

CASAS GOALS 2 Blueprints Crosswalk

Math Level A

Content Area: Number Sense and Operations

Content Standard	NC Standard(s)
Understand place value	<p>M.1.1.1: Understand place value. Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:</p> <ul style="list-style-type: none">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). <p>M.1.1.2: Understand place value. Compare two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols $>$, $=$, and $<$.</p> <p>M.1.2.1: 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:</p> <ul style="list-style-type: none">a. 100 can be thought of as a bundle of ten tens- called a “hundred.”

	<p>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).</p> <p>M.1.2.2: Count within 1000; skip-count by 5s, 10s, and 100s.</p> <p>M.1.2.3: Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.</p> <p>M.1.2.4: Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using $>$, $=$, and $<$ symbols to record the results of comparisons.</p>
Compute using the four operations	<p>M.1.1.3: Use place value understanding and the properties of operations to add and subtract. 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. 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>

M.1.1.4: Use properties of operations to add and subtract. Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used. 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.

M.1.2.5: Add up to four two-digit numbers using strategies based on place value and properties of operations.

M.1.2.6: 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.

M.1.2.7: Use place value understanding and properties of

operations to add and subtract. Mentally add 10 or 100 to a given number 100-900, and mentally subtract 10 or 100 from a given number 100-900.

M.1.2.8: Use place value understanding and properties of operations to add and subtract. Explain why addition and subtraction strategies work, using place value and the properties of operations.

M.1.2.9: Use place value understanding and properties of operations to perform multi-digit arithmetic.

a. Use place value understanding to round whole numbers to the nearest 10 or 100.

b. 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.

M.1.2.10: 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.

Content Area: Algebraic Thinking

Content Standard	NC Standard(s)
Apply properties of the four operations	<p>M.5.1.6: Represent and solve problems involving addition and subtraction. Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20. Apply commutative property of addition and associative property of addition to add. Understand subtraction as an unknown-addend problem.</p> <p>M.5.1.1: Understand and apply properties of operations and the relationship between addition and subtraction. Apply properties of operations as strategies to add and subtract.</p> <p>M.5.1.3: Add and subtract with 20. Relate counting to addition and subtraction (e.g., by counting on 2 to add 2). Add and subtract within 20, demonstrating fluency for addition and subtraction with 10. Use strategies such as counting on; making 10 (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$); decomposing a number leading to a ten (e.g., $13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$); using the relationship between addition and subtraction (e.g., knowing that $8 + 4 = 12$, one knows that $12 - 8 = 4$); and creating equivalent but easier or known sums (e.g., adding $6 + 7$ by creating the known equivalent $6 + 6 + 1 = 12 + 1 = 13$).</p>

M.5.1.4: Work with addition and subtraction. Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false.

*Fluently add and subtract within 20 using mental strategies. Know from memory all sums of two one-digit numbers (2.OA.2 from the National CCSS; no NC standard correlated)

M.5.2.2: Represent and solve problems involving multiplication and division.

a. Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each.

b. 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 as a number of shares when 56 objects are partitioned into equal shares of 8 objects each.

M.5.2.5: Understand properties of multiplication and the relationship between multiplication and division. Apply properties of operations as strategies to multiply and divide. Note: Students need not use formal terms for these properties.

	<p>M.5.2.3.a: 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 $40 \div 5 = 8$) or properties of operations. Know from memory all products of two one-digit numbers.</p> <p>M.5.2.8: Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.</p>
Determine unknown numbers	<p>M.5.1.5: Work with addition and subtraction. Determine the unknown whole number in an addition or subtraction equation relating to three whole numbers.</p> <p>M.5.2.1: Represent and solve problems involving addition and subtraction. 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.</p> <p>M.5.2.3.b: Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the</p>

unknown number to represent the problem.

M.5.2.4: Determine the unknown whole number in a multiplication or division equation relating three whole numbers.

M.5.2.6: Understand division as an unknown-factor problem.

M.5.2.7: Solve problems involving the four operations, and identify and explain patterns in arithmetic. 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.

Content Area: Geometry and Measurement

Content Standard	NC Standard(s)
Compare shapes	<p>M.3.1.1: Analyze, compare, create, and compose shapes. Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using information 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).</p> <p>M.3.1.2: Reason with shapes and their attributes. Compose two-dimensional shapes (rectangles, squares, trapezoids, 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.</p> <p>M.3.2.1: Reason with shapes and their attributes. 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.</p> <p>M.3.2.2: Reason with shapes and their attributes. Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two</p>

	<p>halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.</p> <p>M.3.2.4: Reason with shapes and their attributes. 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.</p> <p>M.3.2.3: Reason with shapes and their attributes. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.</p>
Solve perimeter and area problems	<p>M.2.2.5: Geometric measurement: Understand concepts of area and relate to area of multiplication and addition. Recognize area as an attribute of plane figures and understand concepts of area measurement.</p> <p>a. A square with a side length 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used to measure area.</p> <p>b. A plane figure which can be covered without gaps or overlays by n unit</p>

squares is said to have an area of n square units.

c. Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).

