GRADE SIX

MATHEMATICS	KNOW	UNDERSTAND	DO
COMMON CORE STANDARDS	*(Factual)*	*(Conceptual)*	*(Procedural, Application, Extended Thinking)*
RATIOS AND PROPORTIONAL RELATIONSHIPS			
6.RP.1: Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.	• Write ratio notation- a:b, a to b, a/b • Know order matters when writing a ratio • Know ratios can be simplified • Know ratios compare two quantities; the quantities do not have to be the same unit of measure • Recognize that ratios appear in a variety of different contexts; part-to-whole, part-to-part, and rates	• Generalize that all ratios relate two quantities or measures • within a given situation in a multiplicative relationship • Analyze your context to determine which type of ratio is • represented	•
6.RP.2: Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship.	• Identify and calculate a unit rate • Use appropriate math terminology as related to rate	• Analyze the relationship between a ratio a:b and a unit rate a/b where b ≠ 0	•
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.	• Make a table of equivalent ratios using whole numbers • Find the missing values in a table of equivalent ratios • Plot pairs of values that represent equivalent ratios on the • coordinate plane • Know that a percent is a ratio of a number to 100 • Find a percent of a number as a rate per 100	• Use tables to compare proportional quantities • Apply the concept of unit rate to solve real-world problems • involving unit pricing • Apply the concept of unit rate to solve real-world problems • involving constant speed • Apply ratio reasoning to convert measurement units in real-world • and mathematical problems • Apply ratio reasoning to convert measurement units by • multiplying or dividing in real-world and mathematical problems	• Solve real-world and mathematical problems involving ratio and rate • Solve real-world problems involving finding the whole, given a • part and a percent

GRADE SIX

MATHEMATICS	KNOW	UNDERSTAND	DO
COMMON CORE STANDARDS THE NUMBER SYSTEM	*(Factual)*	*(Conceptual)*	*(Procedural, Application, Extended Thinking)*
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.	Compute quotients of fractions divided by fractions (including mixed numbers)	• Interpret quotients of fractions • Solve word problems involving division of fractions by fractions	•
6.NS.2: Fluently divide multi-digit numbers using the standard algorithm.	•	•	• Fluently divide multi-digit numbers using the standard algorithm with speed and accuracy
6.NS.3: Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	•	•	• Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation with speed and accuracy
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 two whole numbers with no common factor. For example, express 36 + 8 as 4 (9 + 2).	•	•	• Fluently identify the factors of two whole numbers less than or equal to 100 and determine the Greatest Common Factor • Fluently identify the multiples of two whole numbers less than or equal to 12 and determine the Least Common Multiple • Apply the Distributive Property to rewrite addition problems by factoring out the Greatest Common Factor

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MATHEMATICS	KNOW	UNDERSTAND	DO
COMMON CORE STANDARDS THE NUMBER SYSTEM	*(Factual)*	*(Conceptual)*	*(Procedural, Application, Extended Thinking)*
6.NS.5: Understand that positive and negative numbers are used together to describe quantities having opposite directions or values	• Identify an integer and its opposite	• Use integers to represent quantities in real world situations (above/below sea level, etc.) • Explain where 0 fits into a situation represented by integers	•
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.	• Identify a rational number as a point on the number line. • Identify the location of 0 on a number line in relation to positive and negative numbers • Recognize opposite signs of numbers as locations on opposite sides of 0 on the number line • Recognize the signs of both numbers in an ordered pair; indicate which quadrant of the coordinate plane the ordered pair will be located • 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	• Reason that the opposite of the opposite of a number is the number itself. • Reason that when only the x value in a set of ordered pairs are opposites, it creates a reflection over the y-axis • Recognize that when only the y value in a set of ordered pairs • are opposites, it creates a reflection over the x-axis • Reason that when two ordered pairs differ only by signs, the • locations of the points are related by reflections across both axes	•
6.NS.7: Understand ordering and absolute value of rational numbers.	• Order rational numbers on a number line • Identify absolute values of rational numbers	• Interpret statements of inequality as statements about relative position of two numbers on a number line diagram • Write, interpret, and explain statements of order for rational numbers in real-world contexts • Interpret absolute value as magnitude for a positive or negative quantity in a real-world situation • Distinguish comparisons of absolute value from statements about order and apply to real world contexts	•
6.NS.8:	• Calculate absolute value • Graph points in all four quadrants of the coordinate plane	•	• Solve real-world problems by graphing points in all four quadrants of a coordinate plane • Given only coordinates, calculate the distances between two • points with the same first coordinate or the same second coordinate • using absolute value

