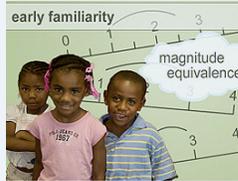




## PRESENTATION

5:40 min

[Full Details and Transcript](#)



## Recognizing Fractions as Numbers

May 2011

**Topic** DEVELOPING EFFECTIVE FRACTIONS INSTRUCTION FOR K-8

**Practice** FRACTIONS AS NUMBERS

- Highlights**
- » It is critical that students learn that fractions are numbers with magnitudes that represent quantities. The concept provides the conceptual basis for all operations with fractions.
  - » Measurement activities, such as working with fraction strips, are a good place to start because many students already have informal experiences to build on.
  - » Number lines are a key tool in helping children learn that fractions are numbers and for introducing fundamental concepts about rational numbers, such as magnitude and equivalence.
  - » Students should be able to:
    - » locate and compare fractions on a presegmented number line,
    - » compare fractions greater than 1 to whole numbers, and
    - » locate a fraction such as one-fourth or three-fourths when eighths have been labeled.
  - » More advanced work with number lines involves using parallel sets of labels, with each set showing fractions with different denominators.

- » The number line is a robust and flexible tool that can be used in many ways to build up the conceptual understanding that students need in order to make progress with rational numbers and understand algebra.

## Full Transcript



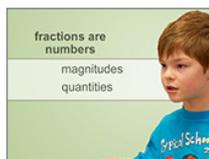
### Slide 1: Welcome

Welcome to the overview on Recognizing Fractions as Numbers.



### Slide 2: Beyond part-whole

Formal instruction about rational numbers usually begins in the primary grades with explorations of part-whole relationships. This approach connects strongly with students' intuitive understanding of what fractions are and how they work. But without further instruction on other interpretations of fractions, students may form misconceptions that will impede future comprehension.



### Slide 3: Fractions as numbers

It is critical that students learn that fractions are numbers with magnitudes that represent quantities—a concept that can be difficult to grasp.

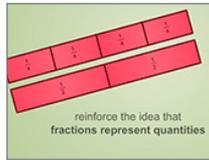
A solid understanding of fractions as numbers enables students to both relate fractions to whole numbers and compare fractions to other fractions. It provides the conceptual basis for all operations with fractions.



### Slide 4: Measurement

Measurement activities are a good place to start because many students already have informal experiences to build on, such as working with recipes or measuring heights.

Teachers can point out that fractions allow for more precise measurement of quantities than do whole numbers, and then measure objects using fractional parts.



### Slide 5: Fraction strips

Practice in measuring with tools such as lengths of paper, or “fraction strips,” reinforces the idea that fractions represent quantities.

Here, a student uses yellow fraction strips as whole units; she has measured objects in the room and recorded her findings. The chair is four fraction strips high; her foot is one fraction strip long.



### Slide 6: Basic equivalence

The stuffed bear, however, is more than one strip long but not as much as two. She addresses the problem by folding a yellow strip in half to measure the full length of the bear.

The teacher then gives her blue strips that are half as long as the yellow strips. The student experiments and finds different ways to measure the bear.

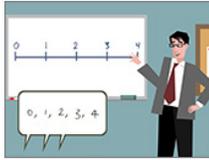
Practice with fraction strips is fun for children and develops a concept of equivalence.



### Slide 7: Number lines

Number lines are a key tool in helping children learn that fractions are numbers. Researchers have demonstrated that as early as preschool, children build number sense when they use number lines.

Students’ early familiarity with the number line makes it a useful tool for introducing fundamental concepts about rational numbers, such as magnitude and equivalence.



### Slide 8: Labeling fractions on the number line

Here, a second-grade teacher is using number lines to help students make the transition from working with whole numbers to working with fractions.

He asks the students to name the whole numbers with him (zero, one, two, three, four). The students then watch as he marks out fractional parts between zero and one (one-fourth, two-fourths, three-fourths) and asks students to count the segments with him. Then he has them label the marks.

The teacher asks students if they can think of another way to label one; he starts writing a fraction, putting four in the denominator, and then shows four-fourths.



### Slide 9: Locating fractions

With practice students will be able to:

- » Locate and compare fractions on a presegmented number line,
- » Compare fractions greater than one to whole numbers, and
- » Locate a fraction such as one-fourth or three-fourths when eighths have been labeled.



### Slide 10: Number line challenges

As students' understanding develops, teachers can use number lines to pose many challenges that build rational number concepts.

Is two-thirds closer to one or zero?

Where would we locate five-sevenths on a number line? What about seven-fifths?

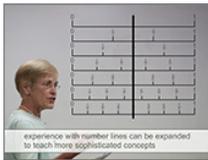
Compare several fractions with the same numerator, such as three-fourths, three-fifths, and three-sevenths.



### Slide 11: Comparing fractions

More advanced work with number lines involves using parallel sets of labels, with each set showing fractions with different denominators. For example, students could be asked to compare two-thirds and three-fourths and identify which is greater.

This use of the number line helps children develop understanding of the relative size of fractions.



### Slide 12: Equivalent fractions

As students progress, their experience with number lines can be expanded to teach more sophisticated concepts related to rational numbers, for example, that equivalent fractions describe the same magnitude.



### Slide 13: Density and negative fractions

The number line helps students understand that there are an infinite number of fractions between any two numbers.

And, for older students, number line experiences will come in handy when they are introduced to negative fractions.



### Slide 14: Decimals and percentages

On a number line, students can represent fractions as decimals and percentages. Different sets of labels help students compare the representations and see that three-fourths, 0.75, and 75% are equivalent.



### Slide 15: Overcoming misconceptions

The number line is a robust and flexible tool that can be used in many ways to build up the conceptual understanding that students need in order to make progress with rational numbers and understand algebra.

Children who have extensive experience with number lines won't be baffled by improper fractions and negative fractions. They will be less likely to think of fractions as made up of whole numbers and make operational mistakes such as trying to add fractions by adding numerators and adding denominators.

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