NC *Standard Course of Study* and Extended Content Standards Mathematics Alignment Grade 3	
NC Standard Course of Study K-8 Mathematics for Implementation in 2018-2019, Adopted June 2017	**Extended Content Standards K-8 for Mathematics for Implementation 2018-19, Adopted September 2017**

Standards for Mathematical Practice

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

Operations and Algebraic Thinking

Abbreviation	Standard	Abbreviation	Standard
Know number names and the counting sequence.			
NC.3.OA.1	For products of whole numbers with two factors up to and including 10: • Interpret the factors as representing the number of equal groups and the number of objects in each group. • Illustrate and explain strategies including arrays, repeated addition, decomposing a factor, and applying the commutative and associative properties.	**NC.3.OA.1**	Use repeated addition, bar models, and arrays to find a total product when there are repeated equal groups.
NC.3.OA.2	For whole-number quotients of whole numbers with a one-digit divisor and a one-digit quotient: • Interpret the divisor and quotient in a division equation as representing the number of equal groups and the number of objects in each group. • Illustrate and explain strategies including arrays, repeated addition or subtraction, and decomposing a factor.		
NC.3.OA.3	Represent, interpret, and solve one-step problems involving multiplication and division. • Solve multiplication word problems with factors up to and including 10. Represent the problem using arrays,		

	pictures, and/or equations with a symbol for the unknown number to represent the problem. • Solve division word problems with a divisor and quotient up to and including 10. Represent the problem using arrays, pictures, repeated subtraction and/or equations with a symbol for the unknown number to represent the problem.		
Understand properties of multiplication and the relationship between multiplication and division.			
NC.3.OA.6	Solve an unknown-factor problem, by using division strategies and/or changing it to a multiplication problem.		
Multiply and divide within 100.			
NC.3.OA.7	Demonstrate fluency with multiplication and division with factors, quotients and divisors up to and including 10. • Know from memory all products with factors up to and including 10. • Illustrate and explain using the relationship between multiplication and division. • Determine the unknown whole number in a multiplication or division equation relating three whole numbers.		
Solve two-step problems.			
NC.3.OA.8	Solve two-step word problems using addition, subtraction, and multiplication, representing problems using equations with a symbol for the unknown number.	**NC.3.OA.8**	N/A
Explore patterns of numbers.			
NC.3.OA.9	Interpret patterns of multiplication on a hundreds board and/or multiplication table.	**NC.3.OA.9**	Identify arithmetic patterns.

Number and Operations in Base Ten

Abbreviation	Standard	Abbreviation	Standard
Use place value to add and subtract.			
NC.3.NBT.2	Add and subtract whole numbers up to and including 1,000. • Use estimation strategies to assess reasonableness of answers. • Model and explain how the relationship between addition and subtraction can be applied to solve addition and subtraction problems. • Use expanded form to decompose numbers and then find sums and differences	**NC.3.NBT.2**	Use decade numbers (10, 20, 30) as benchmarks to demonstrate understanding of place value for numbers 0–30.
Generalize place value understanding for multi-digit numbers.			
NC.3.NBT.3	Use concrete and pictorial models, based on place value and the properties of operations, to find the product of a one-digit whole number by a multiple of 10 in the range 10–90.	**NC.3.NBT.3**	Count by tens using models such as objects, base ten blocks, ten-frames, or money.

Number and Operations – Fractions

Abbreviation	Standard	Abbreviation	Standard
Understand fractions as numbers.			
NC.3.NF.1	Interpret unit fractions with denominators of 2, 3, 4, 6, and 8 as quantities formed when a whole is partitioned into equal parts; • Explain that a unit fraction is one of those parts. • Represent and identify unit fractions using area and length models.	**NC.3.NF.1**	Differentiate a fractional part from a whole.
NC.3.NF.2	Interpret fractions with denominators of 2, 3, 4, 6, and 8 using area and length models.		

	• Using an area model, explain that the numerator of a fraction represents the number of equal parts of the unit fraction. • Using a number line, explain that the numerator of a fraction represents the number of lengths of the unit fraction from 0.		
NC.3.NF.3	Represent equivalent fractions with area and length models by: • Composing and decomposing fractions into equivalent fractions using related fractions: halves, fourths and eighths; thirds and sixths. • Explaining that a fraction with the same numerator and denominator equals one whole. • Expressing whole numbers as fractions, and recognize fractions that are equivalent to whole numbers		
NC.3.NF.4	Compare two fractions with the same numerator or the same denominator by reasoning about their size, using area and length models, and using the >, <, and = symbols. Recognize that comparisons are valid only when the two fractions refer to the same whole with denominators: halves, fourths and eighths; thirds and sixths.		

Measurement and Data			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Solve problems involving measurement.			
NC.3.MD.1	Tell and write time to the nearest minute. Solve word problems involving addition and subtraction of time intervals within the same hour.	NC.3.MD.1	Tell time to the hour on a digital clock.
NC.3.MD.2	Solve problems involving customary measurement. • Estimate and measure lengths in customary units to the quarter-inch and half-inch, and feet and yards to the whole unit. • Estimate and measure capacity and weight in customary units to a whole number: cups, pints, quarts, gallons, ounces, and pounds. • Add, subtract, multiply, or divide to solve one-step word problems involving whole number measurements of	NC.3.MD.2	Measure the length of objects using standard units.

	length, weight, and capacity in the same customary units.		
Represent and interpret data.			
NC.3.MD.3	Represent and interpret scaled picture and bar graphs: • Collect data by asking a question that yields data in up to four categories. • Make a representation of data and interpret data in a frequency table, scaled picture graph, and/or scaled bar graph with axes provided. • Solve one and two-step "how many more" and "how many less" problems using information from these graphs	NC.3.MD.3	Use picture or bar graph data to answer questions about data.
Understand the concept of area.			
NC.3.MD.5	Find the area of a rectangle with whole-number side lengths by tiling without gaps or overlaps and counting unit squares.		
NC.3.MD.7	Relate area to the operations of multiplication and addition. • 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. • Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving problems, and represent whole-number products as rectangular areas in mathematical reasoning. • Use tiles and/or arrays to illustrate and explain that the area of a rectangle can be found by partitioning it into two smaller rectangles, and that the area of the large rectangle is the sum of the two smaller rectangles.		
Understand the concept of perimeter.			
NC.3.MD.8	Solve problems involving perimeters of polygons, including finding the perimeter given the side lengths, and finding an unknown side length.	NC.3.MD.8	Recognize that perimeter is the distance around a shape.

Geometry			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Reason with shapes and their attributes.			
NC.3.G.1	Reason with two-dimensional shapes and their attributes. • Investigate, describe, and reason about composing triangles and quadrilaterals and decomposing quadrilaterals. • Recognize and draw examples and non-examples of types of quadrilaterals including rhombuses, rectangles, squares, parallelograms, and trapezoids.	**NC.3.G.1**	Identify the attributes of two dimensional shapes (circle, square, rectangle, triangle, oval, rhombus).

