Riverside Interim Assessments

Blue Prints

Mathematics

Grade 2-11

RIVERSIDE

HOUGHTON MIFFLIN HARCOURT

Developed to the Common Core State Standards
Blue Prints

Common Core State Standards define the knowledge and skills students should have within their K-12 education careers so that they will graduate high school able to succeed in entry-level, credit-bearing academic college courses and in workforce training programs. The standards:

- Are aligned with college and work expectations;
- Are clear, understandable and consistent;
- Include rigorous content and application of knowledge through high-order skills;
- Build upon strengths and lessons of current state standards;
- Are informed by other top performing countries, so that all students are prepared to succeed in our global economy and society; and
- Are evidence-based
- More coherent and less broad

The Standards are structured very differently from most state standards. The Standards approach concepts and domains at a very much deeper level, ensuring that curriculum and standards far apart. These new standards differ from many current standards by including fewer, but broader, domains at each grade or course. However, each domain is addressed more deeply at each grade, ensuring that the content at each level is reasonable in scope, instructionally manageable, and promotes depth of understanding. Because of this, the Common Core State Standards are changing the way educators plan and deliver instruction, as well as the way they assess students' knowledge of these standards and RPC is working to capture all of these changes and implement this theory into our assessments.

Riverside knows that districts still need to be able to take a snapshot of student performance at fixed times across the school year in order to have data that show how well the district is performing in terms of the Common Core Standards. Therefore, we have developed a series of summative assessments for Grades 2–8 and high school that are aligned to the Common Core State Standards in Mathematics and English Language Arts/Literacy. Each grade and content area set of assessments will consist of a pre-, mid-, and post-test that will cover the broad scope of the entire set of the Standards for each content area and grade. The blueprints for these assessments have been developed using our proven, rigorous process that incorporates high quality assessment design, including using items that have a range of Cognitive Difficulty and Bloom's Taxonomy on each form. In this way, each assessment will yield valid and reliable data that teachers can use to drive instructional decisions to ensure that every student is achieving in terms of the new Common Core Standards.

To ensure the creation of high quality passages, items, and assessments time after time, Riverside has established processes and procedures with accompanying checklists that guide content and assessment development. Periodically the processes and procedures are modified to keep pace with changes in assessment or educational philosophies or to adjust to improved technology. Each time changes are implemented, checklists and other forms of documentation are revised to maintain quality and stay current with today's standards in test publishing. Creating a reliable and valid assessment requires developers and editors to carefully evaluate test materials so that students find them relevant, interesting, and engaging but not offensive, troubling, or distracting. In an effort to achieve this delicate balance, Riverside analyzes the following key elements when developing every assessment:

- Bias and sensitivity
- Representational fairness
- Language usage
- Stereotyping
- Controversial or emotionally charged subject matter
- Historical context

Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Operations and Algebraic Thinking	9	Represent and Solve Problems Involving Addition and Subtraction	3	Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions. E.g. by using drawings and equations with a symbol for the unknown number to represent the problem.	3		1	2			2	1		
		Add and Subtract within 20.	3	Fluently add and subtract within 20 using mental strategies. By end of grade 2, know from memory all sums of two one-digit numbers.	3		3			2	1			
		Work with equal groups of objects to gain foundations for multiplication.	3	Determine whether a group of objects (up to 20) has an odd or even number of members, e.g.. by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.	2	1	1			1	1			
				Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.	1		1			1				
Number and Operations in Base Ten	9	Understand Place Value	5	Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases: a. 100 can be thought of as a bundle of ten tens - called a "hundred". b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).	1		1		1					
				Count within 1000; skip-count by 5s, 10s, and 100s.	1			1				1		
				Read and write numbers to1000 using base-ten numerals, number names, and expanded form.	2	2			1	1				
				Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons	1	1						1		
		Use Place Value understanding and Properties of Operations to add and subtract.	4	Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or relationship between addition and subtraction.	1		1				1			
				Add up to four two-digit numbers using strategies based on place value and properties of operations.	1		1				1			
				Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.	1			1			1			
				Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.	1	1				1				

Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Measurement and Data and Geometry	15	Measure and estimate lengths in Standard Units	3	Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.	1		1				1			
				Estimate lengths using units of inches, feet, centimeters, and meters.	1		1			1				
				Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.	1			1			1			
		Relate addition and subtraction to length	3	Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.	1		1				1			
				Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.	2		1	1				2		
		Work with time and money	3	Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.	1		1					1		
				Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have?	2	1	1			1	1			
		Represent and Interpret data	3	Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.	3		3				1	2		
		Reason with shapes and their attributes	3	Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.	1		1			1				
				Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.	1		1			1				
				Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of,etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.	1	1					1			
	33		33		33	7	2	6	2	1	13	8		

Grade 2: 2 of 2: See previous page.

Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Operations and Algebraic Thinking	9	Represent and solve problems involving multiplication and division	3	Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.	1		1			1				
				Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.1	1		1				1			
				Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = □ ÷ 3, 6 × 6 = ?.	1		1				1			
		Understand properties of multiplication and the relationship between multiplication and division	2	Apply properties of operations as strategies to multiply and divide.2 Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)	1			1			1			
				Understand division as an unknown-factor problem. For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.	1	1				1				
		Multiply and divide within 100	2	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.	2	1	1		2					
		Solve problems involving the four operations, and identify and explain patterns in arithmetic	2	Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.3	2			2			2			
Number and Operations in Base Ten	9	Use Place value understanding and properties of operations to perform multi-digit arithmetic.	9	Use place value understanding to round whole numbers to the nearest 10 or 100.	4	3	1			4				
				Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.	3		2	1			3			
				Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.	2	2			2					

Grade 3: 1 of 3: Continued on next page.

Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Number and Operations - Fractions	9	Develop understanding of fractions as numbers	9	Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b.	2		2			2				
				Understand a fraction as a number on the number line; represent fractions on a number line diagram. a. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. b. Represent a fraction a/b on a number line diagram by marking off a lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.	3		2	1				3		
				Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model. c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram. d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.	4		4				2	2		
Measurement and Data and Geometry	11	Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.	2	Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.	1		1				1			
				Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).6 Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.7	1		1				1			
		Represent and interpret data.	2	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.	2		2			2				

Grade 3: 2 of 3: See previous page.

Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Continued **Measurement and Data and Geometry**	11	Geometric measurement: understand concepts of area and relate area to multiplication and to addition.	3	Recognize area as an attribute of plane figures and understand concepts of area measurement. a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. b. A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.	1		1			1				
				Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).	1		1				1			
				Relate area to the operations of multiplication and addition. a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. b. Multiply side lengths to find areas of rectangles with wholenumber side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and b + c is the sum of a × b and a × c. Use area models to represent the distributive property in mathematical reasoning. d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.	1	1				1				
		Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.	2	Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.	2			2			2			
		Reason with shapes and their attributes.	2	Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.	1		1			1				
				Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.	1		1					1		
	38		38		38	8	23	7	4	13	15	6	0	0

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Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Operations and Algebraic Thinking	9	Use the four operations with whole numbers to solve problems.	3	Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.	1		1			1				
				Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.1	1		1				1			
				Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	1			1			1			
		Gain familiarity with factors and multiples.	3	Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.	3	2	1		1	2				
		Generate and analyze patterns.	3	Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.	3		1	2			2	1		
Number and Operations in Base Ten2	9	Generalize place value understanding for multi-digit whole numbers.	4	Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.	1	1			1					
				Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.	2		2					2		
				Use place value understanding to round multi-digit whole numbers to any place.	1	1			1					
		Use place value understanding and properties of operations to perform multi-digit arithmetic.	5	Fluently add and subtract multi-digit whole numbers using the standard algorithm.	2		2				2			
				Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	2		2				2			
				Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	1			1				1		

Grade 4: 1 of 3: Continued on next page.

Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Number and Operations—Fractions3	10	Extend understanding of fraction equivalence and ordering.	4	Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.	2		2					2		
				Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.	2	2				1	1			
		Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.	3	Understand a fraction a/b with a > 1 as a sum of fractions 1/b. a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8. c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.	2		2				2			
				Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. a. Understand a fraction a/b as a multiple of 1/b. For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4). b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.) c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?	1			1			1			
		Understand decimal notation for fractions, and compare decimal fractions.	3	Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.4 For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.	1		1				1			
				Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.	1		1					1		
				Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.	1		1			1				

Grade 4: 2 of 3: See previous page.

Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Measurement and Data and Geometry	10	Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.	3	Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a twocolumn table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...	1	1			1					
				Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.	1			1			1			
				Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.	1		1				1			
		Represent and interpret data.	3	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.	3		1	2			1	2		
		Geometric measurement: understand concepts of angle and measure angles.	3	Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. b. An angle that turns through n one-degree angles is said to have an angle measure of n degrees.	1		1				1			
				Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.	1		1				1			
				Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.	1		1				1			
		Draw and identify lines and angles, and classify shapes by properties of their lines and angles.	1	Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.	1		1					1		
	38		38		38	7	23	8	4	5	19	10	0	0

Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Operations and Algebraic Thinking	9	Write and interpret numerical expressions	5	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.	2		2				2			
				Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation "add 8 and 7, then multiply by 2" as 2 x (8 + 7). Recognize that 3 x (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.	3	3				3				
		Analyze patterns and relationships.	4	Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. For example, given the rule "Add 3" and the starting number , and given the rule "Add 6" and the starting number , generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.	4		2	2				4		
Number and Operations in Base Ten	9	Understand the place value system.	5	Recognize that in a multi-digit number, a digit in one place represents 1 times as much as it represents in the place to its right and 1/1 of what it represents in the place to its left.	1		1		1					
				Explain patterns in the number of zeros of the product when mulyiplying a number by powers of 1, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 1. Use whole-number exponents to denote powers of 1.	1			1		1				
				Read, write, and compare decimals to thousandths. a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 x 1 + 4 x 1 + 7 x 1 + 3 x (1/1) + 9 x (1/1) + 2 x (1/1) b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.	2	1	1		1	1				
				Use place value understanding to round decimals to any place.	1		1			1				
		Perform operations with multi-digit whole numbers and with decimals to hundredths.	4	Fluently multiply multi-digit whole numbers using the standard algorithm.	1		1				1			
				Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	1		1					1		
				Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	2		1	1			1	1		
Number and Operations - Fractions	9	Use equivalent fractions as a strategy to add and subtract fractions.	3	Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad +bc)bd.)	1		1				1			
				Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2..	2		2					2		

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Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Continued **Number and Operations - Fractions**	9	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.	6	Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 5-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie.	1		1				1			
				Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. a. Interpret the product (a/b) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations a × q ÷ b. For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.) b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.	1		1				1			
				Interpret multiplication as scaling (resizing), by: a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (n×a)/(n×b) to the effect of multiplying a/b by 1.	1	1				1				
				Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem...	1		1					1		
				Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3. b. Interpret division of a whole number by a unit fraction, and compute such quotients. For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 2 because 2 × (1/5) = 4 c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?	2		1	1			1	1		

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Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Measurement and Data	9	Convert like measurement units within a given measurement system.	3	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to .5 m), and use these conversions in solving multi-step, real world problems	3		3			3				
		Represent and interpret data.	3	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.	3		1	2			1	2		
		Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.	3	Recognize volume as an attribute of solid figures and understand concepts of volume measurement. a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.	1	1				1				
				Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.	1		1		1					
				Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication. b. Apply the formulas V = l × w × h and V = b × h for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems. c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.	1			1				1		
Geometry	9	Graph points on the coordinate plane to solve real-world and mathematical problems.	4	Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).	2	1	1		1	1				
				Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	2		1	1				2		
		Classify two-dimensional figures into categories based on their properties..	5	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.	3	2	1			3				
				Classify two-dimensional figures in a hierarchy based on properties.	2		1	1				2		
	45		45		45	9	26	1	4	15	9	17		

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Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Ratio and Proportional Relationships	8	Understand ratio concepts and use ratio reasoning to solve problems.	8	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. 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."	3	3			3					
				Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ , and use rate language in the context of a ratio relationship. For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."	1		1			1				
				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. a. Make tables of equivalent ratios relating quantities with wholenumber measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios b. Solve unit rate problems including those involving unit pricing and constant speed. 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? c. Find a percent of a quantity as a rate per 1 (e.g., 3% of a quantity means 3/1 times the quantity); solve problems involving finding the whole, given a part and the percent. d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	4		2	2			2	2		
The Number System	3	Apply and extend previous understandings of multiplication and division to divide fractions by fractions.	3	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. For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/(In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?	3	1	1	1			3			

Grade 6: 1 of 5: Continued on next page.

Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Continued **The Number System**	7	Compute fluently with multi-digit numbers and find common factors and multiples.	3	Fluently divide multi-digit numbers using the standard algorithm.	1	1					1			
				Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	1		1				1			
				Find the greatest common factor of two whole numbers less than or equal to 1 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 1–1 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).	1		1			1				
		Apply and extend previous understandings of numbers to the system of rational numbers.	4	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of in each situation.	1		1			1				
				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 a. Recognize opposite signs of numbers as indicating locations on opposite sides of on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that is its own opposite b. 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. c. 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.	1		1					1		

Grade 6: 2 of 5: See previous page.

Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Continued **The Number System**	2	*Continued* Apply and extend previous understandings of numbers to the system of rational numbers.	2	Understand ordering and absolute value of rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. 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. b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write –3 oC > –7 oC to express the fact that –3 oC is warmer than –7 oC c. Understand the absolute value of a rational number as its distance from on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. For example, for an account balance of –3 dollars, write |–3| = 3 to describe the size of the debt in dollars. d. Distinguish comparisons of absolute value from statements about order. For example, recognize that an account balance less than –3 dollars represents a debt greater than 3 dollars.	1		1				1			
				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.	1		1				1			
Expressions and Equations	9	Apply and extend previous understandings of arithmetic to algebraic expressions.	2	Write and evaluate numerical expressions involving whole-number exponents.	1		1			1				
				Write, read, and evaluate expressions in which letters stand for numbers. a. Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract y from 5" as 5 – y. b. 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. 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. c. 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 wholenumber exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas V = s3 and A = 6 s2 to find the volume and surface area of a cube with sides of length s = 1/2.	1		1			1				

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Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Continued **Expressions and Equations**	9	*Continued* Apply and extend previous understandings of arithmetic to algebraic expressions.	2	Apply the properties of operations to generate equivalent expressions. 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.	1		1			1				
				Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.	1		1			1				
		Reason about and solve one-variable equations and inequalities.	4	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.	1	1				1				
				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.	1		1			1				
				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.	1		1				1			
				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.	1		1					1		
		Represent and analyze quantitative relationships between dependent and independent variables.	1	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. 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.	1			1				1		

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Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Geometry	9	Solve real-world and mathematical problems involving area, surface area, and volume.	9	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.	3	1	2					3		
				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.	2		1	1		1	1			
				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.	2		1	1			2			
				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.	2		1	1			2			
Statistics and Probability	9	Develop understanding of statistical variability.	5	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.	2	1	1			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.	1	1			1					
				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.	2	1	1			2				
		Summarize and describe distributions.	4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	2		1	1		2				
				Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. 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. d. 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.	2		1	1				2		
	45		45		45	1	26	9	4	16	15	1		

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Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Ratios and Proportional Relationships	8	Analyze proportional relationships and use them to solve real-world and mathematical problems.	8	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.	2		2				2			
				Recognize and represent proportional relationships between quantities.	3	1	2		1		2			
				Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.	3		2	1			2	1		
The Number System	9	Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	9	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and	3	1	2			1	2			
				Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.	3		2	1		1	1	1		
				Solve real-world and mathematical problems involving the four operations with rational numbers.1Computations with rational numbers extend the rules for manipulating fractions to	3	3			1		2			
Expressions and Equations	9	Use properties of operations to generate equivalent expressions.	4	Apply properties of operations as strategies to add, subtract, factor,	2	1	1			1	1			
				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. For example, a + .5a = 1.5a means that "increase by 5%" is the same as "multiply by 1.5."	2	2			2					
		Solve real-life and mathematical problems using numerical and algebraic expressions and equations.	5	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. For example: If a woman making $25 an hour gets a 1% raise, she will make an additional 1/1 of her salary an hour, or $2.5, for a new salary of $27.5. 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.	3		2	1		2	1			
				Use variables to represent quantities in a real-world or mathematical	2		2				2			

