Mathematics Department

Grade 6

Developed By: Grade 6 Teachers
Effective Date: Fall 2020

Scope and Sequence

Month	Grade 6
September	**Grade 6 Math Baseline Assessment (by September 14)- Not Administering for 2020** **Chapter 1: Positive Numbers and the Number Line** ● Teach all sections of this chapter, but continue to move forward as many of these topics will be revisited all year. ● Square and Cubed roots are an 8th grade standard, introduce students to the concept and review during the chapters on Geometry.
October	**Chapter 2: Negative Numbers and the Number Line** ● (Practice fact fluency and operations with whole numbers for 5 minutes 3x a week)
November	**Chapter 3:Multiplying and Dividing Fractions and Decimals** ● (Practice fact fluency and operations with whole numbers for 5 minutes 3x a week) **Grade 6 Benchmark Assessment 1 (by November 30) (Chapters 1 through 3) ?**
December	**Chapter 4: Ratio** ● (First Pull from Grade 5 Chapter 7 Ratio resources to provide foundation. (Talk to grade 5 to see if students were exposed to this in June of Grade 5) ● (Practice fact fluency and operations with whole numbers for 5 minutes 3x a week) ● Review of measurement units **Chapter 5: Rates** ● First review converting of measurements within systems
January	**Finish Chapter 5** **Chapter 6:Percent** ● (First pull from Grade 5 Chapter 10 Percent to provide foundation. (Talk to grade 5 to see if students were exposed to this in June of Grade 5) ● Lesson 6.5: Introduce students to percent of change. But understand that this not a 6th grade standard. Lesson 6.5 may be used for level 4 students or skipped.

February	**Grade 6 Benchmark Assessment 2 (by Feb Break) (Chapters 4 through 6)?** **Chapter 7: Algebraic Expressions** • (First pull from Grade 5 Chapter 5 Algebra to provide foundation. (Talk to grade 5 to see if students were exposed in June of Grade 5) • (Practice fact fluency and operations with whole numbers for 5 minutes 3x a week)
March	**Chapter 8:Equations and Inequalities** **Chapter 9: The Coordinate Plane** • (Practice fact fluency and operations with whole numbers for 5 minutes 3x a week)
April	**Finish Chapter 9** **Grade 6 Benchmark Assessment 3 (by April 12-OPTIONAL) (Chapters 7 through 9)?** **Chapter 10: Area of a Polygon** • (Do Grade 5 Chapter 6 Area of a Triangle first to provide foundation. These resources are not used in Grade 5 at all.) **Chapter 12: Surface Area and Volume of Solids** • (Pull from Grade 5 Chapter 15 Surface Area -(15.3 only) resources first to provide foundation. These resources are not used in Grade 5.)
May	**Chapter 13: Introduction to Statistics** **Chapter 14: Measures of Central Tendency** • **Mandatory:** Pull from Grade 7, 9.1 Interpreting Quartiles and Interquartile Range and 9.3 Understanding Box and Whisker Plots after you teach 14.4 in 6th grade. (CCSS 6.sp.5C, CCSS 6.sp.4) * See Common Core Additional Resources under the My Subscriptions page **Grade 6 Math Spring Summative Assessment by May 31 (will assess all Grade 6 Standards up to this point)**
June	**Chapter 11: Circumference and Area of a Circle** • This is not a 6th grade standard, but exposure will help in 7th grade.

***Infuse word problems into lessons (instead of at the end of the chapter).**

***Any additional time can be review for the Big Ideas of 6th Grade:**

1) **Connecting ratio to rate to whole number multiplication and division and using concepts or ratio and rate to solve problems.**
2) **Completing understandings of division of fractions and extending the notion of number to the system or rational numbers, which included negative numbers**
3) **Writing, interpreting and using expressions and equations**
4) **Developing understandings of statistical thinking**

Unit 1

The Number System

Summary and Rationale

In this unit, students learn that a single number can be represented in many ways. A number line can help students compare and order positive and negative whole numbers by visualizing the relationship among the numbers' positions. Students apply their knowledge of prime factorization to find the greatest common factor and the least common multiple of a set of numbers. They also apply their knowledge of squaring and cubing to evaluate numerical expressions and extend the order of operations to include exponents. Students solve problems involving absolute value and see how it can be used to interpret real-world situations involving positive and negative numbers.

Students learn how to divide fractions and to multiply and divide decimals. They apply multiplication skills to real-world problems involving fractions and decimals. Students draw and revise bar models to aid in solving multi-step real-world problems.

