

PRIME TIME Factors and Multiples

<p>Instructional Time and Investigations</p>	<p>22 days</p>	<ul style="list-style-type: none"> • Inv. 1: Building on Factors and Multiples (4 Problems) • Inv. 2: Common Multiples and Common Factors (3 Problems) • Inv. 3: Factorizations: Searching for Factor Strings (4 Problems) • Inv. 4: Linking Multiplication and Addition: The Distributive Property (4 Problems)
<p>Goals</p>	<p>Factors & Multiples: Understand relationships among factors, multiples, divisors, and products.</p> <ul style="list-style-type: none"> • If a number N can be written as a product of two whole numbers, $N = a \times b$, then a and b are factors of N. Multiples of a can be found using the expression $a \times$ (some whole number), such as $2a$, $3a$, $4a$, etc. Some numbers can be expressed in exponential notation, such as a^2, a^3, a^4, etc. • When all factors of a number are broken down into prime numbers, you have a unique prime factorization. Finding the prime factorization of two numbers can be useful in finding the least common multiple and greatest common factor of the numbers and in classifying numbers as prime, composite, even, odd, or square. 	<p>Equivalent Expressions: Understand why two expressions are equivalent.</p> <ul style="list-style-type: none"> • When calculating the value of an expression, the operations have to be performed in a conventional order, the order of operations. • Sometimes a numerical expression can be written in different ways but the expressions are equivalent because the value is the same. Properties of operations, including the Distributive Property, are essential tools for writing equivalent expressions.
<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.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.1: Write and evaluate numerical expressions involving whole-number exponents</p> <p>6.EE.A.3 Apply the properties of operations to generate equivalent expressions.</p> <p>Also 6.EE.A.2a–c, 6.EE.A.4</p>

PRIME TIME Factors and Multiples

Content Connections to Other Units

Goals of the Unit	Prior Work	Future Work
<p>Factors and Multiples: Understand relationships among factors, multiples, divisors, and products.</p>	<ul style="list-style-type: none"> Learning and applying multiplication and division facts; applying the division algorithm; counting by 2's, 3's, 10's, etc.; testing numbers for divisibility; comparing positive whole numbers; finding equivalent fractions (<i>Elementary School</i>) 	<ul style="list-style-type: none"> Performing arithmetic operations with fractions (<i>Comparing Bits and Pieces; Let's Be Rational; Decimal Ops</i>) Performing arithmetic operations with integers and rational numbers (<i>Accentuate the Negative</i>) Comparing, scaling, and testing for similarity (<i>Stretching and Shrinking; Comparing and Scaling</i>) Factoring algebraic expressions (<i>Frogs, Fleas, and Painted Cubes; It's In the System; Function Junction</i>) Understanding decimal numbers and the concept of place value (<i>Comparing Bits and Pieces; Let's Be Rational; Decimal Ops; Comparing and Scaling</i>) Identifying and analyzing patterns in the products of two numbers (<i>Covering and Surrounding; Variables and Patterns; Accentuate the Negative; Moving Straight Ahead; It's In the System</i>) Finding the LCM in order to find common denominators for fractions and ratios (<i>Comparing Bits and Pieces; Let's Be Rational; Decimal Ops; Comparing and Scaling</i>) Studying patterns in multiplicative relationships to develop algorithms for finding area, surface area, and volume of figures (<i>Covering and Surrounding; Filling and Wrapping</i>) Studying patterns in additive and multiplicative sequences (<i>Function Junction</i>) Identifying irrational numbers (<i>Looking for Pythagoras</i>) Studying exponential relationships (<i>Growing, Growing, Growing</i>) Classifying numbers as positive or negative (<i>Accentuate the Negative</i>) and as rational or irrational (<i>Looking for Pythagoras</i>) Classifying relationships as linear, quadratic, or exponential (<i>Variables and Patterns; Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes; Say It With Symbols</i>)
<p>Equivalent Expressions: Understand why two expressions are equivalent.</p>	<ul style="list-style-type: none"> Developing algorithms for operations on whole numbers and using more than one of them to solve a problem (<i>Elementary School</i>) Developing algorithms for finding sums and products of whole numbers and fractions and for finding the area of rectangle (<i>Elementary School</i>) 	<ul style="list-style-type: none"> Developing order of operations with decimals (<i>Decimal Ops</i>), integers (<i>Accentuate the Negative</i>), and algebraic expressions (<i>Variables and Patterns; Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing; Frogs, Fleas and Painted Cubes; Say It With Symbols</i>) Developing algorithms for finding sums and products of rational numbers (<i>Let's Be Rational; Decimal Ops; Accentuate the Negative</i>) and for finding equivalent algebraic expressions (<i>Variables and Patterns; Moving Straight Ahead; Thinking With Mathematical Models; Frogs, Fleas, and Painted Cubes; Say It With Symbols; It's In the System; Function Junction</i>)