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Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Geometry	9	Draw, construct, and describe geometrical figures and describe the relationships between them.	3	Solve problems involving scale drawings of geometric figures,	2		1	1			1	1		
				Draw (freehand, with ruler and protractor, and with technology)										
				Describe the two-dimensional figures that result from slicing threedimensional	1		1				1			
		Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	6	Know the formulas for the area and circumference of a circle and use	2		1	1			1	1		
				Use facts about supplementary, complementary, vertical, and adjacent	2		1	1			1	1		
				Solve real-world and mathematical problems involving area, volume	2		1	1			1	1		
Statistics and Probability	10	Use random sampling to draw inferences about a population.	3	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.	1		1					1		
				Use data from a random sample to draw inferences about a population	2		2			1		1		
		Draw informal comparative inferences about two populations.	3	Informally assess the degree of visual overlap of two numerical	2		1	1				2		
				Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about	1		1				1			
		Investigate chance processes and develop, use, and evaluate probability models.	4	Understand that the probability of a chance event is a number between and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 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.	1		1			1				
				Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative	1			1				1		
				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.	1	1				1				
				Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.	1	1			1					
	45		45		45	1	26	9	5	8	21	11		

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Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Geometry	9	Understand congruence and similarity using physical models, transparencies, or geometry software.	3	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.	1		1				1			
				Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	1	1				1				
				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.	1		1				1			
		Understand and apply the Pythagorean Theorem.	3	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	2		1	1			1	1		
				Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	1			1				1		
		Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.	3	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	3		2	1			2		1	
The Number System	9	Know that there are numbers that are not rational, and approximate them by rational numbers.	9	Understand informally that every number has a decimal expansion; the rational numbers are those with decimal expansions that terminate in 0s or eventually repeat. Know that other numbers are called irrational.	4	2	2			2	2			
				Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., $\pi 2$). For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.	5	1	3	1			3	2		

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Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Expressions and Equations	10	Work with radicals and integer exponents.	4	Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32 × 3–5 = 3–3 = 1/33 = 1/27.	1		1				1			
				Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.	1		1				1			
				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 than the other. For example, estimate the population of the United States as 3 × 108 and the population of the world as 7 × 109, and determine that the world population is more than 20 times larger.	1	1				1				
				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 seafloor spreading). Interpret scientific notation that has been generated by technology.	1		1					1		
		Understand the connections between proportional relationships, lines, and linear equations.	3	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.	3		1	2			3			
		Analyze and solve linear equations and pairs of simultaneous linear equations.	3	Solve linear equations in one variable. a. 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). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	1		1				1			
				Analyze and solve pairs of simultaneous linear equations. a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6. c. Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.	2		1	1		2				

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Domain	Items per Domain	Cluster	Items per Cluster	Standard	Cognitive Difficulty				Bloom's Taxonomy					
					# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Statistics and Probability	8	Investigate patterns of association in bivariate data.	8	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	2		2					2		
				Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.	2	2				2				
				Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.	2		2				2			
				Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?	2		1	1			1	1		
Functions	9	Define, evaluate, and compare functions.	4	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	2	1	1		1		1			
				Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.	1		1				1			
				Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function A = s2 giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.	1	1				1				
		Use functions to model relationships between quantities.	5	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	3		3				3			
				Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	2		1	1			1	1		
	45		45		45	9	27	9	1	9	25	9	1	

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Subject	Items per Subject	Domain	Standard	Cognitive Difficulty				Bloom's Taxonomy					
				# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Algebra	10	Seeing Structure in Expressions	Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients.	2	1	1			1	1			
			b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret P(1+r)n as the product of P and a factor not depending on P.	1		1			1				
		Creating Equations	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.	1			1				1		
			Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	1		1				1			
			Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R.	1		1				1			
		Reasoning with Equations and Inequalities	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	1	1				1				
			Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	2	1	1				1	1		
			1Graph the solutions to a linear inequality in two variables as a halfplane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.	1			1				1		

Grade 9: 1 of 3: Continued on next page.