M.2.2.6: Geometric measurement:
Relate area to the operations of multiplication and addition.

a. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.

b. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning.

*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. (3.MD.7a from the National CCSS; no NC standard correlated)

*Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems

	<p>(3.MD.7d from the National CCRS; no NC standard correlated)</p> <p>M.2.2.7: Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures. Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.</p>
Measure with non-standard and metric units	<p>M.2.1.1: Measure lengths indirectly and by iterating length units. Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.</p> <p>*Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.</p> <p>(2.MD.2 from the national CCRS; no NC standard correlated)</p>

	<p>M.2.2.1: Measure and estimate lengths in standard units. Estimate lengths using units of inches, feet, centimeters, and meters. Measure to determine how much longer one object is than another, expressing the length difference in terms of standard unit length.</p> <p>M.2.2.2: Relate addition and subtraction to length. Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.</p> <p>*Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units – whole number, halves, or quarters. (3.MD.4 from the national CCRS; no NC standard correlated)</p>
Solve problems using time and liquid volumes	<p>M.2.2.3: Solve problems involving measurement and estimation of intervals of time. Tell and write time to the nearest minute and measure time intervals in minutes.</p> <p>M.2.2.4: Solve problems involving measurement and estimation of liquid volumes and masses of objects. Measure and estimate liquid volumes</p>

	and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.
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Content Area: Data Analysis

Content Standard	NC Standard(s)
Interpret simple data sets, bar graphs, and line graphs	<p>M.4.1.2: Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.</p> <p>M.4.2.1: Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories.</p> <p>M.4.2.2: Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories.</p>
Solve one- and two-step problems using bar graphs	M.4.2.3: Solve one- and two-step how many more and how many less problems using information presented in scaled bar graphs.

Math Level B

Content Area: Number Sense and Operations

Content Standard	NC Standard
Understand place value for whole numbers and decimals	<p>M.1.1.1: Understand place value. Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:</p> <ul style="list-style-type: none">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). <p>M.1.1.2: Understand place value. Compare two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols $>$, $=$, and $<$.</p> <p>M.1.2.1: 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:</p> <ul style="list-style-type: none">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).

M.1.2.2: Count within 1000; skip-count by 5s, 10s, and 100s.

M.1.2.3: Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

M.1.2.4: Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using $>$, $=$, and $<$ symbols to record the results of comparisons.

M.1.3.1: Generalize place value understanding for multi-digit whole numbers. 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 and $\frac{1}{10}$ of what it represents in the place to its left.

M.1.3.2: 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.

M.1.3.3: Use place value understanding to round multi-digit whole numbers to any place.

	<p>M.1.3.7: 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 whole-number exponents to denote powers of 10.</p> <p>M.1.3.8: Read, write, and compare decimals to thousandths.</p> <ul style="list-style-type: none">a. Read and write decimals to thousandths using base ten numerals, number name, 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. <p>M.1.3.9: Use place value understanding to round decimals to any place.</p>
Compute using the four operations	<p>M.1.2.5: Add up to four two-digit numbers using strategies based on place value and properties of operations.</p> <p>M.1.2.6: 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</p>

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.

M.1.2.7: Use place value understanding and properties of operations to add and subtract. Mentally add 10 or 100 to a given number 100-900, and mentally subtract 10 or 100 from a given number 100-900.

M.1.2.8: Use place value understanding and properties of operations to add and subtract. Explain why addition and subtraction strategies work, using place value and the properties of operations.

M.1.4.2: Compute fluently with multi-digit numbers and find common factors and multiples. Fluently divide multi-digit numbers using the standard algorithm.

M.1.4.1: Fluently 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.

	<p>M.1.4.3: Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor. For example, express $36 + 8$ as $4(9 + 2)$.</p> <p>M.1.4.10: Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.</p>
Perform operations with whole numbers, decimals, and fractions	<p>M.1.2.9: Use place value understanding and properties of operations to perform multi-digit arithmetic.</p> <p>a. Use place value understanding to round whole numbers to the nearest 10 or 100.</p> <p>b. 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.</p> <p>M.1.2.10: 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.</p>

M.1.2.11: 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 $1/b$.

