

Grade	NCTM Focal Point / Local Topic	Curriculum (what we teach)	Benchmarks (what we test)
all	Build new mathematical knowledge through problem solving. (PS)	<ul style="list-style-type: none"> Develop and use a variety of appropriate strategies to solve and explore real-world problems and situations related to content material. 	<ul style="list-style-type: none"> Use a variety of appropriate strategies to solve and explore problems and situations related to content material. (PRP)
all	Recognize, develop, select, and use various types of reasoning and methods of proof. (R&P)	<ul style="list-style-type: none"> Recognize reasoning and proof as fundamental aspects of mathematics. Draw conclusions, defend conjectures and use mathematical concepts to justify mathematical arguments and informal proofs related to content material. 	<ul style="list-style-type: none"> Draw conclusions, defend conjectures, and use mathematical concepts to justify (or or show counterexamples for) mathematical arguments and informal proofs (or disproofs) related to content material. (PRP)
all	Communicate mathematical thinking and ideas. (COM)	<ul style="list-style-type: none"> Evaluate mathematical ideas and communicate mathematical thinking and ideas related to content material coherently and clearly orally, in writing, or through the use of mathematical representations and technology. 	<ul style="list-style-type: none"> Evaluate mathematical ideas and communicate mathematical thinking and ideas related to content material coherently and clearly orally, in writing, and through the use of mathematical representations and technology. (CCR)
all	Recognize and use connections among mathematical ideas. (CON)	<ul style="list-style-type: none"> Understand that mathematical ideas interconnect and build upon one another to create a coherent whole. Build and apply connections between and among mathematical ideas related to content material. 	
all	Represent and interpret mathematical ideas in multiple ways. (REP)	<ul style="list-style-type: none"> Recognize, create, use, and translate among appropriate mathematical representations to communicate mathematical ideas and solve problems related to content material. Recognize standard algorithms, understand how they work, that they are only one of many possible algorithms, and that the standard algorithm is an efficient algorithm for most situations. 	<ul style="list-style-type: none"> Recognize, create, use, and translate among appropriate mathematical representations to communicate mathematical ideas and solve problems related to content material. (CCR)
all	Develop and use estimation strategies when appropriate. (N&O)	<ul style="list-style-type: none"> Develop and use strategies to estimate computations involving content material to the appropriate level of accuracy and evaluate the effect of the estimation strategy on the accuracy of the solution. Evaluate the reasonableness of solutions. 	<ul style="list-style-type: none"> Develop and use strategies to estimate computations involving content material to the appropriate level of accuracy and evaluate the effect of the estimation strategy on the accuracy of the solution. Evaluate the reasonableness of solutions. (N&O)
all	Develop and use strategies for performing arithmetic computations mentally. (N&O)	<ul style="list-style-type: none"> Develop and use mental computation strategies to solve problems involving content material and evaluate the reasonableness of solutions. 	<ul style="list-style-type: none"> Develop and use mental computation strategies to solve problems involving content material and evaluate the reasonableness of all solutions. (N&O)
all	Develop algebraic thinking skills. (A)	<ul style="list-style-type: none"> Use symbols and/or variables to express missing or unknown quantities in problems. Recognize formulas, understand how they work, and apply them appropriately, recognizing their strengths and limitations. 	<ul style="list-style-type: none"> Use expressions, equations, and/or formulas involving symbols and/or variables to stand for missing or unknown quantities and use reasoning to find solutions to problems or situations related to content material. (F&A)
all	Recognize and use appropriate units of measure. (M)	<ul style="list-style-type: none"> Measure and use units of measure appropriately and consistently. Makes conversions of measurements within measurement systems. 	<ul style="list-style-type: none"> Measure and use units of measure appropriately and consistently, making conversions of measurements within measurement systems when appropriate. (G&M)

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4	Develop an understanding of fractions and fraction equivalence. (N&O)	<ul style="list-style-type: none"> • Develop an understanding of fractions as parts of a whole, parts of a set, and points or distances on a number line. • Understand that the size of a fractional part is relative to the whole. • Use fractions to represent numbers that are equal to, less than, and greater than 1 (in both mixed and improper formats). • Use fractions to make measurements more precise than whole units. • Solve problems involving comparing and ordering fractions by using models, benchmark fractions, or common numerators or denominators. • Identify equivalent fractions using models, including the number line. • Explore basic probabilities of events, including events with a probability of 0 or 1. Use fractions to express the likelihood of these events. 	<ul style="list-style-type: none"> • Demonstrate conceptual understanding of fractions (proper, mixed number, and improper) as part to whole relationships, parts of a set, or points or distances on a number line. (N&O) • Use fractions to make precise, accurate measurements. (G&M) • Compare, order, and identify equivalent fractions (proper, mixed numbers, and improper) using models, benchmark fractions, or common numerators or denominators. (N&O) • Use fractions to express the probability of an event and to make predictions about probable outcomes given fractional probabilities. (DSP)
4	Develop an understanding of and fluency with whole number multiplication. (N&O), (A)	<ul style="list-style-type: none"> • Understand the meanings of multiplication and division of whole numbers through the use of representations (e.g. repeated addition, equal sized groups in an array, area models, and equal "jumps" on a number line for multiplication; successive subtraction, partitioning, and sharing for division). • Use properties of addition and multiplication (e.g. commutative, associative, and distributive properties) to multiply whole numbers and apply increasingly sophisticated strategies based on these properties to solve multiplication and division problems involving basic facts. • Relate multiplication and division as inverse operations by comparing a variety of solution strategies. • Analyze patterns and relationships involving multiplication and division. • Develop quick recall of the basic multiplication facts and related division facts. • Identify, describe, and extend numeric patterns involving all operations and nonnumeric growing or repeating patterns to develop an understanding of the use of a rule to describe a sequence of numbers or objects. • Develop understanding of multiples including multiples as rows in a multiplication table. • Apply understanding of models for multiplication (e.g. equal sized groups in an array, area models, and equal "jumps" on a number line for multiplication), place value, and properties of operations (in particular the commutative, associative, and distributive properties) as they develop, discuss, and use efficient, accurate, and generalizable methods to multiply multi-digit whole numbers. • Develop fluency with efficient procedures, including the standard algorithm, for multiplying multi-digit whole numbers, understand why the procedures work (on the basis of place value and properties of operations), and use them to solve problems. • Apply models and concepts of multiplication to larger numbers and to multiple factors being multiplied (e.g. multiplying three numbers as opposed to two). • Select appropriate methods and apply them appropriately to estimate products or calculate them mentally depending on the context and numbers involved. 	<ul style="list-style-type: none"> • Demonstrate conceptual understanding of multiplication as repeated addition, equal sized groups in an array, area models, or equal "jumps" on a number line. (N&O) • Demonstrate quick recall of multiplication and division facts with factors less than or equal to 12. (N&O) • Identify multiples of a number. (N&O) • Use and identify the use of the commutative, associative, and distributive properties in multiplying whole numbers. (N&O) • Accurately and fluently complete multi-digit multiplication problems (including numbers with up to 3 digits in each factor) with up to three factors. (N&O)

