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# NEVADA STATE STANDARDS

# Academy of MATH®

## Proven to Raise Achievement for Struggling Students

Grades 2–12

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## Grade 2

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| **Content Standard 1.0** | **Numbers, Number Sense, and Computation:** To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will accurately calculate and use estimation techniques, number relationships, operation rules, and algorithms; they will determine the reasonableness of answers and the accuracy of solutions. | **Academy of Math** |

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| **EXCEEDS STANDARD** | • Immediately recall and use basic addition facts (sums through 18) and the corresponding subtraction facts.<br>• Add and subtract multi-place numbers with and without regrouping.<br>• Generate, write, and solve two-step addition and subtraction problems based on practical situations.<br>• Add and subtract money amounts using decimals.<br>• Use the patterns in numbers to skip count by 2s through 10s to 100 and beyond.<br>• Read and write numerals and order and compare numbers from 0-999 and beyond.<br>• Estimate, with reasonable results, the number of objects in a set of 20 or more.<br>• Read and write number words to 20 and beyond and use the ordinal positions through the twentieth and beyond.<br>• Use, model, and identify the place value positions of 1s, 10s, 100s, and 1,000s.<br>• Identify, model, and label unit fractions as parts of a whole. | • Count and read whole numbers to 1,000 and relate them to the quantities they represent.<br>• Compare and order numbers to 1000; use the symbols >, <, =.<br>• Identify the place value of the digits to 1000.<br>• Use words, and expanded forms (e.g., 35 = 3 tens + 5 ones) to represent numbers to 1000.<br>• Know that even numbers end in 0, 2, 4, 6,or 8; recognize even numbers as multiples of 2; know that odd numbers end in 1, 3, 5, 7 or 9 and work with patterns involving even and odd numbers.<br>• Know that fractions may represent a portion of a whole that has been partitioned into parts of equal area or length; use the terms "numerator" and "denominator."<br>• Recognize the inverse relationship between the size of a unit fraction and the size of the denominator (i.e., the larger the denominator, the smaller the size of the unit fraction).<br>• Recognize, name, and write commonly used fractions such as 1/2, 2/3, 3/4.<br>• Recognize that fractions such as 2/2, 3/3, 4/4, 10/10, 100/100 are equal to the whole and one.<br>• Develop understanding of the relative position and magnitude of whole numbers and of ordinal and cardinal numbers and their connections<br>• Demonstrate the ability to use conventional algorithms for addition (two 3-digit numbers and three 2-digit numbers) and subtraction (two 3-digit numbers).<br>• Find the distance between numbers on the number line (e.g., how far is 76 from 24).<br>• Know addition and subtraction facts, commit to memory, and use them to solve problems.<br>• Demonstrate the ability to add and subtract 3-digit numbers accurately and efficiently.<br>• Use mental arithmetic to find the sum or difference of two 2-digit numbers.<br>• Demonstrate an understanding of the inverse relationship of addition and subtraction and use that understanding to simplify computation and check solutions.<br>▪ Estimate, calculate, and solve problems involving addition and subtraction of 2-digit numbers. Describe differences between estimates and actual calculations. |
| **MEETS STANDARD** | • Identify and model basic addition facts (sums to 18) and the corresponding subtraction facts and immediately recall the addition facts with sums through 10 and the corresponding subtraction facts.<br>• Add and subtract multi-place numbers without regrouping.<br>• Generate, write, and solve one step addition and subtraction problems based on practical situations.<br>• Use decimals to show money amounts.<br>• Use the patterns in numbers to skip count by 2s, 3s, 5s, and 10s to 100 and beyond.<br>• Read and write numerals and order and compare numbers from 0-999.<br>• Estimate, with reasonable results, the number of objects in a set to 20.<br>• Read and write number words through 20 and use, model, and identify the ordinal positions first through the twentieth.<br>• Use, model, and identify the place value positions of 1s, 10s, and 100s.<br>• Identify, model, and label 1/2 and 1/4 as parts of a whole. | |

| Content Standard 2.0 | **Patterns, Functions, and Algebra:** To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will use various algebraic methods to analyze, illustrate, extend, and create numerous representations (words, numbers, tables, and graphs) of patterns, functions, and algebraic relations as modeled in practical situations. | **Academy of Math** |
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| **EXCEEDS STANDARD** | • Recognize, describe, extend, create, and use complex repeating and increasing patterns with symbols, objects, manipulatives, and numbers to solve problems, using calculators and computers when available.<br>• Use variables and number relationships to identify missing terms in open sentences.<br>• Create, model, explain, and solve addition and subtraction number sentences to describe situations involving equality and inequality. | • Distinguish between repeating and growing patterns; create and describe patterns such as repeating patterns and growing patterns using number, shape, size, color, and letter.<br>• Describe functions related to coin trades and measurement trades (e.g., five pennies make one nickel; four cups make one quart).<br>• Skip count forward and backward by twos, fives, and tens up 100.<br>• Construct and solve open sentences that have variables.<br>• Recognize, describe, and extend patterns such as sequences of sounds and shapes or simple numeric patterns and translate from one representation to another<br>• Use concrete, pictorial, and verbal representations to develop an understanding of invented and conventional symbolic notations<br>• Understand various meanings of addition and subtraction of whole numbers and the relationship between the two operations.<br>• Use the commutative and associative rules for addition to simplify mental calculations and to check results. |
| **MEETS STANDARD** | • Recognize, describe, extend, create, and use repeating and increasing patterns using symbols, objects, and manipulatives to solve problems.<br>• Use variables and open sentences to express relationships.<br>• Create, model, explain, and solve problems using addition and subtraction. | |