NC *Standard Course of Study* and Extended Content Standards Mathematics Alignment Grade 4			
NC Standard Course of Study K-8 Mathematics for Implementation in 2018-2019, Adopted June 2017		Extended Content Standards K-8 for Mathematics for Implementation 2018-19, Adopted September 2017	
Standards for Mathematical Practice			
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics.		5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	
Operations and Algebraic Thinking			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Represent and solve problems involving multiplication and division.			
NC.4.OA.1	Interpret a multiplication equation as a comparison. Multiply or divide to solve word problems involving multiplicative comparisons using models and equations with a symbol for the unknown number. Distinguish multiplicative comparison from additive comparison.	NC.3.OA.1	Demonstrate the connection between repeated addition and multiplication ($2*3 = 2+2+2$).
Use the four operations with whole numbers to solve problems.			
NC.4.OA.3	Solve two-step word problems involving the four operations with whole numbers. • Use estimation strategies to assess reasonableness of answers. • Interpret remainders in word problems. • Represent problems using equations with a letter standing for the unknown quantity.	NC.4.OA.3	Solve one step word problem using addition or subtraction within 20.
Gain familiarity with factors and multiples.			

NC.4.OA.4	Find all factor pairs for whole numbers up to and including 50 to: • Recognize that a whole number is a multiple of each of its factors. • Determine whether a given whole number is a multiple of a given one-digit number. • Determine if the number is prime or composite.	NC.4.OA.4	Show one way to arrive at a product.
Generate and analyze patterns.			
NC.4.OA.5	Generate and analyze a number or shape pattern that follows a given rule.	NC.4.OA.5	Use repeating patterns to make predictions.

Number and Operations in Base Ten			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Generalize place value understanding for multi-digit whole numbers.			
NC.4.NBT.1	Explain that in a multi-digit whole number, a digit in one place represents 10 times as much as it represents in the place to its right, up to 100,000.		
NC.4.NBT.2	Read and write multi-digit whole numbers up to and including 100,000 using numerals, number names, and expanded form.	NC.4.NBT.2	Use concrete and pictoral representations to count up to 100 items.
NC.4.NBT.7	Compare two multi-digit numbers up to and including 100,000 based on the values of the digits in each place, using >, =, and < symbols to record the results of comparisons.	NC.4.NBT.7	Round any whole number 0-30 to the nearest ten.
Use place value understanding and properties of operations to perform multi-digit arithmetic.			
NC.4.NBT.4	Add and subtract multi-digit whole numbers up to and including 100,000 using the standard algorithm with place value understanding.	NC.4.NBT.4	Add and subtract two-digit whole numbers.
NC.4.NBT.5	Multiply a whole number of up to three digits by a one-digit whole number,and multiply up to two two-digit numbers with place value understanding using area models, partial products, and the properties of operations. Use models to make connections and develop the algorithm.		

Abbreviation	Standard	Abbreviation	Standard
NC.4.NBT.6	Find whole-number quotients and remainders with up to three-digit dividends and one-digit divisors with place value understanding using rectangular arrays, area models, repeated subtraction, partial quotients, properties of operations, and/or the relationship between multiplication and division.		
Number and Operations – Fractions			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Extend understanding of fractions.			
NC.4.NF.1	Explain why a fraction is equivalent to another fraction by using area and length fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size.	NC.4.NF.1	Identify models of one half (1/2) and one fourth (1/4).
NC.4.NF.2	Compare two fractions with different numerators and different denominators, using the denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100. 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 by: • Reasoning about their size and using area and length models. • Using benchmark fractions 0, ½, and a whole. • Comparing common numerator or common denominators.		
Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.			
NC.4.NF.3	Understand and justify decompositions of fractions with denominators of 2, 3, 4, 5, 6, 8, 10, 12, and 100. • Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. • Decompose a fraction into a sum of unit fractions and a sum of fractions with the same denominator in more than one way using area models, length models, and equations.		

Abbreviation	Standard	Abbreviation	Standard
	• Add and subtract fractions, including mixed numbers with like denominators, by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. • Solve word problems involving addition and subtraction of fractions, including mixed numbers by writing equations from a visual representation of the problem.		
Use unit fractions to understand operations of fractions.			
NC.4.NF.4	Apply and extend previous understandings of multiplication to: • Model and explain how fractions can be represented by multiplying a whole number by a unit fraction, using this understanding to multiply a whole number by any fraction less than one. • Solve word problems involving multiplication of a fraction by a whole number.	NC.4.NF.4	Represent one half as one of two parts to make 1 whole.
Understand decimal notation for fractions, and compare decimal fractions.			
NC.4.NF.6	Use decimal notation to represent fractions. • Express, model and explain the equivalence between fractions with denominators of 10 and 100. • Use equivalent fractions to add two fractions with denominators of 10 or 100. • Represent tenths and hundredths with models, making connections between fractions and decimals.		
NC.4.NF.7	Compare two decimals to hundredths by reasoning about their size using area and length models, and recording the results of comparisons with the symbols >, =, or <. Recognize that comparisons are valid only when the two decimals refer to the same whole.		
Measurement and Data			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Solve problems involving measurement.			

NC.4.MD.1	Know relative sizes of measurement units. Solve problems involving metric measurement. • Measure to solve problems involving metric units: centimeter, meter, gram, kilogram, Liter, milliliter. • Add, subtract, multiply, and divide to solve one-step word problems involving whole-number measurements of length, mass, and capacity that are given in metric units.	**NC.4.MD.1**	Identify the smaller measurement unit that comprises a larger unit within a measurement system (inch/foot, centimeter/meter, minutes/hour).
NC.4.MD.2	Use multiplicative reasoning to convert metric measurements from a larger unit to a smaller unit using place value understanding, two-column tables, and length models.	**NC.4.MD.2**	Determine the area of a square or rectangle by counting units of measure (unit squares).
NC.4.MD.8	Solve word problems involving addition and subtraction of time intervals that cross the hour.		
Solve problems involving area and perimeter.			
NC.4.MD.3	Solve problems with area and perimeter. • Find areas of rectilinear figures with known side lengths. • Solve problems involving a fixed area and varying perimeters and a fixed perimeter and varying areas. • Apply the area and perimeter formulas for rectangles in real world and mathematical problems.	**NC.3.MD.3**	
Represent and interpret data.			
NC.4.MD.4	Represent and interpret data using whole numbers. • Collect data by asking a question that yields numerical data. • Make a representation of data and interpret data in a frequency table, scaled bar graph, and/or line plot. • Determine whether a survey question will yield categorical or numerical data.	**NC.4.MD.4**	Interpret data from a picture or bar graph.
Understand concepts of angle and measure angles.			
NC.3.MD.6	Develop an understanding of angles and angle measurement. • Understand angles as geometric shapes that are formed wherever two rays share a common endpoint, and are measured in degrees.	**NC.4.MD.6**	Identify angles in geometric shapes.

