with an "x".  Encourage students to talk about their strategies for estimation.<br><br>$$\frac{2}{3} \ + \ \frac{1}{20}$$<br><br>$$0 \qquad \frac{1}{2} \qquad 1$$<br><br>∞   2-thirds is greater than $\frac{1}{2}$.  1-twentieth is a very small fraction (much smaller than $\frac{1}{3}$).  Therefore the sum has to be greater than $\frac{1}{2}$ but less than one.<br><br>**Wrap Up**<br><br>6.  End class by sharing their thinking strategies.  Congratulate children for learning so much about fractions.  Point out to them examples of their quantitative thinking that shows just how much they know about these new numbers. | Students are not to find the exact location on the number line.  The number line is being used only as a way to record a reasonable range for the problem.<br><br>You may want to use a multiple choice format:<br><br>a) between 0 and $\frac{1}{2}$<br><br>b) between $\frac{1}{2}$ and 1<br><br>The problems may be challenging, but use them to assess the strength of students' mental representations for fraction symbols. |

**Translations**
∞   Symbols to verbal
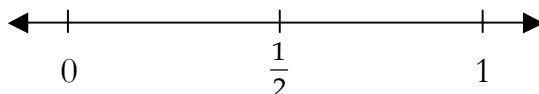∞   Real life to written symbols

Order these fractions:

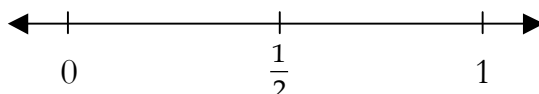$$\frac{1}{8} \quad \frac{1}{4} \qquad \frac{2}{3} \quad \frac{5}{12} \qquad \frac{11}{12} \quad \frac{8}{9}$$
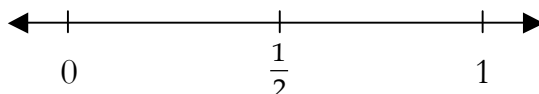
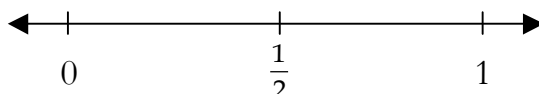# Estimating Fraction Sums and Differences

1) $\dfrac{2}{3} + \dfrac{1}{20}$

<-----+--------------+--------------+----->
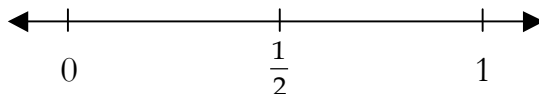　　 0　　　　　　 $\frac{1}{2}$ 　　　　　 1

2) $\dfrac{2}{3} - \dfrac{1}{20}$

<-----+--------------+--------------+----->
　　 0　　　　　　 $\frac{1}{2}$ 　　　　　 1

3) $\dfrac{9}{10} - \dfrac{8}{9}$

<-----+--------------+--------------+----->
　　 0　　　　　　 $\frac{1}{2}$ 　　　　　 1

4) $\dfrac{5}{6} + \dfrac{1}{15}$

<-----+--------------+--------------+----->
　　 0　　　　　　 $\frac{1}{2}$ 　　　　　 1

5) $\dfrac{1}{3} + \dfrac{1}{100}$

<-----+--------------+--------------+----->
　　 0　　　　　　 $\frac{1}{2}$ 　　　　　 1

6) $\dfrac{3}{4} - \dfrac{4}{5}$

<-----+--------------+--------------+----->
　　 0　　　　　　 $\frac{1}{2}$ 　　　　　 1