| Content Standard 3.0 | **Measurement:** To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will use appropriate tools and techniques of measurement to determine, estimate, record, and verify direct and indirect measurements. | **Academy of Math** |
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| **EXCEEDS STANDARD** | • Identify and use the correct unit of measure for time, temperature, length, weight, capacity, volume, and area and describe and define various attributes.<br>• Identify and use the correct unit of measure to compare differences in objects that are greater than, less than, and /or equal to a given unit.<br>• Create possible combinations of bills and coins to equal a given amount.<br>• Use a calendar to identify days, weeks, months, year(s), and elapsed time to solve problems.<br>• Read time to the nearest five minute interval. | • Compare the length, weight, and volume of two or more objects by using direct comparison.<br>• Make and use estimates of measurement, including time and weight.<br>• Measure the length of objects by repeating a nonstandard or standard unit.<br>• Tell time at half-hour intervals on analog and digital clocks using a.m. and p.m. and relate time to events.<br>• Make combinations of coins up to 50 cents.<br>• Tell time at half-hour intervals on analog and digital clocks using a.m. and p.m. and relate time to events.<br>• Demonstrate an understanding of such attributes as length, area, and weight; select the appropriate type of unit for measuring each attribute using both the US Customary and metric systems.<br>▪ Carry out simple unit conversions within a system of measurement such as hours to minutes and cents to dollars (e.g., one hour = 60 minutes). |
| **MEETS STANDARD** | • Compare and order objects by various measurable attributes, such as time, temperature, length, weight, capacity, volume, and area and describe and define these various attributes.<br>• Compare objects that are greater than, less than, and /or equal to a given unit of measure such as inch, yard, centimeter, and meter.<br>• Determine the value of any given set of coins and bills.<br>• Recite and use the months of the year in order and use a calendar to identify days, weeks, months, and year.<br>• Read time to the nearest quarter hour and distinguish between A.M. and P.M. | |

| Content Standard 4.0 | **Spatial Relationships and Geometry:** To solve problems, communicate, and make connections within and beyond the field of mathematics, students will identify, represent, verify, and apply spatial relationships and geometric properties. | **Academy of Math** |
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| **EXCEEDS STANDARD** | • Identify, sort, sketch, describe, compare, and contrast plane geometric figures regardless of position.<br>• Describe the location of objects and, when given directions, place objects in position relative to each other.<br>• Identify and describe similar and congruent two-dimensional figures regardless of how they are positioned relative to each other.<br>• Identify symmetry in figures in the environment and create figures and designs that have more than one line of symmetry.<br>• Describe, sketch, model, and build two- and three- dimensional figures. | • Identify, describe, draw, and compare two-dimensional shapes, including both polygonal (up to six sides) and curved figures such as circles.<br>• Classify familiar two- and three-dimensional shapes by common attributes such as shape of curved and straight lines, number and shape of faces, edges, and vertices.<br>• Match and construct congruent and symmetric shapes.<br>• Relate geometric ideas to numbers (e.g., seeing rows in an array as a model of repeated addition).<br>• Describe, name, and interpret relative positions in space and apply ideas about relative position.<br>▪ Develop understanding of the relative position and magnitude of whole numbers and of ordinal and cardinal numbers and their connections<br>▪ Apply techniques such as reflections (flips), rotations (turns), and translations (slides) for determining if two shapes are congruent. |
| **MEETS STANDARD** | • Identify, name, sort, sketch, describe, and compare circles, triangles, and rectangles including squares, regardless of position.<br>• Describe the location of objects and place objects in position using vocabulary such as before, far, below, and left.<br>• Compare the size of similar two-dimensional figures and identify shapes that are congruent.<br>• Identify symmetry in figures in the environment and create figures and designs that have a line of symmetry.<br>• Identify, name, sort, describe, compare, and contrast two- and three-dimensional figures. | |

| Content Standard 5.0 | **Data Analysis:** To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will collect, organize, display, interpret, and analyze data to determine statistical relationships and probability projections. | **Academy of Math** |
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| **EXCEEDS STANDARDS** | • Collect, organize, record, explain, and analyze data using concrete materials and surveys. | • Classify data using tallies, charts, tables, bar graphs, pictographs, and interpret the representations. |
| **MEETS STANDARD** | • Collect, organize, record, and explain classification of data using concrete materials. | |

