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Quarter 1

Standards for Mathematical Practice

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

2.1 Numbers and Operations	
Ratios and Proportional Relationships	
CC.2.1.7.D.1 Analyze proportional relationships and use them to solve real-world and mathematical problems	
7.RP.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *Example:* *If a person walks ½ mile in each ¼ hour, compute the unit rate as the complex fraction $^{1/2}/1/4$ miles per hour, equivalently 2 miles per hour.*
7.RP.2	Recognize and represent proportional relationships between quantities. a. Decide whether two quantities are in a proportional relationship *Example:by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.* b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. c. Represent proportional relationships by equations. d. Explain what a point (x,y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0,0) and (1,r) where r is the unit rate.
7.RP.3	Use proportional relationships to solve multi-step ratio and percent problems. *Example:* *Solve for simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.*

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2.2 Algebraic Concepts	
Expressions and Equations	
CC.2.2.7.B.1 Apply properties of operations to generate equivalent expressions	
7.EE.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *Example: a+0.05a=1.05a means that "increase by 5%" is the same as "multiply by 1.05."*
CC.2.2.8.B.1 Apply concepts of radicals and integer exponents to generate equivalent expressions.	
8.EE.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions. *Example:* $3^2x3^{-5} = 3^{-3} = 1/3^3 = 1/27$
8.EE2	Use square root and cube root symbols to represent solutions to equations of the form $x^2=p$ and $x^3=p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that the $\sqrt{2}$ is irrational.
8.EE.3	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is to the other. *Example:* *Estimate the population of the United States as $3x10^8$ and the populations of the world as $7x10^9$, and determine that the world population is more than 20 times larger.*
8.EE.4	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for the seafloor spreading). Interpret scientific notation that has been generated by technology.
2.1 Numbers and Operations	
The Number System	
CC.2.1.7.E.1 Apply and extend previous understandings of operations with fractions to operations with rational numbers.	
7.NS.1	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a. Describe situations in which opposite quantities combine to make 0. b. Understand p + q as the number located a distance $\lvert q \rvert$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0. Interpret sums of rational numbers by describing real-world contexts. c. Understand subtraction of rational numbers as adding the additive inverse, p-q = p+(-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference and apply this principle in real-world contexts. d. Apply properties of operations as strategies to add and subtract rational numbers.

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7.NS.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q) = (-p)/q = p/(-q). Interpret quotients of rational numbers by describing real-world contexts. c. Apply properties of operations as strategies to multiply and divide rational numbers. d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
7.NS.3	Solve real-world and mathematical problems involving the four operations with rational numbers.
2.2 Algebraic Concepts	
Expressions and Equations	
CC.2.2.7.B.3 Model and solve real-life and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.	
7.EE3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *Example:* *If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50.* *If you want to place a towel bar 9 ¾ inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge.*
The Number System	
CC.2.1.8.E.1 Distinguish between rational and irrational numbers using their properties.	
8.NS.1	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.

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Quarter 2

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2.2 Algebraic Concepts	
Expressions and Equations	
CC.2.2.7.B.1 Apply properties of operations to generate equivalent expressions	
7.EE.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
7.EE.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *Example: a+0.05a=1.05a means that "increase by 5%" is the same as "multiply by 1.05."*
CC.2.2.7.B.3 Model and solve real-life and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.	
7.EE.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *Example:* *If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50.* *If you want to place a towel bar 9 ¾ inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge.*

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7.EE.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form px+q = r and p(x+q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *Example:* *The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?* b. Solve word problems leading to inequalities of the form px + q>r or px + q <r, where p,q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *Example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make and describe the solutions.*
CC.2.2.8.B.3 Analyze and solve linear equations	
8.EE.7	Solve linear equations in one variable. Give examples of linear equations in one variable with one solution, infinitely many solutions or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x=a, a=a, or a=b results (where a and b are different numbers).

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2.2 Algebraic Concepts	
Expressions and Equations	
CC.2.2.8.B.3 Analyze and solve linear equations	
8.EE.7	Solve linear equations in one variable. Give examples of linear equations in one variable with one solution, infinitely many solutions or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x=a, a=a, or a=b results (where a and b are different numbers).
CC.2.2.8.B.2 Understand the connections between proportional relationships, lines and linear equations.	
8.EE.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *Example:* *Compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*
8.EE.6	*Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane. Derive the equation y=mx for a line through the origin and the equation y=mx+b for a line intercepting the vertical axis b.*
2.2 Algebraic Concepts	
Statistics and Probability	
CC.2.2.7.B.3 Investigate chance processes and develop, use, and evaluate probability models	
7.SP.6.	Approximate the probability of a chance 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. *Example: When rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.*
7.SP.7	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.

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	Example: if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected. b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *Example:* *Find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed?*
7.SP.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. c. Design and use a simulation to generate frequencies for compound events. *Example: Use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*
2.4 Measurement, Data and Probability	
Statistics and Probability	
CC.2.4.7.B.1 Draw inferences about populations based on random sampling concepts.	
7.SP.1	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 if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
7.SP.2	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *Example:* *Estimate the mean word length in a book by randomly sampling words from the book. Predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*
CC.2.4.7.B.2 Draw informal comparative inferences about two populations	
7.SP.3	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *Example: The mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation/standard deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.*
7.SP.4	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.

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	Example: Decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.
7.SP.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around ½ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

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2.3 Geometry	
CC.2.3.7.A.2 Visualize and represent geometric figures and describe the relationships between them.	
7.G.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
7.G.2	Describe two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
7.G.3	Draw (freehand, with ruler and protractor and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
CC.2.3.7.A.1 Solve real-world and mathematical problems involving angle measure, area, surface area, circumference and volume.	
7.G.5	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. ***(can also be taught with first two standards – real world application)*** ***Surface area and volume can be used in equations as well)***
7.G.4	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
7.G.6	Solve real-world and mathematical problems involving area, volume, and surface area of 2- and 3-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
CC.2.3.8.A.1 Apply the concepts of volume cylinders, cones and spheres to solve real-world mathematical problems.	
8.G.9	Know the formulas for the volumes of cones, cylinders and spheres and use them to solve real-world and mathematical problems.
CC.2.3.8.A.2 Understand and apply congruence, similarity and geometric transformations using various tools.	
8.G.1	Verify experimentally the properties of rotations, reflections, and translations: a. lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines.

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8.G.2	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
8.G.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
8.G.4	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
8.G.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *Example:* *Arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*