Recommended Pacing

Standards

The Number System	
6.NS.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. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because ¾ of 8/9 is 2/3. (In general (a/b) ÷ (c/d) =ad/bc.) How much chocolate will each person get if 3 people share ½ lb of chocolate equally? How many ¾-cup servings are in a 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length ¾ mi and area ½ square mi?*
6.NS.2	Fluently divide multi-digit numbers using the standard algorithm.
6.NS.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
6.NS.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 the two whole numbers with no common factor. *For example, express 36 + 8 as 4 (9 + 2).*

6.NS.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.
6.NS.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.
6.NS.6a	Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., -(-3) = 3, and that 0 is its own opposite.
6.NS.6c	Find and position integers and other rational numbers on a horizontal or vertical number line diagram. Find and position pairs of integers and other rational numbers on a coordinate plane.
6.NS.7	Understand ordering and absolute value of rational numbers.
6.NS.7a	Interpret statements of inequality as statements about relative position of two numbers on a number line diagram. *For example, interpret -3 > -7 as a statement that -3 is located to the right of -7 on a number line orientated from left to right.*
6.NS.7b	Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write -3 °C > -7°C to express the fact that -3°C is warmer than -7 °C.*
6.NS.7c	Understand that absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, doe an account balance of -30 dollars, write $\left\vert -30 \right\vert = 30$ to describe the size of the debt on dollars.*
6.NS.7d	Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.*
Expressions and Equations	
6.EE.1	Write and evaluate numerical expressions involving whole number exponents.
6.EE.2	Write, read, and evaluate expressions in which letters stand for numbers.
6.NS.2c	Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order. (Order of Operations). *For example, use the formula $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with side lengths s= ½ .*
Mathematical Practices	
K-12.MP.1	Make sense of problems and persevere in solving them.
K-12.MP.2	Reason abstractly and quantitatively.

K-12.MP.3	Construct viable arguments and critique the reasoning of others.
K-12.MP.4	Model with mathematics.
K-12.MP.5	Use appropriate tools strategically.
K-12.MP.6	Attend to precision.
K-12.MP.7	Look for and make use of structure.
K-12.MP.8	Look for and express regularity in repeated reasoning.
Interdisciplinary Connections	
Standard x.x	
Integration of Technology	

Instructional Focus

Enduring Understandings:	**Essential Questions:**
Whole numbers, fractions, decimals, and positive and negative numbers can be represented in several ways. Negative numbers are the opposites of positive numbers. For every positive number, there is a corresponding negative number. On a horizontal number line, numbers increase in value from left to right. Positive numbers are to the right of 0 and negative numbers are to the left of zero. The number 0 is neither positive or negative. On a vertical number line, numbers increase from the bottom to the top. Prime numbers are numbers that have exactly two factors, the number itself and one. The first prime number is 2. Composite numbers are numbers greater than one that have more than two factors.	How can we compare and order numbers? How can positive and negative numbers represent real-world quantities? Why is the order of operations necessary? What is absolute value? Why are fractions and decimals necessary?

The Fundamental Theorem of Arithmetic states that every integer greater than one can be expressed as a product of prime factors in only one way (except for the order of the factors). The squares and cubes of whole numbers are called perfect squares and perfect cubes. The order of operations is a set of rules for evaluating expressions to ensure that the solution is always the same. The absolute value of a number is the distance from 0 on a number line. Because it represents distance, the absolute value of a number is always positive. Two opposites have the same absolute value. The greater the absolute value of a negative number, the smaller the number. Whole number concepts can be extended to fractions and decimals when more precise calculations are needed. Estimating a product or quotient can help determine where to place the decimal point.	
Evidence of Learning (Assessments)	
Objectives (SLO)	
Students will know: ● Number line ● Positive number, negative number, opposite ● Composite number ● Prime factor ● Common factor, greatest common factor (GCF) ● Common multiple, least common multiple (LCM) ● Square (of a number) ● Exponent, base (of an exponent) ● Perfect square ● Square root	Students will be able to: ● Represent whole numbers, fractions, and decimals on a number line. ● Interpret and write statements of inequality for two given positive numbers using the symbols > or <. ● Express a whole number as a product of its prime factors. ● Find the common factors and the greatest common factor (GCF) of two whole numbers. ● Find the common multiples and the least common multiple (LCM) of two whole numbers. ● Find the square of a number. ● Find the square root of a perfect square.