## Grade 3

| C**ontent Standard 1.0** | **Numbers, Number Sense, and Computation:** To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will accurately calculate and use estimation techniques, number relationships, operation rules, and algorithms; they will determine the reasonableness of answers and the accuracy of solutions. | **Academy of Math** |
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| **EXCEEDS STANDARD** | • Immediately recall and use addition and subtraction facts and multiplication facts with products greater than 81.<br>• Add and subtract multi-place decimals with regrouping.<br>• Use pencil and paper, mental computation, and estimation to generate and solve complex two-step addition and subtraction problems based on practical situations.<br>• Generate and solve two-step multiplication problems based on practical situations, using paper and pencil, mental computation, and estimation.<br>• Create problems that require the addition and subtraction of decimals that represent money amounts.<br>• Explain multiplication using a variety of models.<br>• Read and write numerals and compare and order numbers from 0-9,999 and beyond.<br>• Determine the reasonableness of answers by rounding to the nearest ten, hundred, and beyond.<br>• Use, model, and identify place value positions beyond 10,000.<br>• Model, sketch, and label fractions with denominators to 10 and beyond.<br>• Write fractions using both numerals and number words. | • Exhibit an understanding of the base-ten number system by reading, and writing whole numbers to at least 10,000; demonstrate an understanding of the values of the digits.<br>• Represent, compare, and order numbers to 10,000 using various forms, including expanded notation and written out in words.<br>• Round whole numbers through 10,000 to the nearest 10, 100, and 1,000.<br>• Recognize sets to which a number may belong.<br>• Identify and represent fractions (between 0 and 1 with denominators through 10) as parts of unit wholes and parts of a collection.<br>• Recognize, name, and use equivalent fractions with denominators 2, 3, 4; compare and order them (1/2=2/4=4/8).<br>• Know that any fraction can be written as a sum of unit fraction (e.g.3/4=1/4+1/4+1/4).<br>• Represent a mixed number (with denominator 2, 3, or 4) as a whole number and a fraction (e.g., 1 2/3, 3 ½).<br>• Know the meaning of 0.75, 0.50, and 0.25 as they relate to money; know that fractions and decimals are two different representations of the same concept (e.g., 50 cents is 1/2 of a dollar, 75 cents is 3/4 of a dollar).<br>• Solve problems involving addition and subtraction of money amounts in decimal notation.<br>• Demonstrate an understanding of and the ability to use conventional algorithms for the addition and subtraction of up to 5-digit numbers.<br>• Add and subtract up to 4-digit numbers accurately and efficiently. |

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| **MEETS STANDARD** | • Immediately recall and use addition and subtraction facts and multiplication facts with products through 81.<br>• Add and subtract multi-place numbers with regrouping.<br>• Use pencil and paper, mental computation, and estimation to generate and solve two-step addition and subtraction problems based on practical situations.<br>• Generate and solve one-step multiplication problems based on practical situations using paper and pencil, mental computation, and estimation.<br>• Add and subtract decimals that represent money amounts.<br>• Use addition to model and explain multiplication.<br>• Read and write numerals and compare and order numbers from 0-9,999.<br>• Determine the reasonableness of answers by rounding to the nearest ten and hundred.<br>• Use, model, and identify place value positions through 10,000.<br>• Model, sketch, and label fractions with denominators to 10.<br>• Write commonly used fractions using both numerals and number words. | • Use visual models to add and subtract common fractions (halves, thirds, fourths, sixths, and eighths) with like denominators.<br>• Know multiplication is the result of counting the total number of objects in a set of equal groups.<br>• Know division (÷) as another way of expressing multiplication.<br>• Know multiplication facts through 10 x 10 and related division facts. Use these facts to solve related problems.<br>• Solve simple problems involving multiplication of multi-digit numbers by one-digit numbers.<br>• Solve division problems in which a multi-digit number is evenly divided by a one-digit number.<br>• Multiply up to 2-digit numbers by a 1-digit number accurately and efficiently.<br>• Use the commutative (order) and identify properties of addition and multiplication on whole numbers in computations and problem situations.<br>• Know and apply the special properties of 0 and 1 in multiplication.<br>• Use multiplication and division fact families to understand the inverse relationship of these two operations and to compare and check results.<br>• Estimate the sum and difference of two numbers with three digits (sums up to 1000) and judge reasonableness of estimates.<br>• Understand and use the strategies of rounding and regrouping to estimate quantities, measures, and the results of whole-number computations (addition, subtraction, and multiplication) up to 2-digit whole numbers and amounts of money to $100, and to judge the reasonableness of answers. |

| Content Standard 2.0 | **Patterns, Functions, and Algebra:** To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will use various algebraic methods to analyze, illustrate, extend, and create numerous representations (words, numbers, tables, and graphs) of patterns, functions, and algebraic relations as modeled in practical situations. | **Academy of Math** |
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| **EXCEEDS STANDARD** | • Recognize, describe, extend, and create repeating, increasing and decreasing patterns using numbers; use number patterns and their extensions to solve complex problems using complicated patterns.<br>• Identify missing symbols (+, -, X, >, <, =) and missing numbers in open number sentences involving number facts in addition, subtraction, and multiplication. | • Create, describe, extend, and explain symbolic (geometric) patterns and addition and subtraction patterns; describe patterns in a variety of ways.<br>• Use boxes or other symbols to represent unknowns or quantities that vary in expressions and in equations or inequalities (=, < and >).<br>• Select appropriate operational and relational symbols to make an expression true.<br>• Determine values of variables in simple equations involving addition, subtraction, or multiplication.<br>• Know and express the relationships among linear units of measure, i.e., unit conversions (e.g., 3 feet=1 yard; 12 inches=1 foot).<br>• Extend and recognize a linear pattern by its rules.<br>• Distinguish between repeating and growing patterns; create and describe patterns such as repeating patterns and growing patterns using number, shape, size, color, and letter.<br>• Use the commutative and associative rules for addition to simplify mental calculations and to check results. |
| **MEETS STANDARD** | • Recognize, describe, extend, and create repeating and increasing patterns using numbers; use number patterns and their extensions to solve problems.<br>• Identify missing symbols (+, -, >, <, =) and missing numbers in open number sentences involving number facts in addition and subtraction. | |