	• Measure and sketch angles in whole-number degrees using a protractor. • Solve addition and subtraction problems to find unknown angles on a diagram in real-world and mathematical problems.		
Geometry			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Classify shapes based on lines and angles in two-dimensional figures.			
NC.4.G.1	Draw and identify points, lines, line segments, rays, angles, and perpendicular and parallel lines.	NC.4.G.1	Recognize parallel line and intersecting lines.
NC.4.G.2	Classify quadrilaterals and triangles based on angle measure, side lengths, and the presence or absence of parallel or perpendicular lines.	NC.4.G.2	Describe the attributes of two dimensional shapes.
NC.4.G.3	Recognize symmetry in a two-dimensional figure, and identify and draw lines of symmetry.	NC.4.G.3	Use lines of symmetry to partition shapes into equal areas.

NC *Standard Course of Study* and Extended Content Standards Mathematics Alignment
Grade 5

NC Standard Course of Study K-8 Mathematics for Implementation in 2018-2019, Adopted June 2017		Extended Content Standards K-8 for Mathematics for Implementation 2018-19, Adopted September 2017	

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.

5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Operations and Algebraic Thinking

Abbreviation	Standard	Abbreviation	Standard
Write and interpret numerical expressions.			
NC.5.OA.2	Write, explain, and evaluate numerical expressions involving the four operations to solve up to two-step problems. Include expressions involving: • Parentheses, using the order of operations. • Commutative, associative and distributive properties.		
Analyze patterns and relationships.			
NC.5.OA.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. • Graph the ordered pairs on a coordinate plane.	**NC.5.OA.3**	Identify and extend numerical patterns.

Number and Operations in Base Ten

Abbreviation	Standard	Abbreviation	Standard
Understand the place value system			
NC.5.NBT.1	Explain the patterns in the place value system from one million to the thousandths place. • Explain 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. • Explain patterns in products and quotients when numbers are multiplied by 1,000, 100, 10, 0.1, and 0.01 and/or divided by 10 and 100.	**NC.5.NBT.1**	Identify equivalent groupings for quantities up to 99.
NC.5.NBT.3	Read, write, and compare decimals to thousandths. • Write decimals using base-ten numerals, number names, and expanded form. • Compare two decimals to thousandths based on the value of the digits in each place, using >, =, and < symbols to record the results of comparisons.	**NC.5.NBT.3**	Compare whole numbers up to 100 using symbols (<, >, =).
Perform operations with multi-digit whole numbers.			
NC.5.NBT.5	Demonstrate fluency with the multiplication of two whole numbers up to a three-digit number by a two-digit number using the standard algorithm.	**NC.5.NBT.5**	Multiply whole numbers up to 5 x 5.
NC.5.NBT.6	Find quotients with remainders when dividing whole numbers with up to four-digit dividends and two-digit divisors using rectangular arrays, area models, repeated subtraction, partial quotients, and/or the relationship between multiplication and division. Use models to make connections and develop the algorithm.	**NC.5.NBT.6**	Use fair and equal shares to solve division problems.
Perform operations with decimals.			
NC.5.NBT.7	Compute and solve real-world problems with multi-digit whole numbers and decimal numbers. • Add and subtract decimals to thousandths using models, drawings or strategies based on place value.		

	• Multiply decimals with a product to thousandths using models, drawings, or strategies based on place value. • Divide a whole number by a decimal and divide a decimal by a whole number, using repeated subtraction or area models. Decimals should be limited to hundredths. • Use estimation strategies to assess reasonableness of answers.		
Number and Operations – Fractions			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Use equivalent fractions as a strategy to add and subtract fractions.			
NC.5.NF.1	Add and subtract fractions, including mixed numbers, with unlike denominators using related fractions: halves, fourths and eighths; thirds, sixths, and twelfths; fifths, tenths, and hundredths. • Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. • Solve one- and two-step word problems in context using area and length models to develop the algorithm. Represent the word problem in an equation.	**NC.5.NF.1**	Identify models of halves (1/2, 2/2), fourths (1/4, 2/4, 3/4, 4/4), thirds (1/3, 2/3, 3/3), and tenths (1/10, 2/10, 3/10, 4/10, 5/10, 6/10, 7/10, 8/10, 9/10, 10/10).
Apply and extend previous understandings of multiplication and division to multiply and divide fractions.			
NC.5.NF.3	Use fractions to model and solve division problems. • Interpret a fraction as an equal sharing context, where a quantity is divided into equal parts. • Model and interpret a fraction as the division of the numerator by the denominator. • Solve one-step word problems involving division of whole numbers leading to answers in the form of fractions and mixed numbers, with denominators of 2, 3, 4, 5, 6, 8, 10, and 12, using area, length, and set models or equations.		

NC.5.NF.4	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction, including mixed numbers. • Use area and length models to multiply two fractions, with the denominators 2, 3, 4. • Explain why multiplying a given number by a fraction greater than 1 results in a product greater than the given number and when multiplying a given number by a fraction less than 1 results in a product smaller than the given number. • Solve one-step word problems involving multiplication of fractions using models to develop the algorithm.		
NC.5.NF.7	Solve one-step word problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions using area and length models, and equations to represent the problem.		

Measurement and Data			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Convert like measurement units within a given measurement system.			
NC.5.MD.1	Given a conversion chart, use multiplicative reasoning to solve one-step conversion problems within a given measurement system.	**NC.5.MD.1**	Use standard units to measure weight and length of objects.
Represent and interpret data.			
NC.5.MD.2	Represent and interpret data. • Collect data by asking a question that yields data that changes over time. • Make and interpret a representation of data using a line graph. • Determine whether a survey question will yield categorical or numerical data, or data that changes over time.	**NC.5.MD.2**	Represent and interpret data on a picture, line plot, or bar graph.
Understand concepts of volume.			

NC.5.MD.4	Recognize volume as an attribute of solid figures and measure volume by counting unit cubes, using cubic centimeters, cubic inches, cubic feet, and improvised units.		
NC.5.MD.5	Relate volume to the operations of multiplication and addition. • Find the volume of a 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. • Build understanding of the volume formula for rectangular prisms with whole-number edge lengths in the context of solving problems. • Find volume of solid figures with one-digit dimensions composed of two non-overlapping rectangular prisms.	NC.5.MD.5	Determine the volume of a rectangular prism by counting units of measure (unit cubes).

Geometry			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Understand the coordinate plane.			
NC.5.G.1	Graph points in the first quadrant of a coordinate plane, and identify and interpret the x and y coordinates to solve problems.	NC.5.G.1	Use the x and y axis to locate a point or object on a graph.
Classify quadrilaterals.			
NC.5.G.3	Classify quadrilaterals into categories based on their properties. • Explain that attributes belonging to a category of quadrilaterals also belong to all subcategories of that category. • Classify quadrilaterals in a hierarchy based on properties.	NC.5.G.3	Sort two-dimensional figures and identify the attributes (angles, number of sides, corners) they have in common.

NC *Standard Course of Study* and Extended Content Standards Mathematics Alignment Grade 6	
NC Standard Course of Study K-8 Mathematics for Implementation in 2018-2019, Adopted June 2017	**Extended Content Standards K-8 for Mathematics for Implementation 2018-19, Adopted September 2017**

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.