M.1.2.12: Understand a fraction as a number on the number line; represent fractions on a number line diagram.

a. Represent a fraction $1/b$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts.

Recognize that each part has size $1/b$ and that the endpoint of the part based at 0 locates the number $1/b$ on the number line.

b. Represent a fraction a/b on a number line diagram by marking off a lengths $1/b$ from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.

M.1.2.13: Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.

c. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.

d. Recognize and generate simple equivalent fractions, e.g., $1/2 = 2/4$, $4/6 = 2/3$. Explain why the fractions are equivalent, e.g., by using a visual fraction model.

e. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.

f. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

M.1.3.4: Fluently add and subtract multi-digit whole numbers using the standard algorithm.

M.1.3.5: 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.

M.1.3.6: 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.

M.1.3.10: Perform operations with multi-digit whole numbers and with decimals to hundredths. Fluently multiply multi-digit whole numbers using the standard algorithm.

M.1.3.11: 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.

M.1.4.1: Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

M.1.3.12: Extend understanding of fraction equivalence and ordering. Explain why a fraction $\frac{a}{b}$ is equivalent to a fraction $\frac{n \times a}{n \times b}$ 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.

Use this principle to recognize and generate equivalent fractions.

M.1.3.13: 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 $\frac{1}{2}$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

M.1.3.14: Build fractions from unit fractions by applying and extending previous understanding of operations on whole numbers. Understand a fraction $\frac{a}{b}$ with $a > 1$ as a sum of fractions $\frac{1}{b}$.

a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.

b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model.

M.1.3.15: Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using

properties of operations and the relationship between addition and subtraction.

M.1.3.16: Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.

M.1.3.17: Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.

- a. Understand a fraction a/b as a multiple of $1/b$.
- 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.
- 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.

M.1.3.18: Understand decimal notation for fractions, and compare decimal fractions. Use decimal notation for fractions with denominators 10 or 100.

M.1.3.19: Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results

of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual model.

M.1.3.20: Use equivalent fractions as strategy to add and subtract fractions. 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.

M.1.3.21: Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.

M.1.3.22: Apply and extend previous understanding of multiplication and division to multiply and divide fractions. 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.

Apply and extend previous understandings of multiplication to multiply a fraction or a whole number by a fraction.

M.1.3.23: Interpret multiplication as scaling (resizing) by:

a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.

b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $\frac{a}{b} = \frac{n \times a}{n \times b}$ to the effect of multiplying $\frac{a}{b}$ by 1.

M.1.3.24: Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

M.1.3.25: 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 number, and compute such quotients.</p> <p>b. Interpret division of a whole number by a unit fraction, and compute such quotients.</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>
<p>Understand ratio concepts and use ratios to solve problems</p>	<p>*Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.” “For every vote candidate A received, candidate C received nearly three votes.” (6.RP.1 from the national CCRS; no NC standard correlated)</p> <p>M.1.3.13: Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$. For example, “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is a $3/4$ cup ration of flour for each cup of sugar.” “We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger.”</p>

Content Area: Algebraic Thinking

Content Standard(s)	NC Standard(s)
Apply properties of the four operations	<p>M.5.2.1: Represent and solve problems involving addition and subtraction. 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.</p> <p>*Fluently add and subtract within 20 using mental strategies. Know from memory all sums of two one-digit numbers (2.OA.2 from the National CCRS; no NC standard correlated)</p> <p>M.5.2.2: Represent and solve problems involving multiplication and division.</p> <p>a. Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each.</p> <p>b. 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 as a number of shares when 56 objects are partitioned into equal shares of 8 objects each.</p>

M.5.2.3.b: Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

M.5.2.4: Determine the unknown whole number in a multiplication or division equation relating three whole numbers.

M.5.2.5: Understand properties of multiplication and the relationship between multiplication and division. Apply properties of operations as strategies to multiply and divide. Note: Students need not use formal terms for these properties.

M.5.2.6: Understand division as an unknown-factor problem.

M.5.2.3.a: 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 $40 \div 5 = 8$) or properties of operations. Know from memory all products of two one-digit numbers.

M.5.2.7: Solve problems involving the four operations, and identify and explain patterns in arithmetic. 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.

M.5.2.8: Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.

M.5.3.1: Use the four operations with whole numbers to solve problems. 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 multiplication equations.

M.5.3.2: 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, distinguishing multiplicative comparison from additive comparison.

