

RICAS Supplemental Assessment Tables and Achievement Level Descriptors

Grade 6 Mathematics

This document is designed to provide educators with assessment information for specific standards on RICAS and to describe the RICAS achievement levels for mathematics.

The first set of tables are the Supplemental Assessment Tables. These tables include additional examples or interpretations of how a standard may be assessed, explicit references to the footnotes in the CCSS, and definitions of relevant terms not included in the CCSS glossary. Examples within individual standards are highlighted in blue.

The four RICAS achievement levels are detailed later in the document. The accompanying tables provide summaries of the knowledge and skills demonstrated on RICAS for the domains of the grade as well as conceptual understanding and procedural knowledge, problem solving, mathematical reasoning, and mathematical communication.

RICAS Grade 6 Supplemental Assessment Information Chart

CCSS Standard Key	Standard Text	Supplemental Assessment Information
6.RP.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. <i>For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."</i>	<ul style="list-style-type: none"> • Distinctions should be made between part: part and part: whole comparisons and the value of a ratio expressed as part/part and part/whole. • Example: for every vote candidate A received, candidate C received 3 votes means that candidate C received 3 out of every 4 votes or $\frac{3}{4}$ of all votes.
6.RP.2	Understand the concept of a unit rate a/b associated with a ratio a:b with $b \neq 0$, and use rate language in the context of a ratio relationship. <i>For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is $\frac{3}{4}$ cup of flour for each cup of sugar." "We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger."</i>	<ul style="list-style-type: none"> • Expectations for unit rates in this grade are limited to non-complex fractions. • Units should be included in these comparisons.
6.RP.3a	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 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	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. Solve unit rate problems including those involving unit pricing and constant speed. <i>For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?</i>	

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CCSS Standard Key	Standard Text	Supplemental Assessment Information
6.RP.3c	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. 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 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. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	<ul style="list-style-type: none"> • Example: Malik is making a recipe, but he cannot find his measuring cups! He has, however, found a tablespoon. His cookbook says that 1 cup = 16 tablespoons. Explain how he could use the tablespoon to measure out the following ingredients: 2 cups of flour, $\frac{1}{2}$ cup sunflower seed, and $1\frac{1}{4}$ cup of oatmeal. https://www.illustrativemathematics.org/content-standards/6/RP/A/3/tasks/2174 • The expectation for this standard is that students should be able to make conversions within and between measurement systems. • Students should be able to solve problems that relate the mass of an object to its volume.
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. <i>For example, create a story context for $(\frac{2}{3}) \div (\frac{3}{4})$ and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that $(\frac{2}{3}) \div (\frac{3}{4}) = \frac{8}{9}$ because $\frac{3}{4}$ of $\frac{8}{9}$ is $\frac{2}{3}$. (In general, $(\frac{a}{b}) \div (\frac{c}{d}) = \frac{ad}{bc}$.) How much chocolate will each person get if 3 people share $\frac{1}{2}$ lb of chocolate equally? How many $\frac{3}{4}$-cup servings are in $\frac{2}{3}$ of a cup of yogurt? How wide is a rectangular strip of land with length $\frac{3}{4}$ mi and area $\frac{1}{2}$ square mi?</i>	

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CCSS Standard Key	Standard Text	Supplemental Assessment Information
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 two whole numbers with no common factor. <i>For example, express $36 + 8$ as $4(9 + 2)$.</i>	<ul style="list-style-type: none"> • Students should be able to use prime factorization (a number written as the product of all its prime factors) when determining a greatest common factor or least common multiple. • Students should understand the concept of relatively prime. (Two positive integers that share no common divisors greater than 1; that is, the only common positive factor of the two numbers is 1.)
6.NS.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., <i>temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge</i>); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.	Numbers for this standard include positive and negative whole numbers, fractions, and decimals.
6.NS.6a	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. 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.	

RICAS Grade 6 Supplemental Assessment Information Chart

CCSS Standard Key	Standard Text	Supplemental Assessment Information
6.NS.6b	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. 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	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. 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.	Integers include all positive and negative whole numbers, including zero.
6.NS.7a	Understand ordering and absolute value of rational numbers. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. <i>For example, interpret $-3 > -7$ as a statement that -3 is located to the right of -7 on a number line oriented from left to right.</i>	The absolute value of a real number is its (non-negative) distance from 0 on a number line.
6.NS.7b	Understand ordering and absolute value of rational numbers. Write, interpret, and explain statements of order for rational numbers in real-world contexts. <i>For example, write $-3^{\circ}\text{C} > -7^{\circ}\text{C}$ to express the fact that -3°C is warmer than -7°C.</i>	The absolute value of a real number is its (non-negative) distance from 0 on a number line.

