

RICAS Supplemental Assessment Tables and Achievement Level Descriptors

Grade 7 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 7 Supplemental Assessment Information Chart

CCSS Standard Key	Standard Text	Supplemental Assessment Information
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. <i>For example, if a person walks $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $\frac{1/2}{1/4}$ miles per hour, equivalently 2 miles per hour.</i>	
7.RP.2a	Recognize and represent proportional relationships between quantities. Decide whether two quantities are in a proportional relationship, e.g., 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.	
7.RP.2b	Recognize and represent proportional relationships between quantities. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	An equation that states two ratios are equivalent is a proportion , e.g. $4/8 = \frac{1}{2}$ or $4:8 = 1:2$.
7.RP.2c	Recognize and represent proportional relationships between quantities. Represent proportional relationships by equations. <i>For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as $t = pn$.</i>	An equation that states two ratios are equivalent is a proportion , e.g. $4/8 = \frac{1}{2}$ or $4:8 = 1:2$.
7.RP.2d	Recognize and represent proportional relationships between quantities. 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.	

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7. RP.3	Use proportional relationships to solve multistep ratio and percent problems. <i>Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.</i>	<ul style="list-style-type: none"> • Examples also include rate problems. • Markups may be referred to as price increases. • Markdowns may be referred to as price decreases.
7.NS.1a	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. Describe situations in which opposite quantities combine to make 0. <i>For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.</i>	For this standard, the set of rational numbers is understood to include integers, fractions, and decimals.
7.NS.1b	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. Understand $p + q$ as the number located a distance $ q $ 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 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.	For this standard, the set of rational numbers is understood to include integers, fractions, and decimals.
7.NS.1c	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. 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.	For this standard, the set of rational numbers is understood to include integers, fractions, and decimals.

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7.NS.1d	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. Apply properties of operations as strategies to add and subtract rational numbers.	For this standard, the set of rational numbers is understood to include integers, fractions, and decimals.
7.NS.2a	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. 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.	For this standard, the set of rational numbers is understood to include integers, fractions, and decimals.
7.NS.2b	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. 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.	For this standard, the set of rational numbers is understood to include integers, fractions, and decimals.
7.NS.2c	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. Apply properties of operations as strategies to multiply and divide rational numbers.	For this standard, the set of rational numbers is understood to include integers, fractions, and decimals.
7.NS.2d	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. 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.	For this standard, the set of rational numbers is understood to include integers, fractions, and decimals.

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7.NS.3	Solve real-world and mathematical problems involving the four operations with rational numbers.	<ul style="list-style-type: none"> • Computations with rational numbers extend the rules for manipulating fractions to complex fractions. • For this standard, the set of rational numbers is understood to include integers, fractions, and decimals.
7.EE.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	Examples: $4x + 2 = 2(2x + 1)$ and $-3(x - 5/3) = -3x + 5$
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. <i>For example, $a + 0.05a = 1.05a$ means that "increase by 5%" is the same as "multiply by 1.05."</i>	Example: A shirt at a clothing store is on sale for 20% off the regular price, " p ". The discount can be expressed as $0.2p$. The new price for the shirt can be expressed as $p - 0.2p$ or $0.8p$.
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. <i>For 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 3/4 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; this estimate can be used as a check on the exact computation.</i>	

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7.EE.4a	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. 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. <i>For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?</i>	Mathematical problems may require students to analyze the patterns in simple arithmetic and geometric sequences (e.g. compounding or increasing area) using tables, graphs, words, and expressions. This is a separate standard for MA – 7.EE.4c
7. EE.4b	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. 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. <i>For 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.</i>	
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	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.	Geometric shapes for this standard are two-dimensional.

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7.G.3	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	Students should be able to describe the shape of the two-dimensional face that results from slicing the three-dimensional figure.
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.	<ul style="list-style-type: none"> • Know that a circle is a two-dimensional shape created by connecting all of the points equidistant from a fixed point called the center of the circle. • Understand and describe the relationships among the radius, diameter, and circumference of a circle. • Understand and describe the relationship among the radius, diameter, and area of a circle.
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.	
7.G.6	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	
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.	Random sampling is the process by which a smaller group of people or objects is chosen from a larger group or population by a process giving equal chance of selection to all possible people or objects.

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CCSS Standard Key	Standard Text	Supplemental Assessment Information
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. <i>For 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.</i>	Random sampling is the process by which a smaller group of people or objects is chosen from a larger group or population by a process giving equal chance of selection to all possible people or objects.
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. <i>For 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) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.</i>	Additional information to clarify for the example given in the standard: <ul style="list-style-type: none"> • The mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team and both distributions have similar variability (mean absolute deviation) of about 5cm. The difference between the mean heights of the two teams (10 cm) is about twice the variability (5 cm) on either team. On a dot plot, the separation between the two distributions of heights is noticeable. • Mean absolute deviation first appears in 6.SP.5c but is not assessed until grade 7.
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. <i>For 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.</i>	Random sampling is the process by which a smaller group of people or objects is chosen from a larger group or population by a process giving equal chance of selection to all possible people or objects.