M.5.3.3: Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be

	<p>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.</p> <p>M.5.3.4: Gain familiarity with factors and multiples. 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.</p> <p>M.5.3.5: 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.</p> <p>M.5.3.6: 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.</p> <p>M.5.3.7: Write and interpret numerical expressions. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.</p>
<p>Use a symbol to represent variables, and solve simple one-variable equations</p>	<p>M.5.3.8: Apply and extend previous understandings of arithmetic to algebraic expressions. Write and</p>

evaluate numerical expressions involving whole-number exponents, i.e., $4(4) - 4^2 = 16$ and $2(2)(2) = 2^3 = 8$. Understand that exponents are used to represent repeated multiplication.

M.5.3.9: 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, factor, 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, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).

M.5.3.10: Apply the properties of operations to generate equivalent expressions.

M.5.3.11: Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).

M.5.3.12: Reason about and solve one-variable equations and inequalities. Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

M.5.3.13: Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

M.5.3.14: 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.

M.5.3.15: Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

M.5.3.16: Represent and analyze quantitative relationships between

	<p>dependent and independent variables. Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.</p>
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Content Area: Geometry and Measurement

Content Standard(s)	NC Standard(s)
Solve perimeter and area problems	<p>M.2.2.5: Geometric measurement: Understand concepts of area and relate to area of multiplication and addition. Recognize area as an attribute of plane figures and understand concepts of area measurement.</p> <p>a. A square with a side length 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used to measure area.</p> <p>b. A plane figure which can be covered without gaps or overlays by n unit squares is said to have an area of n square units.</p> <p>c. Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).</p>

M.2.2.6: Geometric measurement:

Relate area to the operations of multiplication and addition.

a. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.

b. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning.

*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. (3.MD.7a from the National CCRS; no NC standard correlated)

*Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems (3.MD.7d from the National CCRS; no NC standard correlated)

M.2.2.7: Geometric measurement:

recognize perimeter as an attribute of plane figures and distinguish between linear and area measures. Solve real

	<p>world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.</p>
<p>Measure with non-standard and metric units, and convert within a given measurement system</p>	<p>M.2.1.2: Measure the length of an object twice, using length units of different lengths for the two measurements and describe how the two measurements relate to the size of the unit chosen.</p> <p>M.2.2.1: Measure and estimate lengths in standard units. Estimate lengths using units of inches, feet, centimeters, and meters. Measure to determine how much longer one object is than another, expressing the length difference in terms of standard unit length.</p> <p>M.2.3.3: Convert like measurement units within a given measurement system. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world, and mathematical problems.</p>
<p>Solve measurement word problems, including with time and volumes</p>	<p>M.2.2.3: Solve problems involving measurement and estimation of intervals of time. Tell and write time to the nearest minute and measure time intervals in minutes.</p>

M.2.2.4: Solve problems involving measurement and estimation of liquid volumes and masses of objects.

Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.

M.3.3.4: Solve real world and mathematical problems involving area, surface area, and volume.

a. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

b. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.

c. Represent three-dimensional figures using nets made up of rectangles and

triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

M.2.3.4: Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

M.2.3.2: Apply the area and perimeter formulas for rectangles in real world and mathematical problems.

M.2.3.6: Geometric measurement: Understand concepts of volume and relate volume to multiplication and addition. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

a. A cube with side length 1 unit, called a “unit cube,” is said to have “one

cubic unit of volume, and can be used to measure volume.

b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.

c. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

M.2.4.1: Geometric measurement:

Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

a. Apply the formulas $V = l \cdot w \cdot h$ and $V = b \cdot h$ for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems.

b. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real-world problems.

*Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-

	number products as volumes, e.g., to represent the associative property of multiplication (5.MD.5a from the National CCRS; no NC standard correlated)
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Content Area: Data Analysis and Statistics

Content Standard(s)	NC Standard(s)
<p>Interpret simple data sets, bar graphs, line graphs, and histograms</p> <p>Solve one- and two-step problems using bar graphs</p>	<p>M.4.2.1: Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories.</p> <p>M.4.2.2: Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories.</p> <p>*Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units – whole numbers, halves, or quarters. (3.MD.4 from the National CCRS; no NC standard correlated)</p> <p>M.4.3.4: Represent and interpret data. Make a line plot to display a data set including data sets involving fractions. Solve problems involving information presented in line plots.</p> <p>M.4.3.3: Summarize and describe distributions. Display numerical data in</p>

	plots on a number line, including dot plots, histograms, and box plots.
Understand statistical variability concepts like center and spread	<p>M.4.3.1: Develop understanding of statistical variability. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, “How old am I?” is not a statistical question, but “How old are the students in my school?” is a statistical question because one anticipates variability in students’ ages.</p> <p>M.4.3.2: Develop understanding of statistical variability. 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 and recognize that a measure of variation describes how its values vary with a single number.</p> <p>*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. (6.SP.3 from the National CCSS; no NC standard correlated)</p>