Subject	Items per Subject	Domain	Standard	Cognitive Difficulty				Bloom's Taxonomy					
				# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Functions	12	Interpreting Functions	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).	1		1				1			
			Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	1	1					1			
			Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.	1			1			1			
			Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima.	1			1				1		
			Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.	1		1				1			
		Building Functions	Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context.	1		1				1			
			Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.	1		1				1			
			Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	1	1				1				
		Linear, Quadratic and Exponential Models	Distinguish between situations that can be modeled with linear functions and with exponential functions. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.	1		1			1				
			c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.	1		1					1		
			Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).	1	1				1				
			Interpret expressions for functions in terms of the situation they model	1		1					1		

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Subject	Items per Subject	Domain	Standard	Cognitive Difficulty				Bloom's Taxonomy					
				# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Geometry	9	Congruence	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.	1	1			1					
			Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).	1		1				1			
			Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.	1		1			1				
			Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	1		1					1		
			1Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.	1		1				1			
		Expressing Geometric Properties with Equations	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).	3		2	1		2	1			
			Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.	1			1				1		
Stats and Probability	9	Interpreting Categorical and Quantitative Data	Represent data with plots on the real number line (dot plots, histograms, and box plots).	2	1	1		1	1				
			Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	1			1				1		
			Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.	1		1				1			
			Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	2		2				2			
		Conditional Probability and the Rules of Probability	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").	1		1					1		
			Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.	1		1					1		
			Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.	1		1					1		
	40			40	8	25	7	2	10	16	12	0	0

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Subject	Items per Subject	Domain	Standard	Cognitive Difficulty				Bloom's Taxonomy					
				# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Algebra	12	Seeing Structure in Expressions	Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients.	1	1				1				
			Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a. Factor a quadratic expression to reveal the zeros of the function it defines.	1		1				1			
			b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.	1		1				1			
		Arithmetic with Polynomials and Rational Expressions	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.	3	1	2			1	2			
		Creating Equations	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.	1			1				1		
			Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	1		1				1			
			Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R.	1		1				1			
		Reasoning with Equations and Inequalities	Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form (x – p)2 = q that has the same solutions. Derive the quadratic formula from this form.	1		1				1			
			b. Solve quadratic equations by inspection (e.g., for x2 = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b."	1			1				1		
			Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line y = –3x and the circle x2 + y2 = 3.	1			1				1		
		Interpreting Functions	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.	1		1				1			
			Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.	1		1				1			
			Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima.	1			1				1		
			Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.	1			1				1		
			Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.	1		1				1			

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Subject	Items per Subject	Domain	Standard	Cognitive Difficulty				Bloom's Taxonomy					
				# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Continued **Algebra**	12	Building Functions	Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context.	1		1				1			
			b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model."	1		1				1			
			Find inverse functions. a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. For example, f(x) =2 x3 for x > 0 or f(x) = (x+1)/(x–1) for x ≠ 1.	1			1				1		
		Linear, Quadratic and Exponential Models	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).	1	1				1				
			Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.	1		1			1				
			Interpret expressions for functions in terms of the situation they model	1		1					1		
		Trigonometric Functions	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle	1	1				1				
			Prove the Pythagorean identity sin2(θ) + cos2(θ) = 1 and use it to calculate trigonometric ratios.	2	1	1				1	1		
		Congruence	Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.	1			1			1			
			Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.	1		1					1		
			1Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.	1			1				1		
		Similarity, Right Triangles, and Trigonometry	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.	1			1				1		
			Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.	1	1				1				
			Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	1		1					1		
			Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	1		1				1			