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>		

COMPARING BITS AND PIECES Ratios, Rational Numbers, and Equivalence

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>)

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>		

LET'S BE RATIONAL Understanding Fraction Operations

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>)

COVERING AND SURROUNDING Two-Dimensional Measurement

<p>Instructional Time and Investigations</p>	<p>22 $\frac{1}{2}$ days</p>	<ul style="list-style-type: none"> • Inv. 1: Designing Bumper Cars: Extending and Building on Area and Perimeter (3 Problems) • Inv. 2: Measuring Triangles (4 Problems) • Inv. 3: Measuring Parallelograms (4 Problems) • Inv. 4: Measuring Surface Area and Volume (3 Problems) 	
<p>Goals</p>	<p>Area and Perimeter: Understand area and perimeter as a measure.</p> <ul style="list-style-type: none"> • Perimeter is a measure of linear units needed to surround a two-dimensional shape and that area is a measure of square units needed to cover a two-dimensional shape. • A fixed number of area units can be enclosed by many different perimeters, and a fixed number of perimeter units can enclose many different areas. • Formulas for the area and perimeter of a rectangle can help you solve problems by reasoning about the relationship between values. 	<p>Area and Perimeter of Parallelograms and Triangles: Understand area and perimeter of parallelograms and triangles.</p> <ul style="list-style-type: none"> • Linear measurements of the base, height, and slanted height of parallelograms and triangles are essential to finding the area and perimeter of these shapes. • The area of a triangle and the area of a parallelogram are related to each other and to the area of a rectangle. • There are many triangles (and parallelograms) that can be drawn with the same base and height. • Polygons and irregular figures can be decomposed into triangles and rectangles to find the area of the figures. 	<p>Surface Area of Prisms and Pyramids and Volume of Rectangular Prisms: Understand the surface area and volume of a three-dimensional shape.</p> <ul style="list-style-type: none"> • The volume of a prism is a measure in cubic units of the capacity of the prism and can be thought of as multiplying a base layer of unit cubes by the number of layers needed to fill the prism. • Surface areas of three-dimensional solids can be found by adding the areas of the faces.
<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.EE.C.9: Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.</p> <p>6.G.A.1: Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.</p> <p>6.G.A.2: Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.</p> <p>Also 6.NS.C.8, 6.EE.A.2, 6.EE.A.2a, 6.EE.A.2c, 6.EE.A.3, 6.EE.A.4, 6.EE.B.6, 6.G.A.3, 6.G.A.4</p>		

