

Number and Operations in Base Ten for Grades K-2		
Grade K	Grade 1	Grade 2
K.NBT/CC Counting and Cardinality/ Number and Operations in Base Ten	1.NBT Number and Operations in Base Ten	2.NBT Number and Operations in Base Ten
Work with numbers 11-19 to gain foundations for place value	Understand place value	Understand place value.
1. Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g., $18 = 10 + 8$); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.	2. Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: a. 10 can be thought of as a bundle of ten ones — called a “ten.” b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).	1. 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).
Counting and Cardinality	Extend the counting sequence	Understand place value
1. Count to 100 by ones and tens 2. Count forward beginning from a given number within the known sequence. 3. Write number from 0 to 20. Represent a number of objects with a written numeral 0-20.	1.Count to 120, starting at any number less than 120. In this range read and write numerals and represent a number of objects with a written numeral.	2. Count within 1000; skip count by 5s, 10s,100s. 3. Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.
4. Identify whether a number of objects is one group is greater than, less than, or equal to the number of objects in another group. 5. Compare two numbers between 1 and 10 presented as written numerals.	3. Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols $>$, $=$, and $<$.	4. Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using $>$, $=$, and $<$ symbols to record the results of comparisons.
6.		

Number and Operations in Base Ten for Grades K-2		
Grade K	Grade 1	Grade 2
K.NBT Number and Operations in Base Ten	1.NBT Number and Operations in Base Ten	2.NBT Number and Operations in Base Ten
	Use place value understanding and properties of operations to add and subtract	Use place value understanding and properties of operations to add and subtract
	<p>4. Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, 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.</p> <p>Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.</p>	<p>5. Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.</p> <p>6. Add up to four two-digit numbers using strategies based on place value and properties of operations.</p> <p>7. 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.</p>
Number and Operations in Base Ten for Grades K-2		
Grade K	Grade 1	Grade 2
	Use place value understanding and properties of operations to add and subtract	Use place value understanding and properties of operations to add and subtract
	<p>5. Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.</p>	<p>8. Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.</p>
	<p>6. Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), 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.</p>	<p>9. Explain why addition and subtraction strategies work, using place value and the properties of operations.</p>

Number and Operations for in Base 10 for Grades 3-5		
Grade 3	Grade 4	Grade 5
3.NBT Number and Operations in Base Ten	4.NBT Number and Operations in Base Ten	5.NBT Number and Operations in Base Ten
	Generalize place value understanding for multi-digit whole numbers.	Understand the place value system
	1. 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.	1. Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
		2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use exponents to denote powers of 10.
	2. 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.	3. Read, write, and compare decimals to 1000ths. a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form. b. Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.
		4. Use place value understanding to round decimals to any place.
Use place value understanding and properties of operations perform multi-digit arithmetic	Use place value understanding and properties of operations to perform multi-digit arithmetic.	Perform operations with multi-digit whole numbers and with decimals to hundredths.
2. 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.	4. Fluently add and subtract multi-digit whole numbers using the standard algorithm.	
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.	5. 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.	5. Fluently multiply multi-digit whole numbers using the standard algorithm.

Number and Operations for in Base 10 for Grades 3-5		
Grade 3	Grade 4	Grade 5
Use place value understanding and properties of operations perform multi-digit arithmetic.	Use place value understanding and properties of operations to perform multi-digit arithmetic.	Perform operations with multi-digit whole numbers and with decimals to hundredths.
	6. 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.	6. 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.
		7. 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.

Operations and Algebraic Thinking for Grades K-2

Grade K	Grade 1	Grade 2
K.OA Operations and Algebraic Thinking	1.OA Operations and Algebraic Thinking	2.OA Operations and Algebraic Thinking
Understand addition as putting together and adding to, and subtraction as taking apart and taking from	Represent and solve problems involving addition and subtraction	Represent and solve problems involving addition and subtraction
2. Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.	1. Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions e.g., by using objects, drawings, and equations with a symbol for the unknown number. <i>Common addition and subtraction situations. Adding To or Taking From situations with result unknown, change unknown, and start unknown. Put Together/ Take Apart with total unknown, added unknown or both addends unknown.</i> 2. Solve word problems that call for addition of three whole numbers whose sum ≤ 20 .	1. 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. 1 Add and subtract within 20. 3. Determine whether a group of objects (up to 20) has an odd or even number of members. Write an equation to express the total as a sum of equal addends.