5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Ratio and Proportional Relationships

Abbreviation	Standard	Abbreviation	Standard
Understand ratio concepts and use ratio reasoning to solve problems.			
NC.6.RP.1	Understand the concept of a ratio and use ratio language to: • Describe a ratio as a multiplicative relationship between two quantities. • Model a ratio relationship using a variety of representations.	**NC.6.RP.1**	Demonstrate a ratio relationship with whole numbers using pictures or numbers.
NC.6.RP.2	Understand that ratios can be expressed as equivalent unit ratios by finding and interpreting both unit ratios in context.		
NC.6.RP.3	Use ratio reasoning with equivalent whole-number ratios to solve real-world and mathematical problems by: • Creating and using a table to compare ratios. • Finding missing values in the tables. • Using a unit ratio. • Converting and manipulating measurements using given ratios. • Plotting the pairs of values on the coordinate plane.	**NC.6.RP.3**	Find equivalent ratios by multiplying or dividing the quantities by the same whole number.

NC.6.RP.4	Use ratio reasoning to solve real-world and mathematical problems with percents by: • Understanding and finding a percent of a quantity as a ratio per 100. • Using equivalent ratios, such as benchmark percents (50%, 25%, 10%, 5%, 1%), to determine a part of any given quantity. • Finding the whole, given a part and the percent.		

The Number System			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Apply and extend previous understandings of multiplication and division to divide fractions by fractions.			
NC.6.NS.1	Use visual models and common denominators to: • Interpret and compute quotients of fractions. • Solve real-world and mathematical problems involving division of fractions.	**NC.6.NS.1**	Compare the relationships between two unit fractions.
Compute fluently with multi-digit numbers and find common factors and multiples.			
NC.6.NS.2	Fluently divide using long division with a minimum of a four-digit dividend and interpret the quotient and remainder in context.	**NC.6.NS.2**	Apply the concept of fair share and equal shares to divide.
NC.6.NS.3	Apply and extend previous understandings of decimals to develop and fluently use the standard algorithms for addition, subtraction, multiplication and division of decimals.	**NC.6.NS.3**	Solve two-factor multiplication problems with products up to 50 using concrete objects and using a calculator.
NC.6.NS.4	Understand and use prime factorization and the relationships between factors to: • Find the unique prime factorization for a whole number. • Find the greatest common factor of two whole numbers less than or equal to 100. • Use the greatest common factor and the distributive property to rewrite the sum of two whole numbers, each less than or equal to 100. • Find the least common multiple of two whole numbers less than or equal to 12 to add and subtract fractions with unlike denominators.		

Apply and extend previous understandings of numbers to the system of rational numbers.			
NC.6.NS.5	Understand and use rational numbers to: • Describe quantities having opposite directions or values. • Represent quantities in real-world contexts, explaining the meaning of 0 in each situation. • Understand the absolute value of a rational number as its distance from 0 on the number line to: -- Interpret absolute value as magnitude for a positive or negative quantity in a real-world context. -- Distinguish comparisons of absolute value from statements about order.	NC.6.NS.5	Use integers to describe real world context, include zero and negative numbers.
NC.6.NS.6	Understand rational numbers as points on the number line and as ordered pairs on a coordinate plane. a. On a number line: --Recognize opposite signs of numbers as indicating locations on opposite sides of 0 and that the opposite of the opposite of a number is the number itself. --Find and position rational numbers on a horizontal or vertical number line. b. On a coordinate plane: --Understand signs of numbers in ordered pairs as indicating locations in quadrants. --Recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. --Find and position pairs of rational numbers on a coordinate plane.		
NC.6.NS.7	Understand ordering of rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. b. Write, interpret, and explain statements of order for rational numbers in real-world contexts.		
NC.6.NS.8	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.		

Abbreviation	Standard	Abbreviation	Standard
NC.6.NS.9	Apply and extend previous understandings of addition and subtraction. • Describe situations in which opposite quantities combine to make 0. • Understand $p+q$ as the number located a distance q from p, in the positive or negative direction depending on the sign of q. Show that a number and its additive inverse create a zero pair. • Understand subtraction of integers as adding the additive inverse, $p-q=p+(-q)$. Show that the distance between two integers on the number line is the absolute value of their difference. • Use models to add and subtract integers from -20 to 20 and describe real-world contexts using sums and differences.		

Expressions and Equations

Abbreviation	Standard	Abbreviation	Standard
Apply and extend previous understandings of arithmetic to algebraic expressions.			
NC.6.EE.1	Write and evaluate numerical expressions, with and without grouping symbols, involving whole-number exponents.	NC.6.EE.1	Identify equivalent number sentences.
NC.6.EE.2	Write, read, and evaluate algebraic expressions. • Write expressions that record operations with numbers and with letters standing for numbers. • Identify parts of an expression using mathematical terms and view one or more of those parts as a single entity. • Evaluate expressions at specific values of their variables using expressions that arise from formulas used in real-world problems.		
NC.6.EE.3	Apply the properties of operations to generate equivalent expressions without exponents.	NC.6.EE.3	Apply the properties of addition to identify equivalent numerical expressions.
NC.6.EE.4	Identify when two expressions are equivalent and justify with mathematical reasoning.		

Reason about and solve one-variable equations.			
NC.6.EE.5	Use substitution to determine whether a given number in a specified set makes an equation true.		
NC.6.EE.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem.		
NC.6.EE.7	Solve real-world and mathematical problems by writing and solving equations of the form: • $x+p=q$ in which p, q and x are all nonnegative rational numbers; and, • $p \cdot x=q$ for cases in which p, q and x are all nonnegative rational numbers.	**NC.6.EE.7**	Identify an equation that represents a real-world problem in which variables are use to represent numbers.
Reason about one variable inequalities.			
NC.6.EE.8	Reason about inequalities by: • Using substitution to determine whether a given number in a specified set makes an inequality true. • Writing an inequality of the form $x>c$ or $x<c$ to represent a constraint or condition in a real-world or mathematical problem. • Recognizing that inequalities of the form $x>c$ or $x<c$ have infinitely many solutions. • Representing solutions of inequalities on number line diagrams.		
Represent and analyze quantitative relationships between dependent and independent variables.			
NC.6.EE.9	Represent and analyze quantitative relationships by: • Using variables to represent two quantities in a real-world or mathematical context that change in relationship to one another. • Analyze the relationship between quantities in different representations (context, equations, tables, and graphs).		

Geometry			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Solve real-world and mathematical problems involving area, surface area, and volume.			
NC.6.G.1	Create geometric models to solve real-world and mathematical problems to: • Find the area of triangles by composing into rectangles and decomposing into right triangles. • Find the area of special quadrilaterals and polygons by decomposing into triangles or rectangles.	**NC.6.G.1**	Solve real-world and mathematical problems about area using unit squares.
NC.6.G.2	Apply and extend previous understandings of the volume of a right rectangular prism to find the volume of right rectangular prisms with fractional edge lengths. Apply this understanding to the context of solving real-world and mathematical problems.	**NC.6.G.2**	N/A
NC.6.G.3	Use the coordinate plane to solve real-world and mathematical problems by: • Drawing polygons in the coordinate plane given coordinates for the vertices. • Using coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate.		
NC.6.G.4	Represent right prisms and right pyramids 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.		
Statistics and Probability			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Develop understanding of statistical variability.			
NC.6.SP.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.	**NC.6.SP.1**	Display data on a graph or table that shows variability in the data.