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6.NS.7c	Understand ordering and absolute value of rational numbers. Understand the 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. <i>For example, for an account balance of -30 dollars, write $-30 = 30$ to describe the size of the debt in dollars.</i>	The absolute value of a real number is its (non-negative) distance from 0 on a number line.
6.NS.7d	Understand ordering and absolute value of rational numbers. Distinguish comparisons of absolute value from statements about order. <i>For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.</i>	The absolute value of a real number is its (non-negative) distance from 0 on a number line.
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.	The absolute value of a real number is its (non-negative) distance from 0 on a number line.
6.EE.1	Write and evaluate numerical expressions involving whole-number exponents.	
6.EE.2a	Write, read, and evaluate expressions in which letters stand for numbers. Write expressions that record operations with numbers and with letters standing for numbers. <i>For example, express the calculation "Subtract y from 5" as $5 - y$.</i>	
6.EE.2b	Write, read, and evaluate expressions in which letters stand for numbers. 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. <i>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.</i>	<ul style="list-style-type: none"> • A coefficient is defined as any of the factors of a product considered in relation to a specific factor; <i>especially</i> a constant factor of a term as distinguished from a variable. • Example: In the expression $3x$ the coefficient is 3.

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6.EE.2c	Write, read, and evaluate expressions in which letters stand for numbers. 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). <i>For example, use the formulas $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = 1/2$.</i>	<p>Order of Operations: Convention adopted to perform mathematical operations in a consistent order.</p> <ol style="list-style-type: none"> 1. Perform all operations inside parentheses, brackets, and/or above and below a fraction bar in the order specified in steps 3 and 4. 2. Find the value of any powers or roots. 3. Multiply and divide from left to right. 4. Add and subtract from left to right.
6.EE.3	Apply the properties of operations to generate equivalent expressions. <i>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 $3y$.</i>	
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). <i>For example, the expressions $y + y + y$ and $3y$ are equivalent because they name the same number regardless of which number y stands for.</i>	
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.	

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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 of 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. <i>For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation $d = 65t$ to represent the relationship between distance and time.</i>	
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.	

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CCSS Standard Key	Standard Text	Supplemental Assessment Information
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 volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	<ul style="list-style-type: none"> The term capacity is often used when addressing volume. It is defined as the maximum amount or number that can be contained or accommodated, e.g., a jug with a one-gallon capacity; the auditorium was filled to capacity. More commonly, the formula for finding the volume of a right-rectangular prism using the area of its base and its height is $V = B \times h$ where B represents the area of the base.
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.	
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. <i>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.</i>	
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.	<ul style="list-style-type: none"> Measures of center include median, mean, and mode. Mode is included to introduce comparisons of measures of center and their uses. The focus for summarizing and describing distributions does not include mode. Measures of variability include range and interquartile range. Range is the difference between the largest and smallest values in a list of numbers.

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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.	<ul style="list-style-type: none"> • Measures of center include median, mean, and mode. • Mode is included to introduce comparisons of measures of center and their uses. The focus for summarizing and describing distributions does not include mode. • Measures of variability include range and interquartile range. • Range is the difference between the largest and smallest values in a list of numbers.
6.SP.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	Students are also expected to be able to read and interpret circle graphs for this standard.
6.SP.5a	Summarize numerical data sets in relation to their context, such as by reporting the number of observations.	
6.SP.5b	Summarize numerical data sets in relation to their context, such as by describing the nature of the attribute under investigation, including how it was measured and its units of measurement.	
6.SP.5c	Summarize numerical data sets in relation to their context, such as by 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.	<ul style="list-style-type: none"> • Assessment items will use range and interquartile range for measures of variability. • Range is the difference between the largest and smallest values in a list of numbers. • Assessment of mean absolute deviation is delayed until grade 7.
6.SP.5d	Summarize numerical data sets in relation to their context, such as by 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.	<ul style="list-style-type: none"> • Measures of center include median, mean, and mode. • Mode is included to introduce comparisons of measures of center and their uses. The focus for summarizing and describing distributions does not include mode. • Measures of variability include range and interquartile range.