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4	Develop an understanding of decimals, including the connections between place value and decimals, between fractions and decimals, and the use of decimals in money. (N&O)	<ul style="list-style-type: none"> • Understand decimal notation as an extension of the base-ten number system of writing whole numbers that is useful for writing numbers between 0 and 1, 1 and 2, etc. • Extend understandings of place values and representing numbers up to millions and millionths. • Develop an understanding of the patterns involved in place value and an understanding that these patterns continue for numbers greater than one million and less than one millionth. • Round numbers to a given decimal place. • Read and write decimals that are greater than or less than 1, identify equivalent decimals, compare and order decimals, and estimate decimal and fraction amounts in problem solving. • Connect equivalent fractions and decimals by comparing models to symbols and locating equivalent symbols on the number line. • Extend the ability to recognize equivalent fractions through the study of decimals. • Convert terminating decimals to fractions. • Connect decimals notation to money and introduce the idea of operations with decimals using situations involving money. <i>[Note: Operations with decimals introduced through money but not tested here because this is an introduction only. This skill is mastered and tested as part of decimal operations in grade 5.]</i> • Use decimals to express basic probabilities of events, including events with a probability of 0 or 1. 	<ul style="list-style-type: none"> • Demonstrate conceptual understanding of decimals as part to whole relationships, parts of a set, or points or distances on a number line. (N&O) • Represent whole and decimal numbers from one millionth to one million. (N&O) • Demonstrate conceptual understanding of the place value patterns to numbers greater than one million and less than one millionth. (N&O) • Accurately and fluently round numbers to a given decimal place and use these estimates appropriately in given situations. (N&O) • Compare, order, and identify equivalent decimal numbers. (N&O) • Express terminating decimals as fractions (not necessarily in reduced form). (N&O) • Express monetary values in decimal notation and demonstrate conceptual understanding of cents as hundredths of a dollar. (N&O) • Use decimals to express the probabilities of events, including events with probabilities of 0 or 1. (DSP)

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4	Develop an understanding of and fluency with division of whole numbers. (N&O), (A)	<ul style="list-style-type: none"> • Develop understandings of strategies for multidigit division by using models that represent division as the inverse of multiplication, as partitioning, as successive subtraction, or as a side length of an area. • Apply understanding of models for division, place value, properties of operations, and the relationship between multiplication and division to develop, discuss, and use efficient, accurate, and generalizable procedures for finding quotients involving multi-digit dividends, divisors, or both. • Select appropriate methods and apply them appropriately to estimate quotients or calculate them mentally depending on the context and numbers involved. • Develop fluency with efficient procedures, including the standard algorithm, for dividing multi-digit whole numbers, understand why the procedures work (on the basis of place value and properties of operations), and use them to solve problems. • Consider the context in which the problem is situated to select the most useful form of the quotient for the solution (remainder, fraction, decimal) and interpret it appropriately. • Develop a understanding of the factors of a number and divisibility rules and reliably determine if one number is a factor of another number (including determining if a number is and even or odd number). • Determine if a number is prime or composite. • Connect division and fractions to see that a fraction a/b is one way to represent $a \div b$. • Use division to express fractions as decimals. • Use division to find the mean (average) of a data set. 	<ul style="list-style-type: none"> • Demonstrate conceptual understanding of multiplication and division as inverse operations. (N&O) • Demonstrate conceptual understanding of division as successive subtraction, partitioning, or area models. (N&O) • Accurately and fluently find quotients involving multi-digit dividends and divisors. (N&O) • Accurately and fluently represent quotients in division problems as remainders, fractions, and decimals. (N&O) • Determine the most useful form of the quotient given the context of the problem (remainder, fraction, decimal) and interpret in appropriately. (N&O) • Use divisibility rules to determine mentally if a number is divisible by 2, 3, 5, 9, or 10. (N&O) • Determine if a number is prime or composite and identify if a number is a factor of that number. (N&O) • Use division to express simple fractions as decimals. (N&O) • Find the mean (average) of a data set. (DSP)
4	Increase understanding and fluency with systems of measurement. (M)	<ul style="list-style-type: none"> • Understand that there are many different systems of measurement including the customary and metric systems. • Practice using both the customary and metric systems to measure units of length, capacity, weight/mass, time, and temperature. • Measure with appropriate units and level of accuracy. • Develop a sense of scale with common units in the customary and metric systems to estimate and choose appropriate units of length, capacity, weight/mass, time, and temperature. • Understand the connection between multiplication and division and unit conversions. • Understand the inverse relationship between the size of a unit and the number needed to measure an item (i.e. more smaller units are the same size as fewer large units). • Perform conversions on units within the same measurement system (using whole number situations, or using a calculator when units are not whole units) with the use of the conversion rates for less common units. • Add and subtract measured amounts (such as times, distances, etc.) to find quantities (such as the elapsed time or total distance), converting units when appropriate. 	<ul style="list-style-type: none"> • Accurately measure units of length, capacity, weight/mass, time, or temperature in both the customary and metric systems using appropriate units and level of accuracy. (G&M) • Demonstrate conceptual understanding of the size of measurement units in the customary and metric systems and use this to estimate the measurement and choose appropriate units for doing so. (G&M) • Demonstrate conceptual understanding of unit conversion as it relates to multiplication and division. (G&M) • Appropriately and consistently make conversions within measurement systems for units of length, capacity, weight/mass, or time (using whole number conversions or a calculator when units are not whole units) with the use of conversion rates for less common units. (G&M) • Accurately and fluently add and subtract measured amounts (such as times, distances, etc.) to find quantities (such as elapsed time or total distance), converting units when appropriate. (G&M)

