Grade 6 Math

Mathematical Practices	
1. Make sense of problems and persevere in solving them.	5. Use appropriate tools strategically.
2. Reason abstractly and quantitatively.	6. Attend to precision.
3. Construct viable arguments and critique the reasoning of others.	7. Look for and make use of structure.
4. Model with mathematics.	8. Look for and express regularity in repeated reasoning.

Highlight = Standards New to Grade 6

Instructional time focus: (1) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems; **(2)** completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; **(3)** writing, interpreting, and using expressions and equations; **(4)** deepening understanding of area, surface area and volume; and **(5)** developing understanding of simple probabilities and statistical thinking. Please note that while every standard/topic in the grade level has not been included in this overview, all standards should be included in instruction.

Domain: Ratio and Proportional Reasoning

Cluster:
- Understand ratio concepts and use ratio reasoning to solve problems.

Standard	Topic	Essential Question	Vocabulary	Skills/Performance Indicators	Assessment	Activities
6.RP.1	Ratios	What is a ratio? Why do we use ratios? How do we use a ratio to describe the relationship between two different quantities?	ratio	Students will understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.	***Note: Lesson quizzes are optional, Mid-Unit and Unit Assessments are mandatory.** Lesson One Quiz	Lesson 1

6.RP.2	Unit Rate	What is a unit rate? How do we find rates? How do we find a unit rate?	Ratio Rate Unit rate	Students will understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0 (b not equal to zero), and use rate language in the context of a ratio relationship.	Lesson Two quiz	Lesson 2
6.RP.3 6.RP.3a 6.RP.3b 6.RP.3c 6.RP.3d	Equivalent Ratios	What are equivalent ratios? How do we use tables and graphs to reason about equivalent ratios? How do we solve problems with unit rates? Why do we use percent? What is percent? How do we solve problems with percent?	Equivalent ratios Unit price percent	Students will use ratio and rate reasoning to solve real-world and mathematical problems. **Note:** Strategies may include but are not limited to the following: tables of equivalent ratios, tape diagrams, double number lines, and equations. Students will 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. Students will use tables to compare ratios. Students will solve unit rate problems. **Note:** Problems may include unit pricing and constant speed. Students will find a percent of a quantity as a rate per 100. Students will solve problems that involve finding the whole given a part and the percent, and finding a part of a whole given the percent. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	Lessons Three, Four and Five quizzes **Mid-Unit Assessment after Lesson Three** **Unit Assessment after Lesson Five**	Lesson 3 Lesson 4 Lesson 5

				Note: Conversion of units occur within a given measurement system, not across different measurement systems.		

Domain: **The Number System**

Cluster:

- Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
- Compute fluently with multi-digit numbers and find common factors and multiples.
- Apply and extend previous understandings of numbers to the system of rational numbers.

Standard	Topics	Essential Question	Vocabulary	Skills/Performance Indicators	Assessment	Activities
6.NS.1	Division with Fractions	How can we use a model to understand division of fractions? How can we use our understanding of division of fractions to be able to multiply fractions?	Multiplicative inverse reciprocal	Students will interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions. **Note:** Strategies may include but are not limited to the following: using visual fraction models, a standard algorithm, and equations to represent the problem.	Lessons Six and Seven quizzes	Lesson 6 Lesson 7
6.NS.B.2	Divide Multi-Digit Numbers	How do we divide multi-digit numbers using the standard algorithm? What does the quotient tell us?	No new vocab	Students will fluently divide multi-digit numbers using a standard algorithm.	Lesson Eight quiz **Mid-Unit Assessment: Unit Two**	Lesson 8

6.NS.B.3	Add and Subtract Decimals Multiply and Divide Decimals	How do we add and subtract decimals? How do we divide decimals? How do we multiply decimals?	No new vocab	Students will fluently add, subtract, multiply, and divide multi-digit decimals using a standard algorithm for each operation.	Lessons Nine and Ten quizzes	Lesson 9 Lesson 10
6.NS.B.4	Common Factors and Multiples	What are Greatest Common Factors? How can we find the GCF of two numbers less than 100 and the LCM of two numbers less than or equal to 12? How can use the distributive property to express the sum of two numbers with a common factor?	Greatest common factor (GCF) Least common multiple (LCM)	Students will find the greatest common factor of two whole numbers less than or equal to 100. Students will use the **distributive property** to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor other than 1. Students will find the least common multiple of two whole numbers less than or equal to 12.	Lesson Eleven quiz	Lesson 11
6.NS.B.5	Positive and Negative Numbers	Why do we use positive and negative numbers? How do we relate negative numbers to real-world situations?	Positive numbers Negative numbers Signed numbers Opposite numbers integers	Students will understand that positive and negative numbers are used together to describe quantities having opposite directions or values. Students will use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.	Lesson Twelve quiz	Lesson 12

