

1

Composing and Decomposing

Pacing: 34 Days

Topic 1: Factors and Area

Students compose and decompose shapes, using properties of arithmetic and the additive property of area. Students review the connection of multiplication with area. They look for commonalities between numbers, specifically least common multiples and greatest common factors.

Standards: 6.G.1, 6.EE.2.b, 6.EE.3, 6.NS.4 **Pacing:** 12 Days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
1	Taking Apart Numbers and Shapes Writing Equivalent Expressions Using the Distributive Property	6.EE.2.b 6.EE.3	1	Students use the Distributive Property to decompose and compose numerical expressions to create equivalent representations.	<ul style="list-style-type: none"> Equivalent expressions can be rewritten using properties. The area of a rectangle is the product of its length and width. An area model with whole-number side lengths a and $(b + c)$ can be used to illustrate the Distributive Property. The Distributive Property of Multiplication over Addition states that for any numbers a, b, and c, $a(b + c) = ab + ac$.
2	All About that Base ... and Height Area of Triangles and Quadrilaterals	6.G.1	2	Students use previously learned knowledge of area to determine areas of a variety of triangles and quadrilaterals.	<ul style="list-style-type: none"> The formula for the area of a rectangle is $A = lw$, where A is the area of the rectangle, l is the length of the rectangle and w is the width of the rectangle. The formula for the area of a parallelogram is $A = bh$, where A is the area of the parallelogram, b is the length of the base of the parallelogram, and h is the height of the parallelogram. The formula for the area of a triangle is $A = 1/2bh$, where A is the area of the triangle, b is the length of the base of the triangle, and h is the height of the triangle. The formula for the area of a trapezoid is $A = 1/2 h(b^1 + b^2)$, where A is the area of the trapezoid, h is the height of the trapezoid, and b^1 and b^2 are bases.
3	Slicing and Dicing Composite Figures	6.G.1	2	Students calculate the areas of complex geometric shapes and shapes found in the real-world by decomposing into shapes with known area formulas.	<ul style="list-style-type: none"> The area of a complex shape can be determined by decomposing the shape into rectangles, parallelograms, or triangles. The areas of real-world objects can be determined by decomposing the object into shapes with known areas.
4	Searching for Common Ground Common Factors and Common Multiples	6.NS.4	2	Students use prime factorization and tables to organize factors and multiplies and are introduced to least common multiple (LCM) and greatest common factor (GCF).	<ul style="list-style-type: none"> All numbers have factors. Prime factorization can be used to determine common factors and common multiples of two numbers. The greatest common factor (GCF) of two numbers is the largest factor shared by the two numbers. The least common multiple (LCM) of two numbers is the smallest non-zero multiple shared by the two numbers. Equivalent expressions can be generated using the associative, commutative, and distributive properties.

*Pacing listed in 45-minute days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
5	Composing and Decomposing Numbers Least Common Multiple and Greatest Common Factor	6.NS.4	1	Students use the greatest common factor (GCF) and least common multiple (LCM) to solve real-world and mathematical problems.	<ul style="list-style-type: none"> • Prime factorization can be used to determine common factors and common multiples of two numbers. • The greatest common factor (GCF) of two numbers is the largest factor shared by the two numbers. • The least common multiple (LCM) of two numbers is the smallest non-zero multiple shared by the two numbers. • Equivalent expressions can be generated using the distributive property and the GCF. • If two numbers a and b are relatively prime, then the $gcf(a, b) = 1$ and the $lcm(a, b) = ab$.
	Learning Individually with MATHia or Skills Practice	6.EE.1 6.G.1	4	<p>Students use the Commutative, Associative, and Distributive Properties to rewrite numeric expressions. Students practice calculating the areas of parallelograms, trapezoids, triangles, and composite figures in mathematical and real-world situations.</p> <p>MATHia Unit: Number Properties MATHia Workspaces: Commutative and Associative Properties / Exploring the Distributive Property with Numeric Expressions / Using the Distributive Property with Numeric Expressions / Identifying Greatest Common Factors and Least Common Multiples</p> <p>MATHia Unit: Area MATHia Workspaces: Calculating Areas of Rectangles / Developing Area Formulas / Calculating Area of Various Figures / Solving Area Problems / Calculating Area of Composite Figures</p>	

Topic 2: Positive Rational Numbers

Students order positive rational numbers written in different forms. They review using models for fraction multiplication, and then they use models to develop an understanding of division of a fraction by a fraction.

Standard: 6.NS.1 **Pacing:** 8 Days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
1	Thinking Rationally Identifying and Ordering Rational Numbers	6.NS.1	2	Students identify and order rational numbers written in different forms using benchmark and equivalent fractions.	<ul style="list-style-type: none"> Benchmark fractions are common fractions used to estimate the value of fractions such as 0, $\frac{1}{2}$, and 1. A fraction is close to 0 when the numerator is very small compared to the denominator. A fraction is close to $\frac{1}{2}$ when the numerator is about half the size of the denominator. A fraction is close to 1 when the numerator is very close in size to the denominator. An inequality is a statement that represents that one number is either less than or greater than another number.
2	Did You Get the Part? Multiplying and Dividing with Fractions	6.NS.1	1	Students use area models to multiply fractions. They use visual fraction models, including number lines, to divide whole numbers by fractions.	<ul style="list-style-type: none"> Area models can be used to illustrate the multiplication of two fractions which is essentially the same as taking a part of a part. Division means asking how many groups of a certain size are contained in a number.
3	Yours IS to Reason Why! Fraction by Fraction Division	6.NS.1	3	Students use area models and numbers to divide fractions. They compute quotients of fractions and interpret the remainders.	<ul style="list-style-type: none"> The reciprocal or multiplicative inverse of a number a/b is the number b/a, where a and b are nonzero numbers. The product of any nonzero number and its multiplicative inverse is 1. The multiplicative Inverse Property states: $(a/b)(b/a) = 1$, where a and b are nonzero numbers. To calculate the quotient of two fractions, multiply the dividend by the reciprocal of the divisor.
Learning Individually with MATHia or Skills Practice		6.NS.1	2	Students express fraction multiplication and division relationships represented in bar models and use these models to solve real-world and mathematical problems. Student practice calculating products and quotients of fractions, including mixed numbers and improper fractions. MATHia Unit: Fraction Division MATHia Workspaces: Representing Fraction Division / Interpreting Remainders Using Models / Developing the Fraction Division Algorithm / Multiplying and Dividing Rational Numbers	

Topic 3: Decimals and Volume

Students determine the volume of rectangular prisms with fractional and decimal side lengths. They review decimal operations. Students use nets to calculate surface area of prisms and pyramids.

