

LET'S BE RATIONAL Understanding Fraction Operations

<p>Instructional Time and Investigations</p>	<p>20 days</p>	<ul style="list-style-type: none"> • Inv. 1: Extending Addition and Subtraction of Fractions (4 Problems) • Inv. 2: Building on Multiplication With Fractions (3 Problems) • Inv. 3: Dividing With Fractions (4 Problems) • Inv. 4: Wrapping Up the Operations (3 Problems) 	
<p>Goals</p>	<p>Numeric Estimation: Understand estimation as a tool for a variety of situations and develop strategies for estimating results of arithmetic operations.</p> <ul style="list-style-type: none"> • Estimation is an important part of reasoning quantitatively. It encourages making sense of a situation, allows you to recognize errors, and complements other problem solving skills. 	<p>Fraction Operations: Revisit and develop meanings for the four arithmetic operations and skill at using algorithms for each.</p> <ul style="list-style-type: none"> • To solve real world problems using arithmetic operations on fractions, it is important to first determine which operation (addition, subtraction, multiplication, or division) is appropriate for solving the problem. Modeling the operations provides understanding of why and when operations work. • For each operation, there is an efficient, general algorithm for computing with fractions that works in all cases. 	<p>Variables and Equations: Understand that variables can represent unknown values and that equations can represent relationships.</p> <ul style="list-style-type: none"> • Variables are used to represent unknown values in a number sentence. • Use fact families to solve for unknown values by rewriting an equation in an equivalent form using a different operation.
<p>Common Core Standards</p>	<p>Common Core Standards for Mathematical Practice</p> <p>MP.1: Make sense of problems and persevere in solving them.</p> <p>MP.2: Reason abstractly and quantitatively.</p> <p>MP.3: Construct viable arguments and critique the reasoning of others.</p> <p>MP.4: Model with mathematics.</p> <p>MP.5: Use appropriate tools strategically.</p> <p>MP.6: Attend to precision.</p> <p>MP.7: Look for and make use of structure.</p> <p>MP.8: Look for and express regularity in repeated reasoning.</p> <p>Common Core Content Standards</p> <p>6.NS.A.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.</p> <p>6.NS.B.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.</p> <p>6.NS.B.4 Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.</p> <p>6.EE.A.3 Apply the properties of operations to generate equivalent expressions.</p> <p>6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.</p> <p>6.EE.B7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.</p> <p>Also 6.EE.A.2, 6.EE.A.2a–c</p>		

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Content Connections to Other Units

Goals of the Unit	Prior Work	Future Work
<p>Numeric Estimation: Understand estimation as a tool for a variety of situations and develop strategies for estimating results of arithmetic operations.</p>	<ul style="list-style-type: none"> • Estimating answers to whole number operations (<i>Elementary School</i>) • Estimating the size of a fraction (<i>Comparing Bits and Pieces</i>) 	<ul style="list-style-type: none"> • Estimating answers to contextual problems. (All <i>CMP</i> Units)
<p>Fraction Operations: Revisit and develop meanings for the four arithmetic operations and skill at using algorithms for each.</p>	<ul style="list-style-type: none"> • Whole number operations (<i>Elementary School</i>) • Interpreting fractions as part-whole relationships; combining and comparing fractions, partitioning and repartitioning fractions, finding equivalent fractions, comparing ratios, finding equivalent ratios (<i>Elementary School; Comparing Bits and Pieces</i>) • Recognizing which operation to use with whole numbers (<i>Prime Time</i>) • Recognizing situations in which fractions represent numbers or ratios (<i>Comparing Bits and Pieces</i>) 	<ul style="list-style-type: none"> • Developing algorithms for finding the area and perimeter of two-dimensional shapes and the volume and surface area of three-dimensional shapes (<i>Covering and Surrounding; Filling and Wrapping; Say It With Symbols</i>) • Developing algorithms for integer computation (<i>Accentuate the Negative</i>) • Developing algorithms for decimal computation (<i>Decimal Ops</i>) • Applying fractions in studying probability (<i>What Do You Expect?</i>) • Applying ratios, proportions, and scale factors (<i>Stretching and Shrinking; Comparing and Scaling</i>) • Interpreting fractions as probabilities (<i>What Do You Expect?</i>) • Interpreting fractions as scale factors, ratios, and proportions (<i>Stretching and Shrinking; Comparing and Scaling</i>) • Interpreting fractions as constants and variable coefficients in linear and nonlinear equations and relationships (<i>Variables and Patterns; Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes; Say It With Symbols</i>) • Using fractions to understand integers (<i>Accentuate the Negative</i>) and irrational numbers (<i>Looking for Pythagoras</i>) • Interpreting and applying fractions (<i>Decimal Ops; What Do You Expect?; Samples and Populations</i>) • Recognizing which operation to use with rational and real numbers (all succeeding <i>CMP</i> Units especially <i>Accentuate the Negative, Looking for Pythagoras, and Function Junction</i>)
<p>Variables and Equations: Understand that variables can represent unknown values and equations to represent relationships.</p>	<ul style="list-style-type: none"> • Inverse operations in whole number settings, fact families (<i>Elementary School; Prime Time; Comparing Bits and Pieces</i>) 	<ul style="list-style-type: none"> • Inverse operations in decimal settings (<i>Decimal Ops</i>) and in integer settings (<i>Accentuate the Negative</i>) • Finding an unknown dimension given area or volume (<i>Covering and Surrounding; Filling and Wrapping</i>) • Solving algebraic equations (<i>Moving Straight Ahead; Thinking With Mathematical Models; Say It With Symbols</i>) • Recognizing patterns of change (<i>Variables and Patterns; Moving Straight Ahead; Thinking With Mathematical Models; Function Junction</i>)