NC.6.SP.2	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.		
NC.6.SP.3	Understand that both a measure of center and a description of variability should be considered when describing a numerical data set. a. Determine the measure of center of a data set and understand that it is a single number that summarizes all the values of that data set. --Understand that a mean is a measure of center that represents a balance point or fair share of a data set and can be influenced by the presence of extreme values within the data set. --Understand the median as a measure of center that is the numerical middle of an ordered data set. b. Understand that describing the variability of a data set is needed to distinguish between data sets in the same scale, by comparing graphical representations of different data sets in the same scale that have similar measures of center, but different spreads.		
Summarize and describe distributions.			
NC.6.SP.4	Display numerical data in plots on a number line. • Use dot plots, histograms, and box plots to represent data. • Compare the attributes of different representations of the same data.	**NC.6.SP.4**	Summarize data distributions shown in graphs or tables.
NC.6.SP.5	Summarize numerical data sets in relation to their context. a. Describe the collected data by: --Reporting the number of observations in dot plots and histograms. --Communicating the nature of the attribute under investigation, how it was measured, and the units of measurement. b. Analyze center and variability by: --Giving quantitative measures of center, describing variability, and any overall pattern, and noting any striking deviations. --Justifying the appropriate choice of measures of center using the shape of the data distribution.		

NC *Standard Course of Study* and Extended Content Standards Mathematics Alignment Grade 7			
NC Standard Course of Study K-8 Mathematics for Implementation in 2018-2019, Adopted June 2017		Extended Content Standards K-8 for Mathematics for Implementation 2018-19, Adopted September 2017	

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.

5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Ratio and Proportional Relationships

Abbreviation	Standard	Abbreviation	Standard
Analyze proportional relationships and use them to solve real-world and mathematical problems.			
NC.7.RP.1	Compute unit rates associated with ratios of fractions to solve real-world and mathematical problems.	**NC.7.RP.1**	Model part-to-whole and part-to-part ratios to compare two measures of the same type.
NC.7.RP.2	Recognize and represent proportional relationships between quantities. a. Understand that a proportion is a relationship of equality between ratios. --Represent proportional relationships using tables and graphs. --Recognize whether ratios are in a proportional relationship using tables and graphs. --Compare two different proportional relationships using tables, graphs, equations, and verbal descriptions. a. Identify the unit rate (constant of proportionality) within two quantities in a proportional relationship using tables, graphs, equations, and verbal descriptions. b. Create equations and graphs to represent proportional relationships. c. Use a graphical representation of a proportional relationship in context to:		

Abbreviation	Standard	Abbreviation	Standard
	--Explain the meaning of any point (x,y). --Explain the meaning of (0, 0) and why it is included. --Understand that the y-coordinate of the ordered pair $(1,r)$ corresponds to the unit rate and explain its meaning.		
NC.7.RP.3	Use scale factors and unit rates in proportional relationships to solve ratio and percent problems.		

<table>
<tr><td colspan="4" align="center">The Number System</td></tr>
<tr><td>Abbreviation</td><td>Standard</td><td>Abbreviation</td><td>Standard</td></tr>
<tr><td colspan="4">Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.</td></tr>
<tr><td>NC.7.NS.1</td><td>Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers, using the properties of operations, and describing real-world contexts using sums and differences.</td><td>NC.7.NS.1</td><td>Add fractions with like denominators (halves, thirds, fourths, and tenths) with sums less than or equal to one.</td></tr>
<tr><td>NC.7.NS.2</td><td>Apply and extend previous understandings of multiplication and division.
a. Understand that a rational number is any number that can be written as a quotient of integers with a non-zero divisor.
b. Apply properties of operations as strategies, including the standard algorithms, to multiply and divide rational numbers and describe the product and quotient in real-world contexts.
c. Use division and previous understandings of fractions and decimals.
--Convert a fraction to a decimal using long division.
--Understand that the decimal form of a rational number terminates in 0s or eventually repeats.</td><td>NC.7.NS.2</td><td>a) Solve multiplication problems with products up to 100 using a calculator.

b) Solve division problems with divisors up to five and also with a divisor of 10 without remainders.

c) Solve one-step real-world problems involving decimal numbers to the tenths place.</td></tr>
<tr><td>NC.7.NS.3</td><td>Solve real-world and mathematical problems involving numerical expressions with rational numbers using the four operations.</td><td>NC.7.NS.3</td><td>Solve on-step real-world problems involving decimal numbers to the tenths place.</td></tr>
</table>

Expressions and Equations			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Use properties of operations to generate equivalent expressions.			
NC.7.EE.1	Apply properties of operations as strategies to: • Add, subtract, and expand linear expressions with rational coefficients. • Factor linear expression with an integer GCF.	**NC.7.EE.1**	Use one of the four operations to determine if expressions are equivalent.
NC.7.EE.2	Understand that equivalent expressions can reveal real-world and mathematical relationships. Interpret the meaning of the parts of each expression in context.	**NC.7.EE.2**	Identify arithmetic sequences where the difference between two consecutive terms is constant.
Solve real-world and mathematical problems using numerical and algebraic expressions, equations, and inequalities.			
NC.7.EE.3	Solve multi-step real-world and mathematical problems posed with rational numbers in algebraic expressions. • Apply properties of operations to calculate with positive and negative numbers in any form. • Convert between different forms of a number and equivalent forms of the expression as appropriate.		
NC.7.EE.4	Use variables to represent quantities to solve real-world or mathematical problems. a. Construct equations to solve problems by reasoning about the quantities. --Fluently solve multistep equations with the variable on one side, including those generated by word problems. --Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. --Interpret the solution in context. b. Construct inequalities to solve problems by reasoning about the quantities. --Fluently solve multi-step inequalities with the variable on one side, including those generated by word problems. --Compare an algebraic solution process for equations and an algebraic solution process for inequalities.	**NC.7.EE.4**	Use the concept of equality with models to solve one-step addition and subtraction equations.

Abbreviation	Standard	Abbreviation	Standard
	--Graph the solution set of the inequality and interpret in context.		
Geometry			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Draw, construct, and describe geometrical figures and describe the relationships between them.			
NC.7.G.1	Solve problems involving scale drawings of geometric figures by: • Building an understanding that angle measures remain the same and side lengths are proportional. • Using a scale factor to compute actual lengths and areas from a scale drawing. • Creating a scale drawing.	**NC.7.G.1**	Identify two similar geometric shapes that are proportional in size and in the same orientation.
NC.7.G.2	Understand the characteristics of angles and side lengths that create a unique triangle, more than one triangle or no triangle. Build triangles from three measures of angles and/or sides.	**NC.7.G.2**	Recognize geometric shapes with given conditions.
Solve real-world and mathematical problems involving angle measure, area, surface area, and volume.			
NC.7.G.4	Understand area and circumference of a circle. • Understand the relationships between the radius, diameter, circumference, and area. • Apply the formulas for area and circumference of a circle to solve problems.	**NC.7.G.4**	Determine the perimeter of a rectangle by adding the measures of the sides.
NC.7.G.5	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve equations for an unknown angle in a figure.	**NC.7.G.5**	Recognize angles that are acute, obtuse, and right.
NC.7.G.6	Solve real-world and mathematical problems involving: • Area and perimeter of two-dimensional objects composed of triangles, quadrilaterals, and polygons. • Volume and surface area of pyramids, prisms, or three-dimensional objects composed of cubes, pyramids, and right prisms.	**NC.7.G.6**	Determine the area of a rectangle using the formula for length x width, and confirm the result using tiling or partitioning into unit squares.