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4	Describe and analyze properties of two-dimensional shapes and develop an understanding of perimeter and area and find the perimeters and areas of two-dimensional shapes. (M), (G)	<ul style="list-style-type: none"> • Describe parts of two-dimensional space (e.g. points, lines, rays, planes). • Identify sets of parallel and perpendicular lines. • Classify angles. • Estimate and measure angles. • Describe, analyze, compare, and classify two-dimensional shapes by their sides and angles and connect these attributes to the definitions of these shapes. • Construct two-dimensional shapes (including polygons and circles). (G&M) • Measure and identify patterns and rules about the sums of interior angles of polygons with a particular focus on triangles and quadrilaterals. • Investigate, describe, and reason about decomposing, combining, and transforming polygons to make other polygons. • Describe parts of two-dimensional shapes using appropriate terminology (e.g. base, height, diagonal, diameter, radius, chord). • Investigate congruence, similarity, and point and line symmetry in two-dimensional shapes and use these attributes in solving problems. • Explore transformations of shapes, including those that produce line and rotational symmetry, and design and analyze simple tilings and tessellations. • Recognize perimeter as an attribute of two-dimensional regions. • Find perimeter of polygons by finding the total number of same-sized units of length that surround a shape completely. • Understand that a line one unit long per side is the standard unit for measuring perimeter. • Recognize area as an attribute of two-dimensional regions. • Quantify area by finding the total number of same-sized units of area that cover a shape without gaps or overlaps. • Understand that a square one unit long per side is the standard unit for measuring area. • Connect area measurement to the area model for multiplication and use this connection to justify the formula for the area of a rectangle. • Select appropriate units, strategies (e.g. decomposing shapes), and tools for solving problems that involve estimating and measuring area. • Justify the formulas for the perimeters and areas of polygons by composing and decomposing polygons (e.g. a parallelogram is the same base and height as a rectangle formed by cutting and re-attaching a triangular end, therefore the formulas for their areas are the same; two triangles together make a parallelogram of the same base and height, etc). • Find the perimeters and areas of polygons (both regular and irregular). [Note: Finding the circumference and area of a circle is not a part of this unit; they are studied in grade 6.] • Study the relationship between perimeter and area in polygons (e.g. that the regular polygon has the largest area for the smallest perimeter). 	<ul style="list-style-type: none"> • Identify, describe, or draw points, rays, lines, and planes. (G&M) • Identify, describe, or draw parallel lines and perpendicular lines. (G&M) • Identify, describe, or draw acute, right, and obtuse angles. (G&M) • Estimate and measure angles. (G&M) • Identify, describe, measure, or classify two-dimensional shapes (including circles, polygons, types of quadrilaterals, and acute, obtuse, right, scalene, isosceles, and equilateral triangles) according to their attributes and definitions. (G&M) • Construct two-dimensional shapes (including polygons and circles). (G&M) • Describe parts of two-dimensional shapes using appropriate terminology (base, height, diagonal, diameter, radius, chord). (G&M) • Identify point and line symmetry in two-dimensional shapes and use the attributes when solving problems. (G&M) • Identify congruent and similar figures and identify reflections, translations, and rotations of those figures. (G&M) • Demonstrate conceptual understanding of perimeter including an understanding of the appropriate units used for perimeter measurement. (G&M) • Demonstrate conceptual understanding of area including an understanding of the appropriate units used for area measurement. (G&M) • Demonstrate conceptual understanding of the formulae for perimeter and area of polygons. (G&M) • Accurately and fluently find the perimeter of polygons (including rectangles, triangles, parallelograms, trapezoids, and irregular shapes made from these). (G&M) • Accurately and fluently find the area of polygons (including rectangles, triangles, parallelograms, trapezoids, and irregular shapes made from these). (G&M)

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5	Develop an understanding of and fluency with exponents and order of operations. (N&O), (A)	<ul style="list-style-type: none"> • Develop an understanding of whole number positive exponents as a special form of multiplication. • Develop fluency for calculating with exponents. • Use substitution property and the idea of equality/equivalence of two expressions when using order of operations to simplify expressions. • Identify perfect squares and find the square roots of perfect squares. • Estimate the square roots of non-perfect squares to the nearest whole number. Find the square roots of non-perfect squares with the use of a calculator. • Determine if a counting number greater than 1 is prime and finding the prime factorization if it is not. • Develop an understanding of the order of operations (PEMDAS) and use it consistently for all operations. 	<ul style="list-style-type: none"> • Accurately and fluently calculate expressions with whole number exponents. (N&O) • Demonstrate an understanding of equality through the proper use of the substitution property showing equivalence between two or more expressions. (N&O) • Determine the prime factorization of any composite number. (N&O) • Explain and consistently apply the basic order of operations (PEMDAS). (N&O)
5	Develop an understanding of and fluency with addition and subtraction of fractions and decimals. (N&O), (A)	<ul style="list-style-type: none"> • Apply understandings of decimal models, place value, and properties to add and subtract decimals. • Develop fluency for adding and subtracting decimals. • Add and subtract decimals to solve problems, including problems involving measurement. • Use understanding of fractions and the substitution property to rewrite fractions (including fractions with unlike denominators) in simplifying, ordering, addition, and subtraction problems as equivalent fractions with new (or like) denominators. • Compare, order, and find equivalent fractions and decimals. • Explore prime and composite numbers and discover concepts related to the addition and subtraction of fractions as they use factors and multiples including applications of common factors and common multiples. • Develop fluency for adding and subtracting fractions and writing answers in simplest form. • Make reasonable estimates of fraction and decimal sums and differences. • Add and subtract decimals and fractions to solve problems, including problems involving measurement. 	<ul style="list-style-type: none"> • Demonstrate conceptual understanding of place value when adding and subtracting decimals. (N&O) • Accurately and fluently add and subtract decimals. (N&O) • Demonstrate conceptual understanding of equality when rewriting fractions with new denominators or when simplifying fractions. (N&O) • Compare, order, and find equivalent fractions and decimals. • Accurately and fluently find common factors of pairs of numbers, including the greatest common factor (GCF) and demonstrate a conceptual understanding of how the GCF can be used to simplify fractions. (N&O) • Accurately and fluently find common multiples of pairs of numbers, including the least common multiple (LCM), and demonstrate a conceptual understanding of the LCM as the lowest common denominator of two or more fractions. (N&O) • Demonstrate conceptual understanding of addition and subtraction of fractions including fractions with unlike denominators. (N&O) • Accurately and fluently simplify fractions into their lowest terms. (N&O) • Accurately and fluently add and subtract fractions including fractions with unlike denominators. (N&O)

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5	Describe three-dimensional shapes and analyze their properties, including volume and surface area. (G), (M), (A)	<ul style="list-style-type: none"> • Relate two-dimensional shapes to three-dimensional shapes. • Analyze properties of polyhedral solids, describing them by the number of faces, edges, and vertices as well as the types of faces. • Construct three-dimensional shapes (including prisms, cylinders, pyramids, cones, and spheres). • Recognize surface area as an attribute of three-dimensional space. • Quantify surface area by finding the total number of same-sized units of area that cover a shape without gaps or overlaps. • Understand that a square one unit long per side is the standard unit for measuring surface area. • Recognize volume as an attribute of three-dimensional space. • Quantify volume by finding the total number of same-sized units of volume that fill a shape without gaps or overlaps. • Understand that a cube one unit long per side is the standard unit for measuring volume. • Select appropriate units, strategies, and tools for solving problems that involve estimating and measuring surface area and volume. • Find and justify relationships among the formulas for the surface areas and volumes of prisms. • Find surface areas and volumes of prisms. [Note: Finding the volumes and surface areas of cylinders is not a part of this unit as circles are not studied until grade 6.] • Explore relationships between surface area and volume (i.e. the smallest surface area for the biggest volume is a cube). • Measure necessary attributes of shapes to use area and volume formulas to solve problems. 	<ul style="list-style-type: none"> • Identify, describe, measure, or classify three-dimensional shapes according to their attributes and definitions. (G&M) • Describe parts of three-dimensional shapes using appropriate terminology (face, edge, vertex). (G&M) • Construct three-dimensional shapes (including prisms, cylinders, pyramids, cones, and spheres). (G&M) • Demonstrate conceptual understanding of surface area including an understanding of the appropriate unit used for surface area measurement. (G&M) • Demonstrate conceptual understanding of volume including an understanding of the appropriate units used for volume measurement. (G&M) • Demonstrate conceptual understanding of the formulas for surface areas and volumes of prisms. (G&M) • Accurately and fluently find the volume and surface area of prisms. (G&M)
5	Develop an understanding and fluency with multiplication and division of decimals. (N&O)	<ul style="list-style-type: none"> • Give decimal solutions to whole number division problems. • Use whole number division to convert any fraction to a decimal, including infinite decimals. Use the relationship between fractions and decimals, as well as the relationship between finite decimals and whole numbers (i.e. a finite decimal multiplied by an appropriate power of ten is a whole number) to understand and explain the procedures for multiplying and dividing decimals. • Use common procedures to multiply and divide decimals efficiently and accurately. • Multiply and divide decimals to solve problems, including multistep problems and problems involving measurement. 	<ul style="list-style-type: none"> • Use division to express any fraction as a decimal, including infinite decimals. (N&O) • Demonstrate conceptual understanding of place value when multiplying and dividing decimals. (N&O) • Accurately and fluently multiply decimals. (N&O) • Accurately and fluently divide decimals including problems with decimal divisors, dividends, or both. (N&O)
5	Connect ratio and rate to multiplication and division. (N&O)	<ul style="list-style-type: none"> • Distinguish multiplicative comparisons from additive comparisons. • Define ratios and determine the various types of ratios (e.g. part to part or part to whole). • Use simple reasoning about multiplication and division to solve ratio and rate problems. • Recognize ratio tables as rows in the multiplication table and view equivalent ratios and rates as deriving from and extending pairs of rows in the multiplication table. • Relate ratio tables and rates to equivalent fractions. • Simplify ratios and find unit rates. • Analyze drawings that show the relative sizes of shapes and quantities (such as scale drawings) to extend whole number multiplication and division to ratios and rates. 	<ul style="list-style-type: none"> • Demonstrate conceptual understanding of ratios as part to whole or part to part relationships written as a:b, a to b, or a/b. (N&O) • Accurately and fluently simplify ratios and find unit rates. (N&O) • Demonstrate conceptual understanding of scale as used in drawings or models. (G&M)