Standards: 6.NS.2, 6.NS.3, 6.G.2, 6.G.4 **Pacing:** 14 Days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
1	Length, Width, and Depth Deepening Understanding of Volume	6.G.2 6.NS.3	2	Students sort polygons and polyhedra and review decimal multiplication. They determine the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes or the appropriate unit fraction edge lengths.	<ul style="list-style-type: none"> A polygon is a closed figure formed by three or more line segments. A polyhedron is a three-dimensional figure that has polygons as faces. A regular polyhedron is a three-dimensional solid that has congruent regular polygons as faces and has congruent angles between all faces. A cube is a regular polyhedron whose six faces are congruent squares. A unit cube is a cube that is one unit in length, one unit in width, and one unit in height. Volume is the amount of space occupied by an object. The formula for the volume of a cube is $V = lwh$, where l is the length, w is the width, and h is the height, or $V = Bh$, where B is the area of the base and h is the height. When multiplying decimals, the number of decimal places in the product is equal to the sum of the decimal places in the factors.
2	Which Warehouse? Volume Composition and Decomposition	6.G.2 6.NS.3	2	Students review estimating and calculating sums and differences of decimals. They determine the volumes of composite solids with decimal side lengths.	<ul style="list-style-type: none"> When adding or subtracting decimals, the decimal points must be lined up to ensure like place values are written in the same columns and combined appropriately. A rectangular prism is a prism that has rectangles as its bases. A composite solid is made up of more than one geometric solid. The formula for the volume of a cube is $V = lwh$, where l is the length, w is the width, and h is the height, or $V = Bh$, where B is the area of the base and h is the height. The volume of composite solids is found by adding or subtracting volumes of common solids.
3	Breaking the Fourth Wall Surface Area of Rectangular Prisms and Pyramids	6.G.4 6.NS.3	3	Students determine the surface areas of prisms and pyramids using nets, drawings, and measurements.	<ul style="list-style-type: none"> A net is a two-dimensional representation of a three-dimensional geometric figure. The surface area of a three-dimensional figure can be calculated by determining the areas of each face of the figure.

*Pacing listed in 45-minute days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
4	Dividend in the House Dividing with Volume and Surface Area	6.NS.2 6.NS.3	2	Students review and practice the standard algorithm for division, including division of decimals, in the context of volume and surface area.	<ul style="list-style-type: none"> • The dividend is the number or decimal that is being divided into equal groups. • The divisor is the number or decimal that divides the dividend. • The quotient is the result of the division sentence. • When the divisor is less than the dividend, then the quotient is always greater than one. • When the divisor is greater than the dividend, then the quotient is always less than one. • When the divisor and the dividend are multiplied by the same number, the quotient remains unchanged. • In long division, it is necessary to use an algorithm to determine the quotient. • The number of digits in a quotient can be determined by the correct placement of the first digit of the quotient in the algorithmic process.
Learning Individually with MATHia or Skills Practice		6.NS.3 6.G.2	5	<p>Students practice operating with decimals. Students calculate the volume and surface area of right prisms and use the volume of right prisms to solve for unknown values.</p> <p>MATHia Unit: Decimal Operations MATHia Workspaces: Converting Fractions to Decimals / Adding and Subtracting Decimals / Decimal Sums and Differences / Exploring Decimal Facts / Patterns with Products and Quotients / Multiplying Decimal / Decimal Products / Dividing Decimals / Whole Number and Decimal Quotients</p> <p>MATHia Unit: Volume and Surface Area MATHia Workspaces: Determining Volume Using Unit Fraction Cubes / Calculating Volume of Right Prisms / Determining Surface Area using Nets / Calculating Surface Area of Right Prisms</p>	

2

Relating Quantities

Pacing: 34 Days

Topic 1: Ratios

Students learn about ratios and use ratio reasoning to determine equivalent ratios. They compare additive and multiplicative relationships and make quantitative and qualitative comparisons. Students use ratio reasoning to solve real-world and mathematical problems with double number lines, tables, proportional statements, and graphs.

Standards: 6.RP.1, 6.RP.3.a **Pacing:** 17 Days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
1	It's All Relative Introduction to Ratio and Ratio Reasoning	6.RP.1	2	Students differentiate between additive and multiplicative reasoning. They write part-to-part and part-to-whole ratios in different forms.	<ul style="list-style-type: none"> A ratio is a comparison of two quantities. Ratios can be expressed using words, with a colon, or in fractional form. A ratio can represent part-to-whole or part-to-part relationships. Fractions and percents are special types of part-to-whole ratios.
2	Going Strong Comparing Ratios to Solve Problems	6.RP.1 6.RP.3	1	Students decide which of two or more ratios in each situation is greater using qualitative and quantitative reasoning.	<ul style="list-style-type: none"> A ratio is a comparison of two quantities.
3	Oh, Yes, I Am the Muffin Man Determining Equivalent Ratios	6.RP.1 6.RP.3	3	Students use a variety of strategies to determine equivalent ratios: pictures, tape diagrams, scaling up/down, and double number lines.	<ul style="list-style-type: none"> Models are used to represent ratio relationships and to solve real-world problems. A ratio is a comparison of two quantities. A rate is a ratio that compares two quantities that are measured in different units. When two rates or ratios are equal to each other, they can be written as a proportion. A proportion is an equation that states two ratios are equal. When writing a proportion, the numbers representing the same quantity must be placed in both numerators or in both denominators. The unit of measurement must be consistent among the ratios. Scaling down means to divide the numerator and denominator by the same factor. Scaling up means to multiply the numerator and denominator by the same factor. A double number line is a model that is made up of two number lines used to represent the equivalence of two related numbers. The intervals on each number line maintain the same ratio.
4	A Trip to the Moon Using Tables to Represent Equivalent Ratios	6.RP.1 6.RP.3.a	2	Students use tables to determine equivalent ratios. They multiply or divide existing ratios by a common factor and add or subtract ratios already in the table to determine equivalent ratios.	<ul style="list-style-type: none"> Ratios are used to represent proportional relationships in the real-world. Equivalent ratios are generated within the context of a situation using addition, subtraction, multiplication, and division.

