Math Curriculum

	Early Childhood 3-6 years	Lower Elementary 6-9 years	Upper Elementary 9-12 years	Middle School 12-14 years
Numbers and Numeration: *The child will develop concepts and skills associated with the understanding of numbers and the decimal system.*	Appropriately names, discriminates between and compares quantities. Familiar with base ten system, represents with materials, and can read, numbers into thousands. Matches number symbols to quantities 1 - 20 and can write the numerals. Practices linear counting up to hundreds and skip counting.	Understands cardinal and ordinal numbers, odd and even, estimates quantities and compares quantities and numbers. Understands place value and exchanging, base ten system and consistently associates quantity and symbol. Reads, writes and decomposes whole numbers. Facility with linear and skip counting, and sequences. Recognizes and counts money and can make simple change.	Apply mental math strategies, estimate solutions and round numbers. Discover and apply rules of divisibility, prime and composite numbers. Learn number theory concepts such as factors and multiples. Use number lines with fractions, decimals and integers. Understands relationship between fractions, decimals and percentages. Uses ratios and proportional relationship of numbers.	Master concepts of place value and number theory. Understand and apply ratios and proportions to represent and compare relationships and solve problems. Confidently apply number properties such as distributive, commutative, and associative. Recognize and use exponential, scientific and calculator notation. Identify and understand rational, real and irrational properties.

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Operations: *The child will develop a deep understanding of the basic operations using numerous concrete materials, working towards abstraction.* *The child will work towards memorization of math facts in all operations.*	Uses Golden Beads to develop familiarity with base ten and exchanging. Explores and plays with concepts of addition, subtraction, multiplication and division. Uses grouping and taking apart numbers to develop concrete understanding of parts and whole. Understands relationship of addition and subtraction (putting together and taking apart) and subsequent results. Understands what's inside a ten through manipulation and exploration of materials (sums to 10).	Understands the relationships, process, vocabulary, and symbols of four operations and can estimate basic answers. Internalizes and abstracts concepts through practice with manipulatives (Golden Beads, Stamp Game, Bead Frame, etc.). Abstractly calculates addition and subtraction, using materials to multiply and divide by single digits and tens. Interprets and solves single-step word problems. Practices four operations with fractions. Practice with memorization of math facts, with consistent recall of addition, subtraction and multiplication up to fives.	Understands relationships, identifies various representations and applies mental math strategies to all operations. Demonstrates fluency with all four operations for whole numbers, fractions, decimals, integers and percents (using manipulatives to internalize concepts). Solves multi-step word problems and applies order of operation rules. Converts fractions, decimals and percents. Understands and applies knowledge of exponents, percent and simple interest. Demonstrates understanding of multiplication of polynomials and square root.	Demonstrate consistent fluency and application of operations for whole numbers, fractions, decimals, integers and percents. Understand and apply order of operation rules. Utilize the relationships between the operations to deconstruct and solve expressions and equations. Apply laws of exponents and their role in exponential relationships. Demonstrates the ability to work with radicals and integer exponents in operations.

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Algebraic Reasoning: *The child will develop a fluency with mathematical patterns and relationships and an ability to predict or solve for an unknown.*	Sorts, classifies and orders objects by size, number or other properties. Experience with patterns and relationships of quantity and number. Describes qualitative change (small, smaller, smallest). Sensorial experience with polynomial equations.	Classify and sort objects and numbers by various properties (i.e. odd and even). Recognize, describe and extend patterns and sequences. Experience with and understanding of basic vocabulary in problem solving.	Classify and group like terms, recognize functions and express mathematical relationships using equations. Analyze, describe and extend patterns and sequences. Describe qualitative and quantitative change. Formulate algebraic knowledge through the use of Hands on Equations and solve for an unknown variable.	Analyze, construct and deconstruct numerical and geometric patterns. Consistently applies appropriate algebraic and problem solving vocabulary. Use tables, graphs and relationships to determine an unknown variable. Explore, solve and graph linear and nonlinear equations using multiple methods.
Data Analysis, Probability and Measurement: *The child will predict, interpret and display mathematical information and calculate measurement.*	Introduced to collecting data and graphing. Compares and orders objects according to size. Introduced to basic measurement. Experiences with vocabulary of time and clocks (face, hour hand, minute hand, etc.)	Design investigations and collect data, using bar graphs, line graphs and tables to show results. Describe and interpret graphs and data sets. Understands and recognizes measurable attributes (length, weight, area).	Make predictions, interpretations and basic statistical assessments recognizing effect of collection method and sample size on data set. Design experiments to predict and calculate probability. Understands and converts standardized	Generate, interpret, and collect data from various types of graphs and tables to analyze trends, trend lines and data distributions. Evaluate and make predictions of probability based on expected values and experiments. Judge and calculate distance on a coordinate

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		Familiar with English and metric measurements and applies them to objects. Recognizes and reads time to the minute.	measurement and applies appropriate type (length, weight, area, volume) and unit (English or metric) to various attributes.	grid to construct and interpret geometric shapes.
Geometry *The child will develop the use of visualization, spatial reasoning and geometric modeling to solve problems.*	Identifies and differentiates shapes and solids in the environment. Demonstrates the ability to discriminate between various objects' properties such as size, length, width, form, etc.	Discovers the properties and differentiates between two- and three-dimensional figures, including lines, angles, triangles, quadrilaterals and polygons. Describes shapes using geometric terminology such as height, width, base, point, ray, etc. Introduced to and explores concepts of congruence, similarity and equivalence.	Discovers and applies the formulas for perimeter, area, volume and proportional measurement, i.e. pi, of various polygons and circles. Draw, measure, and understand the relationships of straight lines, lines and types of angles. Applies concepts & terms of equality, similarity and equivalence. Explore and deduce the Pythagorean & Euclid Theorems.	Formulate and apply concepts of congruence and similarity to various geometric shapes. Examine and understand the connections among slope and area. Examine and evaluate the relationship between radius, diameter and circumference. Explore, formulate and calculate area, perimeter, volume and surface area of various two- and three-dimensional measurements. Formulate, apply and prove the Pythagorean Theorem.

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