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		<ul style="list-style-type: none"> ● Use ratios and rates to convert units in measurement (within and across measurement systems). ● Solve a wide variety of problems using ratios and rates. <p><i>[Note: Ratio and rate should be studied as extensions of multiplication and division and equivalent fractions only. Proportion writing and solving should not be studied here; they are studied in grade 7.]</i></p>	<ul style="list-style-type: none"> ● Accurately and fluently use ratios or rates to convert units within and across measurement systems. (N&O) ● Accurately and fluently use ratios or rates to solve problems. (N&O)

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5	Develop an understanding of percents, including the connections between percents and decimals, and percents and fractions. (N&O)	<ul style="list-style-type: none"> Develop an understanding of percents as parts of a whole of size 100. Use understanding of equivalent fractions, and place value as it connects to decimal notation to determine the percent of an amount or non unit-sized whole. Develop fluency with estimations and computations involving benchmark percents (e.g. 1%, 5%, 10%, 25%, 33 1/3 %, 50%, 66 2/3 %, 75%, 100%, 200%). Use understandings of fractions (as parts of a whole) and place value as it connects to decimal notation, to convert percents into fractions, percents into decimals, fractions into percents, and decimals into percents; and to compare and order fractions, decimals, and percents. 	<ul style="list-style-type: none"> Demonstrate conceptual understanding of percents as parts of a whole of size 100. (N&O) Accurately and fluently determine the percent of an amount (e.g. 72% of 45). (N&O) Accurately and fluently perform estimates and computations involving benchmark percents (i.e. 1%, 5%, 10%, 25%, 33 1/3% 50%, 66 2/3%, 75%, 100%, 200%). (N&O) Accurately and fluently convert percents to decimals and decimals to percents. (N&O) Accurate and fluently convert percents to fractions and fractions to percents. (N&O) Compare and order fractions, decimals, and percents. (N&O)
5	Extend understandings of data and data analysis (DA&P)	<ul style="list-style-type: none"> Collect data to answer various questions and discuss any limitations to the reliability of such data. Define and calculate measures of center (e.g. mean, median, and mode) and range of a data set. Distinguish between numerical and categorical data and explain why some measures of center are only valid for numerical data. Analyze patterns, trends, or distributions using measures of center and range (e.g. if two data sets have the same median but different means, what does that tell you about the data?). Construct and analyze frequency tables, bar graphs (including double- and triple-bar graphs), picture graphs, circle graphs, line plots, stem-and-leaf plots, histograms, first-quadrant coordinate graphs, and line graphs and use them to solve problems. Determine which type of graph would be most effective for a given situation. Determine if a graph is misleading and consistently create graphs that are not misleading. 	<ul style="list-style-type: none"> Collect data and examine limitations to the reliability of collected data. (DSP) Accurately and fluently calculate measures of center (mean, median, and mode) and range of a data set. (DSP) Distinguish between numerical and categorical data and the analysis that can be performed on each type (e.g. there is no mean for categorical data). (DSP) Analyze patterns, trends, or distributions using measures of center and range (e.g. if two data sets have the same median but different means, what does that tell you about the data?). (DSP) Construct and analyze charts, tables, and graphs including frequency tables, single-, double-, and triple- bar graphs, picture graphs, circle graphs, line plots, stem-and-leaf plots, histograms, first-quadrant coordinate graphs, or first-quadrant line graphs that are not misleading and use them to solve problems. (DSP) Make reasonable predictions from graphs, tables, and charts and use them to solve problems. (DSP) Choose and construct appropriate graphs to represent given data. (DSP) Determine if and, if so, how a graph is misleading. (DSP)
5	Develop a basic understanding of negative integers. (N&O)	<ul style="list-style-type: none"> Extend the number line to include negative numbers and explore contexts that can be described with negative numbers. Compare and order positive and negative rational numbers. Use ordered pairs in four quadrants on coordinate grids. [Note: Operations with integers are not a part of this unit; they are studied in grade 6.] 	<ul style="list-style-type: none"> Demonstrate understanding of negative numbers in real-world situations (such a temperatures below zero or money owed). (N&O) Compare and order positive and negative rational numbers. (N&O) Plot ordered pairs in four quadrants on the coordinate plane. (G&M)
5	Develop a basic understanding of mathematical expressions and equations. (A)	<ul style="list-style-type: none"> Use symbols and/or variables to express missing or unknown quantities in problems. Use patterns, models, and relationships as contexts for writing and solving simple equations and inequalities using reasoning skills in problem situations. Determine which values of a replacement set make a multi-step equation true. Create coordinate graphs of simple equations. Construct and analyze line graphs. Solve simple equations and inequalities using reasoning skills in problem situations. 	<ul style="list-style-type: none"> Demonstrate conceptual understanding of algebraic expressions and equalities by using letters or symbols as variables to represent unknown quantities. (F&A) Identify, represent, analyze, and extend to specific cases patterns and functions and write a rule in words or symbols. (F&A) Determine which values of a replacement set make a multi-step equation a true statement. (F&A) Construct and analyze coordinate graphs of simple equations. (F&A) Construct and analyze coordinate line graphs of data sets. (DSP) Solve simple equations and inequalities using reasoning skills in problem situations. (F&A)