*Pacing listed in 45-minute days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
5	They're Growing Graphs of Ratios	6.RP.1 6.RP.3.a	2	Students investigate the graphs of proportional and non-proportional relationships in order to recognize graphs or equivalent ratios as those that form straight lines and pass through the origin.	<ul style="list-style-type: none"> Equivalent ratios can be represented by tables, double number lines, and on coordinate planes. A ratio y/x is plotted as the ordered pair (x, y). Equivalent ratios represented on the coordinate plane form a straight line that passes through the origin.
6	One Is Not Enough Using and Comparing Ratio Representations	6.RP.1 6.RP.3.a	3	Students use a variety of representations to determine equivalent ratios. They summarize how to use the different representations in a graphic organizer.	<ul style="list-style-type: none"> Equivalent ratios represented by tables, double number lines, and on coordinate planes can be used to solve real-world and mathematical problems. Equivalent ratios represented on the coordinate plane form a straight line that passes through the origin.
Learning Individually with MATHia or Skills Practice		6.RP.1 6.RP.3.a	4	<p>Students write part-to-part and part-to-whole ratios using different notations. They practice using tables, double number lines, and graphs to solve real-world and mathematical problems involving equivalent ratios and rates.</p> <p>MATHia Unit: Ratio Reasoning MATHia Workspaces: Understanding Ratio Relationships / Equivalent Ratios / Multiple Representations of Ratios</p> <p>MATHia Unit: Problem Solving Using Ratio and Rate Reasoning MATHia Workspaces: Problem Solving with Equivalent Ratios and Rates Using Tables / Problem Solving with Equivalent Ratios and Rates Using Double Number Lines / Problem Solving with Equivalent Ratios and Rates Using Graphs</p>	

Topic 2: Percents

Students use their knowledge of fractions and decimals and their basic understanding of percents to write and compare rational numbers written in these three different forms. They use estimation, benchmark percents, and ratio strategies to solve percent problems, including determining the whole given the part and percent and determining the part of a whole.

Standard: 6.RP.3.c **Pacing:** 8 Days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
1	We Are Family! Percent, Fraction, and Decimal Equivalence	6.RP.3.c	2	Students learn about the relationships between percents, fractions, and decimals. Students write numbers in equivalent forms and use number lines to indicate the equivalent fraction, decimal, and percent represented by the markers on the number line.	<ul style="list-style-type: none"> Percent is a part-to-whole ratio with a whole of 100. The symbol % means "out of 100." The hundredths grid can be used to represent a fraction, decimal, or percent. To write a fraction as a percent, scale up or down to an equivalent fraction with a denominator of 100, if possible. To write a fraction as a percent, divide the numerator by the denominator and move the decimal in the quotient two places to the right.
2	Warming the Bench Using Estimation and Benchmark Percents	6.RP.3.c	2	Students build strategies for determining reasonableness or percent calculations. They estimate shaded portions of shapes and use benchmark percents to mentally estimate and compute the value of a percent.	<ul style="list-style-type: none"> Percent is a fraction in which the denominator is 100. The symbol % means "out of 100." A benchmark percent is a percent that is commonly used, such as 1%, 5%, 10%, 25%, 50%, and 100%. Calculating 1% of any number is the same as moving the decimal point two places to the left. Calculating 10% of any number is the same as moving the decimal point one place to the left. Benchmark percents can be used to perform mental estimation and calculation of percents.
3	The Forest for the Trees Determining the Part and the Whole in Percent Problems	6.RP.3.c	2	Students use a variety of strategies to determine a part of a whole and to determine the whole in a variety of percent problems, including problems about money, area, and volume.	<ul style="list-style-type: none"> Percent problems involve three quantities: the part, the whole, and the percent. When calculating the whole, given the percent and the part, write the percent as a fraction with a denominator of 100 and set it equal to the part over x. Then solve for x.
Learning Individually with MATHia or Skills Practice		6.RP.3.c	2	Students convert between fractions, decimals, and percents. Students solve real-world and mathematical percent problems by using bar models, using equivalent fractions, or determining a fraction of a quantity. MATHia Unit: Introduction to Percent MATHia Workspaces: Percent Models / Fraction, Decimal, Percent Conversions / Determining a Part Given a Percent and a Whole / Determining a Whole Given a Percent and a Part	

Topic 3: Unit Rates and Conversions

Students use conversion rates and ratio reasoning to convert within and between systems of measurement. They explore unit rates and their representations and use unit rates and ratio reasoning to solve problems.