| Content Standard 3.0 | **Measurement:** To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will use appropriate tools and techniques of measurement to determine, estimate, record, and verify direct and indirect measurements. | **Academy of Math** |
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| **EXCEEDS STANDARD** | • Measure to a required degree of accuracy and record the measurements, evaluating for error and describing the appropriateness of self-selected units of measure.<br>• Estimate measurements and select and use appropriate measuring devices with standard units to measure length, surface area, liquid volume, capacity, temperature, and weight.<br>• Read, write, and use money notation and determine possible combinations of coins and bills to equal given amounts, and apply to practical situations.<br>• Read time to the nearest minute using analog and digital clocks and determine elapsed time, applying it to practical situations. | ▪ Demonstrate an understanding of such attributes as length, area, and weight; select the appropriate type of unit for measuring each attribute using both the US Customary and metric systems.<br>• Carry out simple unit conversions within a system of measurement such as hours to minutes and cents to dollars (e.g., one hour = 60 minutes).<br>• Identify time to the nearest five minutes on analog and digital clocks using a.m. and p.m.<br>• Estimate and find area and perimeter of a rectangle and triangle.<br>• Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems<br>• Understand that measurements are approximations and understand how differences in units affect precision<br>• Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute<br>▪ Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles |
| **MEETS STANDARD** | • Measure to a required degree of accuracy, record the measurement, and evaluate it for error, describing the appropriateness of selected units of measure.<br>• Estimate measurements and use measuring devices with standard and non-standard units to measure length, area of a region, liquid volume, capacity, temperature, and weight, communicating the concepts of more, less, and equivalent.<br>• Read, write, and use money notation and determine possible combinations of coins and bills to equal given amounts.<br>• Read time to the nearest minute using analog and digital clocks and determine elapsed time. | |

| Content Standard 4.0 | **Spatial Relationships and Geometry:** To solve problems, communicate, and make connections within and beyond the field of mathematics, students will identify, represent, verify, and apply spatial relationships and geometric properties. | **Academy of Math** |
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| **EXCEEDS STANDARD** | • Describe, sketch, compare, and contrast plane geometric figures in great detail.<br>• Demonstrate and describe a sequence of transformations (motions) of geometric figures as slides, rotations, and/or flips.<br>• Describe, sketch, model, build, compare, and contrast two- and three-dimensional geometric figures, with great detail. | • Compare and analyze attributes and other features (e.g., number and shape of sides, faces, corners, right angles) of two-dimensional geometric shapes, especially the attributes of triangles (isosceles, equilateral, right) and quadrilaterals (rectangle, square, parallelogram).<br>• Describe, compare, and classify two-dimensional shapes such as circles and polygons, especially triangles and quadrilaterals.<br>• Identify angles as right, acute (less than a right angle), or obtuse (greater than a right angle).<br>• Identify parallel, perpendicular, and intersecting lines.<br>• Identify lines of symmetry in two-dimensional shapes.<br>• Describe, name, and interpret relative positions in space and apply ideas about relative position.<br>▪ Develop understanding of the relative position and magnitude of whole numbers and of ordinal and cardinal numbers and their connections<br>▪ Apply techniques such as reflections (flips), rotations (turns), and translations (slides) for determining if two shapes are congruent. |
| **MEETS STANDARD** | • Describe, sketch, compare, and contrast plane geometric figures.<br>• Demonstrate and describe the transformation (motion) of a geometric figure as a slide, rotation, or a flip.<br>• Describe, sketch, model, build, compare, and contrast two- and three-dimensional geometric figures. | |

| Content Standard 5.0 | **Data Analysis:** To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will collect, organize, display, interpret, and analyze data to determine statistical relationships and probability projections. | **Academy of Math** |
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| **EXCEEDS STANDARD** | • Collect, organize, display, describe, and interpret simple data using number lines, pictographs, bar graphs, and frequency tables, by hand and with computers when they are available.<br>• Use concepts of probability to make predictions about future events. | ▪ Organize data using observations, measurements, surveys, or experiments.<br>▪ Identify the main idea, and make predictions from various representations of data sets in the forms of tables, bar graphs (horizontal and vertical forms), pictographs, and tallies. |
| **MEETS STANDARD** | • Collect, organize, display, and describe simple data using number lines, pictographs, bar graphs, and frequency tables, by hand and with computers when they are available.<br>• Use concepts of probability such as impossible, unlikely, likely, and certain to make predictions about future events. | |

## Grade 5

| Content Standard 1.0 | **Numbers, Number Sense and Computation:** To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will accurately calculate and use estimation techniques, number relationships, operation rules, and algorithms; they will determine the reasonableness of answers and the accuracy of solutions. | **Academy of Math** |
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| **EXCEEDS STANDARD** | • Immediately recall and use multiplication and corresponding division facts.<br>• Multiply and divide multi-place numbers.<br>• Generate and solve complex addition, subtraction, multiplication, division problems involving whole numbers and order of operations in practical situations.<br>• Compare and order negative numbers within the context of practical situations and plot rational numbers on a number line.<br>• Estimate, using a variety of methods, to determine and justify the reasonableness of an answer.<br>• Model, draw, identify, compare, add, and subtract decimals and fractions with like and unlike denominators to solve problems. | • Estimate, round, and manipulate very large (e.g., billions) and very small (e.g., thousandths) numbers; demonstrate an understanding of place value to billions and thousandths.<br>• Represent and compare very large (billions) and very small (thousandths) positive numbers in various forms such as expanded notation without exponents.<br>• Find and position integers, fractions, mixed numbers, and decimals (both positive and negative) on the number line.<br>• Compare and order integers (including negative integers) and positive fractions, mixed numbers, decimals, and percents.<br>• Apply the number theory concepts of common factor, common multiple, and divisibility rules for 2, 3, 5, and 10 to the solution of problems. Demonstrate an understanding of the concepts of prime and composite |