Math Level C

Content Area: Number Sense and Operations

Content Standard(s)	NC Standard(s)
Perform the four operations with whole numbers, decimals, and fractions	<p>M.1.3.4: Fluently add and subtract multi-digit whole numbers using the standard algorithm.</p> <p>M.1.3.5: 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.</p> <p>M.1.3.6: 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.</p> <p>M.1.3.10: Perform operations with multi-digit whole numbers and with decimals to hundredths. Fluently multiply multi-digit whole numbers using the standard algorithm.</p>

M.1.3.11: 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.

M.1.4.1: Fluently 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.

M.1.3.20: Use equivalent fractions as strategy to add and subtract fractions. 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.

M.1.3.21: Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to

represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.

M.1.3.22: Apply and extend previous understanding of multiplication and division to multiply and divide fractions. 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. Apply and extend previous understandings of multiplication to multiply a fraction or a whole number by a fraction.

M.1.3.23: Interpret multiplication as scaling (resizing) by:

- a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
- b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1

results in a product smaller than the given number; and relating the principle of fraction equivalence $\frac{a}{b} = \frac{n \times a}{n \times b}$ to the effect of multiplying $\frac{a}{b}$ by 1.

M.1.3.24: Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

M.1.3.25: Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.

- Interpret division of a unit fraction by a non-zero whole number, and compute such quotients.
- Interpret division of a whole number by a unit fraction, and compute such quotients.
- 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.

M.1.4.10: Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

Understand ratio, rate, and percent concepts

*Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.” “For every vote candidate A received, candidate C received nearly three votes.” (6.RP.1 from the national CCRS; no NC standard correlated)

M.1.3.13: Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$. For example, “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is a $3/4$ cup ration of flour for each cup of sugar.” “We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger.”

M.1.4.14: Understand ratio concepts and use ratio reasoning to solve problems. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

a. Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

- b. Solve unit rate problems including those involving unit pricing and constant speed.
- c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means $30/100$ times the quantity); solve problems involving finding the whole, given a part and the percent.
- d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

M.1.4.15: Analyze proportional relationships and use them to solve real-world and mathematical problems. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.

- M.1.4.16: Recognize and represent proportional relationships between quantities.
- a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
 - b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

	<p>c. Represent proportional relationships by equations.</p> <p>d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0,0)$ and $(1, r)$, where r is the unit rate.</p> <p>M.1.4.17: Use proportional relationships to solve multistep ratio and percent problems.</p>
<p>Understand properties of integer exponents</p>	<p>M.1.4.4: Apply and extend previous understandings of numbers to the system of rational numbers. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.</p> <p>M.1.4.5: Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.</p> <p>a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the</p>

opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite.

b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.

c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

M.1.4.6: Understand ordering and absolute value of rational numbers.

a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.

b. Write, interpret, and explain statements of order for rational numbers in real-world contexts.

c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.

d. Distinguish comparisons of absolute value from statements about order.

M.1.4.7: 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.

M.1.4.8: Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

a. Describe situations in which opposite quantities combine to make 0.

b. Understand $p + q$ as the number located a distance $|q|$ from p , in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.

c. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

d. Apply properties of operations as strategies to add and subtract rational numbers.

M.1.4.9: Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.

c. Apply properties of operations as strategies to multiply and divide rational numbers.

d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

M.1.4.11: Solve real-world and mathematical problems involving the four operations with rational numbers.

M.1.4.12: Know that there are numbers that are not rational, and

	<p>approximate them by rational numbers. Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2).</p>
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Content Area: Algebraic Thinking

Content Standard(s)	NC Standard
<p>Solve simple one-variable equations and simple inequalities</p>	<p>M.5.3.12: Reason about and solve one-variable equations and inequalities. Understand solving an equation or inequality as a process of answering a question: Which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.</p> <p>M.5.3.13: Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.</p> <p>M.5.3.14: 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.</p>

	<p>M.5.3.15: Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.</p>
<p>Understand relationships between dependent and independent variables</p>	<p>M.5.3.16: Represent and analyze quantitative relationships between dependent and independent variables. Use variables to represent two quantities in a real world problem that change in relationship to one another; write an equation to express a quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.</p>
<p>Understand proportional relationships and linear equations</p>	<p>M.1.4.15: Analyze proportional relationships and use them to solve real-world and mathematical problems. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.</p> <p>M.1.4.16: Recognize and represent proportional relationships between quantities.</p> <p>a. Decide whether two quantities are in a proportional relationship, e.g., by</p>

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.

b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

c. Represent proportional relationships by equations.

d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0,0)$ and $(1,r)$ where r is the unit rate.