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6	Write, interpret, and use mathematical expressions and equations. (A)	<ul style="list-style-type: none"> • Understand that variables represent numbers whose exact values are not yet specified, and use variables appropriately. • Know that the solutions of an equation are the values of the variables that make the equation true. • Understand that expressions in different forms can be equivalent and can rewrite an expression to represent a quantity in a different way (e.g. to make more compact or to feature different information). • Use commutative, associative, and distributive properties to show that expressions are equivalent, and illustrate properties of operations by showing that two expressions are equivalent in a given context (e.g. there are two ways to find the area of a rectangle whose dimensions are $x+3$ and 5). • Construct and analyze tables and use equations to describe simple one-step relationships shown in a table. • Solve simple one-step equations using number sense, properties of operations, and the idea of maintaining equality on both sides of an equation. • Write mathematical expressions and equations that correspond to given situations, evaluate expressions, and use equations and formulas to solve problems. 	<ul style="list-style-type: none"> • Demonstrate conceptual understanding that the solution to an equation or inequality are the values of the variable that make the equation true. (F&A) • Use associative, commutative, and distributive properties to write equivalent expressions. (F&A) • Solve simple one-step equations algebraically using properties of operations and the idea of maintaining equality on both sides of an equation. (F&A) • Write, analyze, and explain simple (one-step) mathematical expressions or formulas that correspond to given situations, patterns, tables, or sequences. (F&A)
6	Develop an understanding and fluency with multiplication and division of fractions. (N&O)	<ul style="list-style-type: none"> • Use the meanings of fractions, multiplication and division, and the inverse relationship between multiplication and division to make sense of procedures for multiplying and dividing fractions and explain why they work. • Give mixed number solutions to whole number division problems. • Use common procedures to multiply and divide fractions efficiently and accurately. • Multiply and divide fractions to solve problems, including multistep problems and problems involving measurement. • Increase understanding of order of operations through use of the fraction bar as a grouping symbol. 	<ul style="list-style-type: none"> • Demonstrate conceptual understanding of multiplication of fractions. (N&O) • Demonstrate conceptual understanding of division of fractions. (N&O) • Accurately and fluently multiply fractions. (N&O) • Accurately and fluently divide fractions. (N&O) • Accurately and consistently use order of operations to simplify expressions including those involving a fraction bar used as a grouping symbol. (N&O)

Grade	NCTM Focal Point / Local Topic	Curriculum (what we teach)	Benchmarks (what we test)
6	Develop an understanding of and use formulas to determine circumferences and areas of circles and surface areas and volumes of three-dimensional shapes. (M), (G), (A)	<ul style="list-style-type: none"> ● See that the formula for the circumference of a circle is plausible by measuring the circumference and diameter of circles and dividing to find an approximate of pi. ● See that the formula for the area of a circle is plausible by decomposing a circle into a number of wedges and re-arranging them into a shape that approximates a parallelogram. ● Find the circumference and area of circles. ● Find the perimeters and area of irregular two-dimensional shapes by decomposing shapes (especially those that can include parts of circles). ● Find surface areas and volumes by decomposing two- and three-dimensional shapes into smaller, component shapes, and develop and justify formulas for the surface areas and volumes of prisms and cylinders. ● Create nets for three-dimensional solids and use these nets to find surface area. ● Perform experiments to see that the formulas for surface area and volume of pyramids, cones, and spheres are plausible. ● Apply formulas for surface area and volume in problem solving to determine the surface areas and volumes of prisms, cylinders, pyramids, cones, and spheres. ● Select appropriate two- and three- dimensional shapes to model real world situations and solve a variety of problems (including multistep problems) involving surface areas, areas and circumferences of circles, and volumes of prisms and cylinders. 	<ul style="list-style-type: none"> ● Demonstrate conceptual understanding of the formulae for circumference and area of a circle, including proper units. (G&M) ● Accurately and fluently find the circumference and area of circles. (G&M) ● Accurately and fluently find the perimeter and area of irregular shapes by decomposition (including shapes made from rectangles, triangles, parallelograms, trapezoids, and/or circles). (G&M) ● Demonstrate conceptual understanding of the formulae for surface area and volume of three-dimensional shapes. (G&M) ● Appropriately and consistently determine the surface areas and volumes of three-dimensional shapes (including prisms, cylinders, pyramids, cones, and spheres), using formulas when appropriate. (G&M)
6	Develop an understanding of operations on all rational numbers (including negative integers). (N&O)	<ul style="list-style-type: none"> ● Apply properties of arithmetic and consider negative numbers in everyday contexts (e.g. situations of owing money or measuring elevations above sea level) to explain why the rules for adding, subtracting, multiplying, and dividing with negative numbers make sense. ● Extend understanding of operations, together with their properties, to all rational numbers, including negative integers. ● Add, subtract, multiply, and divide all rational numbers including negative integers, other negative rational numbers, and problems with a mix of types of positive and negative whole numbers, fractions, and decimals. (N&O) ● Find integer square roots and estimate square roots to the nearest integer. ● Develop an understanding of the absolute value of a number as the distance that number is from zero on the number line. ● Introduce opposites (or additive inverses). ● Use order of operations consistently and appropriately including grouping symbols such as brackets, fraction bars, square root signs, and absolute value signs. 	<ul style="list-style-type: none"> ● Demonstrate conceptual understanding of negative integers and operations involving negative rational numbers. (N&O) ● Accurately and fluently add and subtract all rational numbers, including negative rational numbers. (N&O) ● Accurately and fluently multiply and divide all rational numbers, including negative rational numbers. (N&O) ● Demonstrate conceptual understanding of the absolute value as a measure of the distance (number of units) from zero. (N&O) ● Accurately and consistently find the absolute value of a number. (N&O) ● Accurately and consistently use order of operations to simplify expressions, including those with complex grouping symbols such as brackets, fraction bars, square root signs, and absolute value symbols. (N&O)