• Cube (of a number) • Perfect cube • Cube root • Absolute value • Reciprocals . .	• Find the cube of a number. • Find the cube root of a perfect cube. • Evaluate numerical expressions involving whole number exponents. • Use negative numbers to represent real-world quantities. • Represent, compare, and order positive and negative numbers on a number line. • Understand that the absolute value of a number is the distance from 0 on a number line. • Interpret absolute value as the magnitude for a positive or negative quantity in a real-world situation. • Divide a fraction, whole number, or mixed number by a fraction or a mixed number • Multiply a decimal by a decimal. • Divide a whole number or a decimal by a decimal. • Solve problems involving fractions and decimals.

Suggested Resources/Technology Tools

Math In Focus Resources Chapter 1: Positive Numbers and the Number Line
Math In Focus Resources Chapter 2: Negative Numbers and the Number Line
Math In Focus Resources Chapter 3: Multiplying and Dividing Fractions and Decimals

Khan Academy
Prodigy
Front Row
www.studyisland.com
www.ixl.com
www.brainpop.com

Modifications

Special Education - Transition Skills, Reteach, Anchor Charts, Guided Notes, Multiplication Chart, Hands on Activities, Manipulatives, See textbook for Differentiated Instruction ideas in each chapter, Teacher Resource Tools TRT1-TRT12

504 - Transition Skills, Reteach, Anchor Charts, Manipulatives, Teacher Resource Tools TRT1-TRT12

ELL - Vocabulary lists with examples, Manipulatives

Gifted and Talented - Activity Project, Extra Brain Work, Enrichment, Extra Practice, Performance Tasks (my.hrw.com) , Video and Tools (my.hrw.com) ,

21ST CENTURY LIFE AND CAREER STANDARDS

Please select all standards that apply to this unit of study:

- ❑ Act as a responsible and contributing citizen and employee.
- ❑ Apply appropriate academic and technical skills.
- ❑ Attend to personal health and financial well being.
- ❑ Communicate clearly and effectively and with reason.
- ❑ Consider the environmental social and economics impacts of decisions.
- ❑ Demonstrate creativity and innovation.
- ❑ Employ valid and reliable research strategies.
- ❑ Utilize critical thinking to make sense of problems and persevere in solving them.
- ❑ Model integrity, ethical leadership, and effective management.
- ❑ Plan education and career paths aligned to personal goals.
- ❑ Use technology to enhance productivity.
- ❑ Work productively in teams while using cultural global competence.

Suggestions on integrating these standards can be found at: http://www.state.nj.us/education/cccs/2014/career/9.pdf

LINKS TO CAREERS:

Unit 2

Ratios and Proportional Relationships

Summary and Rationale

Ratio

In this unit, students learn to compare two numbers using division and express this comparison as a ratio. They apply the concepts of equivalent ratios, part-whole, part-part, and whole-part comparisons to solve one and two-step real-world problems involving ratios. The study of ratios in this unit is extended to involve three quantities. Students then write equivalent ratios and ratios in simplest form, and use comparison models and the unitary method to solve many types of ratio problems involving two or three quantities, two related sets, and ratios that change.

Rate

Students extend their knowledge of ratios to the concept of rate. They use the unitary method and bar models to find rates and unit rates, and solve real-world rate problems.

Percent

Students learn that percent can be expressed as a fraction with a denominator of 100 and review the relationship between fractions, decimals, and percents. Students find percent of a number and solve real-world problems involving percent, including concepts such as sales tax, discount, and interest.

Students use bar models to visualize percents, and solve problems using both the unitary method and traditional methods. Students write equivalent fractions, decimals, and percents. They use bar models and equations to visualize and solve problems that involve finding a percent given a part and a whole, finding a part given its percent and the whole and finding the whole given a part and its percent.

Recommended Pacing	
November - January	
Standards	
Ratios and Proportional Relationships	
6.RP.1	With prompting and support, ask and answer questions about key details in a text.
6.RP.2	Understand the concept of a unit rate *a/b* associated with a ratio *a:b* with *b* not equal to zero, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is ¾ cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*
6.RP.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.
6.RP.3a	Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
6.RP.3b	Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to row 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*
6.RP.3c	Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
6.RP.3d	Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
The Number System	
6.NS.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. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because ¾ of 8/9 is 2/3. (In general (a/b) ÷ (c/d) =ad/bc.) How much chocolate will each person get if 3 people share ½ lb of chocolate equally? How many ¾-cup servings are in a 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length ¾ mi and area ½ square mi?*
6.NS.2	Fluently divide multi-digit numbers using the standard algorithm.
Mathematical Practices	
K-12.MP.1	Make sense of problems and persevere in solving them.
K-12.MP.2	Reason abstractly and quantitatively.