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| **MEETS STANDARD** | • Immediately recall and use multiplication and corresponding division facts using factors of 0 through 12.<br>• Multiply and divide multi-place numbers by two-digit numbers including multiples of 10.<br>• Generate and solve addition, subtraction, multiplication, and division problems involving whole numbers and order of operations in practical situations.<br>• Compare and order negative numbers within the context of practical situations and plot integer values on a number line.<br>• Estimate to determine the reasonableness of answer by identifying and using the correct place value position.<br>• Model, draw, identify, compare, add, and subtract decimals and fractions with like denominators to solve problems. | numbers.<br>• Know the set of prime numbers to 100.<br>• Determine the prime factors of all numbers through 50 and write the numbers as the product of their prime factors by using exponents to show multiples of a factor (e.g., 24=2x2x2x3=23x3).<br>• Explain different interpretations of fractions as a ratio of whole numbers, as parts of unit wholes, as parts of a collection, as division of whole numbers by whole numbers, as locations on the number line.<br>• Interpret percents as parts out of 100, use % notation, and express a part of a whole as a percentage.<br>• Identify and determine common equivalent fractions, mixed numbers, decimals, and percents.<br>• Write improper fractions as mixed numbers, and know that a mixed number represents the number of "wholes" and the part of a whole remaining.<br>• Add and subtract fractions with like and unlike denominators and express answers in the simplest form.<br>• Add and subtract positive decimals.<br>• Use models to show an understanding of multiplication and division of fractions; multiply positive fractions with whole numbers.<br>• Simplify fractions in cases when both the numerator and the denominator have 2, 3, 4, 5, or 10 as a common factor.<br>• Multiply positive decimals with whole numbers.<br>• Add with negative integers, subtract positive integers from negative integers, and verify the reasonableness of the results.<br>• Solve problems involving multiplication and division of any whole number.<br>• Demonstrate proficiency with division, including division with positive decimals and long division with multi-digit divisors.<br>• Demonstrate an understanding of and compute (positive integer) powers of ten (e.g., 102, 105); compute examples as repeated multiplication.<br>• Demonstrate an understanding of how parentheses affect expressions involving addition, subtraction, and multiplication, and use that understanding to solve problems, e.g., 3 x (4 + 2) = 3 x 6.<br>• Estimate sums and differences of whole numbers, positive fractions, and positive decimals. Estimate products of whole numbers and products of positive decimals with whole numbers. Use a variety of strategies and judge reasonableness of answers. |

| **Content Standard 2.0** | Patterns, Functions, and Algebra: **To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will use various algebraic methods to analyze, illustrate, extend, and create numerous representations (words, numbers, tables, and graphs) of patterns, functions, and algebraic relations as modeled in practical situations.** | **Academy of Math** |
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| **EXCEEDS STANDARD** | • Create tables and charts to identify, describe, and extend number patterns and relationships.<br>• Use variables in open sentences to describe a wide variety of functions and relationships.<br>• Solve simple equations and inequalities using whole numbers, decimals, and common fractions.<br>• Generate complex number sequences given the first term of the sequence and any computation rule. | • Analyze and determine the rules for extending symbolic, arithmetic, and geometric patterns.<br>• Replace variables with given values, evaluate and simplify.<br>• Use the properties of equality to solve problems with whole numbers (e.g., if x + 7 = 13, then x = 13 – 7, therefore x = 6; if 3 x = 15, then 1/3 x 3 x = 1/3 x 15, therefore = 5).<br>• Interpret and evaluate mathematical expressions that use parentheses; use parentheses to indicate which operation to perform first when writing expressions containing more than two terms and different operations.<br>• Interpret graphs that represent the relationship between two variables in everyday situations.<br>• Use the properties of equality to solve problems with whole numbers (e.g., if x + 7 = 13, then x = 13 – 7, therefore x = 6; if 3 x = 15, then 1/3 x 3 x = 1/3 x 15, therefore = 5).<br>• Use, the commutative, associative, and identity properties of operations on whole numbers in problem situations.<br>• Use the relationship between multiplication and division to simplify computations and check results. |
| **MEETS STANDARD** | • Identify, describe, and explain number patterns and relationships, including triangular numbers, perfect squares, arithmetic and geometric sequences, using concrete materials, paper and pencil, and calculators.<br>• Use variables in open sentences to describe simple functions and relationships.<br>• Solve simple whole numbers equations and inequalities using a variety of methods.<br>• Generate number sequences given the first term of the sequence and any simple computation rule. | |