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Subject	Items per Subject	Domain	Standard	Cognitive Difficulty				Bloom's Taxonomy					
				# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Continued **Algebra**	12	Circles	Prove that all circles are similar.	1		1				1			
			Identify and describe relationships among inscribed angles, radii and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.	1	1				1				
			Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	1		1					1		
		Expressing Geometric Properties with Equations	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.	3		3				2	1		
			Derive the equation of a parabola given a focus and directrix.	1		1				1			
		Geometric Measurement and Dimension	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.	2	1	1			1	1			
		The Real Number System	Rewrite expressions involving radicals and rational exponents using the properties of exponents.	3	1	2			1	1	1		
		Quantities	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.	2	1	1			1	1			
			Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	1			1				1		
		The Complex Number System	Know there is a complex number i such that i2 = –1, and every complex number has the form a + bi with a and b real.	1	1				1				
			Use the relation i2 = –1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.	1		1				1			
			Solve quadratic equations with real coefficients that have complex solutions.	1			1				1		
	51			51	11	29	11	0	11	23	17	0	0

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Subject	Items per Subject	Domain	Standard	Cognitive Difficulty				Bloom's Taxonomy					
				# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Algebra	12	Seeing Structure in Expressions	Interpret expressions that represent a quantity in terms of its context. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret P(1+r)n as the product of P and a factor not depending on P.	1		1					1		
			Use the structure of an expression to identify ways to rewrite it. For example, see x4 – y4 as (x2)2 – (y2)2, thus recognizing it as a difference of squares that can be factored as (x2 – y2)(x2 + y2).	1		1				1			
			Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments.	1		1				1			
		Arithmetic with Polynomials and Rational Expressions	Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x).	1		1				1			
			Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	1			1				1		
			Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.	1			1				1		
		Creating Equations	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	1		1				1			
			Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.	1	1				1				
			Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R.	1		1				1			
		Reasoning with Equations and Inequalities	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	2		2				1	1		
			Graph the solutions to a linear inequality in two variables as a halfplane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.	1			1				1		

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Subject	Items per Subject	Domain	Standard	Cognitive Difficulty				Bloom's Taxonomy					
				# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Functions	14	Interpreting Functions	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.	1		1				1			
			Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.	1		1				1			
			Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.	1		1				1			
			c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	1		1				1			
			Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as y = (1.02)t, y = (0.97)t, y = (1.01)12t, y = (1.2)t/10, and classify them as representing exponential growth or decay.	1			1				1		
		Building Functions	Write a function that describes a relationship between two quantities. b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.	1		1				1			
			Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	1	1				1				
			Find inverse functions. a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. For example, f(x) =2 x3 for x > 0 or f(x) = (x+1)/(x–1) for x ≠ 1.	1			1				1		
		Linear, Quadratic and Exponential Models	Distinguish between situations that can be modeled with linear functions and with exponential functions. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.	1			1				1		
			Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).	1	1				1				
			For exponential models, express as a logarithm the solution to abct = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.	1		1				1			
		Trigonometric Functions	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle	1	1				1				
			Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline	2		1	1			2			

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Subject	Items per Subject	Domain	Standard	Cognitive Difficulty				Bloom's Taxonomy					
				# items	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Geometry	9	Geometric Measurement and Dimension	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.	4	1	3			1	2	1		
			Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.	2		2				2			
		Modeling with Geometry	Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).	1		1				1			
			Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).	1		1				1			
			Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typograhic grid systems based on ratios).	1		1				1			
Stats and Probability	9	Interpreting Categorical and Quantitative Data	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.	1	1				1				
			Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	1		1			1				
			Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.	1		1					1		
		Making Inferences and Justifying Conclusions	Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?	1			1				1		
			Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.	1	1				1				
			Evaluate reports based on data.	1	1				1				
		Conditional Probability and the Rules of Probability	Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.	1		1				1			
			Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.	1		1				1			
			Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.	1		1				1			
	44			43	7	28	8	0	8	24	11	0	0

Grade 11: 3 of 3: See previous page.

Riverside Interim Assessments

Local Scanning Requirements

Administering the Riverside Interim Assessments is easy and convenient. Just follow these steps:

- Download and print answer documents using plain paper
- Scan the completed answer documents locally, using one of these approved scanners
- You will then receive powerful web-based reporting

Approved scanner	With this operating system
Brother DCP-8080DN	Windows XP or Windows 7
Brother DCP-8060	Windows XP
Brother DCP-8080N	
Fujitsu fi-6160	Windows XP

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