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CCSS Standard Key	Standard Text	Supplemental Assessment Information
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 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.	
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. <i>For 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.</i>	
7.SP.7a	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. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. <i>For 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.</i>	
7.SP.7b	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. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. <i>For 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 frequencies?</i>	

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7.SP.8a	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. 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.	
7.SP.8b	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. 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.	
7.SP.8c	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. Design and use a simulation to generate frequencies for compound events. <i>For 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?</i>	

Grade 7 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 7 RICAS Achievement Level Descriptors

Grade 7	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

Grade 7 RICAS Achievement Level Descriptors

Grade 7	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"> Represents addition and subtraction on horizontal and vertical number lines Operates with rational numbers with limited accuracy 	<ul style="list-style-type: none"> Adds, subtracts, multiplies, and divides integers and other rational numbers in mathematical and real-world problems Recognizes situations in which opposite quantities combine to make zero Recognizes the additive inverse Converts a rational numbers to a decimal number 	<ul style="list-style-type: none"> Applies properties of operations as strategies to add and subtract rational numbers Interprets quotient and remainder of rational numbers by describing real-world contexts
Ratios and Proportional Relationships	<ul style="list-style-type: none"> Recognizes a proportional relationship Uses ratios and proportionality to solve simple mathematical problems, including percent problems 	<ul style="list-style-type: none"> Represents a proportional relationship by equations Interprets the meaning of any point on a graph of a proportional relationship Sometimes uses ratios and proportionality to solve multi-step mathematical and real-world problems, including percent problems 	<ul style="list-style-type: none"> Consistently uses ratios and proportionality to solve multi-step mathematical and real-world problems, including percent problems

Grade 7 RICAS Achievement Level Descriptors

Grade 7	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>
Expressions and Equations	<ul style="list-style-type: none"> • Uses properties of operations to add and subtract linear expressions • Solves simple mathematical problems using numerical and algebraic expressions and equations • Identifies simple arithmetic and geometric sequences from tables, graphs, words, and expressions. • Extends patterns in simple arithmetic and geometric sequences from tables, graphs, words, and expressions. 	<ul style="list-style-type: none"> • Uses properties of operations to expand linear expressions • Uses properties of operations to factor linear expressions • Given a real-world problem, rewrites expressions in different forms (whole numbers, fractions, decimals) to show understanding of the problem • Graphs the solutions of an inequality • Interprets the solution of an inequality in a real-world problem • Solves multi-step mathematical and real-world problems using numerical and algebraic expressions and equations • Create equations and inequalities to solve problems • Analyzes patterns for simple arithmetic and geometric sequences using tables, graphs, words and expressions 	<ul style="list-style-type: none"> • Uses properties of operations to factor linear expressions and interprets the result in the context of a problem • Justifies solutions to multi-step problems • Analyzes patterns and determines expressions for simple arithmetic and geometric sequences using tables, graphs, words, and expressions
Geometry	<ul style="list-style-type: none"> • Draws triangles with given conditions • Applies formulas to find the circumference of circles • Applies formulas to find the area of two-dimensional figures, including circles 	<ul style="list-style-type: none"> • Solves mathematical problems involving scale drawings • Constructs triangles with given conditions and describes some of their attributes 	<ul style="list-style-type: none"> • Finds unknown supplementary, complementary, vertical, and adjacent angles by solving equations

Grade 7 RICAS Achievement Level Descriptors

Grade 7	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>
Geometry	<ul style="list-style-type: none"> Recognizes attributes of angles (supplementary, complementary, vertical, adjacent) 	<ul style="list-style-type: none"> Describes the shape of the two-dimensional face of the figure that results from slicing three-dimensional figures. Solves problems involving the relationship between area and circumference of circles Solves problems involving the surface area and volume of three-dimensional shapes Solves multi-step problems using attributes of angles (supplementary, complementary, vertical, adjacent) 	
Statistics and Probability	<ul style="list-style-type: none"> Makes inferences about a population by examining a sample population Visually compares two populations based on measures of center and variability Differentiates between representative and non-representative samples Identifies probability as a number between 0 and 1 Finds probabilities of simple events 	<ul style="list-style-type: none"> Uses random sampling to draw inferences about a population Recognizes the probabilities of 0 through 1 as likely, unlikely, or neither. Develops probability models and uses them to find probabilities of events Finds probabilities for compound events using organized lists, tables, and tree diagrams 	<ul style="list-style-type: none"> Computes the differences of the centers as a multiple of the measure of variability for two populations Evaluates probability models Designs and uses a simulation to generate frequencies for compound events