| **Content Standard 3.0** | **Measurement:** To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will use appropriate tools and techniques of measurement to determine, estimate, record, and verify direct and indirect measurements. | **Academy of Math** |
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| **EXCEEDS STANDARD** | • Measure and compare lengths, masses, and capacities and convert those measurements within the same measurement system.<br>• Estimate measures of length, volume, capacity, quantity, and weight justifying the reasonableness of the estimates.<br>• Select the method of measurement and justify the use of estimation or direct measurement.<br>• Determine several different combinations of bills and coins that would provide correct change in practical situations.<br>• Determine the perimeter and area of given polygons, and describe how changes in dimensions affect changes in area.<br>• Convert units of time to equivalent units. | • Apply the concepts of perimeter and area to the solution of problems involving triangles and rectangles. Apply formulas where appropriate.<br>• Apply formulas for the areas of triangles, rectangles, and parallelograms; recognize that shapes with the same number of sides but different appearances can have the same area.<br>• Solve problems involving proportional relationships and units of measurement.<br>• Identify, measure, and describe circles and the relationships of the radius, diameter, circumference, and area (e.g., d=2r) and use these concepts to solve problems.<br>• Find volumes and surface areas of rectangular prisms.<br>• Know that angles on a straight line add up to 180°, interior angles of a triangle add up to 180°, angles surrounding a point add up to 360°, and interior angles of a quadrilateral add up to 360°; use these properties to solve problems.<br>• Identify angles and triangles, given sides and the angle between them or given two angles and the side between them.<br>• Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems<br>• Understand that measurements are approximations and understand how differences in units affect precision<br>• Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute<br>▪ Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles |
| **MEETS STANDARD** | • Measure, compare, and convert units of length, within the same measurement system, to the nearest fractional/decimal part.<br>• Estimate and directly measure length, volume, capacity, and quantity.<br>• Select and justify the use of estimation or direct measurement and weight in a given situation.<br>• Determine the total cost of purchases and the amount of change in practical situations.<br>• Describe the difference between perimeter and area and determine the perimeter of any polygon and the area of right triangles and rectangles, including squares.<br>• Identify equivalent periods of time using relationships between and among seconds, minutes, hours, days, months, and years. | |

| Content Standard 4.0 | **Spatial Relationships and Geometry:** To solve problems, communicate, and make connections within and beyond the field of mathematics, students will identify, represent, verify, and apply spatial relationships and geometric properties. | **Academy of Math** |
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| **EXCEEDS STANDARD** | • Draw and classify angles and triangles according to given measurements.<br>• Identify, draw, and label circles and elements of circles, describing the relationships between the various elements.<br>• Identify transformations as a translation, rotation, reflection, enlargement, or reduction using the formal vocabulary for shapes that have congruence, similarity, and symmetry.<br>• Identify and draw shapes that have congruence, similarity, and symmetry using a wide variety of methods.<br>• Graph ordered pairs and identify coordinates for a given point in any quadrant.<br>  • Draw and classify complex two- and three-dimensional figures by their properties including the number of vertices, and edges and the number and shape of the faces.<br>  • Identify, describe, classify, and construct one- and two dimensional geometric figures including intersecting, perpendicular and parallel lines, line segments, rays, and angles when given measurements and describe the relationships among various elements. | • Identify polygons based on their properties, including types of interior angles, perpendicular or parallel sides, and congruence of sides (e.g., squares, rectangles, rhombuses, parallelograms, trapezoids, and isosceles, equilateral, and right triangles).<br>• Identify, describe, and compare special types of three-dimensional shapes (e.g., cubes, prisms, spheres, cones, and pyramids) based on their properties, such as edges and faces.<br>• Identify relationships among points, lines, and planes (e.g., intersecting, parallel, perpendicular).<br>• Identify and describe types of symmetry, including line and rotational.<br>• Determine if two triangles are congruent by measuring sides or a combination of sides and angles.<br>• Describe transformations on two-dimensional shapes.<br>• Identify coordinates of points on the Cartesian coordinate plane in the first two quadrants.<br>▪ Describe transformations on two-dimensional shapes.<br>• Identify and describe types of symmetry, including line and rotational.<br>▪ Determine if two triangles are congruent by measuring sides or a combination of sides and angles. |
| **MEETS STANDARD** | • Draw and classify angles and triangles as right, acute, or obtuse.<br>• Identify and draw circles and elements of circles, describing the relationships between the various elements.<br>• Identify a transformation as translation, rotation, reflection, enlargement, or reduction.<br>• Identify shapes that have congruence, similarity, and/or symmetry using a variety of methods, including transformational motions and models, drawings, and measurement tools.<br>• Graph ordered pairs and identify coordinates for a given point in the first quadrant.<br>• Identify, describe, compare and classify two- and three-dimensional figures by their properties including the number of vertices, and edges and the number and shape of the faces.<br>• Identify, describe, classify and draw one- and two-dimensional geometric figures including intersecting, perpendicular and parallel lines, line segments, rays, and angles with given measurements. | |

| Content Standard 5.0 | **Data Analysis:** To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will collect, organize, display, interpret, and analyze data to determine statistical relationships and probability projections. | **Academy of Math** |
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| **EXCEEDS STANDARD** | • Collect, organize, and interpret data using a variety of graphic representations.<br>• Use data and graphs to draw conclusions and/or make predictions using data in a variety of written and oral forms, with and without technology.<br>• Conduct simple and compound probability experiments using concrete materials and represent the results in fractional forms.<br>• Solve and analyze probability problems using a variety of methods.<br>• Use measures of central tendency in practical problem situations.<br>• Select a type of graph to represent a given set of data and provide written and oral justification of selection, including discussion of limitations of graphs not selected. | • Organize data using observations, measurements, surveys, or experiments and identify appropriate ways to display the data.<br>• Make predictions from various representations of data sets, including tables and bar graphs (where symbols or scales represent multiple units), line graphs, and line plots.<br>• Interpret line plots, bar graphs, and circle graphs.<br>• Define and apply the concepts of mean, median, and mode.<br>• Make predictions from various representations of data sets, including tables and bar graphs (where symbols or scales represent multiple units), line graphs, and line plots. |
| **MEETS STANDARD** | • Collect, organize, read, and interpret data using graphic representations including tables, line plots, stem and leaf plots, scatter plots, and histograms.<br>• Use data and graphs to formulate and explain conclusions and predictions with and without technology.<br>• Conduct simple probability experiments using concrete materials and represent the results in fractional form.<br>• Solve probability problems using a variety of methods including constructing sample spaces and tree diagrams.<br>• Model and compute measures of central tendency including mean, median, and mode.<br>• Describe the limitations of various graph formats and select a type of graph to accurately represent the given data; justify the selection. | |