M.5.4.8: Understand the connections between proportional relationships, lines, and linear equations. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.

Content Area: Geometry and Measurement

Content Standard	NC Standard
Solve problems involving perimeter, area, surface area, and volume	<p>M.3.3.4: Solve real world and mathematical problems involving area, surface area, and volume.</p> <p>a. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.</p> <p>b. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.</p> <p>c. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.</p>
Solve problems with measurement and scale drawings.	<p>M.3.4.1: Draw, construct, and describe geometrical figures and describe the relationships between them. 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.</p>

Understand the Pythagorean theorem and concepts of congruence and similarity

M.3.4.4: Understand and apply the Pythagorean Theorem to find the distance between two points in a coordinate system and to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

M.3.4.3: Understand congruence and similarity using physical models, transparencies, or geometry software.

- a. 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, translations, and dilations; given two congruent figures, describe a sequence that exhibits the congruence between them.
- b. 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.
- c. 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.

Content Area: Data Analysis, Statistics, and Probability

Content Standard	NC Standard
Understand statistical variability concepts like center and spread, and recognize deviations from patterns	<p>M.4.3.1: Develop understanding of statistical variability. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.</p> <p>M.4.3.2: Develop understanding of statistical variability. Understand that a set of data collected to answer statistical questions has a distribution which can be described by its center, spread, and overall shape and recognize that a measure of variation describes how its values vary with a single number.</p>
Understand and apply the concept of probability	<p>M.4.3.5: Investigate chance processes. Develop an understanding of events as certain, impossible, likely, or unlikely to occur. Understand that probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring.</p> <p>M.4.3.6: Investigate chance processes. Determine the probability of basic events (e.g., in the results of tossing a coin, rolling a die, or drawing cards from a deck of cards, chance of baby being born on a certain day of week, etc.) and express the likelihood of an occurrence as a ratio, fraction, or percent.</p>

Math Level D

Content Area: Number Sense and Operations

National Standard	NC Standard
Solve real-world mathematical problems involving the four operations and rational numbers	<p>M.1.4.4: Apply and extend previous understandings of numbers to the system of rational numbers. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.</p> <p>M.1.4.5: Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.</p> <p>a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite.</p> <p>b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.</p>

c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

M.1.4.6: Understand ordering and absolute value of rational numbers.

a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.

b. Write, interpret, and explain statements of order for rational numbers in real-world contexts.

c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.

d. Distinguish comparisons of absolute value from statements about order.

M.1.4.7: 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.

M.1.4.8: Apply and extend previous understandings of addition and subtraction to add and subtract

rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

a. Describe situations in which opposite quantities combine to make 0.

b. Understand $p + q$ as the number located a distance $|q|$ from p , in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.

c. Understand subtraction of rational numbers as adding the additive inverse ($p - q = p + -q$). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. Apply properties of operations as strategies to add and subtract rational numbers.

M.1.4.9: Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying

	<p>signed numbers. Interpret products of rational numbers by describing real-world contexts.</p> <p>b. Understand that integers can be divided, provided that the divisor is not 0, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.</p> <p>c. Apply properties of operations as strategies to multiply and divide rational numbers. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.</p> <p>M.1.4.11: Solve real-world and mathematical problems involving the four operations with rational numbers.</p>
<p>Understand ratio, rate, and percent concepts</p>	<p>M.4.1.14: Understand ratio concepts and use ratio reasoning to solve problems. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line, diagrams, or equations.</p> <p>a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.</p>

	<p>b. Solve unit rate problems including those involving unit pricing and constant speed.</p> <p>c. Find a percent of a quantity as a rate per 100, solve problems involving finding the whole, given a part and the percent.</p> <p>d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.</p>
<p>Understand properties of integer exponents, square roots, and cube roots</p>	<p>M.5.4.5: Work with radicals and integer exponents. Know and apply the properties of integer exponents to generate equivalent numerical expressions.</p> <p>M.5.4.6: Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.</p> <p>M.5.4.7: Use scientific notation.</p> <p>a. Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.</p> <p>b. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are</p>

	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.
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Content Area: Algebraic Thinking

Content Standard	NC Standard
Solve problems involving proportional relationships, linear equations, and pairs of simultaneous linear equations	<p>M.1.4.15: Analyze proportional relationships and use them to solve real-world and mathematical problems. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.</p> <p>M.1.4.16: Recognize and represent proportional relationships between quantities.</p> <p>a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.</p> <p>b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.</p> <p>c. Represent proportional relationships by equations.</p> <p>d. Explain what a point (x, y) on the graph of a proportional relationship</p>

means in terms of the situation, with special attention to the points $(0,0)$ and $(1, r)$ where r is the unit rate.