Operations and Algebraic Thinking for Grades K-2

Grade K	Grade 1	Grade 2
Understand addition as putting together and adding to, and subtraction as taking apart and taking from.	Understand and apply properties of operations and the relationship between addition and subtraction	
1. Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations. 3. Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., $5 = 2 + 3$ and $5 = 4 + 1$) 4. For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.	3. Apply properties of operations as strategies to add and subtract. 3 Examples: If $8 + 3 = 11$ is known, then $3 + 8 = 11$ is also known. (Commutative property of addition.) To add $2 + 6 + 4$, the second two numbers can be added to make a ten, so $2 + 6 + 4 = 2 + 10 = 12$. (Associative property of addition.) 4. Understand subtraction as an unknown-addend problem.	4. 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.
	Add and subtract within 20	Add and subtract within 20
5. Fluently add and subtract within 5.	5. Relate counting to addition and subtraction. 6. Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten; decomposing a number; or using the relationship between addition and subtraction.	2. Fluently add and subtract within 20 using mental strategies. Know from memory all sums of two one-digit numbers.

Operations and Algebraic Thinking for Grades K-2		
Grade K	Grade 1	Grade 2
	Represent and solve problems involving addition and subtraction	Represent and solve problems involving addition and subtraction
2. Solve addition and subtraction word problems, and add and subtract within 10.	1. Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions. 2. Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20.	1. 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.
	Work with addition and subtraction equations	
	7. Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. <i>For example, which of the following equations are true and which are false? $6 = 6$, $7 = 8 - 1$, $5 + 2 = 2 + 5$, $4 + 1 = 5 + 2$.</i>	
	8. Determine the unknown whole number in an addition or subtraction equation relating three whole numbers.	

Operations and Algebraic Thinking for Grades 3-5		
Grade 3	Grade 4	Grade 5
3.OA Operations and Algebraic Thinking	4.OA Operations and Algebraic Thinking	5.OA Operations and Algebraic Thinking
Represent and solve problems involving multiplication and division.	Use the four operations with whole numbers to solve problems	Write and interpret numerical expressions
1. Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each.	1. Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ 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 equations.	1. Use parentheses, brackets, or braces in numerical expressions and evaluate expressions with these symbols.
2. Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares or when 56 objects are partitioned into equal shares of 8 objects each.		2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.
3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities.	2. 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.	
4. Determine the unknown whole number in a multiplication or division equation relating three whole numbers. <i>For example, determine the unknown number that makes the equation true in each of these equations: $8 \times ? = 48$, $5 = \square \div 3$, $6 \times 6 = ?$.</i>		
Understand properties of multiplication and the relationship between multiplication and division	Gain familiarity with factors and multiples.	
5. Apply properties of operations as strategies to multiply and divide. <i>Examples: Commutative Property of Multiplication; Associative Property of Multiplication; Distributive Property).</i>	4. 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.	
6. Understand division as an unknown-factor problem.		
7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$). Know from memory all products of 2 one-digit numbers) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit number.		

Operations and Algebraic Thinking for Grades 3-5

Grade 3	Grade 4	Grade 5
Solve problems involving the four operations, and identify and explain patterns in arithmetic.	Use the four operations with whole numbers to solve problems	
8. 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. 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.	
Solve problems involving the four operations, and identify and explain patterns in arithmetic.	Generate and analyze patterns	Analyze patterns and relationships
9. Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. <i>For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends</i>	5. 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. <i>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.</i>	3. 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 the coordinate plane. <i>For example, given the rule “Add 3” and starting number 0, and given the rule “Add 6” and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence.</i>

Geometry for Grades K-2		
Grade K	Grade 1	Grade 2
K.G Geometry	1.G Geometry	2.G Geometry
Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).	Reason with shapes and their attributes	Reason with shapes and their attributes
1. Describe objects in the environment using names of shapes and describe the relative positions of these objects using terms such as <i>above, below, beside, in front of, behind, and next to.</i> <i>can</i>	1. Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); -build and draw shapes to possess defining attributes.	1. 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.
2. Correctly name shapes regardless of their orientations or overall size.		
3. Identify shapes as two-dimensional (lying in a plane, “flat”) or three-dimensional (“solid”).		