Statistics and Probability			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Use random sampling to draw inferences about a population.			
NC.7.SP.1	Understand that statistics can be used to gain information about a population by: • Recognizing that generalizations about a population from a sample are valid only if the sample is representative of that population. • Using random sampling to produce representative samples to support valid inferences.	**NC.7.SP.1**	Answer a question related to the collected data from an experiment, given a model of data, or from data collected by the student.
NC.7.SP.2	Generate multiple random samples (or simulated samples) of the same size to gauge the variation in estimates or predictions, and use this data to draw inferences about a population with an unknown characteristic of interest.		
Make informal inferences to compare two populations.			
NC.7.SP.3	Recognize the role of variability when comparing two populations. a. Calculate the measure of variability of a data set and understand that it describes how the values of the data set vary with a single number. --Understand the mean absolute deviation of a data set is a measure of variability that describes the average distance that points within a data set are from the mean of the data set. --Understand that the range describes the spread of the entire data set. --Understand that the interquartile range describes the spread of the middle 50% of the data. b. Informally assess the difference between two data sets by examining the overlap and separation between the graphical representations of two data sets.	**NC.7.SP.3**	Compare two sets of data within a single data display such as a picture graph, line plot, or bar graph.
NC.7.SP.4	Use measures of center and measures of variability for numerical data from random samples to draw comparative inferences about two populations.		

Investigate chance processes and develop, use, and evaluate probability models.			
NC.7.SP.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring.	**NC.7.SP.5**	Describe the probability of events occurring as possible or impossible.
NC.7.SP.6	Collect data to calculate the experimental probability of a chance event, observing its long-run relative frequency. Use this experimental probability to predict the approximate relative frequency.		
NC.7.SP.7	Develop a probability model and use it to find probabilities of simple events. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. b. Develop a probability model (which may not be uniform) by repeatedly performing a chance process and observing frequencies in the data generated. c. Compare theoretical and experimental probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.		
NC.7.SP.8	Determine probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. For an event described in everyday language, identify the outcomes in the sample space which compose the event, when the sample space is represented using organized lists, tables, and tree diagrams. c. Design and use a simulation to generate frequencies for compound events.		

NC *Standard Course of Study* and Extended Content Standards Mathematics Alignment Grade 8			
NC Standard Course of Study K-8 Mathematics for Implementation in 2018-2019, Adopted June 2017		**Extended Content Standards K-8 for Mathematics for Implementation 2018-19, Adopted September 2017**	
Standards for Mathematical Practice			
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics.		5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	
The Number System			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Know that there are numbers that are not rational, and approximate them by rational numbers.			
NC.8.NS.1	Understand that every number has a decimal expansion. Building upon the definition of a rational number, know that an irrational number is defined as a non-repeating, non-terminating decimal.	**NC.8.NS.1**	Subtract fractions with like denominators (halves, thirds, fourths, and tenths) with minuends less than or equal to one.
NC.8.NS.2	Use rational approximations of irrational numbers to compare the size of irrational numbers and locate them approximately on a number line. Estimate the value of expressions involving: • Square roots and cube roots to the tenths. • π to the hundredths.	**NC.8.NS.2**	a) Express a fraction with a denominator of 100 as a decimal. b) Compare decimal quantities using less than ($<$), greater than ($>$), or equal to ($=$), in real-world examples to the hundredths place.
Expressions and Equations			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Work with radicals and integer exponents.			

NC.8.EE.1	Develop and apply the properties of integer exponents to generate equivalent numerical expressions.	NC.8.EE.1	Identify the meaning of an exponent (limited to single digits and exponents of 2).
NC.8.EE.2	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 perfect squares and cube roots of perfect cubes for positive numbers less than or equal to 400.		
NC.8.EE.3	Use numbers expressed in scientific notation to estimate very large or very small quantities and to express how many times as much one is than the other.	NC.8.EE.3	Compose and decompose whole numbers up to 999.
NC.8.EE.4	Perform multiplication and division with numbers expressed in scientific notation to solve real-world problems, including problems where both decimal and scientific notation are used.	NC.8.EE.4	Given a table or graph with identified points, determine the ratio that describes the relationship between quantities.
Analyze and solve linear equations and inequalities.			
NC.8.EE.7	Solve real-world and mathematical problems by writing and solving equations and inequalities in one variable. • Recognize linear equations in one variable as having one solution, infinitely many solutions, or no solutions. • Solve linear equations and inequalities including multi-step equations and inequalities with the same variable on both sides.	NC.8.EE.7	Solve simple algebraic equations with one variable using addition and subtraction.
Analyze and solve pairs of simultaneous linear equations.			
NC.8.EE.8	Analyze and solve a system of two linear equations in two variables in slope-intercept form. • Understand that solutions to a system of two linear equations correspond to the points of intersection of their graphs because the point of intersection satisfies both equations simultaneously. • Solve real-world and mathematical problems leading to systems of linear equations by graphing the equations. Solve simple cases by inspection.		

	Functions		
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Define, evaluate, and compare functions.			
NC.8.F.1	Understand that a function is a rule that assigns to each input exactly one output. • Recognize functions when graphed as the set of ordered pairs consisting of an input and exactly one corresponding output. • Recognize functions given a table of values or a set of ordered pairs.		
NC.8.F.2	Compare properties of two linear functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	**NC.8.F.2**	Given a linear function table containing at least 2 complete ordered pairs, identify a missing number that completes another ordered pair (limited to linear functions).
NC.8.F.3	Identify linear functions from tables, equations, and graphs.		
Use functions to model relationships between quantities.			
NC.8.F.4	Analyze functions that model linear relationships. • Understand that a linear relationship can be generalized by $y=mx+b$. • Write an equation in slope-intercept form to model a linear relationship by determining the rate of change and the initial value, given at least two (x,y) values or a graph. • Construct a graph of a linear relationship given an equation in slope-intercept form. • Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of the slope and y-intercept of its graph or a table of values.	**NC.8.F.4**	Determine the values or rule of a function using a graph or a table.
NC.8.F.5	Qualitatively analyze the functional relationship between two quantities. • Analyze a graph determining where the function is increasing or decreasing; linear or non-linear.	**NC.8.F.5**	Describe how a graph represents a relationship between two quantities as increasing or decreasing.