COVERING AND SURROUNDING Two-Dimensional Measurement

Content Connections to Other Units

Goals of the Unit	Prior Work	Future Work
<p>Area and Perimeter: Understand area and perimeter as a measure.</p>	<ul style="list-style-type: none"> • Side lengths of polygons (<i>Elementary School</i>) • Finding area of rectangles by covering and counting (<i>Elementary School</i>) • Finding area of nonrectangular shapes by composing and decomposing into rectangles (<i>Elementary School</i>) • Exploring the relationship between area and perimeter (<i>Elementary School</i>) 	<ul style="list-style-type: none"> • Finding the area and side lengths of shapes on a coordinate grid (<i>Looking for Pythagoras</i>) • Studying two-dimensional (surface area, square units) and three-dimensional (volume, cubic units) measures of figures (<i>Decimal Ops; Accentuate the Negative; Stretching and Shrinking; Filling and Wrapping; Frogs, Fleas, and Painted Cubes; Say It With Symbols</i>)
<p>Area and Perimeter of Parallelograms and Triangles: Understand area and perimeter of parallelograms and triangles.</p>	<ul style="list-style-type: none"> • Finding area of nonrectangular shapes by composing and decomposing into rectangles (<i>Elementary School</i>) • Exploring the relationship between area and perimeter (<i>Elementary School</i>) 	<ul style="list-style-type: none"> • Finding the area and side lengths of shapes on a coordinate grid (<i>Looking for Pythagoras</i>) • Studying two-dimensional (surface area, square units) and three-dimensional (volume, cubic units) measures of figures (<i>Filling and Wrapping; Say It With Symbols</i>)
<p>Surface Area of Prisms and Pyramids and Volume of Rectangular Prisms: Understand the surface area and volume of a three-dimensional shape.</p>	<ul style="list-style-type: none"> • Using rectangular models to perform operations with rational numbers, understand the Distributive Property, and find factor pairs of whole numbers (<i>Prime Time, Let's Be Rational</i>) • Collecting data and looking for and generalizing patterns (<i>Prime Time</i>) • Performing operations with rational numbers; estimating sums of rational numbers (<i>Prime Time, Let's Be Rational</i>) 	<ul style="list-style-type: none"> • Studying two-dimensional (surface area, square units) and three-dimensional (volume, cubic units) measures of figures • Finding surface area and volume of three-dimensional figures (<i>Filling and Wrapping</i>) • Studying the relationship between the dimensions and volume of a prism (<i>Filling and Wrapping; Say It With Symbols</i>) • Developing strategies and algorithms for finding the surface area and volume of prisms, cylinders, cones, and spheres (<i>Filling and Wrapping; Say It With Symbols</i>) • Using the Distributive Property to solve equations and factor algebraic expressions (<i>Decimal Ops; Accentuate the Negative; Moving Straight Ahead; Frogs, Fleas, and Painted Cubes</i>) • Comparing areas of two-dimensional shapes to test for similarity (<i>Stretching and Shrinking</i>)

DECIMAL OPS: Computing with Decimals and Percents

<p>Instructional Time and Investigations</p>	<p>23 days</p>	<ul style="list-style-type: none"> • Inv. 1: Decimal Operations and Estimation (3 Problems) • Inv. 2: Adding and Subtracting Decimals (3 Problems) • Inv. 3: Multiplying and Dividing Decimals (5 Problems) • Inv. 4: Using Percents (4 Problems)
<p>Goals</p>	<p>Numeric Estimation: Understand that estimation can be used as a tool in a variety of situations to solve problems.</p> <ul style="list-style-type: none"> • Estimation is an important part of reasoning quantitatively. It helps you make sense of a situation, allows you to recognize errors, and complements other problem solving skills. 	<p>Decimal Operations: Continue to develop meanings for the four arithmetic operations on rational numbers.</p> <ul style="list-style-type: none"> • The standard algorithm for dividing decimals is supported by the connections between fraction and decimal operations. • Fluency with decimal operations allows you to solve a variety of problems involving ratios and percents. • Understanding why an algorithm works helps you recognize when the algorithm is appropriate to use to solve a problem.
	<p>Variables and Number Sentences: Use variables to represent unknown values and number sentences to represent relationships between values.</p> <ul style="list-style-type: none"> • Writing number sentences to represent relationships between both real-world and abstract values contributes to an initial understanding of algebra. • Fact families can be used to write and solve equivalent number sentences. 	<p>Percents: Develop understanding of percents through various contexts.</p> <ul style="list-style-type: none"> • Using models for percent helps you to develop the meaning of percent and to solve problems involving sales tax, tips, discounts, and percent increases.
<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.B.3: Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.</p> <p>6.EE.A.3: Apply the properties of operations to generate equivalent expressions.</p> <p>Also 6.RP.A.1, 6.RP.A.2, 6.RP.A.3, 6.RP.A.3b-c, 6.NS.A.1, 6.NS.B.2, 6.EE.A.2, 6.EE.A.2a, 6.EE.B.5, 6.EE.B.6, 6.EE.B.7</p>