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6	Develop an understanding of and facility with solving linear equations. (N&O), (A)	<ul style="list-style-type: none"> • Translate among verbal, tabular, graphical, and algebraic representations of situations and describe how rate of change (slope), initial value (y-intercept), and the solutions to an equation appear in each representation. • Examine various relationships and determine which relationships are linear from tables, graphs, and equations. • Use arithmetic of rational numbers to formulate and solve linear equations in one variable and use these equations to solve problems. • Make strategic choices of procedures to solve linear equations in one variable and implement them efficiently, understanding that when they use properties of equality, the distributive property, and substitution to express an equation in a new way, solutions they obtain for the new equation also solve the original equation. • Identify additive and multiplicative inverses and connect them to efficient procedures for solving equations algebraically. • Develop fluency solving linear equations in one variable including equations where like terms must be combined, the distributive property applied, and with variables on both sides of the equal sign. • Convert repeating decimals to fractions. • Connect dividing fractions with equations of the form $ax=b$ where a and b are fractions. • Develop formulas from sequences, including rules from patterns of figures, sequences, or stacks of objects. 	<ul style="list-style-type: none"> • Make, analyze, explain, and translate among verbal, tabular, graphical, and algebraic representations of linear or simple exponential situations. (F&A) • Describe how rate of change (i.e. slope), initial value (i.e. y-intercept), and the solution of the equation appear in verbal, tabular, graphic, and algebraic representations of linear or simple exponential situations. (F&A) • Demonstrate conceptual understanding of linear relationships and determine if relationships are linear. (F&A) • Accurately and fluently solve linear equations algebraically, including those involving all rational numbers (both positive and negative, in whole number, fraction, or decimal form). Convert verbal sentences into algebraic equations and solve. (F&A) • Accurately and fluently solve linear equations algebraically, including those where like terms must be combined, where the distributive property applied, and with variables on both sides of the equal sign. Convert verbal sentences into algebraic equations and solve. (F&A)
6	Analyze and summarize data sets (DA&P), (N&O), (A)	<ul style="list-style-type: none"> • Use measures of center and measures of variation including mean, median, mode, quartiles and range to summarize and compare data sets and organize and display data to pose and answer questions. • See numerical data as an aggregate which can be described using measures of center and measures of variation. • Compare information provided by the mean and median and investigate the different effects that changes in data values have on these measures of center, including the effect of outliers in a data set. • Understand that a measure of center alone does not thoroughly describe a data set because very different data sets can share the same measure of center. • Select and justify an appropriate measure of center for a given purpose. • Make and interpret box and whisker plots to display data with aggregate information (e. g. quartiles). • Make scatter plots to display bivariate data and informally estimate lines of best fit to make and test conjectures. • Determine which type of graph would be most effective for a given situation (including all types of graphs used in elementary school as well, see grade 5). • Examine sampling methods and their various strengths and weaknesses. • Make reasonable predictions from graphs, tables, and charts and use them to solve problems. • Determine if and, if so, how a graph is misleading. 	<ul style="list-style-type: none"> • Accurately and fluently calculate summary statistics including measures of center, quartiles, and range of a data set and analyze patterns, trends, or distributions using this information. (DSP) • Analyze and construct appropriate charts, tables, and graphs of a data set including frequency tables, single-, double-, and triple- bar graphs, picture graphs, circle graphs, line plots, stem-and-leaf plots, coordinate graphs using all four quadrants, line graphs, box-and-whisker plots, and scatter plots that are not misleading and use the to solve problems. (DSP) • Determine which type of graph would be most effective for a given situation. (DSP) • Make reasonable predictions from graphs, tables, and charts and use them to solve problems. (DSP) • Determine if and, if so, how a graph is misleading. (DSP)
6	Extend understanding of exponents to scientific notation. (N&O)	<ul style="list-style-type: none"> • Use exponents and scientific notation to describe very large and very small numbers. 	<ul style="list-style-type: none"> • Accurately and fluently convert numbers back and forth between standard and scientific notation. (N&O)

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7	Develop an understanding of proportionality, including similarity. (N&O), (A), (G)	<ul style="list-style-type: none"> • Extend understanding of ratios to develop an understanding of proportionality. • Solve single and multistep proportion problems in various contexts. • Use proportionality in various contexts such as converting units; rates of motion; circumference, diameter, and radius of a circle; the area of a sector of a circle; and scale drawings. • Use proportions or rates to make estimates relating to a population on the basis of a sample, or to estimate growth. • Understand theoretical probability when events are equally likely and use theoretical probability and proportions to make approximate predictions. • Connect proportions and percents. Solve percent problems where the percent, the whole, or the part are unknown. • Use ratio and proportionality to solve a variety of percent problems including problems involving discounts, interest, taxes, tips, and percent increase or decrease. (N&O), (A) • Apply percentages to make and interpret histograms and circle graphs. • Solve problems involving similar objects (including figures) by using scale factors that relate corresponding lengths of the objects or by using the fact that relationships of lengths within an object are preserved in similar objects. • Investigate similarity including the scale factor describes how the lengths are related, the square of the scale factor describes how areas are related, and the cube of the scale factor describes how volumes are related. • Graph proportional relationships and identify that the line must pass through the origin and that the constant of proportionality (unit rate) as the slope of the related line. • Distinguish proportional relationships ($y/x=k$ or $y=kx$) from other relationships, including inverse proportionality ($xy=k$ or $y=k/x$). 	<ul style="list-style-type: none"> • Use proportional reasoning to solve word problems, including those involving similar objects, using units of measure appropriately. (N&O) • Use proportions and theoretical probabilities to make approximate predictions. (DSP) • Accurately and fluently solve percent problems, including problems involving discounts, interest, taxes, tips, or percent increase or decrease. (N&O) • Solve problems involving similar objects (including figures). (G&M) • Graph proportional relationships and identify that the line passes through the origin and that the constant of proportionality (or unit rate or scale factor) is the slope of the related line. (F&A) • Distinguish proportional relationships from other relationships, including inverse relationships. (F&A)
7	Develop an understanding of probability and its applications. (DA&P)	<ul style="list-style-type: none"> • Predict the probability of various outcomes of simple experiments and test those predictions. • Understand that the measure of the likelihood of an event can be represented by a number from 0 to 1 and can be written as a fraction, a decimal, or a percent • Understand the difference between theoretical and experimental probability. • Understand and use appropriate terminology to describe complementary and mutually exclusive events. • Understand theoretical probability when events are equally likely and use theoretical probability and proportions to make approximate predictions. • Understand theoretical probability when events are not equally likely and use theoretical probability to make approximate predictions. • Compute probabilities for simple compound events, using such methods as organized lists, tree diagrams, and area models. • Understand the difference between combinations and permutations and how to apply each to basic situations. • Develop methods for efficiently calculating the number of combinations and permutations of objects, including justification for the traditional algorithms. 	<ul style="list-style-type: none"> • Predict the probability of the outcome of simple experiments and test those predictions. (DSP) • Understand, interpret, and write the measure of the likelihood of an event as a fraction, decimal, or percent. (DSP) • Demonstrate understanding of theoretical versus experimental probabilities. (DSP) • Use proportions and theoretical probabilities to make approximate predictions. (DSP) • Compute probabilities for simple compound events. (DSP) • Appropriately apply combinations and permutations to problem situations to solve basic problems. (DSP)