Standards: 6.RP.2, 6.RP.3.b, 6.RP.3.d **Pacing:** 9 Days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
1	Many Ways to Measure Using Ratio Reasoning to Convert Units	6.RP.3.d	2	Students use ratio reasoning and strategies to convert measurement units. Students use double number lines, ratio tables, and scaling up and down, and unit analysis to convert units of measurement. Students make choices about which strategy to use when converting between units of measurement.	<ul style="list-style-type: none"> When a smaller unit of measure is converted to a larger unit of measure, the larger unit of measure has fewer units. When a larger unit of measure is converted to a smaller unit of measure, the smaller unit of measure has more units. All of the strategies used to determine equivalent ratios (double number lines, ratio tables, scaling up and down) can be used to convert between units. Unit analysis is a strategy for converting units that ensures the correct calculations and units in the final result.
2	What Is the Best Buy? Introduction to Unit Rates	6.RP.2 6.RP.3.b	3	Students use models to estimate unit rates. They compare and use different methods for writing unit rates. Students use unit rates to determine the best unit rate in a variety of contexts, including unit pricing and constant speed.	<ul style="list-style-type: none"> A rate is a ratio in which the two quantities being compared are measured in different units. A unit rate is a comparison of two measurements in which the denominator has a value of one unit. Unit rates are used to calculate best buys. Unit rates are used to make comparisons involving rates.
3	Seeing Things Differently Multiple Representation of Unit Rates	6.RP.3.b	2	Students solve problems with unit rates using a variety of representations including tables and graphs.	<ul style="list-style-type: none"> Equivalent rates can be represented through tables, double number lines, and on coordinate planes.
Learning Individually with MATHia or Skills Practice		6.RP.3.b 6.RP.3.d	2	Students practice determining and comparing unit rates. Students use ratios and unit analysis to convert units within and between Customary and metric measurement systems. MATHia Unit: Rate Reasoning MATHia Workspaces: Determining and Comparing Unit Rates MATHia Unit: Ratio Reasoning to Convert Units MATHia Workspaces: Converting Within Systems / Converting Between Systems	

*Pacing listed in 45-minute days

3

Determining Unknown Quantities

Pacing: 33 Days

Topic 1: Expressions

Students extend their application of the Order of Operations with numerical expressions to include exponents. They write and evaluate algebraic expressions to solve problems. Students create equivalent expressions and determine if expressions are equivalent.

Standards: 6.EE.1, 6.EE.2, 6.EE.3, 6.EE.4, 6.EE.6 **Pacing:** 13 Days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
1	Relationships Matter Evaluating Numeric Expressions	6.EE.1	2	Students learn that an expression represents a relationship between quantities. Then they write simplified numerical expressions. Students apply the Order of Operations to simplify numeric expressions.	<ul style="list-style-type: none"> A numeric expression is a mathematical phrase containing numbers. To simplify a numeric expression means to calculate an expression to get a single value. Parentheses are symbols used to group numbers and operations, and are used to change the normal order in which operations are performed. The Order of Operations is a set of rules that ensures the same result every time an expression is simplified. <ol style="list-style-type: none"> Simplify expressions inside parentheses or grouping symbols such as () or []. Simplify terms with exponents. Multiply and divide from left to right. Add and subtract from left to right.
2	Into the Unknown Introduction to Algebraic Expressions	6.EE.2.a 6.EE.2.b 6.EE.2.c	2	Students learn that an algebraic expression is a series of terms linked together by operation signs. They decompose given algebraic expressions by stating the number of terms in each algebraic expression and listing the terms. Students evaluate algebraic expressions and practice composing algebraic expressions from verbal phrases written with mathematical terminology.	<ul style="list-style-type: none"> A variable is a letter or symbol used to represent quantities. An algebraic expression is a mathematical phrase involving at least one variable and sometimes numbers and operation symbols. Situations can be expressed using algebraic expressions. A numerical coefficient is a number, or quantity, that is multiplied by a variable in an algebraic expression. If a variable does not have a coefficient, then it is understood to be 1. A constant is a number, or quantity, that does not change its value. To evaluate an algebraic expression, substitute the given values for the variables and then apply the order of operation rules to the numerical expression.
3	Second Verse, Same as the First Equivalent Expressions	6.EE.2.a 6.EE.3	2	Students review the properties of arithmetic and algebra and use the properties to rewrite algebraic expressions in equivalent forms. They model and simplify algebraic expressions using algebra tiles and using properties.	<ul style="list-style-type: none"> Algebra tiles are used as a model to make sense of rewriting algebraic expressions. Like terms are two or more terms that have the same variable raised to the same power. The Distributive Property states that if a, b, and c are any real numbers, then $a(b + c) = ab + ac$. Because subtraction is a special form of addition and division is a special form of multiplication, the Distributive Property can also be expressed as $a(b - c) = ab - ac$, $(a + b)/c = a/c + b/c$, and $(a - b)/c = a/c - b/c$. An algebraic expression can be written as the product of two factors by applying the Distributive Property.