K-12.MP.3	Construct viable arguments and critique the reasoning of others.
K-12.MP.4	Model with mathematics.
K-12.MP.5	Use appropriate tools strategically.
K-12.MP.6	Attend to precision.
K-12.MP.7	Look for and make use of structure.
K-12.MP.8	Look for and express regularity in repeated reasoning.
K-12.MP.1	Make sense of problems and persevere in solving them.
Interdisciplinary Connections	
Standard x.x	
Integration of Technology	

Instructional Focus

Enduring Understandings:	**Essential Questions:**
Two or more numbers or quantities can also be compared by division and the comparison expressed as a ratio. A ratio expresses the relationship between two numbers or quantities that have the same units. A ratio can be written as a fraction or using a colon. A ratio can be used to compare two quantities, and can be used to solve problems. A rate can be used to compare one quantity to another quantity, and can be used to solve problems. Percent is another way of expressing a part of a whole. Percent is a concept used to compare quantities expressed per hundred.	In what different ways can numbers be compared? What is a ratio? In what different ways can a ratio be written? What does percent mean? Why is percent helpful? How are the concepts of ratio, rate, and percent used to solve real world problems? Where when are ratios, rate, and percents used?

A percent can be expressed as a fraction with a denominator of 100. Percent means “per hundred” or “out of 100.” A given percent is a numerator on a fraction with a denominator of 100. Percents are used everywhere in the real world. When fractions are expressed as percents, they already have a common denominator, which makes for much easier computation.	
Evidence of Learning (Assessments)	
Objectives (SLO)	
Students will know: ● Ratio ● Term ● Equivalent ratios ● Simplest form ● Greatest common factor (GCF) ● Rate, unit rate ● Speed, average speed ● Percent ● Base ● Sales tax ● Commission ● Interest, interest rate ● Markup ● Discount	Students will be able to: ● Read and write ratios to compare two quantities. ● Express equivalent ratios with three quantities. ● Interpret ratios given in fraction form. ● Use a ratio to find what fraction one quantity is of another or how many times as great (or as large) one is as the other. Identify and write equivalent ratios. ● Write ratios in simplest form ● Compare ratios. ● Solve real-world problems involving ratios and fractions. ● Solve real-world problems involving ratios with three quantities. ● Solve unit rate problems including unit pricing and constant speed. ● Solve problems involving unit rates and rates. ● Understand percent notation. ● Relate and compare percents. ● Express fractions as percents. ● Use different ways to find the number represented by a percent. ● Write equivalent fractions, decimals, and percents. ● Find the percent of a number. ● Solve problems involving percent, percent increase, and percent decrease.

Suggested Resources/Technology Tools

Math In Focus Resources Grade 5 Chapter 7: Ratio
Math In Focus Resources Grade 6 Chapter 4: Ratio
Math In Focus Resources Grade 6 Chapter 5: Rate
Math In Focus Resources Grade 5 Chapter 10: Percent
Math In Focus Resources Grade 6 Chapter 6: Percent

www.aaamath.com/rat61cx2.htm (Fractions to percents)
www.studyisland.com
www.ixl.com
www.brainpop.com

Khan Academy, Front Row, Prodigy

Modifications

Special Education - Transition Skills, Reteach, Anchor Charts, Guided Notes, Multiplication Chart, Hands on Activities, Manipulatives, See textbook for Differentiated Instruction ideas in each chapter, Teacher Resource Tools TRT13, Conversion Charts

504 - Transition Skills, Reteach, Anchor Charts, Manipulatives, Teacher Resource Tools TRT13, Conversion Charts

ELL - Vocabulary lists with examples, Manipulatives, Conversion Charts

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- ❑ Communicate clearly and effectively and with reason.
- ❑ Consider the environmental social and economics impacts of decisions.
- ❑ Demonstrate creativity and innovation.
- ❑ Employ valid and reliable research strategies.
- ❑ Utilize critical thinking to make sense of problems and persevere in solving them.
- ❑ Model integrity, ethical leadership, and effective management.
- ❑ Plan education and career paths aligned to personal goals.
- ❑ Use technology to enhance productivity.
- ❑ Work productively in teams while using cultural global competence.

Suggestions on integrating these standards can be found at: http://www.state.nj.us/education/cccs/2014/career/9.pdf

LINKS TO CAREERS:

Unit 3

Expressions and Equations

Summary and Rationale

Algebra is a language that is used to create mathematical models of real-world situations and handle problems that we cannot solve using just arithmetic. Rather than using words, algebra uses symbols to make statements about things. In this unit, students will earn to write both numerical and algebraic expressions and equations that correspond to given situations. They also learn to simplify and evaluate expressions, and use expressions, inequalities, and equations to solve real-world problems.