Geometry for Grades K-2		
Grade K	Grade 1	Grade 2
Analyze, compare, create, and compose shapes	Reason with shapes and their attributes	Reason with shapes and their attributes
4. Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices “corners”) and other attributes (e.g., having sides of equal length).		
5. Model shapes in the world by building shapes from components (sticks and clay balls) and drawing shapes.		
6. Compose simple shapes to form larger shapes. <i>For example, “Can you join these two triangles with full sides touching to make a rectangle?”</i>	2. Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.	2. Partition a rectangle into rows and columns of the same-size squares and count to find the total number of them.
	3. Partition circles and rectangles into two and four equal shares, describe the shares using the words <i>halves, fourths, and quarters</i> , and use the phrases <i>half of, fourth of, and quarter of</i> . Describe the whole as two of or four of the shares. Understand that for these examples that decomposing into more equal shares creates smaller shares.	3. Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words <i>halves, thirds, half of, a third of, etc.</i> , and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

Geometry for Grades 3-5		
Grade 3	Grade 4	Grade 5
Reason with shapes and their attributes	Draw and identify lines and angles, and classify shapes by properties of their lines and angles	Classify two-dimensional figures into categories based on their properties
1. 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.	2. Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.	3. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. <i>For example, all rectangles have four right angles and square are rectangles, so all squares have four right angles.</i>
		4. Classify two-dimensional figures in a hierarchy based on properties.
2. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. <i>For example, partition a shape into 4 parts with equal area, and describe the area of each part as $\frac{1}{4}$ of the area of the shape.</i>	1. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines and identify these in two-dimensional figures	
	3. 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. 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 0 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 the 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.
		2. 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 ext of the situation.

Number and Operations—Fractions for Grades 3 - 5		
Grade 3	Grade 4	Grade 5
Develop understanding of fractions as numbers.	Extend understanding of fraction equivalence and ordering	Apply and extend previous understandings of multiplication and division to multiply and divide fractions
<p>G2. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.</p> <p>1. 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 $1/b$.</p>	<p>3. Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.</p> <p>a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.</p> <p>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, by using a visual fraction model.</p>	<p>3. Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). 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.</p>
<p>2. Understand a fraction as a number on the number line; represent fractions on a number line diagram.</p> <p>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.</p> <p>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.</p>	<p>4. Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. Understand a fraction a/b as a multiple of $1/b$. <i>For example, use a visual fraction model to represent $5/4$ as the product $5 \times (1/4)$, recording the conclusion by the equation $5/4 = 5 \times (1/4)$.</i></p>	<p>5. Interpret multiplication as scaling (resizing), 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 $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.</p>
	Extend understanding of fraction equivalence and ordering	Use equivalent fractions as a strategy to add and subtract fractions
<p>3. Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.</p> <p>a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. b. Recognize and</p>	<p>1. Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ 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. Recognize/generate equivalent fractions.</p>	<p>1. 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.</p>

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.		
Grade 3	Grade 4	Grade 5
3.NF Number and Operations— Fractions	4.NF Number and Operations— Fractions	5.NF Number and Operations— Fractions
Develop understanding of fractions as numbers	Extend understanding of fraction equivalence and ordering	Use equivalent fractions as a strategy to add and subtract fractions
3. Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. 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.	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.	2. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators.
	Build fractions from unit fractions y applying and extending previous understanding of operations on whole numbers	Apply and extend previous understanding of multiplication and division to multiply and divide fractions
	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—justify decomposition c. Add and subtract mixed numbers with like denominators. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators.	3. Interpret a fraction as division of the numerator by the denominator. Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers.

Grade 3	Grade 4	Grade 5
3.NF Number and Operations— Fractions	4.NF Number and Operations— Fractions	5.NF Number and Operations— Fractions
	Build fractions from unit fractions y applying and extending previous understanding of operations on whole numbers	Apply and extend previous understanding of multiplication and division to multiply and divide fractions
	<p>4. Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.</p> <p>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. <i>For example, use a visual fraction model to express $3 \times (2/5)$ as $6 \times (1/5)$, recognizing this product as $6/5$. (In general, $n \times (a/b) = (n \times a)/b$.)</i></p> <p>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.</p>	<p>4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.</p> <p>a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$.</p> <p>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.</p>
	<p>5. 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.</p>	<p>5. Interpret multiplication as scaling (resizing), by:</p> <p>a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without multiplying b. Explaining why multiplying a given number by a fraction is greater than 1 results in a product greater than the whole number; explaining why multiplying a number by a fraction that is less than 1 results in a product smaller than the number.</p>
Grade 3	Grade 4	Grade 5
		5.NF Number and Operations— Fractions
		Apply and extend previous understanding of multiplication and division to multiply and divide fractions
		6. Solve real world problems involving multiplication of fractions and mixed numbers.
		7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.