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7	Analyze and represent linear functions and solve linear equations and inequalities, and systems of linear equations and inequalities. (A)	<ul style="list-style-type: none"> • Recognize a proportion ($y=kx$) as a special case of a linear equation of the form $y=mx+b$ and understand that the constant of proportionality (k) is the slope of the line and the resulting graph is a line through the origin. • Understand that the slope (m) of a line is a constant rate of change so if the input, or x-coordinate, changes by a specific amount, a, the output, or y-coordinate, changes by the amount ma. • Explore the constant slope of a line in a coordinate plane and understand how slope triangles are triangles with a "rise" of the change in the y coordinates and a "run" of the change in the x coordinate and that every slope triangle of a linear relationship is similar. • Use and move between various forms of linear equations including slope-intercept, point-slope, and standard forms. • Define and explore functions. Evaluate functions, their different representations, and find their domains and ranges. Determine whether situations represent functions and if those functions are linear. • Translate among and develop fluency with verbal, tabular, graphical, and algebraic representations of functions (recognizing that tabular and graphical representations are usually only partial representations) and describe how aspects of a function such as slope, y-intercept, x-intercept, domain, range, and the solutions to the equation appear in each representation. • Investigate parallel and perpendicular lines and their equations for similarities, differences, and patterns. • Investigate horizontal and vertical lines and their equations for similarities, differences, and patterns. • Examine functions, including non-linear functions, and compare domains and ranges, rates of change, arithmetic sequences, and functions as input-output tables. • Extend understandings of solving linear equations through investigations of linear inequalities. • Develop fluency with efficient procedures for solving and graphing linear inequalities. • Solve systems of two linear equations in two variables and relate the systems to pairs of lines that intersect, are parallel, or are the same line in a plane and therefore have one, no, or infinitely many solutions. • Develop fluency with efficient procedures for solving systems of linear equations including the graphic, substitution, and elimination methods. • Use graphing to illustrate the solutions to systems of linear inequalities. • Investigate absolute value and connect absolute value as distance from a given point. • Develop fluency with efficient procedures for solving equations and inequalities involving absolute value. • Use linear equations and inequalities, systems of linear equations and inequalities, linear functions, an understanding of slope of a line, and an understanding of absolute value as distance to analyze situations and solve problems. 	<ul style="list-style-type: none"> • Graph linear equations using the slope - y intercept and table methods. Explain the significance of a positive, negative, zero, and undefined slope. Use technology when appropriate. (F&A) • Use and move between various forms of linear equations including slope-intercept, point-slope, and standard forms. (F&A) • Recognize and evaluate relations and functions, both linear and non-linear. Express relations as order pairs, in table format, in graphs, and through mapping. Identify and recognize the domain and range within a relation. (F&A) • Describe how slope, x-intercept, y-intercept, domain, range, and the solution of the equation appear in verbal, tabular, graphic, and algebraic representations of linear or simple exponential situations. (F&A) • Solve and graph simple and compound linear inequalities. (e.g. $-3 < x - 5 < 2$; $2 < x < 7$) (F&A) • Accurately and fluently solve systems of equations using graphing, elimination and substitution methods. Recognize how single solution, infinite solutions, and no solution sets appear in various representations (i.e. graph, equation) and what those solutions mean in the given situation. Use technology when appropriate. (F&A) • Demonstrate an understanding of absolute value equations and solve equations and inequalities involving absolute value. (F&A) • Solve everyday problems that can be modeled using linear equations and/or systems of linear equations including (but not limited to) uniform motion, mixture, and work problems using units of measure appropriately. (F&A)

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8	Describe and analyze two- and three-dimensional space and figures by using distance and angle. (G), (M)	<ul style="list-style-type: none"> • Examine two- and three-dimensional shapes and their characteristics, determine and apply definitions of shapes to name (with the most precise name and with less precise but also valid names), and classify various polygons and polyhedra. • Find relationships among angles (adjacent, vertical, straight) created by two or three intersecting lines. • Prove that particular configurations of lines give rise to similar triangles because of the congruent angles created when a transversal cuts parallel lines. • Apply reasoning about similar triangles to solve a variety of problems including those that ask them to find heights and distances. • Use facts about angles that are created when a transversal cuts parallel lines to explain why the sum of measures in a triangle is 180 degrees. • Measure and identify patterns and find a formula for the sums of interior angles and exterior angles of polygons, and the measures of interior and exterior angles of regular polygons. • Use facts about sums of interior and exterior angles of polygons to find unknown measures of angles. • Use a straight edge and compass to draw perpendicular and parallel lines, bisect angles, find midpoints, and construct shapes. 	<ul style="list-style-type: none"> • Name and classify polygons, including special types of triangles and quadrilaterals, and polyhedra according to their definitions. • Identify and use relationships among angles created by two and three intersecting lines (e.g. segment and angle addition, vertical angles are congruent). (G&M) • Demonstrate conceptual understanding of the properties and relationships involving parallel and perpendicular lines through recognizing and solving problems involving special pairs of angles including congruent angles, complementary and supplementary angles, vertical angles, corresponding angles, alternate interior angles, and consecutive interior angles. (G&M) • Apply concepts of congruence and similarity to triangles to find missing parts of geometric figures and provide logical justification (although NOT formal proofs or with the use of formal postulates). (G&M) • Use facts about sums of interior and exterior angles of polygons to find unknown measures of angles. (G&M) • Use a straight edge and compass to draw perpendicular and parallel lines, bisect angles, find midpoints, and construct shapes. (G&M)
8	Develop understanding and efficient use of radicals (square roots) and the Pythagorean Theorem. (N&O), (A), (G)	<ul style="list-style-type: none"> • Explore radicals (square roots) and relate them to the side length of a square with a given area. • Explore and apply operations on radicals, including simplifying radicals, and connect those operations to a geometric representation. • Develop fluency with efficient procedures for calculating, simplifying, and using radicals in other expressions and equations. • Explain why the Pythagorean Theorem is valid by using a variety of methods. • Apply the Pythagorean Theorem to find missing side lengths of right triangles. • Apply the Pythagorean Theorem to find distances between points on the Cartesian coordinate plane and to measure lengths and analyze polygons and polyhedra, including reflections, translations, and rotations of polygons. • Use radicals when applying the Pythagorean Theorem. 	<ul style="list-style-type: none"> • Demonstrate conceptual understanding of and fluency with simplifying radicals. (N&O) • Perform basic operations on radicals and solve simple radical equations. (N&O) • Apply the Pythagorean Theorem to solve problems, including the distance between two points on the Cartesian plane. (G&M)

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8	Explore, analyze, and use algebraic fractions, and polynomial and exponential functions. (A)	<ul style="list-style-type: none"> • Explore exponents including negative and fractional exponents on rational numbers and variables and become fluent in their usage. • Simplify expressions including exponents and operations on monomials including exponents. • Connect simplifying expressions with exponents to operations with numbers expressed in scientific notation and accurately and fluently perform calculations using scientific notation. • Explore polynomials including their relationship to exponential functions. • Explore and become fluent in operations involving polynomials (addition, subtraction, and multiplication of polynomials; division of polynomials by monomials only). • Relate factoring polynomials to the factoring of whole numbers, specifically the prime factorization. • Connect division of polynomials to simplifying algebraic fractions. • Fluently and efficiently factor polynomials and use this concept to solve quadratic equations (with real roots) and simplify algebraic fractions. • Solve quadratic equations using graphic and algebraic methods. • Graph functions (incl. quadratic and exponential functions) and explore how changes in the graph are represented in the equations for those functions (e.g. stretching, translating, and shrinking). • Explore and consistently apply excluded values (restrictions on variables) when using algebraic fractions or dividing polynomials and connect this to dividing by zero. • Apply algorithms for operations with fractions to algebraic fractions. • Use algebraic fractions and exponential functions to analyze situations and solve problems. 	<ul style="list-style-type: none"> • Demonstrate conceptual understanding of and fluency with exponents, including negative and fractional exponents, on rational numbers, variables, and monomials. (N&O) • Accurately perform operations on numbers expressed in scientific notation, giving answers in proper scientific notation format. (N&O) • Accurately and fluently add, subtract, and multiply polynomials, divide polynomials by monomials, and compute simple powers of polynomials. Use these procedures to simplify equations and expressions. (F&A) • Demonstrate conceptual understanding of and fluency with factoring algebraic expressions and equations and use this procedure to solve quadratic equations (with real roots) and to simplify algebraic fractions. Understand the concept of excluded values (e.g. $(x+8) / (x^2+11x+24) = 1 / (x+3)$ where x cannot equal -3). (F&A) • Solve quadratic equations using graphic and algebraic methods. • Simplify expressions and solve equations containing algebraic fractions. (F&A) • Solve everyday problems that can be modeled with quadratic equations including area and velocity. Use technology where appropriate. (F&A)
8	Examine sets and subsets of numbers to apply field properties.	<ul style="list-style-type: none"> • Define and identify common sets of numbers (e.g. the natural numbers, rational numbers, irrational numbers, real numbers). • Examine how field properties (e.g. closure, commutative, associative, distributive, identity, etc.) do or do not hold over given sets of numbers. • Examine how field properties (e.g. closure, commutative, associative, distributive, identity, etc.) do or do not hold over given sets of numbers when those properties are defined in non-traditional ways (e.g. if $a \Delta b = a+b-1$, is Δ a commutative operation?). 	<ul style="list-style-type: none"> • Demonstrate conceptual understanding of field properties as they apply to subsets of the real numbers. (N&O) • Demonstrate conceptual understanding of field properties as they apply to subsets of the real numbers when operations are defined in non-traditional ways. (N&O)
8	Develop a basic understanding of formal logic and algebraic proof. (R&P)	<ul style="list-style-type: none"> • Describe properties and known theorems as "if ..then..." statements. • Explore proof as a method of defining assumptions and deriving conclusions based on those assumptions. • Identify the "if" in "if ..then..." statements as the given (or assumed) information and the "then" as what is to be proved. • Explore converses of statements and determine that the converse of a true statement may or may not be also true. • Explore the words "and" versus "or" and their specific meanings as they connect to sets and set theory. • Explore the use of counterexamples to disprove a conjecture. • Apply deductive reasoning to prove or disprove statements. 	<ul style="list-style-type: none"> • Demonstrates conceptual understanding of proof and determine if, and if so what, a series of statements proves and the conditions thereupon. (PRP) • Accurately applies supplied theorems to given situations (e.g. The triangle angle sum property states that the sum of the angles in a triangle add to 180 degrees. From this, what can you determine about the angles in the following picture? What can you NOT determine?). (PRP)