Grade 6 RICAS Achievement Level Descriptors

Student results on the RICAS assessments are reported according to four achievement levels:

- **Exceeding Expectations**
A student who performed at this level exceeded grade-level expectations by demonstrating mastery of the subject matter.
- **Meeting Expectations**
A student who performed at this level met grade-level expectations and is academically on-track to succeed in the current grade in this subject.
- **Partially Meeting Expectations**
A student who performed at this level partially met grade-level expectations in this subject. The school, in consultation with the student's parent/guardian, should consider whether the student needs additional academic assistance to succeed in this subject.
- **Not Meeting Expectations**
A student who performed at this level did not meet grade-level expectations in this subject. The school, in consultation with the student's parent/guardian, should determine the coordinated academic assistance and/or additional instruction the student needs to succeed in this subject.

The descriptors included in the table below illustrate the knowledge and skills students demonstrate on RICAS at each level. Knowledge and skills are cumulative at each level. No descriptors are provided for the *Not Meeting Expectations* achievement level because students' work at this level, by definition, does not meet the criteria of the *Partially Meeting Expectations* level.

Grade 6 RICAS Achievement Level Descriptors

Grade 6	Partially Meets Expectations <i>On RICAS, a student at this level:</i>	Meeting Expectations <i>On RICAS, a student at this level:</i>	Exceeding Expectations <i>On RICAS, a student at this level:</i>
Conceptual Understanding and Procedural Knowledge	<ul style="list-style-type: none"> • Demonstrates partial understanding of the grade appropriate numeration system • Performs some calculations and estimations • Identifies examples of basic math facts or mathematical concepts • Mostly reads and sometimes constructs graphs, tables and charts 	<ul style="list-style-type: none"> • Applies understanding of the base-ten system and fractions to interpret numbers and solve problems • Performs most calculations and estimations • Describes mathematical concepts and generates examples and counterexamples of concepts • Represents data and mathematical relationships using equations, verbal descriptions, tables, and graphs 	<ul style="list-style-type: none"> • Performs complex calculations and estimations • Selects the best representations for a given set of data • Explains relationships between models such as equations, verbal descriptions, tables, and graphs • Applies math facts and connects mathematical concepts from various areas of mathematics, and uses the concepts to develop generalizations • Recognizes and makes use of structure, discerning patterns by seeing complicated things as single objects
Problem Solving	<ul style="list-style-type: none"> • Applies learned procedures to solve routine problems • Uses concrete objects or pictures to help conceptualize and solve problems. 	<ul style="list-style-type: none"> • Applies learned procedures and mathematical concepts to solve a variety of problems, including multi-step problems • Solves problems using multiple methods • Demonstrates the relationships between operations used to solve problems and the context of the problems 	<ul style="list-style-type: none"> • Generates strategies and procedures to solve non-routine problems • Solves problems using multiple methods, evaluating reasonableness of intermediate steps leading to the standard algorithms • Draws connections between strategies • Analyzes givens, constraints, and relationships in problems, using multiple methods and appropriate tools

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Grade 6	Partially Meets Expectations <i>On RICAS, a student at this level:</i>	Meeting Expectations <i>On RICAS, a student at this level:</i>	Exceeding Expectations <i>On RICAS, a student at this level:</i>
Mathematical Reasoning	<ul style="list-style-type: none"> Applies some reasoning methods to solve routine problems 	<ul style="list-style-type: none"> Uses a variety of reasoning methods to solve routine and non-routine problems Uses symbols to solve routine mathematical problems 	<ul style="list-style-type: none"> Reasons abstractly and quantitatively, using multiple reasoning methods to solve complex problems and provides justification for the reasoning Decontextualizes situations and represents them symbolically
Mathematical Communication	<ul style="list-style-type: none"> Identifies and uses basic terms 	<ul style="list-style-type: none"> Uses logical forms of representation (e.g., text, graphs, symbols) to illustrate steps to a solution 	<ul style="list-style-type: none"> Uses logical forms of representation (e.g., text, graphs, symbols) to justify solutions and solution strategies Constructs viable arguments and critiques the reasoning of others, attending to precision
The Number System	<ul style="list-style-type: none"> Interprets quotients of fractions to solve problems Solves mathematical problems by using all operations on multi-digit decimals Identifies greatest common factors or least common multiples Uses positive and negative numbers to describe quantities having opposite directions or values Interprets statements of order for rational numbers Graphs ordered pairs in all four quadrants to solve problems 	<ul style="list-style-type: none"> Computes quotients of fractions to solve problems Uses the standard algorithm to fluently divide multi-digit numbers, including decimals Uses prime factorization to find the greatest common factors, or least common multiples to solve problems Represents quantities in real-world context on a number line, explaining the meaning of zero Interprets and writes statements of order for rational numbers Finds the absolute value of a rational number by recognizing its distance from zero on the number line 	<ul style="list-style-type: none"> Applies interpretation of quotients of fractions to solving word problems Uses visual fraction models to solve word problems involving computing quotients of fractions Applies number theory concepts to the solution of problems. Solves problems involving order and absolute value of rational numbers