M.1.4.17: Use proportional relationships to solve multistep ratio and percent problems.

M.5.4.8: Understand the connections between proportional relationships, lines, and linear equations. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.

M.5.4.9: 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.

	<p>M.5.4.10: Analyze and solve pairs of simultaneous 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 simultaneously.</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 mathematical problems leading to linear equations in two variables.</p>
<p>Use algebraic expressions to solve real-world mathematical problems</p>	<p>M.5.4.1: Use properties of operations to generate equivalent expressions. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.</p> <p>M.5.4.2: Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.</p> <p>M.5.4.3: Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of</p>

	<p>answers using mental computation and estimation strategies.</p> <p>M.5.4.4: Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</p> <p>a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.</p> <p>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 context of the problem.</p>
<p>Use linear functions to model relationships between quantities</p>	<p>M.5.4.11: Define, evaluate, and compare functions.</p> <p>a. Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.</p> <p>b. Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.</p> <p>M.5.4.12: Use functions to model relationships between quantities.</p>

a. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

b. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Content Area: Geometry

Content Standard	NC Standard
Compare shapes	M.3.4.1: Draw, construct, and describe geometrical figures and describe the relationships between them. 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.
Solve real-world problems involving volume and surface area	M.3.4.2: Solve real-world and mathematical problems involving angle, measure, area, surface area, and volume. c. 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.
Solve problems with measurement and scale drawings	M.3.4.1: Draw, construct, and describe geometrical figures and describe the relationships between them. 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.
Understand the Pythagorean theorem and concepts of congruence and similarity	M.3.4.4: Understand and apply the Pythagorean Theorem to find the distance between two points in a coordinate system and to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

M.3.4.3: Understand congruence and similarity using physical models, transparencies, or geometry software.

- a. 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, translations, and dilations; given two congruent figures, describe a sequence that exhibits the congruence between them.
- b. 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.
- c. 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.

Content Area: Statistics and Probability

Content Standard	NC Standard
Understand statistical variability concepts and recognize deviations	<p>M.4.4.1: Summarize and describe distributions. Summarize numerical data sets in relation to their context, such as by:</p> <ul style="list-style-type: none">a. Reporting the number of observations.b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurements.c. Giving quantitative measures of center (median and/or mean), variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.D. Relating the choice of measures of center and variability to the shape of the data distributions and the context in which the data was gathered. <p>M.4.4.7: Draw informal comparative inferences about two populations.</p> <ul style="list-style-type: none">a. Informally assess the degree of visual overlap of two numerical data distributions with similar variability, measuring the difference between the centers by expressing it as a multiple of a measure of variability.b. Use measures of center and measures of variability for numerical data from random samples to draw

	informal comparative inferences about two populations.
Understand and apply the concept of probability	<p>*Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around $\frac{1}{2}$ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. (7.SP.5 from the National CCRS; no NC standard correlated)</p> <p>*Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. <i>For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.</i> (7.SP.6 from the National CCRS; no NC standard correlated)</p> <p>M.4.4.2: 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.</p> <p>a. Develop a uniform probability model by assigning equal probability to all</p>

	<p>outcomes, and use the model to determine probabilities of events.</p> <p>b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.</p> <p>M.4.4.3: 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. Represent sample spaces for compound events using methods such as lists, tables and tree diagrams.</p>
Use 2-way tables to interpret bivariate data	<p>M.4.4.4: Investigate patterns of association in bivariate data. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.</p> <p>a. 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> <p>b. Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.</p>

M.4.4.5: 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 row or columns to describe possible association between two variables.

Math Level E

Content Area: Number Sense and Operations

Content Standard	NC Standard
Solve multi-step problems using rates and proportional relationships	<p>M.1.4.15: Analyze proportional relationships and use them to solve real-world and mathematical problems. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.</p> <p>M.1.4.16: Recognize and represent proportional relationships between quantities.</p> <ol style="list-style-type: none">Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.Represent proportional relationships by equations.Explain what a point (x,y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0,0)$ and $(1,r)$ where r is the unit rate.