		<p>a. Interpret division of a unit fraction by a non-zero whole and compute such quotients.</p> <p>b. Interpret division of a whole number by a unit fraction, and compute such quotients.</p>
Grade 3	Grade 4	Grade 5
		5.NF Number and Operations— Fractions
		<p>7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.</p> <p>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.</p>

Ratios and Proportional Relationships for Grades 6-8		
Grade 6	Grade 7	Grade 8
6.RP Ratios and Proportional Relationships	7.RP Ratios and Proportional Relationships	8.EE Expressions and Equations
Understand ratio concepts and use ratio reasoning to solve problems.	Analyze proportional relationships and use them to solve real-world and mathematical problems.	Understand connections between proportional relationships, lines, and linear equations.
<p>1. 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.”</p>	<p>1. 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 $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $\frac{1/2}{1/4}$ miles per hour, equivalently 2 miles per hour.</p>	<p>5. 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.</p>

Ratios and Proportional Relationships for Grades 6-8		
Grade 6	Grade 7	Grade 8
Understand ratio concepts and use ratio reasoning to solve problems.	Analyze proportional relationships and use them to solve real-world and mathematical problems.	Understand connections between proportional relationships, lines, and linear equations.
2. Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the ext 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."	2. Recognize and represent proportional relationships between quantities. 2a. Decide whether two quantities are in a proportional relationship by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. 2d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation.	6. Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b .
3. Use ratio and rate reasoning to solve real-world and mathematical problems by reasoning. 3c. Find a percent of a quantity as a rate per 100; solve problems involving finding the whole, given a part and the percent.	2b. Identify the constant of proportionality in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. 2c. Represent proportional relationships by equations.	
3a. Make tables of equivalent ratios relating quantities with whole umber measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.	3. Use proportional relationships to solve multistep ratio and percent problems. <i>Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease.</i>	
3b. Find a percent of a quantity as a rate per 100; solve problems involving finding the whole, given a part and the percent.		
3d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.		

Geometry for Grades 6-8

6.G Geometry	7.G Geometry	8.G Geometry
Solve real-world and mathematical problems involving area, surface area, and volume.	Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.*
1. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the ext of solving real-world and mathematical problems.	4. Know the formulas for area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.	
2. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply formulas $V=l w h$ and $V = bh$ to find volumes to solve real-world and mathematical problems.	6. Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	
4. Represent 3-dimensional figures using nets of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the ext of solving real-world and mathematical problems.	3. Describe the two-dimensional figures that result from slicing three dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	9. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
	Draw, construct, and describe geometrical figures and describe the relationships between them.	Understand congruence and similarity using physical models, transparencies, or geometry software.
3. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate.	5. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.
		1. Verify the properties of rotations, reflections, and translations: a. lines are taken to lines and the line segments to line segments of the same length; b. angles are taken to angles; c. parallel lines are taken to parallel lines.
		3. Describe the effect of dilations, translations, rotations, and reflections on

		two-dimensional figures using coordinates.
	1. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	4. Understand that a 2-dimensional figure is similar to another if the second can be obtained from the first by rotations, reflections, translations, and dilations; given two similar figures, describe sequences that make them similar.
Geometry for Grades 6-8		
Grade 6	Grade 7	Grade 8
6.G Geometry	7.G Geometry	8.G Geometry
	Draw, construct, and describe geometrical figures and describe the relationships between them.	Understand congruence and similarity using physical models, transparencies, or geometry software.
	2. Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.	2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits congruence between them.
		Understand and apply the Pythagorean Theorem
		6. Explain a proof of the Pythagorean Theorem and its converse.
		7. Apply the Pythagorean Theorem to determine the unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
		8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