*Pacing listed in 45-minute days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
4	Are They Saying the Same Thing? Verifying Equivalent Expressions	6.EE.4	1	Students use properties, tables, and graphs to show that the expressions are or are not equivalent.	<ul style="list-style-type: none"> The Commutative Properties of Addition and Multiplication state that the order in which you add or multiply two or more numbers does not affect the sum or the product. The Associative Properties of Addition and Multiplication state that changing the grouping of the terms in an addition or multiplication problem does not change the sum or product. The Distributive Property states that if a, b, and c are any real numbers, then $a(b + c) = ab + ac$. Because subtraction is a special form of addition and division is a special form of multiplication, the Distributive Property can also be expressed as $a(b - c) = ab - ac$, $(a + b)/c = a/c + b/c$, and $(a - b)/c = a/c - b/c$. Two algebraic expressions are equivalent expressions if, when any values are substituted for the variables, the results are equal. One non-example is necessary to disprove a claim, whereas an infinite number of examples are necessary to prove a claim. Because it is impossible to provide an infinite number of examples, the use of properties and graphs are more effective means of proof than tables. Two algebraic expressions can be proven to be equivalent by: (1) using algebraic properties to simplify them until they are written the exact same way; and (2) graphing each expression on the same graph to determine if their graphs are the same.
5	DVDs and Songs Using Algebraic Expressions to Analyze and Solve Problems	6.EE.2.a 6.EE.2.c 6.EE.3 6.EE.6	1	Students practice writing algebraic expressions and using those expressions to solve problems.	<ul style="list-style-type: none"> Many real-life situations can be represented using algebraic expressions. The algebraic expressions can then be used to answer questions about the situation. Different algebraic expressions may represent the same real-life situation depending upon what the initial variable represents.
Learning Individually with MATHia or Skills Practice		6.EE.2.c 6.EE.3 6.EE.4 6.EE.6 6.EE.7 6.EE.9	5	<p>Students practice rewriting expressions using the Order of Operations and the properties. Students practice writing and evaluating algebraic expressions with multiple variables for real-world and mathematical problems. Students create and identify equivalent expressions.</p> <p>MATHia Unit: Numeric Expressions MATHia Workspaces: Evaluating One-Step Expressions with Whole Numbers / Evaluating Two-Step Expressions with Whole Numbers / Writing and Evaluating Exponent Expressions / Order of Operations / Applying the Order of Operations / Using Order of Operations to Evaluate Simple Numeric Expressions / Using Order of Operations to Evaluate Numeric Expressions with Four Operations / Using Order of Operations to Evaluate Numeric Expressions with Parentheses and Exponents / Using Order of Operations to Evaluate Numeric Expressions</p> <p>MATHia Unit: Algebraic Expressions MATHia Workspaces: Identifying Parts of Simple Algebraic Expressions / Evaluating Multi-Step Expressions / Evaluating Expressions with Multiple Variables</p> <p>MATHia Unit: Equivalent Algebraic Expressions MATHia Workspaces: Using Order of Operations to Rewrite Simple Algebraic Expressions / Using Order of Operations to Rewrite Algebraic Expressions with Four Operations / Using Order of Operations to Rewrite Algebraic Expressions with Parentheses and Exponents / Using Order of Operations to Rewrite Algebraic Expressions</p> <p>MATHia Unit: Reasoning with Expressions and Equations MATHia Workspaces: Using Picture Algebra with Addition, Subtraction, and Multiplication / Using Picture Algebra with Multiplication, Total Given / Using Picture Algebra with Addition and Subtraction, Total Given / Patterns and One-Step Expressions</p>	

*Pacing listed in 45-minute days

Topic 2: Equations

Students learn that the equals sign indicates a relationship between two expressions. They learn that equations can have 1, 0, or infinite solutions and that inequalities have a solution set. Students use bar models to reason about solving one-step addition and multiplication equations. They develop strategies for solving equations without the models and practice writing and solving equations.

Standards: 6.EE.5, 6.EE.6, 6.EE.7, 6.EE.8, 6.EE.9 **Pacing:** 11 Days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
1	First Among Equals Reasoning with Equal Expressions	6.EE.5 6.EE.8	3	<p>Students learn that an equation is a mathematical sentence created by equating two expressions. They rewrite equations using properties in order to maintain equality. Then students create equations from a list of expressions and determine the solutions to their equations, using substitution, given a set of possible solutions. They learn that equations may have one solution, no solution, or multiple solutions.</p> <p>Students are introduced to algebraic inequalities. They analyze graphs and solution sets of algebraic inequalities, including inequalities of the form $x > c$, $x < c$, $x \geq c$, and $x \leq c$.</p>	<ul style="list-style-type: none"> A solution to an equation is any value for a variable that makes the equation true. The Properties of Equality state that if the same operation is performed on both sides of the equation, then equality is maintained. The graph of an inequality in one variable is the set of all points on a number line that make the inequality true. The solution set of an inequality is the set of all points that make the inequality true.
2	Bar None Solving One-Step Addition Equations	6.EE.6 6.EE.7	1	<p>Students use bar models to solve a variety of one-step addition equations of the form $p + x = q$, where p, x, and q can be nonnegative rational numbers. Then they use properties of arithmetic and algebra to solve addition equations without using models, eventually using the Subtraction Property of Equality to solve a variety of addition equations.</p>	<ul style="list-style-type: none"> A one-step equation is an equation that can be solved using only one operation. A solution to an equation is any value for a variable that makes the equation true. To solve an equation, you must isolate the variable by performing inverse operations. The Properties of Equality state that if you perform the same operation on both sides of an equation, then equality is maintained.

*Pacing listed in 45-minute days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
3	Play It in Reverse Solving One-Step Multiplication Equations	6.EE.6 6.EE.7	2	Students use bar models to solve a variety of one-step multiplication equations of the form $px = q$, where p , x , and q can be nonnegative rational numbers. Then they use properties of arithmetic and algebra to solve multiplication equations without using models, eventually using the Division Property of Equality to solve a variety of multiplication equations.	<ul style="list-style-type: none"> A one-step equation is an equation that can be solved using only one operation. A solution to an equation is any value for a variable that makes the equation true. To solve an equation, you must isolate the variable by performing inverse operation. The Properties of Equality state that if you perform the same operation on both sides of an equation, then equality is maintained.
4	Getting Real Solving Equations to Solve Problems	6.EE.6 6.EE.7 6.EE.9	2	<p>Students solve a variety of real-world and mathematical problems that can modeled by one-step equations. They begin by being introduced to literal equations and use the skills learned in the previous lesson to solve them.</p> <p>Students are then presented with a set of rather direct statement problems as a way to introduce a mathematical structure (defining variables, writing an equation, solving the equation, and interpreting the solution) to solve real-world problems. This activity is followed by a set of problems that are not as straightforward in nature, one requiring the use of the area formula. Students also investigate division problems in which the remainder must be interpreted correctly in order to arrive at a reasonable conclusion.</p>	<ul style="list-style-type: none"> A mathematical framework can be used to solve real-world problems. Variables can be used to represent quantities in expressions describing real-world values. To solve an equation, you must isolate the variable by performing inverse operations. A remainder in a quotient can have different meanings depending on the context of the division problem.
	Learning Individually with MATHia or Skills Practice	6.EE.5 6.EE.7 6.EE.8	3	<p>Students practice solving one-step equations in the form $p + x = q$ and $px = q$. They determine which given values for a variable are solutions to an equation. Students represent simple inequalities on a number line.</p> <p>MATHia Unit: Solving One-Step Equations MATHia Workspaces: Using Substitution to Identify Solutions to Equations / Solving One-Step Equations with a Balance / Representing One-Step Equations / Solving with Addition and Subtraction (No Type In) / Solving with Multiplication and Division (No Type In) / Solving One-Step Equations (Type In)</p> <p>MATHia Unit: Solving One-Step Inequalities MATHia Workspace: Graphing Inequalities with Positive Rational Numbers / Modeling Scenarios with Equations / Analyzing Models of One-Step Linear Relationships / Patterns</p>	