DECIMAL OPS: Computing with Decimals and Percents

Content Connections to Other Units

Goals of the Unit	Prior Work	Future Work
<p>Numeric Estimation: Understand that estimation can be used as a tool in a variety of situations to solve problems.</p>	<ul style="list-style-type: none"> Connecting fractions, decimals, and percents to check the reasonableness of answers, estimating to check reasonableness of answers (<i>Comparing Bits and Pieces</i>) 	<ul style="list-style-type: none"> Connecting fractions, decimals, and percents to check the reasonableness of answers, estimating to check reasonableness of answers (<i>Stretching and Shrinking; Comparing and Scaling; Growing, Growing, Growing</i>)
<p>Decimal Operations: Continue to develop meanings for the four arithmetic operations on rational numbers.</p>	<ul style="list-style-type: none"> Developing and applying algorithms for performing decimal calculations (<i>Let's Be Rational</i>) Developing algorithms for finding the area and perimeter of two-dimensional shapes (<i>Covering and Surrounding</i>) Interpreting decimals as fractions; understanding place value of decimals; combining and comparing decimals (<i>Comparing Bits and Pieces</i>) Performing mathematical operations with fractions (<i>Let's Be Rational</i>) Inverse operations in whole number settings (<i>Elementary School</i>) and in fraction settings (<i>Let's Be Rational</i>) Finding an unknown dimension when given area (<i>Covering and Surrounding</i>) 	<ul style="list-style-type: none"> Interpreting decimals as probabilities (<i>What Do You Expect?; Samples and Populations</i>) and as scale factors, ratios, and proportions (<i>Stretching and Shrinking</i>) Using decimals in scientific notation (<i>Growing, Growing, Growing</i>) Interpreting decimals 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; It's In the System</i>) Using decimals to understand integers and real numbers (<i>Accentuate the Negative; Looking for Pythagoras</i>) Developing algorithms for finding the volume and surface area of three-dimensional shapes (<i>Filling and Wrapping</i>) Developing algorithms for integer computation (<i>Accentuate the Negative</i>) Applying decimals in studying probability (<i>What Do You Expect?; Samples and Populations</i>) Applying ratios, proportions, and scale factors (<i>Stretching and Shrinking; Comparing and Scaling; Moving Straight Ahead; Thinking With Mathematical Models</i>) Inverse operations in integer settings (<i>Accentuate the Negative</i>) Solving algebraic equations (<i>Variables and Patterns; Moving Straight Ahead; Thinking With Mathematical Models; Say It With Symbols; It's In the System; Function Junction</i>) Recognizing patterns of change (<i>Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes; It's In the System; Function Junction</i>)
<p>Variables and Number Sentences: Use variables to represent unknown values and number sentences to represent relationships between values.</p>	<ul style="list-style-type: none"> Inverse operations in whole number settings (<i>Elementary School</i>) and in fraction settings (<i>Let's Be Rational</i>) Finding an unknown dimension when given area (<i>Covering and Surrounding</i>) 	<ul style="list-style-type: none"> Inverse operations in integer settings (<i>Accentuate the Negative; Filling and Wrapping</i>) Writing and solving algebraic equations (<i>Variables and Patterns; Moving Straight Ahead; Thinking With Mathematical Models; Say It With Symbols; It's In The System</i>) Recognizing patterns of change (<i>Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes; Function Junction</i>)
<p>Percents: Develop understanding of percents through various contexts.</p>	<ul style="list-style-type: none"> Connecting fractions, decimals, and percents to check the reasonableness of answers, estimating to check reasonableness of answers (<i>Comparing Bits and Pieces</i>) Developing and applying algorithms for performing fraction calculations (<i>Let's Be Rational</i>) Defining, comparing, and applying percents (<i>Comparing Bits and Pieces</i>) 	<ul style="list-style-type: none"> Interpreting percents as probabilities (<i>What Do You Expect?; Samples and Populations</i>) Applying percents to analyze data (<i>Data About Us; Samples and Populations</i>) Understanding percents in exponential growth and decay (<i>Growing, Growing, Growing</i>)