6.NS.6 6.NS.6a 6.NS.6b 6.NS.6c	Positive and Negative Numbers Rational Number on a number line Coordinate Axes Coordinate Plane	How do we use vertical and horizontal number lines to show negative numbers? How can we use coordinates and absolute values to find the distance between points on a coordinate plane?		Students will understand a rational number as a point on the number line. Students will use number lines and coordinate axes to represent points on a number line and in the coordinate plane with negative number coordinates. Students will recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line. Students will recognize that the opposite of the opposite of a number is the number itself, and that 0 is its own opposite. Students will understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane. Students will recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. Students will find and position integers and other rational numbers on a horizontal or vertical number line. Students will find and position pairs of integers and other rational numbers on a coordinate plane.	Lessons Twelve and Fourteen quizzes	Lesson 12 Lesson 14

6.NS.7 6.NS.7a 6.NS.7b 6.NS.7c 7.NS.7d	Absolute Value Ordering Numbers	How does the absolute value of a rational number tell us the distance from 0 on the number line? How can we order and compare rational numbers?	Absolute value	Students will understand ordering and absolute value of rational numbers. Students will interpret statements of inequality as statements about the relative position of two numbers on a number line. Students will write, interpret, and explain statements of order for rational numbers in real-world contexts. Students will understand the absolute value of a rational number as its distance from 0 on the number line. Students will interpret absolute value as magnitude for a positive or negative quantity in a real-world situation Students will distinguish comparisons of absolute value from statements about order.	Lessons Twelve and Thirteen quizzes	Lesson 12 Lesson 13
6.NS.8	Coordinate Plane	How do we describe points within the four quadrants? How do we find distances between points on a coordinate plane?	quadrants	Students will solve real-world and mathematical problems by graphing points on a coordinate plane. Students will include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.	Lesson Fourteen quiz **Unit Assessment: Unit Two**	Lesson 14

Domain: **Expressions and Equations (Inequalities)**

Cluster:

- Apply and extend previous understandings of arithmetic to algebraic expressions.
- Reason about and solve one-variable equations and inequalities.
- Represent and analyze quantitative relationships between dependent and independent variables.

Standard	Topic	Essential Question	Vocabulary	Skills/Performance Indicators	Assessment	Activities
6.EE.1	Numerical Expressions and Exponents	How do we write and evaluate numerical expressions with whole-number exponents?	Base Exponent Exponential expression	Students will write and evaluate numerical expressions involving whole number exponents.	Lesson Fifteen quiz	Lesson 15
6.EE.2 6.EE.2a 6.EE.2b 6.EE.2c	Algebraic Expressions	How do we write, read, and evaluate variable expressions? How do we apply the order of operations on expressions with variables, including those with exponents? How do we translate an expression from its word form to an algebraic expression vice versa?	Term Coefficient Sum Difference product factor Quotient	Students will write, read, and evaluate expressions in which letters stand for numbers. Students will write expressions that record operations with numbers and with letters standing for numbers Students will identify parts of an expression using mathematical terms. Students will view one or more parts of an expression as a single entity. Students will evaluate expressions given specific values for their variables. Students will include expressions that arise from formulas in real-world problems. Students will perform arithmetic operations, including those involving	Lesson Sixteen quiz	Lesson 16

				whole-number exponents, in the conventional order (Order of Operations). **Note:** Expressions may or may not include parentheses. Nested grouping symbols are not included.		
6.EE.3	Equivalent Expressions	How do we recognize and generate equivalent expressions?	Commutative property of addition Associative property of addition Distributive property Like terms	Students will apply the properties of operations to generate equivalent expressions.	Lesson Seventeen quiz **Mid-Unit Assessment: Unit Three**	Lesson 17
6.EE.4	Equivalent Expressions	How do we substitute values into expressions to prove equivalency?		Students will identify when two expressions are equivalent		Lesson 17
6.EE.5	Solutions to Equations	How do we use models to write and solve equations? How do we use substitution to determine whether a given number makes an equation true?	Equation	Students will 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? Students will use substitution to determine whether a given number in a specified set makes an equation or inequality true.	Lessons Eighteen and Twenty quizzes	Lesson 18 Lesson 20
6.EE.6	Solve Equations	How do we solve equations?	No new vocabulary	Students will use variables to represent numbers and write expressions when solving a real-world or mathematical problem.	Lesson Nineteen quiz	Lesson 19

