

**REL-SE Research to Practice Bridge Event**

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**Fractions Instruction  
Aligned with Research  
and the Common Core  
State Standards**

$$\frac{19\frac{5}{8}}{2\frac{7}{8}} = \frac{2}{x+2}$$

$$\frac{1}{x+2} + \frac{15\frac{1}{4}}{2\frac{7}{8}} = \frac{2}{x}$$

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REGIONAL EDUCATIONAL  
LABORATORY SOUTHEAST    SCALING UP THE IMPLEMENTATION  
OF RIGOROUS ACADEMIC STANDARDS

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### Discuss with a partner

- How does Betsy use the number line to solve the problem or explain her solution?
- What does Betsy appear to understand about the number line?

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### Zooming in on elements of teaching and learning of fractions

- ① Exploring properties and conventions of the number line
- ② Analyzing student work: Identifying points on the number line
- ③ Comparing fractions using the number line
- ④ Adding and subtracting fraction: Using the number line

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### A number line task



- Use what you know about the number line to identify points A and B.
- What properties and conventions of the number line allow you to name these points?

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### Place the following numbers on the number line

$$\frac{2}{3} \quad \frac{1}{6} \quad \frac{3}{2} \quad -\frac{2}{3}$$



What do you notice about how you placed the numbers on the line?

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## Equivalence on the number line



- What is an equivalent name for the fraction  $\frac{2}{3}$ ?
- How can you use the number line to justify that it is an equivalent fraction?
- How can you use the number line to generate additional equivalent names for the fraction  $\frac{2}{3}$ ?

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## Revisiting the IES practice guide

**Recommendation #2:** Use number lines as a central representational tool in teaching and providing opportunities to compare fractions

Things to try :

- Make properties and conventions of the number line explicit to students
- Listen/watch for the properties and conventions that students use as they reason about numbers

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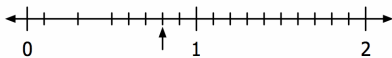
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## Labeling locations on the number line

What value should be written where the arrow is pointing?



How might 5<sup>th</sup> graders respond to this question?

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## Revisiting the IES practice guide

**Recommendation #2:** Use number lines as a central representational tool in teaching and providing opportunities to compare fractions

Things to try with students:

- Use tasks that enable you to see if students are attending to the whole and parts of equal length
- Have students consider the reasoning behind incorrect answers in order to make properties of the number line explicit

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## Fraction comparison problems

a)  $\frac{2}{10}$   $\frac{3}{4}$

d)  $\frac{11}{12}$   $\frac{15}{16}$

b)  $\frac{3}{7}$   $\frac{4}{7}$

e)  $\frac{2}{8}$   $\frac{1}{3}$

c)  $\frac{5}{8}$   $\frac{5}{9}$

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## Narrating the construction and use of a representation

- Make clear the mathematical problem or context.
- Describe how a particular representation is useful for this problem.
- Construct the representation and use it to solve the task while describing and giving meaning to each step.
- Summarize what the representation has helped to do.

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## Revisiting the IES practice guide

**Recommendation #2:** Use number lines as a central representational tool in teaching and providing opportunities to compare fractions

Things to try :

- Use the number line to support meaning making of different comparison strategies
- Make your reasoning for using a number line explicit
- Prepare to model the use of the number line, as well as to encourage students to talk about its use

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## Fraction addition and subtraction problems

a)  $\frac{7}{8} + \frac{1}{12}$       d)  $\frac{2}{3} - \frac{1}{6}$   
b)  $\frac{1}{2} + \frac{4}{8}$       e)  $\frac{2}{4} - \frac{3}{4}$   
c)  $\frac{2}{4} + \frac{3}{4}$

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## Problems that harness the power of the number line

How could the following problems provide useful experiences with number lines?

- ① The sum of  $\frac{7}{8} + \frac{1}{12}$  is closest to: a) 20 b) 8 c)  $\frac{1}{2}$  d) 1
- ② A class wants a plant to grow more than 1 foot. The first week it grew  $\frac{1}{2}$  of a foot. The next week it grew  $\frac{5}{8}$  of a foot. Have they reached their goal?
- ③ Tina has a giant licorice stick. She ate  $\frac{2}{3}$  of the licorice stick and gave  $\frac{1}{4}$  of licorice stick to her sister. How much of the licorice stick is left?
- ④ Try constructing one of your own...

Petit et al, 2010

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## Revisiting the IES practice guide

Recommendation #3: Help students understand why procedures for computations with fractions make sense.

Things to try :

- Use the number line to support meaning making of computational procedures
- Provide opportunities to use estimation to predict or judge answers
- Develop/select problems that expose and work through common misconceptions

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## Key Themes

- Fractions knowledge of both concepts and procedures are critical for algebra
- What are the Implications for teaching based on Recommendations #2 and #3?
- Why is the evidence only moderate for both of these recommendations?
- What surprised you the most?
- Questions?

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