Grade	NCTM Focal Point / Local Topic	Curriculum (what we teach)	Benchmarks (what we test)
NCTM Process Standards: PS: Problem Solving R&P: Reasoning & Proof COM: Communication CON: Connections REP: Representations			
NCTM Content Standards: N&O: Numbers & Operations A: Algebra G: Geometry M: Measurement DA&P: Data Analysis & Probability			
NH Frameworks Process Strands: PRP: Problem Solving, Reasoning, and Proof CCR: Communication, Connections, and Representations			
NH Frameworks Content Strands: N&O: Numbers & Operations G&M: Geometry and Measurement F&A: Functions and Algebra DSP: Data, Statistics, and			
Materials Abbreviations:			
CMP Acc the Neg: Lappan, Glenda, James T. Fey, William M. Fitzgerald, Susan N. Friel, and Elizabeth Difanis Phillips. (Connected Mathematics.) <u>Accentuate the Negative: Integers.</u> Needham, MA: Prentice Hall, 2004.			
CMP B&P 1: Lappan, Glenda, James T. Fey, William M. Fitzgerald, Susan N. Friel, and Elizabeth Difanis Phillips. (Connected Mathematics 2.) <u>Bits and Pieces I: Understanding Fractions, Decimals, and Percents.</u> Boston, MA: Pearson Prentice Hall, 2006.			
CMP B&P 2: Lappan, Glenda, James T. Fey, William M. Fitzgerald, Susan N. Friel, and Elizabeth Difanis Phillips. (Connected Mathematics 2.) <u>Bits and Pieces II: Using Fraction Operations.</u> Boston, MA: Pearson Prentice Hall, 2006.			
CMP B&P 3: Lappan, Glenda, James T. Fey, William M. Fitzgerald, Susan N. Friel, and Elizabeth Difanis Phillips. (Connected Mathematics 2.) <u>Bits and Pieces III: Computing with Decimals and Percents.</u> Boston, MA: Pearson Prentice Hall, 2006.			
CMP Comp & Scal: Lappan, Glenda, James T. Fey, William M. Fitzgerald, Susan N. Friel, and Elizabeth Difanis Phillips. (Connected Mathematics.) <u>Comparing and Scaling: Ratio, Proportion, and Percent.</u> Glenview, IL: Prentice Hall, 2002.			
CMP Cov & Surr: Lappan, Glenda, James T. Fey, William M. Fitzgerald, Susan N. Friel, and Elizabeth Difanis Phillips. (Connected Mathematics.) <u>Covering and Surrounding: Two-Dimensional Measurement.</u> Glenview, IL: Prentice Hall, 2002.			
CMP Data About: Lappan, Glenda, James T. Fey, William M. Fitzgerald, Susan N. Friel, and Elizabeth Difanis Phillips. (Connected Mathematics.) <u>Data About Us: Statistics.</u> Glenview, IL: Prentice Hall, 2002.			
CMP Data Around: Lappan, Glenda, James T. Fey, William M. Fitzgerald, Susan N. Friel, and Elizabeth Difanis Phillips. (Connected Mathematics.) <u>Data Around Us: Number Sense.</u> Glenview, IL: Prentice Hall, 2002.			
CMP F&W: Lappan, Glenda, James T. Fey, William M. Fitzgerald, Susan N. Friel, and Elizabeth Difanis Phillips. (Connected Mathematics.) <u>Filling and Wrapping: Three-Dimensional Measurement.</u> Glenview, IL: Prentice Hall, 2002.			
CMP LFP: Lappan, Glenda, James T. Fey, William M. Fitzgerald, Susan N. Friel, and Elizabeth Difanis Phillips. (Connected Mathematics.) <u>Looking for Pythagoras: The Pythagorean Theorem.</u> Glenview, IL: Prentice Hall, 2002.			
CMP MSA: Lappan, Glenda, James T. Fey, William M. Fitzgerald, Susan N. Friel, and Elizabeth Difanis Phillips. (Connected Mathematics.) <u>Moving Straight Ahead: Linear Relationships.</u> Glenview, IL: Prentice Hall, 2002.			
CMP Prime: Lappan, Glenda, James T. Fey, William M. Fitzgerald, Susan N. Friel, and Elizabeth Difanis Phillips. (Connected Mathematics.) <u>Prime Time: Factors and Multiples.</u> Glenview, IL: Prentice Hall, 2002.			
CMP Samp & Pop: Lappan, Glenda, James T. Fey, William M. Fitzgerald, Susan N. Friel, and Elizabeth Difanis Phillips. (Connected Mathematics.) <u>Samples and Populations: Data and Statistics.</u> Glenview, IL: Prentice Hall, 2002.			
CMP Shapes & D: Lappan, Glenda, James T. Fey, William M. Fitzgerald, Susan N. Friel, and Elizabeth Difanis Phillips. (Connected Mathematics.) <u>Shapes and Designs: Two-Dimensional Geometry.</u> Glenview, IL: Prentice Hall, 2002.			
CMP SIWS: Lappan, Glenda, James T. Fey, William M. Fitzgerald, Susan N. Friel, and Elizabeth Difanis Phillips. (Connected Mathematics.) <u>Say It with Symbols: Algebraic Reasoning.</u> Needham, MA: Prentice Hall,			
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