Abbreviation	Standard	Abbreviation	Standard
	• Sketch a graph that exhibits the qualitative features of a real-world function.		
Geometry			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Understand congruence and similarity using physical models, transparencies, or geometry software.			
NC.8.G.2	Use transformations to define congruence. • Verify experimentally the properties of rotations, reflections, and translations that create congruent figures. • 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.	NC.8.G.2	Identify congruent shape after transformation (translation, rotation, and reflection).
NC.8.G.3	Describe the effect of dilations about the origin, translations, rotations about the origin in 90 degree increments, and reflections across the x-axis and y-axis on two-dimensional figures using coordinates.		
NC.8.G.4	Use transformations to define similarity. • Verify experimentally the properties of dilations that create similar figures. • 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.	NC.8.G.4	Identify similar shapes after dilation (resizing).
Analyze angle relationships.			
NC.8.G.5	Use informal arguments to analyze angle relationships. • Recognize relationships between interior and exterior angles of a triangle. • Recognize the relationships between the angles created when parallel lines are cut by a transversal.	NC.8.G.5	Compare any angle to a right angle, and describe the angle as greater than, less than, or congruent to a right angle.

	• Recognize the angle-angle criterion for similarity of triangles. • Solve real-world and mathematical problems involving angles.		
Understand and apply the Pythagorean Theorem.			
NC.8.G.6	Explain the Pythagorean Theorem and its converse.		
NC.8.G.7	Apply the Pythagorean Theorem and its converse to solve real-world and mathematical problems.		
NC.8.G.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.		
Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.			
NC.8.G.9	Understand how the formulas for the volumes of cones, cylinders, and spheres are related and use the relationship to solve real-world and mathematical problems.	**NC.8.G.9**	Use the formula for volume to solve real-world and mathematical problems (limited to volume of rectangular prisms).
Statistics and Probability			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Investigate patterns of association in bivariate data.			
NC.8.SP.1	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Investigate and describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	**NC.8.SP.1**	Construct a graph or table from given categorical data and compare data categorized in the graph or table.
NC.8.SP.2	Model the relationship between bivariate quantitative data to: • Informally fit a straight line for a scatter plot that suggests a linear association. • Informally assess the model fit by judging the closeness of the data points to the line.		

NC.8.SP.3	Use the equation of a linear model to solve problems in the context of bivariate quantitative data, interpreting the slope and *y*-intercept.		
NC.8.SP.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.		

NC *Standard Course of Study* and Extended Content Standards Mathematics Alignment NC Math 1			
NC Standard Course of Study K-8 Mathematics for Implementation in 2018-2019, Adopted June 2017		Extended Content Standards K-8 for Mathematics for Implementation 2018-19, Adopted September 2017	
Standards for Mathematical Practice			
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics.		5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	
Number and Quantity			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
The Real Number System *Extend the properties of exponents to rational exponents.*			
NC.M1.N-RN.2	Rewrite algebraic expressions with integer exponents using the properties of exponents.	**NC.ECS.M1.N-RN.2**	Determine the value of a quantity that is squared (up to 20) or cubed, (up to 10).
Algebra			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Seeing Structure in Expressions *Interpret the structure of expressions.*			
NC.M1.A-SSE.1 **NC.M1.A-SSE.1a** **NC.M1.A-SSE.1b**	Interpret expressions that represent a quantity in terms of its context. a. Identify and interpret parts of a linear, exponential, or quadratic expression, including terms, factors, coefficients, and exponents. b. Interpret a linear, exponential, or quadratic expression made of multiple parts as a combination of entities to give meaning to an expression.	**NC.ECS.M1.A-SSE.1**	Identify the different parts of the linear expression (Ax+B) and explain their meaning within the context of a problem.

Seeing Structure in Expressions: *Write expressions in equivalent forms to solve problems.*			
NC.M1.A-SSE.3	Write an equivalent form of a quadratic expression $ax2 +bx +c$, where a is an integer, by factoring to reveal the solutions of the equation or the zeros of the function the expression defines.	NC.ECS.M1.A-SSE.3	Use properties of operations to rewrite expressions. (distributive, commutative, associative).
Arithmetic with Polynomial Expressions *Perform arithmetic operations on polynomials.*			
NC.M1.A-APR.1	Build an understanding that operations with polynomials are comparable to operations with integers by adding and subtracting quadratic expressions and by adding, subtracting, and multiplying linear expressions.	NC.ECS.M1.A-APR.1	Add and subtract quadratic expressions. $(2x^2 + 3x - 1) - (x^2 + 4x - 2)$
Arithmetic with Polynomial Expressions *Understand the relationship between zeros and factors of polynomials.*			
NC.M1.A-APR.3	Understand the relationships among the factors of a quadratic expression, the solutions of a quadratic equation, and the zeros of a quadratic function.		
Creating Equations *Create equations that describe numbers or relationships.*			
NC.M1.A-CED.1	Create equations and inequalities in one variable that represent linear, exponential, and quadratic relationships and use them to solve problems.	NC.ECS.M1.A-CED.1	Use equations to solve problems using addition and subtraction with decimals when a part is unknown (e.g., a can of soda cost $0.75 and John has $0.50 how much more money does he need?).
NC.M1.A-CED.2	Create and graph equations in two variables to represent linear, exponential, and quadratic relationships between quantities.		
NC.M1.A-CED.3	Create systems of linear equations and inequalities to model situations in context.		
NC.M1.A-CED.4	Solve for a quantity of interest in formulas used in science and mathematics using the same reasoning as in solving equations.		
Reasoning with Equations and Inequalities *Understand solving equations as a process of reasoning and explain the reasoning.*			
NC.M1.A-REI.1	Justify a chosen solution method and each step of the solving process for linear and quadratic equations using mathematical reasoning.	NC.ECS.M1.A.REI.1	Explain each step in solving an equation.

Reasoning with Equations and Inequalities *Solve equations and inequalities in one variable.*			
NC.M1.A-REI.3	Solve linear equations and inequalities in one variable.	**NC.ECS.M1.A.REI.3**	Solve a three step linear equation.
NC.M1.A-REI.4	Solve for the real solutions of quadratic equations in one variable by taking square roots and factoring.		
Reasoning with Equations and Inequalities *Solve systems of equations.*			
NC.M1.A-REI.5	Explain why replacing one equation in a system of linear equations by the sum of that equation and a multiple of the other produces a system with the same solutions.		
NC.M1.A-REI.6	Use tables, graphs, or algebraic methods (substitution and elimination) to find approximate or exact solutions to systems of linear equations and interpret solutions in terms of a context.		
Reasoning with Equations and Inequalities *Represent and solve equations and inequalities graphically.*			
NC.M1.A-REI.10	Understand that the graph of a two variable equation represents the set of all solutions to the equation.	**NC.ECS.M1.A-REI.10**	Understand that a graph represents the solutions to an equation. Interpret a point on a graph in context.
NC.M1.A-REI.11	Build an understanding of why the x-coordinates of the points where the graphs of two linear, exponential, and/or quadratic equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$ and approximate solutions using graphing technology or successive approximations with a table of values.		
NC.M1.A-REI.12	Represent the solutions of a linear inequality or a system of linear inequalities graphically as a region of the plane.		
Functions			
Abbreviation	**Standard**	**Abbreviation**	**Standard**
Interpreting Functions *Understand the concept of a function and use function notation.*			