VARIABLES AND PATTERNS Introducing Algebra

<p>Instructional Time and Investigations</p>	<p>$25 \frac{1}{2}$ days</p>	<ul style="list-style-type: none"> • Inv. 1: Variable, Tables, and Graphs (4 Problems) • Inv. 2: Analyzing Relationships Among Variables (4 Problems) • Inv. 3: Relating Variables With Equations (4 Problems) • Inv. 4: Expressions, Equations, and Inequalities (5 Problems)
<p>Goals</p>	<p>Variables and Patterns (Relationships): Develop understanding of variables and how they are related.</p> <ul style="list-style-type: none"> • In many real-world situations, one variable quantity depends on another. Tables, graphs, and equations are various representations that can be used to better understand the pattern of change between variable quantities. • Not all relationships are linear. Linear relationships have a constant rate of change between variables and are written in the form $y = mx$, $y = b + x$, and $y = b + mx$. 	<p>Expressions and Equations: Develop understanding of expressions and equations.</p> <ul style="list-style-type: none"> • There is more than one way to write an expression to model a real world situation. Properties of operations allow you to generate equivalent expressions and check equivalence. • Solutions for equations and inequalities can be found by examining the table or graph of the equation or by rewriting it as a related equation.
<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.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.8 Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distance between points with the same first coordinate or the same second coordinate.</p> <p>6.EE.A.3 Apply the properties of operations to generate equivalent expressions.</p> <p>6.EE.B.7 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 and q and x are all nonnegative rational numbers.</p> <p>6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.</p> <p>Also 6.RP.A.2, 6.RP.A.3a–b, 6.RP.A.3d, 6.NS.C.6, 6.NS.C.6b–c, 6.EE.A.1, 6.EE.A.2, 6.EE.A.2a–c, 6.EE.A.4, 6.EE.B.5, 6.EE.B.6, 6.EE.B.8</p>

VARIABLES AND PATTERNS Focus on Algebra

Content Connections to Other Units

Goals of the Unit	Prior Work	Future Work
<p>Variables and Patterns (Relationships): Develop understanding of variables and how they are related.</p>	<ul style="list-style-type: none"> Analyzing patterns to develop concepts of area and volume (<i>Covering and Surrounding</i>) Developing algorithms for operations of fractions and decimals (<i>Let's Be Rational; Decimal Ops</i>) Identifying patterns in number and geometry (<i>Prime Time; Covering and Surrounding</i>) Analyzing maximum and minimum values in measurement (<i>Covering and Surrounding</i>) Organizing, displaying, and interpreting data in one- and two- dimensional graphs and tables (<i>Data About Us</i>) Constructing graphs of the relationship between the dimensions and area of a rectangle when the perimeter is held constant (<i>Covering and Surrounding</i>) 	<ul style="list-style-type: none"> Gathering data by conducting trials of an experiment and organizing data in tables and graphs in order to look for patterns and relationships (<i>Data About Us; What Do You Expect?; Thinking With Mathematical Models</i>) Analyzing patterns to develop concepts of surface area and volume (<i>Filling and Wrapping</i>) Understanding the relationship between edge lengths and surface area and volume of three-dimensional figures (<i>Stretching and Shrinking; Filling and Wrapping</i>) Studying data to develop the concept of linear, exponential, and quadratic functions (<i>Moving Straight Ahead; Growing, Growing, Growing; Frogs, Fleas and Painted Cubes</i>) Gathering and analyzing data about populations (<i>Samples and Populations</i>) Identifying maximum and minimum values for a mathematical model or equation (<i>Thinking with Mathematical Models; Frogs, Fleas, and Painted Cubes; Function Junction</i>) Extending tables and graphs to include negative coordinates and quantities (<i>Accentuate the Negative</i>) Formalizing understandings of linear equations in $y = mx + b$ form (<i>Comparing and Scaling; Moving Straight Ahead</i>) Studying and developing mathematical models (<i>Thinking With Mathematical Models</i>) Identifying and studying nonlinear patterns of growth (<i>Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes; Function Junction</i>) Identifying patterns of inverse variation (<i>Thinking With Mathematical Models</i>)
<p>Expressions and Equations: Develop understanding of expressions and equations.</p>	<ul style="list-style-type: none"> Developing operation algorithms for fractions, decimals, and percents (<i>Comparing Bits and Pieces; Let's Be Rational</i>) Developing rules for perimeter (<i>Covering and Surrounding</i>) Using four function calculators for computation (<i>Prime Time; Let's Be Rational; Decimal Ops</i>) 	<ul style="list-style-type: none"> Expressing linear relationships in $y = mx + b$ form (<i>Moving Straight Ahead</i>) Describing situations with linear models or equations (<i>Thinking With Mathematical Models</i>) Developing strategies for expressing linear relationships in symbols and for solving linear equations (<i>Moving Straight Ahead; Say It With Symbols</i>) Developing exponential and quadratic relationships (<i>Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes; Function Junction</i>) Developing strategies for solving simultaneous linear equations (<i>It's In the System</i>) Developing the quadratic formula (<i>Function Junction</i>) Using graphing calculators to graph and compare functions (<i>Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes; Say It With Symbols; It's In the System; Function Junction</i>)