## Grade 8

| Content Standard 1.0 | **Numbers, Number Sense, and Computation:** To solve problems, communications, reason, and make connections within and beyond the field of mathematics, students will accurately calculate and use estimation techniques, number relationships, operation rules, and algorithms: they will determine the reasonableness of answers and the accuracy of solutions. | **Academy of Math** |
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| **EXCEEDS STANDARD** | • Read, write, apply, and compute with real numbers including radicals, exponentials, scientific notation, and irrationals and use them to solve multi-step problems.<br>• Solve multi-step proportion problems involving addition, subtraction, multiplication, and division.<br>• Explain, connect, and apply concepts of number theory and properties of real numbers to solve problems and justify solutions.<br>• Explain, connect, and apply properties of real numbers to solve problems and justify solutions.<br>• Estimate in appropriate practical applications and explain the validity of the estimation method.<br>• Explain and apply the relationships among fractions, decimals, and percents and translate among various representations. | • Explain the properties of and compute with real numbers, expressed in a variety of forms.<br>• Know that every rational number is either a terminating or repeating decimal and that every irrational number is a non-repeating decimal.<br>• Use the laws of exponents for integer exponents.<br>• Identify and use the arithmetic properties of subsets of integers and rational numbers.<br>• Solve problems involving ratio units such as miles per hour.<br>• Solve simple proportion problems using such methods as unit rate, finding equivalent fractions.<br>• Apply the rules of powers and roots to the solution of problems.<br>• Select and use appropriate operations—addition, subtraction, multiplication, division, and positive integer exponents—to solve problems with rational numbers, including negative rationals<br>• Demonstrate an understanding of the properties of arithmetic operations. |
| **MEETS STANDARD** | • Read, write, apply, and compute with real numbers in various forms including radicals, exponentials, and scientific notation.<br>• Determine, write, and use ratios and proportions to solve problems.<br>• Explain and use concepts of number theory such as factors and multiples, and properties of real numbers such as the commutative property and associative property, to solve problems.<br>• Explain and use properties of real numbers such as the associative, commutative, and distributive properties and order of operations to solve problems.<br>• Estimate in problem solving situations and practical applications to determine the reasonableness of answers and verify the results.<br>• Explain the relationship among fractions, decimals, and percents and translate among representations. | • . Select and use appropriate operations—addition, subtraction, multiplication, division, and positive integer exponents—to solve problems with rational numbers and negative integers.<br>• Apply the laws of exponents to multiply whole number positive and negative powers of whole numbers; divide whole number powers with like bases; explain the inverse relationship between negative and positive exponents.<br>• Use the inverse relationships of addition and subtraction, multiplication and division to simplify computations and solve problems (e.g., multiplying by 1/2 or 0.5 is the same as dividing by 2).<br>• Use the associative, commutative, and distributive properties; properties of the identity and inverse elements (e.g., -7 + 7 = 0; 3/4 x 4/3 = 1).<br>• Extend the Order of Operations to include positive integer exponents.<br>• Estimate and solve problems with square roots; find square roots of perfect squares.<br>• Determine when an estimate rather than an exact answer is appropriate and apply in problem situations. |

| **Content Standard 2.0** | **Patterns, Functions, and Algebra:** To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will use various algebraic methods to analyze, illustrate, extend, and create numerous representations (words, numbers, tables, and graphs) of patterns, functions, and algebraic relations as modeled in practical situations. | **Academy of Math** |
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| **EXCEEDS STANDARD** | • Use inductive reasoning to find a missing term in numeric, arithmetic, and geometric sequences and to generalize basic patterns and formulas to the nth term, with and without calculators.<br>• Identify, model, describe, and evaluate complex relationships including functions using diagrams, written, oral, graphic, and symbolic language.<br>• Solve a complex equation or formula for any variable.<br>• Describe and demonstrate how a change in one variable of a complex mathematical relationship affects the remaining variables.<br>• Solve complex linear equations and inequalities.<br>• Add and subtract polynomials describing the connection between the algebraic and arithmetic processes. | • Solve linear equations and inequalities with one or two variables using algebraic methods.<br>• Use linear equations to analyze problems.<br>• Identify the roles of variables within an equation.<br>• Distinguish between numerical and algebraic expressions, equations, and inequalities |
| **MEETS STANDARD** | • Use inductive reasoning to find a missing term in numeric, arithmetic, and geometric sequences and to generalize basic patterns to the nth term, with and without calculators.<br>• Identify, describe, model, and evaluate relationships including patterns, sequences, and functions using oral, written, and symbolic language, with and without technology.<br>• Solve an equation or a formula for any variable.<br>• Describe how a change in one variable of a mathematical relationship affects the remaining variables using various tools and methods.<br>• Model, identify, and solve simple linear equations and inequalities and relate that process to the order of operations, using formal and informal methods.<br>• Add and subtract binomials describing the connection between the algebraic process and the arithmetic process. | |