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Grade 6	Partially Meets Expectations <i>On RICAS, a student at this level:</i>	Meeting Expectations <i>On RICAS, a student at this level:</i>	Exceeding Expectations <i>On RICAS, a student at this level:</i>
The Number System		<ul style="list-style-type: none"> Solves problems by graphing in all four quadrants and finds distances between points with the same first coordinate or same second coordinate 	
Ratios and Proportional Relationships	<ul style="list-style-type: none"> Identifies part-to-part and part-to-whole relationships Uses rate language in the context of a ratio relationship Sometimes solves unit rate problems 	<ul style="list-style-type: none"> Solves problems requiring the conversion of part-to-part ratios to part-to-whole ratios Consistently solves unit rate problems Interprets and manipulates models with ratios such as tape diagrams, tables and double number lines to compare ratios Uses rate reasoning to solve problems Finds the percent of a quantity Uses ratio reasoning to convert measurement units within measurement systems 	<ul style="list-style-type: none"> Explains when to use part-to-part ratios, and when to use part-to-whole ratios to solve problems Creates models with ratios such as tape diagrams, tables and double number lines to compare ratios Determines what percent of a quantity is a given amount Uses ratio reasoning to convert measurement units between measurement systems Relates mass of an object to its volume to solve problems
Expressions and Equations	<ul style="list-style-type: none"> Evaluates given expressions and equations involving whole-number exponents to solve problems Identifies parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient) 	<ul style="list-style-type: none"> Interprets, evaluates and writes expressions and equations involving whole-number exponents Views one or more parts of an expression as a single entity Generates and identifies equivalent expressions Relates tables and graphs to equations Writes and solves equations of the form $x + p = q$ and $px = q$ 	<ul style="list-style-type: none"> Creates equations of the form $x + p = q$ and $px = q$ from a given situation Writes and graphs inequalities that represent a constraint or condition in a mathematical or real-world problem Uses equations to describe relationships between quantities

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Expressions and Equations		<ul style="list-style-type: none"> • Solves and graphs inequalities that represent a constraint or condition in a mathematical or real-world problem. • Analyzes the relationships between dependent and independent variables in real-world problems. 	
Geometry	<ul style="list-style-type: none"> • Solves mathematical problems involving areas of triangles, including right triangles and quadrilaterals • Solves mathematical problems involving volumes of right rectangular prisms with whole number edge lengths • Given coordinates of a polygon, draws the polygon on a coordinate plane • Represents three-dimensional figures using nets 	<ul style="list-style-type: none"> • Solves real-world problems involving areas of triangles, including right triangles and quadrilaterals by decomposing shapes, rearranging or removing pieces, and relating shapes to rectangles • Finds volumes of right rectangular prisms with fractional edge lengths • Given coordinates of a polygon on a coordinate plane, finds lengths of the sides of the polygon • Uses nets of three-dimensional figures to find the surface area 	<ul style="list-style-type: none"> • Reasons about geometric shapes and their measurements • Develops, and justifies formulas to solve mathematical and real-world problems that involve areas of triangles, including right triangles, and quadrilaterals • Applies the formula for volume of right rectangular prisms with fractional edge lengths • Applies knowledge of nets to solve mathematical and real-world problems involving surface area • Given coordinates of a polygon (without a coordinate plane), finds lengths of the sides of the polygon and applies these techniques to solve real-world problems

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Statistics and Probability	<ul style="list-style-type: none"> • Recognizes a statistical question • Visually recognizes measures of center and variability • Interprets dot plots and histograms 	<ul style="list-style-type: none"> • Solves problems involving finding the measures of center and variability • Constructs dot plots, histograms, box plots, and circle graphs given real-world situations 	<ul style="list-style-type: none"> • Recognizes that a data distribution may not have a definite center, and that different ways to measure center can yield different values, and uses this understanding to interpret a situation • Describes and summarizes numerical data sets, identifying clusters, peaks, gaps, and symmetry in real-world problems