

COMPARING BITS AND PIECES Ratios, Rational Numbers, and Equivalence

<p>Instructional Time and Investigations</p>	<p>24 $\frac{1}{2}$ days</p>	<ul style="list-style-type: none"> • Inv. 1: Making Comparisons (5 Problems) • Inv. 2: Connecting Ratios and Rates (3 Problems) • Inv. 3: Extending the Number Line (5 Problems) • Inv. 4: Working With Percents (3 Problems) 	
<p>Goals</p>	<p>Fractions as numbers: Understand fractions and decimals as numbers that can be located on the number line, compared, counted, partitioned, and decomposed.</p> <ul style="list-style-type: none"> • Rational numbers can be written in fraction form or decimal form and can be represented as points or distances on a number line. The absolute value of a number is its distance from 0 on the number line. A number-line representation is useful for ordering and comparing rational numbers. • Benchmarks are useful for estimating values of fractions and decimals. 	<p>Ratios as comparisons: Understand ratios as comparisons of two quantities.</p> <ul style="list-style-type: none"> • Ratios are comparisons between two numbers. You can scale ratios to make equivalent ratios. Percents are ratios where 100 parts represent the whole. • A rate is a particular kind of ratio, where the amounts compared are in different units. A unit rate is a ratio in which one of the quantities being compared has a value of 1. 	<p>Equivalence: Understand equivalence of fractions and ratios, and use equivalence to solve problems.</p> <ul style="list-style-type: none"> • Fractions and decimals can be renamed or repartitioned to find equivalent fractions or decimals. Equivalence is useful for moving between fraction and decimal representations and for solving problems. Equivalent ratios represent the same relationship between quantities.
<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.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.</p> <p>6.RP.A.2 Understand the concept of a unit rate a/b associated with a ratio $a : b$ with $b \neq 0$, and use rate language in the context of a ratio relationship.</p> <p>6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.</p> <p>6.NS.C.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.</p> <p>6.NS.C.6 Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.</p> <p>6.NS.C.7 Understand ordering and absolute value of rational numbers</p> <p>Also 6.RP.A, 6.RP.A.3a–c, 6.NS.B.4, 6.NS.C.6a, 6.NS.C.6c, 6.NS.C.7a–d</p>		

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Content Connections to Other Units

Goals of the Unit	Prior Work	Future Work
<p>Fractions as numbers: Understand fractions and decimals as numbers that can be located on the number line, compared, counted, partitioned, and decomposed.</p>	<ul style="list-style-type: none"> • Division of whole numbers; comparing whole numbers; equivalence of fractions; addition and subtraction of simple fractions (<i>Elementary School</i>) • Finding the least common multiple and greatest common multiple; exploring multiples of 10 (<i>Prime Time</i>) 	<ul style="list-style-type: none"> • Developing algorithms for performing calculations with fractions (<i>Let's Be Rational</i>) • Developing algorithms and performing calculations with decimals (<i>Decimal Ops</i>) • Extending algorithms for performing calculations with rational numbers (<i>Accentuate the Negative</i>) • Using scale factors (<i>Stretching and Shrinking; Comparing and Scaling</i>) • Applying rational numbers (<i>Covering and Surrounding; Comparing and Scaling</i>) • Using decimals to express, compare, and work with very large or very small numbers (<i>Data About Us; Growing, Growing, Growing</i>) • Using scale factors to identify and find equivalent expressions (<i>Say It With Symbols; It's In the System</i>)
<p>Ratios as comparisons: Understand ratios as comparisons of two numbers.</p>	<ul style="list-style-type: none"> • Division of whole numbers; comparing whole numbers and fractions; equivalence of fractions; addition and subtraction of simple fractions (<i>Elementary School</i>) • Finding the least common multiple and greatest common multiple; exploring multiples of 10 (<i>Prime Time</i>) 	<ul style="list-style-type: none"> • Using ratios, decimals, and percents as expressions of probability (<i>What Do You Expect?</i>) • Using ratio and decimals as expressions of slope or variable coefficients in equations (<i>Variables and Patterns; Comparing and Scaling; Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes; Say It With Symbols; Function Junction</i>) • Connecting fractions, decimals, percents, and ratios by interpreting percents as decimals, fractions, and ratios (<i>Let's Be Rational; Decimal Ops; Comparing and Scaling</i>) • Using scale factors to identify and find equivalent expressions (<i>Say It With Symbols; It's In the System</i>).
<p>Equivalence: Understand equivalence of fractions and ratios, and use equivalence to solve problems.</p>	<ul style="list-style-type: none"> • Comparing fractions; equivalence of fractions (<i>Elementary School</i>) 	<ul style="list-style-type: none"> • Using fractions, decimals, and percents as expressions of probability ratios (<i>What Do You Expect?</i>) • Extending fractions to the set of rational, real and complex numbers (<i>Accentuate the Negative; Looking for Pythagoras; Function Junction</i>) • Using fractions and decimals as slope or variable coefficients in equations (<i>Variables and Patterns; Comparing and Scaling; Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes; Say It With Symbols</i>) • Connecting fractions, decimals, percents, and ratios by interpreting percents as decimals, fractions, or ratios (<i>Let's Be Rational; Decimal Ops; Comparing and Scaling</i>)