*Pacing listed in 45-minute days

Topic 3: Graphing Quantitative Relationships

Students use multiple representations to model and solve problems. They learn that quantities can vary in relation to each other and are often referred to as independent and dependent quantities. Quantities do not necessarily vary in a linear pattern; students analyze graphs for non-linear as well as linear scenarios. Students solve for unknown values of the independent or dependent variable by analyzing their graphs. They then solve linear equations using the variety of tools available, and they contrast the advantages and limitations of each.

Standard: 6.EE.9 **Pacing:** 9 Days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
1	Every Graph Tells a Story Independent and Dependent Variables	6.EE.9	2	Students match graphs with the appropriate scenarios. They analyze the graphs and use inequality statements to represent constraints in problem situations. Students identify independent and dependent quantities and represent those quantities using variables. They learn that the independent and dependent classifications may depend on the question being asked.	<ul style="list-style-type: none"> Graphical representations are used to solve problems. Graphs represent the relationships between independent and dependent quantities. The dependent quantity is the quantity that depends on another quantity. The variable representing the dependent quantity is the dependent variable. The independent quantity is the quantity that is depended upon. The variable representing the independent quantity is the independent variable. The independent variable is located on the x-axis and the dependent variable is located on the y-axis. In an equation, the dependent quantity is represented by the isolated variable.
2	The Power of the Horizontal Line Using Graphs to Solve One-Step Equations	6.EE.9	1	Students analyze representations of a multiplicative and an additive scenario. They analyze the graphs of the equations and use the graphs to determine the value of an independent quantity using a value of the dependent variable by using a horizontal line graphed at the value of the dependent variable.	<ul style="list-style-type: none"> Multiple representations such as words, tables, equations, and graphs, are used to solve problems of the form $x + p = q$ and $px = q$ for cases in which p, q, and x are all nonnegative rational numbers. A solution to an equation is any value for a variable that makes the equation true. A solution to an equation represented on a graph is any point on the line. An inequality of the form $x > c$ or $x < c$ can be used to represent constraints when solving a real-world problem.
3	Planes, Trains, and Paychecks Multiple Representations of Equations	6.EE.9	2	Students analyze equations in a variety of different forms — represented in tables graphs, in word problems, and as algebraic equations. They solve problems using these multiple representations of equations and organize the characteristics of the different representations.	<ul style="list-style-type: none"> Multiple representations such as words, tables, equations, and graphs, are used to solve problems.

*Pacing listed in 45-minute days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
4	Triathlon Training Relating Distance, Rate, and Time	6.EE.9	1	Students analyze and solve problems about competing in triathlons to investigate the relationship between distance rate, and time. They analyze the rate for a specific segment of the triathlon, beginning with either a graph, table, or given rate. Finally, students write that each activity used a form of the equation $d = rt$.	<ul style="list-style-type: none"> Graphical representations are used to solve problems. Multiple representations such as words, tables, equations, and graphs, are used to solve problems of the form $px = q$ for cases in which p, q, and x are all nonnegative rational numbers. Distance equals rate times time, where rate is distance per time.
Learning Individually with MATHia or Skills Practice		6.EE.9	3	Students create tables of values, write and use algebraic expressions with one operation, and create graphs to represent problem scenarios. Students identify the independent and dependent quantities in scenarios. MATHia Unit: Problem Solving with One-Step Equations MATHia Workspaces: Modeling Scenarios with Equations / Patterns and One-Step Equations / Problem Solving Using Multiple Representations in the First Quadrant / Problem Solving with Decimals	

4

Moving Beyond Positive Quantities

Pacing: 20 Days

Topic 1: Signed Numbers

Students explore positive and negative numbers on a number line. They interpret the meanings of positive rational numbers, negative rational numbers, and zero in real-world and mathematical situations. Students develop an understanding of the relationship between opposites and distance on a number line, defining absolute value of a rational number. Students classify numbers into their respective number systems and explore the density of the rational numbers.

Standards: 6.NS.5, 6.NS.6.a, 6.NS.6.c, 6.NS.7 **Pacing:** 7 Days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
1	Human Number Line Introduction to Negative Numbers	6.NS.5 6.NS.6.a 6.NS.6.c 6.NS.7 6.NS.7.a 6.NS.7.b	2	Students plot positive and negative rational numbers on a number line. They learn that opposite on a number line means to reflect over 0. They also learn that the negative sign is used as notation for opposites. Students explain the meaning of 0, positive numbers, and negative numbers in a variety of contexts.	<ul style="list-style-type: none"> Positive and negative numbers are used to describe quantities having opposite directions or values. Positive and negative numbers are used in real-world situations. Zero has different meanings in different real-world situations.
2	Magnificent Magnitude Absolute Value	6.NS.7 6.NS.7.c 6.NS.7.d	2	Students define absolute value of a rational number as the distance from 0. Students evaluate absolute value statements and compare numbers using absolute values. They solve problems using absolute value statements.	<ul style="list-style-type: none"> The distance from zero is the absolute value, or magnitude, of a rational number. Absolute values are used to describe real-world situations. Absolute value equations are used to compute distance on a number line.
3	What's in a Name? Rational Number System	6.NS.6	1	Students sort and classify numbers as natural numbers, whole numbers, integers, and rational numbers. They investigate the density of rational numbers by locating rational numbers between other rational numbers.	<ul style="list-style-type: none"> Rational numbers are the set of numbers that can be written as a/b, where a and b are integers and b does not equal 0. The set of rational numbers includes the sets of integers, whole numbers, and natural numbers. Given two rational numbers, there exists an infinite number of rational numbers between those numbers.
Learning Individually with MATHia or Skills Practice		6.NS.6 6.NS.6.a 6.NS.7.c 6.EE.8	2	Students explore numbers and their opposites on number lines. They develop an understanding of absolute value as the distance of a number from 0. Students practice graphing simple inequalities involving rational numbers on number line. MATHia Unit: Integers MATHia Workspaces: Introduction to Negative Numbers / Representing Integers on Number Lines / Using Absolute Value / Graphing Inequalities with Rational Numbers	