Students learn that variables represent numbers whose exact values are not yet specified. They also learn that expressions in different forms can be equivalent, as they rewrite expressions to represent a quantity in different way by simplifying it. Students will solve simple equations by using number sense, properties of operations, and the idea of maintaining equality on both sides of an equation.

Students write algebraic expressions to represent situations in the world around them. They learn to use variables to represent unknown quantities and to correctly identify the terms in algebraic expressions. Students expand and factor algebraic expressions and use substitution to evaluate algebraic expressions for given values.

Students relate the use of bar models and number properties to algebraic expressions in order to solve real-word problems, expand algebraic expressions, and recognize equivalent algebraic expressions.

Students learn to think of the = symbol as meaning that two expressions have the same value. This leap in abstraction should be accompanied by as much work with balanced scale as possible. Students use inverse operations to "get the variable alone" on one side of an equal sign to solve an equation. This reliance on the properties if equality establishes a strong base for future work in algebra. Students can use substitution to check the accuracy of a solution to an equation. The solution is the value that makes the equation a true statement.

Students learn to think of the symbols > and < as meaning that two expressions have different values. This concept can be visualized using an unbalanced scale. Students are also introduced to the symbols $\geq$ and $\leq$, which expands their conception of how two quantities or expressions compare. They extend their use of substitution to determine whether a given number is a solution to an inequality and use number lines to represent a visual solution to one-variable inequalities.

The term *linear equation* is introduced in this unit. Students learn that the graphed solutions of simple two-variable equations are lines that contain an infinite number of solutions, including not just whole numbers, but also fractions, mixed numbers, and decimals.

Recommended Pacing	
January - March	
Standards	
(Sub Standard Heading)	
6.EE.2	Write, read, and evaluate expressions in which letters stand for numbers.
6.EE.2a	Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as 5 – y.*
6.EE.2b	Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.*
6.EE.2c	Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order. (Order of Operations). *For example, use the formula $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with side lengths $s = ½$.*
6.EE.3	Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.*
6.EE.4	Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for. Reason about and solve one-variable equations and inequalities.*
6.EE.5	Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
6.EE.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.
6.EE.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, q, and x are all nonnegative rational numbers
6.EE.8	Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real world or mathematical problem. Recognize that inequalities in the form $x > c$ or $x < c$ have infinitely many

	solutions; represent solutions of such inequalities on number line diagrams.
6.EE.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. *For example in a problem involving motion at constant speed, list and graph ordered pairs of distance and times, and write the equation d=65t to represent the relationship between distance and time.*
The Number System	
6.NS.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.
6.NS.6b	Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
6.NS.6c	Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
6.NS.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 distances between points with the same first coordinate or the same second coordinate.
Mathematical Practices	
K-12.MP.1	Make sense of problems and persevere in solving them.
K-12.MP.2	Reason abstractly and quantitatively.
K-12.MP.3	Construct viable arguments and critique the reasoning of others.
K-12.MP.4	Model with mathematics.
K-12.MP.5	Use appropriate tools strategically.
K-12.MP.6	Attend to precision.
K-12.MP.7	Look for and make use of structure.
K-12.MP.8	Look for and express regularity in repeated reasoning.
Interdisciplinary Connections	
Standard x.x	

Integration of Technology	

Instructional Focus

Enduring Understandings:	**Essential Questions:**
Algebra is a language that is used to create mathematical models of real-world situations and handle problems that we cannot solve using just arithmetic. Rather than using words, algebra uses symbols to make statements about things. Variables represent numbers whose exact values are not yet specified. Numerical expressions can involve addition, subtraction, multiplication, and division. Numerical expressions that involve an unknown value are called algebraic expressions. To solve an equation is to find the exact value of the unknown variable. To do so, inverse operations are used along with the properties of operations and equality are used on both sides of the equation. Variables are used to represent unknown quantities. Algebraic expressions can be used to describe situations and solve real-world problems. Algebraic expressions are sometimes called variable expressions because they contain one or more variables. To evaluate an algebraic expression for a given value, substitute the value in for the variable and simplify the remaining numerical expression. When simplifying numerical or algebraic expressions, the expression obtained after simplifying is equivalent to the original expression.	What does algebra allow us to do? What is a variable? Why are variables helpful? What are the guidelines for solving an equation? What is the difference between an algebraic expression and an equation? How are equations different from inequalities? How do you evaluate an algebraic expression given a specific value for the variable? How do you solve a simple equation? What is the best way to show the solutions to a one-variable inequality? Why? What do the solutions to a linear equation look like? Can the solutions be counted?