	<p>M.1.4.17: Use proportional relationships to solve multistep ratio and percent problems.</p>
<p>Understand radicals and irrational numbers</p>	<p>M.1.4.12: Know that there are numbers that are not rational, and approximate them by rational numbers. Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2).</p> <p>M.5.4.5: Work with radicals and integer exponents. Know and apply the properties of integer exponents to generate equivalent numerical expressions.</p> <p>M.5.4.6: Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.</p> <p>M.5.4.7: Use scientific notation.</p> <p>a. Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.</p> <p>b. Perform operations with numbers expressed in scientific notation,</p>

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.

MA.1.1.1: Rewrite expressions involving radicals and rational exponents using the properties of exponents. For example: the expression $\sqrt{5a^4b^{12}}$ can be rewritten as $(5a^4b^{12})^{1/2}$ which can also be rewritten as $5^{1/2}(a^4)^{1/2}(b^{12})^{1/2}$.

Content Area: Algebraic Thinking

Content Standard	NC Standard
Solve problems involving inequalities, pairs of simultaneous linear equations, and quadratic expressions	<p>MA.1.2.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. Factor a quadratic expression to reveal the zeros of the function it defines.</p> <p>MA.2.1.1: Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions and simple rational and exponential functions.</p> <p>MA.2.1.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.</p> <p>MA.2.1.3: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context.</p> <p>MA.2.2.1: Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.</p>

	<p>MA.2.2.2: Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.</p> <p>MA.2.2.3: Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</p> <p>MA.2.2.4: Solve quadratic equations with one variable.</p> <p>MA.2.2.5: Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.</p> <p>MA.2.2.6: Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).</p>
Understand and use function notation	<p>MA.3.1.1: Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$.</p> <p>MA.3.1.2: Use function notation, evaluate functions for inputs in their</p>

	domains, and interpret statements that use function notation in terms of a context.
Rearrange formulas to highlight a quantity of interest	MA.2.1.4: Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

Content Area: Geometry

Content Standard	NC Standard
Solve real-world problems involving volume and surface area.	M.3.4.2: Solve real-world and mathematical problems involving angle, measure, area, surface area, and volume. c. 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. MA.4.2.1: Explain perimeter, area, and volume formulas and use them to solve problems involving two- and three-dimensional shapes.
Apply the Pythagorean theorem in real-world contexts and on the coordinate plane	M.3.4.4: Understand and apply the Pythagorean theorem to find the distance between two points in a coordinate system and to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
Solve problems involving similarity and congruence	M.3.4.3: Understand congruence and similarity using physical models, transparencies, or geometry software. a. 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, translations, and dilations; given two congruent figures, describe a sequence that exhibits the congruence between them. b. Understand that a two-dimensional figure is similar to another if the

	<p>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.</p> <p>c. 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.</p> <p>MA.4.1.2: Prove theorems involving similarity. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.</p>
<p>Understand the concept of density based on area and volume</p>	<p>MA.4.2.2: Apply geometric concepts of modeling of density based on area and volume in modeling.</p>

Content Area: Data Analysis, Statistics, and Probability

Content Standard	NC Standard
Understand and apply the concept of probability	<p>*Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around $\frac{1}{2}$ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. (7.SP.5 from the National CCRS; no NC standard correlated)</p> <p>*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. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times. (7.SP.6 from the National CCRS; no NC standard correlated)</p> <p>M.4.4.2: 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.</p> <p>a. Develop a uniform probability model by assigning equal probability</p>

to all outcomes, and use the model to determine probabilities of events.

b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.

M.4.4.3: 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. Represent sample spaces for compound events using methods such as lists, tables and tree diagrams.

MA.4.4.1: Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value.

MA.4.4.2: Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.

MA.4.4.3: Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. Find the expected payoff for a game of chance.

MA.4.4.4: Use probabilities to make fair decisions.

	<p>MA.4.4.5: Analyze decisions and strategies using probability concepts.</p>
<p>Use 2-way tables to interpret bivariate data</p>	<p>M.4.4.4: Investigate patterns of association in bivariate data. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.</p> <p>a. 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> <p>b. Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.</p> <p>M.4.4.5: 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 row or columns to describe possible association between two variables.</p>

Interpret and compare data sets, including comparisons of statistical variability

MA.4.3.1: Represent data with plots on the real number line.

MA.4.3.2: Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

MA.4.3.3: Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data. Recognize possible associations and trends in the data.

MA.4.3.4: Interpret the slope and the intercept of a linear model in the context of the data.

MA.4.3.5: Distinguish between correlation and causation.