GRADE SIX

MATHEMATICS	KNOW	UNDERSTAND	DO
COMMON CORE STANDARDS EXPRESSIONS AND EQUATIONS	*(Factual)*	*(Conceptual)*	*(Procedural, Application, Extended Thinking)*
6.EE.1: Write and evaluate numerical expressions involving whole-number exponents.	• Write numerical expressions involving whole number exponents Ex. 34 = 3 x 3 x 3 x 3 • Evaluate numerical expressions involving whole number • exponents Ex. 34 = 3 x 3 x 3 x 3 = 81	•	• Do: Solve order of operation problems that contain exponents Ex. 3+ 22 – (2 + 3) = 2
6.EE.2: Write, read, and evaluate expressions in which letters stand for numbers.	• Use numbers and variables to represent desired operations • Identify parts of an expression using mathematical terms (sum, • term, product, factor, quotient, coefficient) • Identify parts of an expression as a single entity, even if not a • Monomial • Substitute specific values for variables • Evaluate algebraic expressions including those that arise from • real-world problems	• Apply order of operations when there are no parentheses for expressions that include whole number exponents • Translate written phrases into algebraic expressions • Translate algebraic expressions into written phrases	•
6.EE.3: Apply the properties of operations to generate equivalent expressions	• Generate equivalent expressions using the properties of • operations	•	•
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).	• Know: Recognize when two expressions are equivalent	•	•

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MATHEMATICS	KNOW	UNDERSTAND	DO
COMMON CORE STANDARDS EXPRESSIONS AND EQUATIONS	*(Factual)*	*(Conceptual)*	*(Procedural, Application, Extended Thinking)*
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.	• Recognize solving an equation or inequality as a process of answering "Which values from a specified set, if any, make the equation or inequality true?" • Know that the solutions of an equation or inequality are the values that 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.	• Recognize 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.	• Define inverse operation • Know how inverse operations can be used in solving one variable equations	• Apply rules of the form $x + p = q$ and $px = q$, for cases in which p, q, and x are all nonnegative rational numbers, to solve real-world and mathematical problems; with only one unknown quantity • Develop a rule for solving one-step equations using inverse operations with nonnegative rational coefficients	• Solve and write equations for real-world mathematical problems containing one unknown

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MATHEMATICS	KNOW	UNDERSTAND	DO
COMMON CORE STANDARDS EXPRESSIONS AND EQUATIONS	*(Factual)*	*(Conceptual)*	*(Procedural, Application, Extended Thinking)*
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 of the form x > c or x < c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.	• Identify the constraint or condition in a real-world or mathematical problem in order to set up an inequality • Recognize that inequalities of the form x > c or x < c have infinitely many solutions	• Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem • Represent solutions to inequalities or the form x > c or x < c, with infinitely many solutions, 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.	• Define independent and dependent variables • 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 (dependent) in terms of the other quantity (independent) • Analyze the relationship between the dependent variable and independent variable using tables and graphs • Relate the data in a graph and table to the corresponding equation	•

GRADE SIX

MATHEMATICS	KNOW	UNDERSTAND	DO
COMMON CORE STANDARDS GEOMETRY	*(Factual)*	*(Conceptual)*	*(Procedural, Application, Extended Thinking)*
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.	• Recognize and know how to compose and decompose polygons into triangles and rectangles	• Compare the area of a triangle to the area of the composed rectangle • Apply the techniques of composing and/or decomposing to find the area of triangles, special quadrilaterals, and polygons to • solve mathematical and real-world problems • Discuss, develop, and justify formulas for triangles and parallelograms	•
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 = l w h and V = b h to find the volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	• Know how to calculate the volume of a right rectangular prism	• Apply volume formulas for right rectangular prisms to solve real-world and mathematical problems involving rectangular prisms with fractional edge lengths	• Model the volume of a right rectangular prism with fractional • edge lengths by packing it with unit cubes of the appropriate unit • fraction edge lengths
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.	• Draw polygons in the coordinate plane • Use coordinates (with the same x-coordinate or the same y-coordinate) to find the length of a side of a polygon	•	• Apply the technique of using coordinates to find the length of a side of a polygon drawn in the coordinate plane to solve 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.	• Know that 3-D figures can be represented by nets	• Represent three-dimensional figures using nets made up of rectangles and triangles • Apply knowledge of calculating the area of rectangles and triangles to a net, and combine the areas for each shape into one answer representing the surface area of a three-dimensional figure	• Solve real-world and mathematical problems involving surface area using nets

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MATHEMATICS	KNOW	UNDERSTAND	DO
COMMON CORE STANDARDS	*(Factual)*	*(Conceptual)*	*(Procedural, Application, Extended Thinking)*
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. For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.	• Recognize that data can have variability • Recognize a statistical question (examples versus non-examples)	•	•
6.SP.2: Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.	• Know that a set of data has a distribution • Describe a set of data by its center • Describe a set of data by its 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.	• Recognize there are measures of central tendency for a data set • Recognize there are measures of variances for a data set • Recognize [measures] of central tendency for a data set; summarize the data with a single number • Recognize [measures] of variation for a data set; describe 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.	• Identify the components of dot plots, histograms, and box plots • Find the median, quartile, and interquartile range of a set of data	• Analyze a set of data to determine its variance	• Create a dot plot to display a set of numerical data • Create a histogram to display a set of numerical data • Create a box plot to display a set of numerical data
6.SP.5: Summarize numerical data sets in relation to their context:	• Organize and display data in tables and graphs • Report the number of observations in a data set or display • Describe the data being collected, including how it was measured and its units of measurement • Calculate quantitative measures of center • Calculate quantitative measures of variance • Identify outliers	• Determine the effect of outliers on quantitative measures of a set of data • Choose the appropriate measure of central tendency to represent the data • Analyze the shape of the data distribution and the context in which the data were gathered to choose the appropriate measures of central tendency and variability and justify why this measure is appropriate in terms of the context	•