The = symbol as meaning that two expressions have the same value. To solve a one-variable equation, use inverse operations to “get the variable alone” on one side of an equal sign to solve an equation. Substitution to check the accuracy of a solution to an equation. The solution is the value that makes the equation a true statement. The symbols > and < as meaning that two expressions have different values. The solutions to a one-variable inequality can be represented using a number line. The graphed solutions of simple two-variable linear equations are lines that contain an infinite number of solutions, including not just whole numbers, but also fractions, mixed numbers, and decimals. Equations and inequalities can be used to describe situations and solve real-world problems. The coordinate plane is formed by the intersection of two number lines. The plane is divided into four regions, called quadrants. The origin is the place where the two number lines intersect.. An ordered pair is a pair of numbers that describes the location of a point in a coordinate plane. Any point on a coordinate plane can be named by an ordered pair of numbers, and you can graph any ordered pair of real numbers as a point on the plane. An ordered pair (x, y) is ordered because the horizontal coordinate is named first. If the order is reversed the location of the point is changed.	
Evidence of Learning (Assessments)	
Objectives (SLO)	

Students will know:	Students will be able to:
• Numerical expression • Variable • Algebraic expression • Terms • Evaluate • Substitute • Simplify • Coefficient • Like terms • Equivalent expressions • Expand • Factor • Equation • Solve • True • Equality Properties • Solution • Linear equation • Independent variable, dependent variable • Inequality • Coordinate plane • Origin • Quadrants • Ordered pair, x-coordinate, y-coordinate	• Recognize, write, and evaluate simple algebraic expressions in one variable. • Use variables to write algebraic expressions. • Evaluate algebraic expressions for given values of the variable. • Simplify algebraic expressions in one variable. • Solve simple equations. • Write and evaluate inequalities. • Solve real-world problems involving algebraic equations. • Recognize the expression obtained after simplifying is equivalent to the original expression. • Expand and factor algebraic expressions. • Solve real-world problems involving algebraic expressions. • Solve equations in one variable • Express the relationship between two quantities as a linear equation. • Use a table or graph to represent a linear equation. • Use substitution to determine whether a given number is a solution of an inequality. • Represent the solutions of an inequality on a number line. • Solve real-world problems by writing equations and inequalities. • Name and graph points on a coordinate plane.

Suggested Resources/Technology Tools

Math In Focus Resources Grade 5 Chapter 5: Algebra
Math In Focus Resources Chapter 7: Algebraic Expressions
Math In Focus Resources Chapter 8: Equations and Inequalities
Math In Focus Resources Chapter 9: The Coordinate Plane

Rulers
Yardsticks
Algebra tiles
Balance scale

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Modifications

Special Education - Transition Skills, Reteach, Anchor Charts, Guided Notes, Multiplication Chart, Hands on Activities, Manipulatives, See textbook for Differentiated Instruction ideas in each chapter, Teacher Resource Tools TRT1, 12, 14-20

504 - Transition Skills, Reteach, Anchor Charts, Manipulatives, Teacher Resource Tools TRT1, 12, 14-20

ELL - Vocabulary lists with examples, Manipulatives,

Gifted and Talented - Activity Project, Extra Brain Work, Enrichment, Extra Practice, Performance Tasks (my.hrw.com) , Video and Tools (my.hrw.com)

21ST CENTURY LIFE AND CAREER STANDARDS

Please select all standards that apply to this unit of study:

- ❑ Act as a responsible and contributing citizen and employee.
- ❑ Apply appropriate academic and technical skills.
- ❑ Attend to personal health and financial well being.
- ❑ Communicate clearly and effectively and with reason.
- ❑ Consider the environmental social and economics impacts of decisions.
- ❑ Demonstrate creativity and innovation.
- ❑ Employ valid and reliable research strategies.
- ❑ Utilize critical thinking to make sense of problems and persevere in solving them.
- ❑ Model integrity, ethical leadership, and effective management.
- ❑ Plan education and career paths aligned to personal goals.
- ❑ Use technology to enhance productivity.
- ❑ Work productively in teams while using cultural global competence.

Suggestions on integrating these standards can be found at: http://www.state.nj.us/education/cccs/2014/career/9.pdf

LINKS TO CAREERS:

Unit 4

Geometry

Summary and Rationale

Students will explore and identify the differences between a two dimensional figure and a three-dimensional figure. Formulas for calculating perimeter and area for two-dimensional figures as well as formulas for calculating surface area and volume of three-dimensional figures will be modeled. Students are expected to recognize area as an attribute of two-dimensional shapes and volume as an attribute of three-dimensional shapes. Because a net is a two-dimensional representation of a three-dimensional solid, it can be used to find the surface area of a solid.

