

## Math Success with DMTI

### THE FIVE INTERPRETATIONS OF FRACTIONS

In today's edition, we explore:

- The Five Interpretations of Fractions
- Why Understanding Multiple Views is Crucial
- Practical Teaching Strategies for Each Interpretation

### Educators!

This week, we are diving into fractions and exploring the five key interpretations that can unlock a deeper understanding for your students. Research shows that moving beyond the traditional "part-whole" model is essential for building a robust and flexible understanding of fractions, preparing students for success in advanced mathematics and real-world applications.

### Understanding the Five Interpretations of Fractions

Thomas Kieren's research identifies five crucial interpretations:

**Part-Whole:** The classic view of a fraction as representing a portion of a whole (e.g.,  $\frac{3}{4}$  is three parts of a whole unit partitioned into four equal parts).

**Measure:** Understanding fractions as points on a number line, representing quantities.

**Quotient:** Interpreting a fraction as a division problem (e.g.,  $\frac{5}{4}$  means 5 divided by 4).

**Ratio:** Viewing fractions as a comparison between two or more quantities (e.g., the ratio of girls to boys in a class is 3 to 2, 3:2 or  $\frac{3}{2}$ ).

**Operator:** Seeing fractions as transformations that enlarge or reduce quantities (e.g., multiplying a number by  $\frac{1}{2}$  shrinks it to half its size).

### Strategies for Teaching the Five Interpretations

- Research highlights several effective strategies for developing a comprehensive understanding of fractions:
- **Use Multiple Representations:** Employ iconic models like bar models, number lines, area models and real-world examples to illustrate each interpretation.

- **Connect to Prior Knowledge:** Introduce fraction concepts by building upon students' understanding of whole numbers and partitioning.
- **Emphasize Precise Language:** Clearly define the numerator as the count and the denominator as the unit size, which is named by the number of equivalent units formed by partitioning between 0 and 1.

## Effective Teaching Approaches

To successfully implement these strategies, consider the following approaches:

- **Use number lines** to represent fractions as quantities and measurements.
- **Encourage discussion** and explanation of strategies used in each interpretation.
- **Connect the interpretations** to show how they relate to each other and different mathematical operations.

## Classroom Tips

- Use squares, circles, and rectangles in grade 2 to represent part-whole relationships.
- First, utilize number lines and bar models to introduce fractions as a measure, and then area models and equations to teach addition, subtraction, multiplication, and division of fractions.
- Pose sharing problems to illustrate the quotient interpretation.
- Explore real-world ratios like the ratio of ingredients in a recipe.
- Use scaling activities to demonstrate fractions as operators.

## A Teacher's Perspective

*I didn't know these five interpretations. But once I learned them, I now know the differences among them and at what grade level they should be taught! Jeremy D., 5th Grade Teacher*

By emphasizing a multi-faceted understanding of fractions, we help students build the cognitive frameworks to support them throughout their mathematical careers. These approaches improve current performance and set students up for long-term achievement in mathematics and STEM fields.

How are you incorporating the five interpretations of fractions in your classroom? Email and let us know! We would love to share more questions, tips, and insights in future newsletters at [mathsuccess@dmti.org](mailto:mathsuccess@dmti.org) for our next newsletter!

**Keep developing mathematical thinking!**

#MathEducation #Fractions #ElementaryMath #TeachingMath #DMTI #DevelopingMathematicalThinkingInstitute  
#MathSuccess #FiveViewsOfFractions #Kieren #SusanLamon #JonathanBrendefur

## MORE INFORMATION

This is a quick summary of this topic, but if you want to download and read the research overview or watch the video, go to **Research Overviews** at [dmtiinstitute.com/research](https://dmtiinstitute.com/research)

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