Expressions and Equations for Grades 6-8

Grade 6	Grade 7	Grade 8
6.EE Expressions and Equations	7.EE Expressions and Equations	8.EE Expressions and Equations
Apply and extend previous understandings of arithmetic to algebraic expressions	Use properties of operations to generate equivalent expressions	Work with radicals and integer exponents
1. Write and evaluate numerical expressions involving whole number exponents.		1. Know and apply the properties of integer exponents to generate equivalent numerical expressions.
		4. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities. Interpret scientific notation that has been generated by technology.
2. 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. b. Identify parts of an expression using mathematical terms (sum, term, product, quotient, coefficient); view one or more parts of an expression as a single entity.		
c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations that include whole-number exponents, in the order when there are no parentheses to specify order.	1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	
3. Apply the properties of operations to generate equivalent expressions. <i>For example, apply the distributive property or properties of operations.</i>	2. Understand that rewriting an expression in different forms in a problem ext can shed light on the problem and how the quantities are related.	
4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).		
6. Use variables to represent numbers and write expressions when solving a real-world or		

mathematical problem; understand that a variable can represent an unknown number, or any number in a specified set.		
Expressions and Equations for Grades 6-8		
Grade 6	Grade 7	Grade 8
6.EE Expressions and Equations	7.EE Expressions and Equations	8.EE Expressions and Equations
Reason about and solve one-variable equations and inequalities	Solve real life and mathematical problems using numerical and algebraic expressions and equations	Analyze and solve linear equations and pairs of simultaneous linear equations
5. Understand solving an equation or inequality as a process of answering a question: Which values form 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.		7. 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.
7. Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers.	4. Use variables to represent quantities in a real-world and mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , r are specific rational numbers. Solve equations like these fluently.	
8. Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of inequalities on number lines.	b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p , q , and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the ext of the problem.	
Expressions and Equations for Grades 6-8		

Grade 6	Grade 7	Grade 8
6.EE Expressions and Equations	7.EE Expressions and Equations	8.EE Expressions and Equations
		<p>8. Analyze and solve pairs of linear equations.</p> <p>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.</p> <p>b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations.</p> <p>c. Solve real-world and math problems leading to two linear equations in two variables.</p>

Statistics and Probability for Grades 6-8		
Grade 6	Grade 7	Grade 8
6.SP Statistics and Probability	7.SP Statistics and Probability	8.SP Statistics and Probability
Develop understanding of statistical variability.	Use random sampling to draw inferences about a population.	Investigate patterns of association in bivariate data.
<p>1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. <i>For example, “How old am I?” is not a statistical question, but “How old are the students in my school?” is a statistical question because one anticipates variability in students’ ages.</i></p>	<p>1. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Know that random sampling produces samples and supports valid inferences.</p>	<p>1. Construct and interpret scatterplots 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.</p>
	<p>2. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.</p>	<p>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.</p>

Develop understanding of statistical variability	Draw informal comparative inferences about two populations	
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.	3. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. <i>For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable</i>	
3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.	4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. <i>For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.</i>	4. 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
Statistics and Probability for Grades 6-8		
Grade 6	Grade 7	Grade 8
6.SP Statistics and Probability	7.SP Statistics and Probability	8.SP Statistics and Probability
Summarize and describe distributions.		
4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.		
5. Summarize numerical data sets in relation to their ext, 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 ext in which the data were		

gathered; and d. relating the choice of measures of center and variability to the shape of the data distribution and the ext in which the data were gathered.		
	Investigate chance processes and develop, use, and evaluate probability models	
	5. Understand that the probability of a chance event is a between 0 and 1 and expresses the likelihood of the event. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is not unlikely or likely, and a probability near 1 indicates a likely event.	

Statistics and Probability for Grades 6-8		
Grade 6	Grade 7	Grade 8
6.SP Statistics and Probability	7.SP Statistics and Probability	8.SP Statistics and Probability
	Investigate chance processes and develop, use, and evaluate probability models	
	6. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.	
	7. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.	
	7a. Develop a probability model by assigning equal probability to all outcomes, and use the model to find probabilities of events.	
	7b. Develop a probability model by observing frequencies in data generated from a chance process (which may not be uniform) by observing frequencies in data generated from a chance process. 7c. Design and use a stimulation to generate frequencies for compound events.	
	8. Find probabilities of compound events using lists, tables, tree diagrams, and simulation. a. Understand that the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. 8c. Design and use a simulation to generate frequencies for compound events.	