| Content Standard 3.0 | **Measurement:** To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will use appropriate tools and techniques of measurement to determine, estimate, record, and verify direct and indirect measurements. | **Academy of Math** |
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| **EXCEEDS STANDARD** | • Use conversion factors to compare and convert units of measure for length, weight/mass, and volume within the same measurement system (customary or metric); estimate conversions between like units of the two systems to solve problems.<br>• Describe the distinction between precision, error of measure, and tolerance in measurement when using an appropriate measurement tool.<br>• Determine an appropriate degree of accuracy and measure to that degree of accuracy for a specified measurement situation.<br>• Recall and apply formulas to find perimeter, circumference, and area of plane figures and volume and surface area of solid figures; identify the relationship between changes in area and volume and changes in linear measures of figures.<br>• Evaluate formulas and algebraic expressions for given values of a variable, using various tools and methods.<br>• Apply ratios and proportions in multi-step problems. | • Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems<br>• Understand that measurements are approximations and understand how differences in units affect precision<br>• Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute<br>• Given the formulas, convert from one system of measurement to another.<br>• Understand the concept of surface area and volume; given the formulas, determine the surface area and volume of rectangular prisms.<br>▪ Use proportions to express relationships between corresponding parts of similar figures. |
| **MEETS STANDARD** | • Compare and convert units of measure for length, weight/mass, and volume within the same measurement system (customary or metric); estimate conversions between like units of the two systems to solve problems.<br>• Identify the range of precision, error of measure, and tolerance in measurement when using the appropriate measurement tool and measuring to the required degree of accuracy.<br>• Estimate and measure length, weight/mass, and volume to the required degree of accuracy.<br>• Derive and apply formulas to find perimeter, circumference, and area of plane figures and volume and surface area of solid figures; identify the relationship between changes in area and volume and changes in linear measures of figures.<br>• Evaluate formulas and algebraic expressions for given values of a variable.<br>• Apply ratio and proportion to calculate rates and as a method of indirect measure. | |

| Content Standard 4.0 | **Spatial Relationships and Geometry:** To solve problems, communicate, and make connections within and beyond the field of mathematics, students will identify, represent, verify and apply spatial relationships and geometric properties. | **Academy of Math** |
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| **EXCEEDS STANDARD** | • Identify, classify, compare, and draw regular and complicated irregular polygons, with given specifications and determine the sum of the interior angles of convex polygons, developing a rule to describe the sum.<br>• Apply the properties of equality and proportionality to solve complex problems involving congruent or similar shapes.<br>• Use coordinate geometry and graphs to show multiple-step geometric transformations.<br>• Create a variety of models of a three-dimensional figures from two-dimensional drawings and make two-dimensional proportional sketches of three-dimensional objects.<br>• Represent, interpret, and generalize relationships defined by equations and formulas (including distance, midpoint, and slope) on a coordinate plane, with and without technology.<br>• Form generalizations and validate conclusions about properties of geometric shapes including those associated with parallel lines, perpendicular lines, bisectors, triangles, and polygons and use these generalizations to solve problems.<br>• Verify, explain and use both the Pythagorean Theorem and the Triangle Sum Theorem to determine missing sides and angles of triangles in practical situations.<br>• Construct, draw, and sketch geometric figures, bisected angles and lines, accurately and efficiently using hand tools, technology, and models. | • Analyze, and apply the relationship between the number of sides and the sums of the interior and exterior angle measures of polygons.<br>• Demonstrate an understanding of the relationships of angles formed by intersecting lines, including parallel lines cut by a transversal.<br>▪ Demonstrate an understanding of conditions that indicate two triangles are similar: the corresponding angles are congruent (AAA similarity); the ratios of two pairs of corresponding sides are equal and the included angles are congruent (SAS similarity); ratios of all pairs of corresponding sides are equal (SSS similarity).<br>▪ Identify coordinates of points on the Cartesian coordinate plane in all four quadrants.<br>▪ Understand and use coordinate graphs to plot simple figures<br>▪ Determine if two shapes are congruent by motions or series of motions (e.g., translations, rotations, and reflections); predict the results of transformations on unmarked planes. |

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| **MEETS STANDARD** | • Identify, classify, compare, and draw regular and irregular polygons, given specifications; determine the sum of the interior angles of convex polygons.<br>• Apply the properties of equality and proportionally to solve problems involving congruent or similar shapes.<br>• Use coordinate geometry and models to illustrate change in scale and other geometric transformations.<br>• Create a model of a three-dimensional figure from two-dimensional drawings and make a two-dimensional drawing of a three-dimensional object.<br>• Represent and interpret relationships defined by equations and formulas (including distance, midpoint, and slope) on a coordinate plane with and without technology.<br>• Form generalizations and validate conclusions about properties of geometric shapes including those associated with parallel lines, perpendicular lines, bisectors, triangles, and quadrilaterals.<br>• Verify, explain and use both the Pythagorean Theorem and the Triangle Sum Theorem to determine missing sides and angles of triangles.<br>• Construct, draw, and sketch geometric figures, bisected angles and lines and line segments with given specifications, using hand tools and technology. | |