NC.M1.F-IF.1	Build an understanding 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 by recognizing that: • 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 $y = f(x)$.	**NC.ECS.M1.F-IF.1**	Build an understanding that a function occurs when each input (x) has only one output (y). Students recognize $f(x)$ function notation.
NC.M1.F-IF.2	Use function notation to evaluate linear, quadratic, and exponential functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	**NC.ECS.M1.F-IF.2**	Evaluate linear functions.
NC.M1.F-IF.3	Recognize that recursively and explicitly defined sequences are functions whose domain is a subset of the integers, the terms of an arithmetic sequence are a subset of the range of a linear function, and the terms of a geometric sequence are a subset of the range of an exponential function.	**NC.ECS.M1.F-IF.3**	Use patterns to solve problems (adding and multiplying).
Interpreting Functions *Interpret functions that arise in applications in terms of the context.*			
NC.M1.F-IF.4	Interpret key features of graphs, tables, and verbal descriptions in context to describe functions that arise in applications relating two quantities, including: intercepts; intervals where the function is increasing, decreasing, positive, or negative; and maximums and minimums.	**NC.ECS.M1.F-IF.4**	Given a graph of a linear function, identify the rate of change (slope) and intercepts. Identify whether the line is increasing or decreasing, and whether it has a positive or negative slope.
NC.M1.F-IF.5	Interpret a function in terms of the context by relating its domain and range to its graph and, where applicable, to the quantitative relationship it describes.		
NC.M1.F-IF.6	Calculate and interpret the average rate of change over a specified interval for a function presented numerically, graphically, and/or symbolically.	**NC.ECS.M1.F-IF.6**	Given two points on a line, identify the slope.
Interpreting Functions *Analyze functions using different representations.*			
NC.M1.F-IF.7	Analyze linear, exponential, and quadratic functions by generating different representations, by hand in simple cases and using technology for more complicated cases, to show key features, including: domain and range; rate of change; intercepts; intervals where the	**NC.ECS.M1.F-IF.7**	Given a linear function, identify the slope and y intercept and graph the line.

	function is increasing, decreasing, positive, or negative; maximums and minimums; and end behavior.		
NC.M1.F-IF.8 NC.M1.F-IF.8a NC.M1.F-IF.8b	Use equivalent expressions to reveal and explain different properties of a function. a. Rewrite a quadratic function to reveal and explain different key features of the function b. Interpret and explain growth and decay rates for an exponential function.		
NC.M1.F-IF.9	Compare key features of two functions (linear, quadratic, or exponential) each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions).	NC.ECS.M1.F-IF.9	Given two graphs of linear functions compare the rates of change and initial values.
Building Functions *Build a function that models a relationship between two quantities.*			
NC.M1.F-BF.1 NC.M1.F-BF.1a NC.M1.F-BF.1b	Write a function that describes a relationship between two quantities. a. Build linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two ordered pairs (include reading these from a table). b. Build a function that models a relationship between two quantities by combining linear, exponential, or quadratic functions with addition and subtraction or two linear functions with multiplication.		
NC.M1.F-BF.2	Translate between explicit and recursive forms of arithmetic and geometric sequences and use both to model situations.		
Linear, Quadratic, and Exponential Models *Construct and compare linear and exponential models and solve problems.*			
NC.M1.F-LE.1	Identify situations that can be modeled with linear and exponential functions, and justify the most appropriate model for a situation based on the rate of change over equal intervals.		
NC.M1.F-LE.3	Compare the end behavior of linear, exponential, and quadratic functions using graphs and tables to show that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.		

Linear, Quadratic, and Exponential Models			
Interpret expressions for functions in terms of the situation they model.			
NC.M1.F-LE.5	Interpret the parameters a and b in a linear function $f(x) = ax + b$ or an exponential function $g(x) = abx$ in terms of a context.		

Geometry

Abbreviation	Standard	Abbreviation	Standard
Expressing Geometric Properties with Equations *Use coordinates to prove simple geometric theorems algebraically.*			
NC.M1.G-GPE.4	Use coordinates to solve geometric problems involving polygons algebraically • Use coordinates to compute perimeters of polygons and areas of triangles and rectangles. • Use coordinates to verify algebraically that a given set of points produces a particular type of triangle or quadrilateral.	NC.ECS.M1.G-GPE.4	On a coordinate plane find the perimeter and area of geometric figures, in which all needed measurements can be counted on the grid. Identify geometric figures on the coordinate plane, using estimation and counting.
NC.M1.G-GPE.5	Use coordinates to prove the slope criteria for parallel and perpendicular lines and use them to solve problems. • Determine if two lines are parallel, perpendicular, or neither. • Find the equation of a line parallel or perpendicular to a given line that passes through a given point.	NC.ECS.M1.G-GPE.5	Know the attributes of perpendicular lines, parallel lines, and line segments. Compare lines on the coordinate plan, to identify parallel lines an recognize that parallel lines have the same slope (rate of change).
NC.M1.G-GPE.6	Use coordinates to find the midpoint or endpoint of a line segment.	NC.ECS.M1.G-GPE.6	Use coordinates to find the midpoints or endpoints of a line segment, in the first quadrant.

Statistics and Probability

Abbreviation	Standard	Abbreviation	Standard
Interpreting Categorical and Quantitative Data *Summarize, represent, and interpret data on a single count or measurement variable.*			
NC.M1.S-ID.1	Use technology to represent data with plots on the real number line (histograms, and box plots).	NC.ECS.M1.S-ID.1	Given data, use technology to construct a simple graph (line, pie, bar, or picture) or table, and interpret the data.

NC.M1.S-ID.2	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. Interpret differences in shape, center, and spread in the context of the data sets.	NC.ECS.M1.S-ID.2	Interpret general trends on a graph or chart. (more, less, increasing, decreasing) Given a graph, table, or word problem, calculate the mean of a given data sets (when the number of data points is fewer than five) and compare the mean.
NC.M1.S-ID.3	Examine the effects of extreme data points (outliers) on shape, center, and/or spread.	NC.ECS.M1.S-ID.3	Identify in general outliers in a data set and explain why they are important to identify.
Interpreting Categorical and Quantitative Data *Summarize, represent, and interpret data on two categorical and quantitative variables.*			
NC.M1.S-ID.6 NC.M1.S-ID.6a NC.M1.S-ID.6b NC.M1.S-ID.6c	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. a. Fit a least squares regression line to linear data using technology. Use the fitted function to solve problems. b. Assess the fit of a linear function by analyzing residuals. c. Fit a function to exponential data using technology. Use the fitted function to solve problems.		
Interpreting Categorical and Quantitative Data *Interpret linear models.*			
NC.M1.S-ID.7	Interpret in context the rate of change and the intercept of a linear model. Use the linear model to interpolate and extrapolate predicted values. Assess the validity of a predicted value.		
NC.M1.S-ID.8	Analyze patterns and describe relationships between two variables in context. Using technology, determine the correlation coefficient of bivariate data and interpret it as a measure of the strength and direction of a linear relationship. Use a scatter plot, correlation coefficient, and a residual plot to determine the appropriateness of using a linear function to model a relationship between two variables.		
NC.M1.S-ID.9	Distinguish between association and causation.		