*Pacing listed in 45-minute days

Topic 2: The Four Quadrants

Students explore the four quadrant coordinate plane. They look for patterns in the signs of the ordered pairs in each quadrant and for ordered pairs that lie along the same vertical and horizontal grid lines. Students analyze and solve problems involving geometric shapes on the coordinate plane. Students then solve a wide range of problems on the coordinate plane using scenarios, graphs, equations, and tables.

Standards: 6.NS.6.b, 6.NS.6.c, 6.NS.C.8, 6.EE.9, 6.G.A.3 **Pacing:** 13 Days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
1	Four Is Better than One Extending the Coordinate Plane	6.NS.6.b 6.NS.6.c 6.NS.C.8	3	Students identify all four quadrants, identify and plot ordered pairs, and make generalizations about points located in given quadrants. They determine distances between two points that share a common coordinate.	<ul style="list-style-type: none"> The coordinate plane is used to plot ordered pairs of rational numbers. The coordinate plane has 4 quadrants that are named with Roman numerals. The relationship between two ordered pairs differing only by signs is a reflection across one or both axes. Absolute value equations are used to determine the distance between two points that share an x-coordinate or a y-coordinate.
2	It's a Bird, It's a Plane ... It's a Polygon on the Plane! Graphing Geometric Figures	6.NS.C.8 6.G.A.3	2	Students graph and solve problems with geometric figures on the coordinate plane. They determine perimeters and area of polygons on the coordinate plane and solve a playground design problem using coordinates in multiple quadrants.	<ul style="list-style-type: none"> Absolute value equations can be used to determine area and perimeter of polygons plotted in the coordinate plane. Polygons drawn in the coordinate plane can be used to solve real-world and mathematical problems.
3	There Are Many Paths ... Problem Solving on the Coordinate Plane	6.NS.C.8 6.EE.9	4	Students apply their knowledge of plotting rational numbers on the coordinate plane, interpreting points on the coordinate plane, creating tables of values, and writing and solving equations to solve a variety of problems situated on the coordinate plane.	<ul style="list-style-type: none"> Multiple representations such as situations written in words, equations, tables, and graphs can be used to solve problems. Graphs other than lines can be used to model real-life situations. Graphs can be used to interpret data and changes in data. There are advantages and disadvantages to using different mathematical tools to solve problems.
Learning Individually with MATHia or Skills Practice		6.NS.6.c 6.EE.9	4	Students reflect points across the x-axis, across the y-axis, and across both axes on the coordinate plane. Students practice identifying and interpreting coordinate points. They will create tables of values, write algebraic expression with one operation, and create graphs to represent and answer questions about problem scenarios. MATHia Unit: The Coordinate Plane MATHia Workspaces: Exploring Symmetry on the Coordinate Plane / Identifying and Interpreting Ordered Pairs / Plotting Points / Drawing Polygons on the Coordinate Plane MATHia Unit: Multiple Representations MATHia Workspace: Writing an Expression from a Scenario, Table or Graph / Solving One-Step Equations Using Multiple Representations in Four Quadrants	

5

Describing Variability of Quantities

Pacing: 18 Days

Topic 1: The Statistical Process

Students learn about the statistical problem solving process: formulate questions, collect data, analyze data, and interpret the results. They learn about variability in data, statistical questions, and basic forms of data collection. Students use real-world data to create and analyze dot plots, stem-and-leaf plots, and histograms in terms of their shape and defining characteristics.

Standards: 6.SP.A.1, 6.SP.A.2, 6.SP.A.3, 6.SP.B.4, 6.SP.B.5 **Pacing:** 7 Days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
1	What's Your Question? Understanding the Statistical Process	6.SP.A.1	2	Students learn about the statistical process, statistical variability, and statistical questions. They organize questions into two types, categorical and quantitative, and determine the best method of data collection to answer each question. Students engage in the statistical process, analyzing and interpreting circle and bar graphs for their data.	<ul style="list-style-type: none"> The statistical process includes formulating a statistical question, collecting data, analyzing the collected data, and interpreting the data in context of the situation. A statistical question is one that anticipates and accounts for variability in data. Data can be described as being categorical or quantitative. Categorical data is a set of data for which each piece of data fits into exactly one of several different groups or categories. Quantitative data is a set for which each piece of data can be placed on a numerical scale. Data are collected through the use of surveys, observational studies, and experiments. Data can be displayed using graphs and plots. Categorical data can be displayed in tables, bar graphs, and circle graphs.
2	Get in Shape Analyzing Numerical Data Displays	6.SP.A.2 6.SP.B.4 6.SP.B.5.a 6.SP.B.5.b 6.SP.B.5.c	2	Students explore dot plots and stem-and-leaf plots. They learn how to describe the shape of a data set displayed in a plot and identify other properties, such as clusters and gaps in plots of data.	<ul style="list-style-type: none"> Dot plots are a type of graph used to represent the frequency of data values using a number line. Dot plots are used to represent quantitative data rather than categorical data. They are best suited for a small number of data points. Data sets have a graphical distribution, which can be described in terms of overall shape and patterns and deviations from the pattern. Distributions are commonly referred to as symmetric, skewed left, skewed right, or uniform. Common graphical features include clusters, peaks, and gaps in the data values. Often a gap in the data is an indicator that the data include an outlier. Stem-and-leaf plots are a type of graph used to represent and organize data values for a large number of quantitative data.
3	Skyscrapers Using Histograms to Display Data	6.SP.A.2 6.SP.B.4 6.SP.B.5.a 6.SP.B.5.b 6.SP.B.5.c	1	Students analyze and interpret histograms. Then students create and compare two histograms from provided data sets.	<ul style="list-style-type: none"> Histograms and bar graphs look very similar. Bar graphs are necessary when the data is categorical. Histograms are used when the data is numerical; numerical data can be represented continuously in intervals. The intervals in a histogram must all be the same size. The width of the bar represents the interval. The height of the bar indicates the frequency of values in the interval. Histograms and frequency tables display the same information. The histogram is a more visual representation of the information.
Learning Individually with MATHia or Skills Practice		6.SP.B.4 6.SP.B.5.a 6.SP.B.5.b	2	Students interpret, create, and analyze stem-and-leaf plots, dot plots, and histograms as they learn about the features of each plot type. Students summarize and describe the displays according to shape and numerical summaries. MATHia Unit: Measures of Central Tendency MATHia Workspaces: Calculating Mean, Median, Mode, and Range / Determining Measures of Center / Measuring the Effects of Changing Data Sets	