				Students will 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 Equations	How do we solve problems using algebraic equations? How do we use inverse operations? How do we solve real-world problems? How do we use a variable to represent an unknown quantity?		Students will solve real-world and mathematical problems by writing and solving equations of the form x + p = q; x – p = q; px = q; and x/p= q for cases in which p, q and x are all nonnegative rational. **Note:** For the x/p = q case, p ≠ 0.		Lesson 19
6.EE.8	Solve Inequalities	What are algebraic inequalities? How can variables be used and graphed in different ways to represent solutions involving inequalities? How do we check our answers when solving problems involving inequalities?	inequality	Write an inequality of the form x > c, x ≥ c, x ≤ c or x < c to represent a constraint or condition in a real-world or mathematical problem. Students will recognize that inequalities of these forms have infinitely many solutions; represent solutions of such inequalities on a number line.	Lesson Twenty quiz	Lesson 20
6.EE.9	Dependent	What is a	dependent	Students will use variables to	**Unit**	Lesson 21

	and Independent Variables	dependent variable? What is an independent variable? How do we make a graph, table, or equation to represent a problem? How are dependent and independent variables related?	variable independent variable	represent two quantities in a real-world problem that change in relationship to one another. Given a verbal context and an equation, students will identify the dependent variable, in terms of the other quantity, thought of as the independent variable. Students will analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.	**Assessment: Unit Three**	

Domain: Statistics and Probability

Cluster:
- Develop an understanding of statistical variability.
- Summarize and describe distributions.
- Investigate chance processes and develop, use and evaluate probability models.

Standard	Topic	Essential Question	Vocabulary	Skills/Performance Indicators	Assessment	Activities
6.SP.1 6.SP.1a 6.SP.1b 6.SP.1c	Statistical Questions	How do statistical questions give us varying answers? How are statistical and nonstatistical questions different?	statistical question	Students will recognize that a statistical question is one that anticipates variability in the data related to the question and accounts for it in the answers. Students will understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only	Lesson Twenty-Six quiz	Lesson 26

				if the sample is representative of that population. Students will understand that the method and sample size used to collect data for a particular question is intended to reduce the difference between a population and a sample taken from the population so valid inferences can be drawn about the population. Students will generate multiple samples (or simulated samples) of the same size to recognize the variation in estimates or predictions.		
6.SP.2	Measures of Center and Variability	How are mean, median, mode good measures of data?	cluster skewed left skewed right symmetrical graph peak outlier mean median mode range mean absolute deviation	Students will understand that a set of quantitative data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.	Lesson Twenty-Seven quiz	Lesson 27
6.SP.3	Measures of Center and Variability	What does a measure of variation tell us about a data set?		Students will recognize that a measure of center for a quantitative 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. Note: Measures of center are mean, median, and mode. The measure of		Lesson 27

				variation is the range.		
6.SP.4	Dot Plots Histograms Box Plots	How can we use dot plots, histograms, and box plots to display data?	lower quartile upper quartile box plot interquartile range (IQR)	Students will display quantitative data in plots on a number line, including dot plots and histograms.	Lesson Twenty-Eight quiz	Lesson 28
6.SP.5a 6.SP.5b 6.SP.5c 6.SP.5d	Analyze Numerical Data	How do we analyze data?	no new vocab	Students will summarize quantitative data sets in relation to their context. Students will report the number of observations. Students will describe the nature of the attribute under investigation, including how it was measured and its units of measurement. Students will calculate range and measures of center, as well as describe any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. Students will relate the range and the choice of measures of center to the shape of the data distribution and the context in which the data were gathered.	Lesson Twenty-Nine quiz **Unit Assessment: Unit Five**	Lesson 29
6.SP.6				Students will understand that the probability of a chance event is a number between 0 and 1 inclusive, that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a		

				probability near 1 indicates a likely event.		
6.SP.7				Students will approximate the probability of a simple event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.		
6.SP.8 6.SP.8a 6.SP.8b				Students will develop a probability model and use it to find probabilities of simple events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. Students will develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of simple events. Students will develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.		

Domain: **Geometry**

Students will:

- Solve real-world and mathematical problems involving area, surface area and volume.

Standard	Topic	Essential Question	Vocabulary	Skills/Performance Indicators	Assessment	Activities
6.G.1	Area of Polygons	How can we find the area of polygons?	no new vocab	Students will find the area of triangles, trapezoids, and other polygons by composing into rectangles or decomposing into triangles and quadrilaterals. Apply these techniques in the context of solving real-world and	Lesson Twenty-Two quiz	Lesson 22

				mathematical problems.		
6.G.2	Volume	How do we find the volume of right rectangular prisms with fractional edge lengths?	no new vocab	Students will find volumes of right rectangular prisms with fractional edge lengths in the context of solving real world and mathematical problems.	Lesson Twenty-Five quiz Unit Assessment: Unit Four	Lesson 25
6.G.3	Polygons in the Coordinate Planes	How do we draw polygons in the coordinate planes?	polygon	Students will 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.	Lesson Twenty-Three quiz	Lesson 23
6.G.4	Nets and Surface Area	How do we find the surface area and nets of different figures?	base net surface area triangular prism pyramid	Students will 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.	Lesson Twenty-Four quiz	Lesson 24
6.G.5				Students will use area and volume models to explain perfect squares and perfect cubes.		