Students learn to find the area of a triangle by correctly identifying and using its base and height. Students compare the area of a triangle with the area of its corresponding rectangle, that is, a rectangle sharing the same base and height as that triangle.

Calculating measurements for two and three-dimensional figures is often used by homeowners when working on household projects. Many contractors, such as, painters, carpenters, masons, and landscapers will use these formulas when problem solving to calculate cost and materials.

Recommended Pacing

March - April

Standards

(Sub Standard Heading)	
6.G.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.
6.G.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.
6.G.3	Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real world and mathematical problems.

6.G.4	Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real world and mathematical problems.
Mathematical Practices	
K-12.MP.1	Make sense of problems and persevere in solving them.
K-12.MP.2	Reason abstractly and quantitatively.
K-12.MP.3	Construct viable arguments and critique the reasoning of others.
K-12.MP.4	Model with mathematics.
K-12.MP.5	Use appropriate tools strategically.
K-12.MP.6	Attend to precision.
K-12.MP.7	Look for and make use of structure.
K-12.MP.8	Look for and express regularity in repeated reasoning.
Interdisciplinary Connections	
Standard x.x	
Integration of Technology	

Instructional Focus

Enduring Understandings:	**Essential Questions:**
Perimeter and circumference are used to calculate the distance around a two-dimensional figure. Area is used to calculate the covering of a two-dimensional figure and is measured in square units. Area is as an attribute of two-dimensional shapes and volume is as an attribute of three-dimensional shapes. Because a net is a two-dimensional representation of	Why is it important to be able to calculate the perimeter, circumference, and area, of two-dimensional figures? Why is it important to be able to calculate the surface area and volume of three-dimensional figures? How is surface area different from volume? How can you calculate the area of a triangle? How are the base and height of a rectangle or triangle related?

a three-dimensional solid, it can be used to find the surface area of a solid. Surface area is used to calculate the covering of a three-dimensional figure. A net of a three-dimensional figure can be used to calculate the surface area. The surface area is the total area of all faces. Volume is used to calculate the capacity of a three-dimensional container. Base and height are measurements that are used to find the area of a triangle. The base of a rectangle always perpendicular to its height. The base is a side of the triangle. However, depending on the triangle, the height may or not be another side of the triangle. The height must be perpendicular to the base. In right triangles, the base and the height are both sides of the triangle. They are the sides that are perpendicular to each other, forming the right angle. In other triangles, the sides are not perpendicular, so a dotted line is drawn to represent the height. The area of irregular polygons can often be found by separating it into familiar figures, finding the area of each smaller figure, and adding the areas together. A three-dimensional figure has the three dimensions of length, width, and height. Prisms and pyramids are named by the shapes of their bases.	Are the base and the height always both sides of the triangle?
Evidence of Learning (Assessments)	

Objectives (SLO)

Students will know:

- Two-dimensional geometric figures have an area and a perimeter.
- Three-dimensional geometric figures have a surface area and volume.
- Vertex
- Side
- Angle
- Base
- Height
- Perpendicular
- Area
- Right triangle
- Acute triangle
- Obtuse triangle
- Prism
- Rectangular prism
- Triangular prism
- Pyramid
- Square pyramid, triangular pyramid
- Net
- Surface area

Students will be able to:

- Identify the base given the height of a triangle.
- Identify the height given the base of the triangle.
- Find the area of a triangle given its base and height.
- Calculate the area and perimeter of a triangle and quadrilateral.
- Calculate the area of composite shapes.
- Find the surface area of a prism by adding the area of each face.
- Calculate the volume and surface area of a right rectangular prism.
- Draw polygons on a coordinate plane given the coordinates of vertices
- Represent three-dimensional figures using nets to calculate surface areas
- Use knowledge of area, perimeter, volume, and surface area to solve real world problems.