*Pacing listed in 45-minute days

Topic 2: Numerical Summaries of Data

Students learn about measures of central tendency and measures of variability and when each is the most appropriate measure for a given data set. They identify the modes and calculate means and medians of data sets. Students calculate the five-number summaries and interquartile ranges of data sets and use them to create box-and-whisker plots. Students calculate the mean absolute deviations of data sets.

Standards: 6.SP.A.2, 6.SP.A.3, 6.SP.B.4, 6.SP.B.5 **Pacing:** 11 Days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
1	In the Middle Analyzing Data Using Measures of Center	6.SP.A.2 6.SP.A.3 6.SP.B.5.c	2	Students analyze and interpret data using the three different measures of center: mode, median, and mean. Students investigate mean in three different ways: by leveling off a set of data values (creating fair shares), by establishing a balance point for a set of data values, and by determining the sum of the data values and dividing by the number of data values. Students calculate and interpret each measure of center in a real-world problem.	<ul style="list-style-type: none"> • A measure of center for a data set summarizes all of its values with a single number. • Measures of center are numerical ways of determining where the center of data is located. • Three measures of center are mode, median, and mean. • The mode is the data value or values that occur most often in a data set. • The median is the data value in the middle of a data set that has been placed in numerical order. • The mean can be thought of as leveling off a set of data values, a balance point of a data set placed on a number line, and the sum of the data values divided by the number of data values.
2	Box It Up Displaying the Five-Number Summary	6.SP.A.2 6.SP.A.3 6.SP.B.4 6.SP.B.5.c	2	Students are introduced to measures of variability, specifically the interquartile range. They divide data sets into quartiles, leading to the five-number summary. Then students use box-and-whisker plots to display the five-number summary. They construct, analyze, and interpret box-and-whisker plots of real-world data.	<ul style="list-style-type: none"> • Measures of variability in a data set describe how spread out the data is. • Quartiles are values that divide a data set into four parts once the data is arranged in ascending order. • The five-number summary for a data set consists of the minimum value, the first quartile (Q1), the median (Q2), the third quartile (Q3), and the maximum value of the data set. • The IQR is the interquartile range or the difference between the first and third quartiles (Q3 - Q1), Q1 and Q3. • A box-and-whisker plot is another way to display numerical data on a number line. It displays the five-number summary and the interquartile range.
3	March MADness Mean Absolute Deviation	6.SP.A.2 6.SP.A.3 6.SP.B.5	1	Students are introduced to the mean absolute deviation as a measure of variability. The mean absolute deviation is associated with the mean as a measure of center. Students calculate the mean absolute deviations of data sets. They compare the two measures of variability: interquartile range and mean absolute deviation.	<ul style="list-style-type: none"> • Measures of variability in a data set describe how spread out the data is. • The mean absolute variation is a measure of variability describing how the data is spread out around the mean of the data set.

*Pacing listed in 45-minute days

Lesson	Title / Subtitle	Standards	Pacing*	Lesson Summary	Essential Ideas
4	You Chose ... Wisely Choosing Appropriate Measures	6.SP.B.5.a 6.SP.B.5.c 6.SP.B.5.d	2	Students choose the appropriate measures of center and variation to best describe a data set. They relate the mean and median of a data set to the shape of its distribution. Students use these corresponding measures of center and variation, choosing among them to describe a data set, to draw conclusions about data given in a variety of displays.	<ul style="list-style-type: none"> The mean is affected by extreme high and low values in a data set, while the median is not. The value of the mean can be estimated by comparing it to the median of the data, and taking into consideration the spread of the data and any extreme values in the data set. When a data set contains an extreme value, the median is a better measure of center to summarize the data than the mean.
	Learning Individually with MATHia or Skills Practice	6.SP.3 6.SP.4 6.SP.5 6.SP.5.a 6.SP.5.b 6.SP.5.c 6.SP.5.d	4	<p>Students practice calculating mean, median, mode, and range for a variety of data sets. Students practice calculating mean absolute deviation. Students create box-and-whisker plots and use them to understand the relationship between the shape of the display and the spread of the data set.</p> <p>MATHia Unit: Displays of Numerical Data MATHia Workspaces: Analyzing Distributions with Shape, Center, and Spread / Creating and Interpreting Stem Plots / Creating and Interpreting Dot Plots / Creating and Interpreting Histograms</p> <p>MATHia Unit: Mean Absolute Deviation MATHia Workspaces: Calculating Mean Absolute Deviation / Using Mean Absolute Deviation</p> <p>MATHia Unit: Box Plots MATHia Workspaces: Constructing Box Plots / Interpreting Box Plots / Choosing Appropriate Measures</p>	

Total Days: 139

Learning Together: 97
Learning Individually : 42