DATA ABOUT US Statistics and Data Analysis

<p>Instructional Time and Investigations</p>	<p>$22\frac{1}{2}$ days</p>	<ul style="list-style-type: none"> • Inv. 1: What’s in a Name? Organizing, Representing, and Describing Data (3 Problems) • Inv. 2: Who’s in Your Household? Using the Mean (4 Problems) • Inv. 3: What’s Your Favorite ...? Measuring Variability (3 Problems) • Inv. 4: What Numbers Describe Us? Using Graphs to Group Data (3 Problems)
<p>Goals</p>	<p>Statistical Process: Understand and use the process of statistical investigation.</p> <ul style="list-style-type: none"> • The process of statistical investigation involves posing questions, collecting and analyzing data, and interpreting answers. 	<p>Attributes of Data: Distinguish data and data types.</p> <ul style="list-style-type: none"> • The answers to a statistical question are called data. Data can be either numerical or categorical.
	<p>Data Displays: Understand the role of multiple representations of data distributions.</p> <ul style="list-style-type: none"> • Finding measures of center or variability and graphing data are useful for summarizing the information in a variable data set. Visual representations of a data set can help you interpret the measures of center and spread and relate this to the overall shape of the representation. 	<p>Measures of Central Tendency and Variability: Understand that a single number may be used to characterize the center of a distribution of data and the degree of variability (or spread).</p> <ul style="list-style-type: none"> • There are several ways to try to say what is typical of a set of data; in each case a single number, called a measure of center, summarizes the data. Because various measures of center are calculated differently, they respond differently to changes in the data or to unusual data values. • The variability of a set of data can be measured, interpreted, and compared with the variability of other data sets. Measures of variability tell you how spread out the data are in relation to each other or to the center.
<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.SPA.1: Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.</p> <p>6.SPA.2: Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.</p> <p>6.SPA.3: Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.</p> <p>6.SP.B.4: Display numerical data in plots on a number line, including dot plots, histograms, and box plots.</p> <p>6.SP.B.5: Summarize numerical data sets in relation to their context.</p> <p>Also 6.RP.A.3, 6.RP.A.3a, 6.SP.B.5a–d, 6.NS.C.6, 6.NS.C.7</p>

DATA ABOUT US Statistics and Data Analysis

Content Connections to Other Units

Goals of the Unit	Prior Work	Future Work
<p>Statistical Process: Understand and use the process of statistical investigation.</p> <p>Attributes of Data: Distinguish data and data types.</p>	<ul style="list-style-type: none"> Analyzing and classifying counting and rational numbers (<i>Prime Time; Comparing Bits and Pieces; Let's Be Rational; Decimal Ops</i>). 	<ul style="list-style-type: none"> Gathering and organizing data collected from conducting experiments or trials of games (<i>What Do You Expect?; Samples and Populations; Thinking With Mathematical Models</i>)
<p>Data Displays: Understand the role of multiple representations of data distributions.</p>	<ul style="list-style-type: none"> Representing the number of factors of a counting number (<i>Prime Time</i>) Graphing rectangular lengths and widths with constant perimeter or constant area (<i>Covering and Surrounding</i>) 	<ul style="list-style-type: none"> Representing data to aid with statistical analysis (<i>Samples and Populations; Thinking With Mathematical Models</i>)
<p>Measures of Central Tendency and Variability: Understand that a single number may be used to characterize the center of a distribution of data and the degree of variability (or spread).</p>	<ul style="list-style-type: none"> Ordering numbers from least to greatest, counting (<i>Elementary School; Comparing Bits and Pieces; Let's Be Rational; Decimal Ops</i>) Comparing, counting, and ordering numbers (<i>Elementary School</i>) Using arithmetic operations (particularly addition and division); learning the meaning of rational numbers (<i>Elementary School; Prime Time; Comparing Bits and Pieces; Let's Be Rational; Decimal Ops</i>) 	<ul style="list-style-type: none"> Using measures of center and variability to make inferences and predictions about events or populations (<i>Samples and Populations; Thinking With Mathematical Models</i>) Using variability in data sets to make judgments about the accuracy and reliability of the data and to make inferences and predictions about the group to which the data pertains (<i>Samples and Populations; Thinking With Mathematical Models</i>) Developing further understanding about what measures of center do or do not measure about a data set using the measures of center and variability to make inferences and predictions about the group to which the data pertains (<i>Samples and Populations; Thinking With Mathematical Models</i>)