Suggested Resources/Technology Tools

Math In Focus Resources Grade 5 Chapter 6: Area of a Triangle
Math In Focus Resources Chapter 10: Area of Polygons
Math In Focus Resources Grade 5 Chapter 15: Surface Area Lesson 15.3 Nets and Surface Area
Math In Focus Resources Chapter 12: Surface Area and Volume of Solids

Solid shapes
Net of solid shapes

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Modifications

Special Education - Transition Skills, Reteach, Anchor Charts, Guided Notes, Multiplication Chart, Hands on Activities, Manipulatives, See textbook for Differentiated Instruction ideas in each chapter, Teacher Resource Tools TRT 12, 21-26

504 - Transition Skills, Reteach, Anchor Charts, Manipulatives, Teacher Resource Tools TRT 12, 21-26

ELL - Vocabulary lists with examples, Manipulatives,

Gifted and Talented - Activity Project, Extra Brain Work, Enrichment, Extra Practice, Performance Tasks (my.hrw.com) , Video and Tools (my.hrw.com)

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LINKS TO CAREERS:

Unit 5

Statistics and Probability

Summary and Rationale

Students will discover how to collect, organize, and display data. Choosing the appropriate graph is situational, yet specific graphs are used for displaying different types of data. Students will calculate the probability of an event occurring, based on comparing the possible outcomes to the total outcomes. These ratios are used to make predictions on the chance the event will occur.

Many companies in the business world will use statistical analysis to make very important decisions. Advertising and marketing companies collect, organize, and display data, then analyze the information.

Recommended Pacing

April - May

Standards

Statistics and Probability	
6.SP.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
6.SP.2	Understand that a set of data collected to answer a statistical question has a distribution that can be described by its center, spread, and overall shape.
6.SP.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.
6.SP.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
6.SP.5	Summarize numerical data sets in relation to their context such as by:
6.SP.5.a	Reporting the number of observations.
6.SP.5.b	Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

6.SP.5.c	Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
6.SP.5.d	Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
Mathematical Practices	
K-12.MP.1	Make sense of problems and persevere in solving them.
K-12.MP.2	Reason abstractly and quantitatively.
K-12.MP.3	Construct viable arguments and critique the reasoning of others.
K-12.MP.4	Model with mathematics.
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K-12.MP.7	Look for and make use of structure.
K-12.MP.8	Look for and express regularity in repeated reasoning.
Interdisciplinary Connections	
Standard x.x	
Integration of Technology	

Instructional Focus

Enduring Understandings:	**Essential Questions:**
Statistical data identifies central tendency, or patterns used to make inference that influence the decision making process.	How can statistical data and probability be used to influence decisions and make predictions?

There are different statistics for describing the "the center" of a numerical data set. A measure of center describes how the data within a set is centered. The mean, median, and mode are common measures for central tendency of a data set. A frequency table shows how often each data value occurs. A box-and-whisker plot displays and analyzes how a data set is distributed by emphasizing five key values and dividing the data into four equal parts. A bar graph uses horizontal or vertical bars to display numerical information. When the numerical information is grouped into equal intervals, the bar graph is called a histogram. Data can be described through observations of peeks, gaps, clusters, and symmetry of lack of symmetry. Survey questions are statistical questions that usually have more than one answer when asked of a group of people. The questions should contain language that is neutral and does not lead people to answer in a particular way.	
Evidence of Learning (Assessments)	
Objectives (SLO)	
Students will know: · Statistical variability · Display of data · Mean · Median · Mode · Range · Frequency tables, dot plots · Bar graph, histogram · Box-and-whisker plot · Statistical question	Students will be able to: Recognize a statistical question as one that anticipates a range in the collected data Collect, organize, and display data on appropriate graph; including bar graph, line graph, stem and leaf plot, and histogram. Calculate measures of central tendency; mean, median, and mode, for a set of data Identify and predict trends and deviations of data given measures of central tendency and variability

· Shapes of distribution	· ·

Suggested Resources/Technology Tools

Math in Focus Resources Chapter 13: Introduction to Statistics
Math in Focus Resources Chapter 14: Measures of Central Tendency
Course 2- Grade 7 (Green Book) Chapter 9: 9.1 Interpreting Quartiles and Interquartile Range
Course 2- Grade 7 (Green Book) Chapter 9: 9.2 Understanding Box and Whisker Plots (6.SP. 4 and 6.SP.5.c)

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Modifications

Special Education - Transition Skills, Reteach, Anchor Charts, Guided Notes, Multiplication Chart, Hands on Activities, Manipulatives, See textbook for Differentiated Instruction ideas in each chapter, Teacher Resource Tools TRT 27-36

504 - Transition Skills, Reteach, Anchor Charts, Manipulatives, Teacher Resource Tools TRT 27-36

ELL - Vocabulary lists with examples, Manipulatives,

Gifted and Talented - Activity Project, Extra Brain Work, Enrichment, Extra Practice, Performance Tasks (my.hrw.com) , Video and Tools (my.hrw.com)

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LINKS TO CAREERS: