Mathematics Curriculum

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Philosophy

Mathematics is a way of making sense of the world and understanding the patterns around us. Students should be actively engaged in exploring, conjecturing, and thinking rather than in the rote learning of rules and procedures. When students construct personal knowledge derived from meaningful experiences, they are much more likely to retain and use what they have learned. This fact underlies the teacher's role in providing experiences that help students make sense of mathematics, to view and use it as a tool for reasoning.

The mathematics curriculum is designed to build and expand on what the students know while addressing their individual needs. Students move from the concrete to the abstract by using manipulative materials and current technology. Effective math programs build students' ability to estimate, conduct mental computations, problem solve, communicate effectively, and apply mathematical concepts that are relevant to our rapidly changing world.

Summary of Content Standards

1.   The student will engage in the mathematical processes of problem solving and reasoning, estimation, communication, connections and applications, and using appropriate technology. *(MT Content Standard 1)*

      Problem solving is the process of applying acquired knowledge to new and unfamiliar situations. Students will utilize a variety of approaches to solve real-world problems.

2.   The student will demonstrate understanding of an ability to use numbers and operations. *(MT Content Standard 2)*

      Numbers are used to describe quantities, to compare quantities, to identify specific objects in collections, and to measure. Students will make sense of the various ways numbers are used.

3.   The student will use algebraic concepts, processes, and language to model and solve a variety of real-world and mathematical problems. *(MT Content Standard 3)*

      Computation is the process of using the operations of addition, subtraction, multiplication, and division to obtain numerical information. Students will understand how the operations are related to one another.

4.   The student will demonstrate understanding of shape and an ability to use geometry. *(MT Content Standard 4)*

      The student will analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.

5.   The student will demonstrate understanding of measurable attributes

and an ability to use measurement processes. *(MT Content Standard 5)*

Fundamental concepts of measurement are acquired through concrete experiences. Students will do measurement using the appropriate tools and levels of precision.

6.　　Students will demonstrate understanding of and an ability to use data analysis, probability, and statistics. *(MT Content Standard 6)*

Students will understand and apply basic and advanced concepts of data analysis and distributions, probability and statistics.   Probability, statistics, data analysis, and distribution are all based on the science of studying data. These areas provide real application of arithmetic and help students develop critical thinking skills. This involves collecting, sorting, representing, analyzing and interpreting information. This information will be used for predicting, drawing inferences and making decisions.

7.　　Students will demonstrate understanding of and an ability to use patterns, relations, and functions. *(MT Content Standard 7)*

Students will understand and apply basic and advanced properties of patterns, functions and algebra.

Students will learn to describe patterns of all kinds, work with formulas, and discuss unknowns in problems.

Summary of Assessment Tools

Listed below are assessment tools which may be used for any of these performance standards. It is up to each teacher to decide which assessment tools best fit the lesson.

3. Teacher observation
4. Homework/written assignments
5. Activities and projects (individual and group)
6. Checklist - a list of skills
7. Demonstration
8. Conferencing - talking to the student about what he/she understands (individual or group)
9. Class discussion
10. Portfolio - compilation of student work
11. Journals
12. Timed tests
13. Written tests

Note: Each teacher will give an end-of-the-year test or use a checklist to assess student progress which will then be passed on to the next year's teacher.

Performance Standards

Performance standards will be met if the student:

1. Understands and uses a variety of strategies in the problem-solving process

K-3	1.1	Clarifies problems using discussions with a teacher or peers
	1.2	Brainstorms possible approaches before starting a problem
	1.3	Draws pictures, models, and uses charts to represent problems
	1.4	Represents problems by patterning, classifying and sorting objects
	1.5	Makes organized lists or tables of information necessary for solving a problem
	1.6	Makes estimates of answers to problems before doing them
	1.7	Applies problem-solving strategies such as working backwards, guess and check, asking questions, reasoning, or finding a simpler related problem
4-6	1.8	Demonstrates an understanding of problem solving strategies and uses them appropriately
	1.9	States problems and solutions in his/ her words to better understand them
	1.10	Recognizes and investigates the relevance and usefulness of mathematics through applications in daily life
	1.11	Makes attempts to verify solutions or results in situations where it is warranted
	1.12	Identifies a range of possible answers for a given problem situation
	1.13	Distinguishes between pertinent and irrelevant information when solving problems
	1.14	Determines appropriate computation method in problem-solving situations (e.g., pencil and paper, mental arithmetic, calculator)
7-8	1.15	Represents real-world problems using geometric models
	1.16	Identifies similarities and differences between problem types and problem-solving strategies
	1.17	Verifies solutions or results in situations where it is warranted
	1.18	Understands that to solve mathematical problems, different methods have different advantages and disadvantages
	1.19	Determines and communicates information required to solve a problem, methods for obtaining this information, and limits of acceptable solutions
	1.20	Uses proportional thinking (e.g., rates, scaling, similarity) to solve problems

1. Cont'd — Understands and uses a variety of strategies in the problem-solving process

9-12		
	1.21	Classifies problem-solving strategies or problem types by underlying general characteristics
	1.22	Constructs and describes simple algorithms for solving problems that take several steps
	1.23	Constructs direct and indirect mathematical proofs when solving problems
	1.24	Uses inductive reasoning to make conjectures and tests the conjectures using deductive reasoning to construct either a logical verification or a counter example
	1.25	Provides simple valid arguments as justification for solutions to specific problems and for algorithms constructed for various purposes
	1.26	Writes an equation to represent a problem situation
	1.27	Experiences problem solving by patterning, classifying, graphing, and estimating, using appropriate technology
	1.28	Compares and contrasts the real number system and the complex number system
	1.29	Understands logic of algebraic procedures

2. Understands and applies basic and advanced properties of number concepts

K-3		
	2.1	Uses counting to represent numbers, by exhibiting the connection between concrete and symbolic representation of number concepts
	2.2	Uses number lines to describe small whole numbers
	2.3	Orders small sets of numbers
	2.4	Understands the basic meaning of place value
	2.5	Recognizes and counts money
	2.6	Understands there are numbers between whole numbers
	2.7	Uses fractions to count, order, and measure things encountered in everyday experiences
	2.8	Estimates objects and numbers
	2.9	Understands the difference between odd and even numbers

2. Cont'd   Understands and applies basic and advanced properties of number concepts

4-6	2.10	Understands the basic relationship between fractions, decimals, percent, and whole numbers
	2.11	Understands the basic characteristics of mixed numbers and fractions
	2.12	Understands that if '0' and '1' are located on a line, any other number can be depicted as a position on that line
	2.13	Understands when one form of a number might be more useful than another
	2.14	Renames, orders, and compares numbers presented in routine and non-routine forms (e.g., 12/6, 10, 4x2)
	2.15	Understands the associative, commutative and distributive laws
	2.16	Finds prime factors of whole numbers, and uses prime factorization to find factors, multiples, greatest common factors, and least common multiples of a set of whole numbers
7-8	2.17	Understands the similarities and differences between rational numbers and irrational numbers
	2.18	Understands the role of integers in the number system
	2.19	Understands the relationship of prime numbers to other numbers
	2.20	Understands the basic characteristics of and the relationships among fractions, ratios, proportions, decimals, and percent
	2.21	Expresses numbers using scientific notation
	2.22	Models numbers using two-dimensional regions
	2.23	Expresses numbers like 100, 1,000, and 1,000,000 and powers of 10
	2.24	Locates, identifies, and orders numbers on a number line, including fractions, decimals, and positive and negative integers
	2.25	Understands the role of place value in whole numbers as compared to decimals
	2.26	Uses the associative and commutative laws of multiplication and addition and the distributive law to simplify numerical calculations
	2.27	Represents the prime factorization of whole numbers in exponential notation, and converts whole numbers from base 10 to scientific notation
	2.28	Uses the additive and multiplicative laws of exponents to simplify mathematic expressions involving positive integral exponents and to multiply and raise numbers represented in scientific notation to powers
	2.29	Selects and uses the symbols of equalities and inequalities, operational symbols, and properties of the number systems to write mathematical expressions that satisfy given conditions

2. Cont'd   Understands and applies basic and advanced properties of number concepts

9-12	2.30	Understands the basic characteristics of the real-number system and its subsystems
	2.31	Understands the basic characteristics of roots and exponents
	2.32	Demonstrates an understanding of relative magnitude by expressing and comparing very small and very large numbers in scientific notation
	2.33	Has a basic understanding of the concept of equalities and inequalities
	2.34	Uses the associative and commutative laws of addition and multiplications and the distributive law to simplify calculations
	2.35	Understands and does basic operations on the full set of the rational numbers
	2.36	Understands complex numbers - notations, graphical representations, and applications
	2.37	Understands basic and natural logarithms

3.   Understands and uses basic and advanced procedures in the process of computation

K-3	3.1	Adds and subtracts whole numbers with accuracy
	3.2	Solves real-world problems involving addition and subtraction of whole numbers
	3.3	Multiplies and divides whole numbers with accuracy
	3.4	Understands concepts and common terms used with estimation (e.g., about, near, closer to, between, a little less than)
	3.5	Understands that it is useful to estimate quantities without knowing them exactly
	3.6	Uses a calculator to add and subtract
4-6	3.7	Adds, subtracts, multiplies, and divides whole numbers using mental math, paper and pencil, and a calculator with reasonable accuracy
	3.8	Adds, subtracts, multiplies, and divides fractions, mixed numbers, and decimals with accuracy
	3.9	Rounds whole numbers and decimals
	3.10	Accurately translates between decimals and fractions
	3.11	States, accurately, the purpose for each step in basic calculations when asked

3.　　Understands and uses basic and advanced procedures in the process of computation

4.6	3.12	Calculates what percentage one number is of another
	3.13	Understands that choices must be made when determining which operation to use
	3.14	Carries out arithmetic computations involving dollars and cents, including counting money and making change
	3.15	Solves real-world problems with multiplication and division of whole numbers, decimals, and fractions
	3.16	Understands how close an estimate is required in a given problem situation
	3.17	Uses ratios and proportions to solve a variety of problems
	3.18	Uses order of operations accurately
	3.19	Understands zero and identity properties
7-8	3.20	Rounds, adds, subtracts, multiplies, and divides decimals, mixed numbers, and fractions
	3.21	Multiplies and divides basic combinations of whole numbers mentally with reasonable accuracy
	3.22	Solves complex problems using order of operations effectively
	3.23	Understands nature of and similarities and differences between multiples and factors
	3.24	Uses a calculator to compare amounts proportionally
	3.25	Understands that addition and subtraction and inverses of one another as are multiplication and division, one operation undoes what the other does
	3.26	Understands the three basic meanings of the expression a/b (e.g., the number of units each of which has the size 1/b; 'a' divided by 'b'; and 'a' compared to or in relationship to 'b')
	3.27	Converts fractions to decimals, percentages to fractions, fractions to percentages, percentages to decimals, decimals to percentages, common fractions and mixed numbers to decimal fractions, and decimal fractions to common fractions and mixed numbers
	3.28	Solves real-world problems involving fractions, ratios, proportions, percent, and decimals
	3.29	Selects and uses appropriate type of estimation)e.g., overestimate, underestimate, range of estimate) to solve real-world problems
	3.30	Understands and describes the purpose of algorithms (e.g., regrouping with or without manipulatives, partial products, finding the greatest common divisor)

3. Cont'd   Understands and uses basic and advanced procedures in the process of computation

9-12	3.31	Adds and subtracts algebraic expressions
	3.32	Analyzes rounding errors using a calculator or computer
	3.33	Identifies the source of any discrepancy between an estimate and a calculated answer
	3.34	Understands that the reasonableness of the result of a computation can be estimated from the inputs and operations
	3.35	Solves real-world problems involving roots and exponents

4.   Understands and applies basic and advanced properties of the measurement concept

K-3	4.1	Understands the basic characteristics of weight, area, and time and how they are measured
	4.2	Uses a ruler and understands the relationships between length, width, and height
	4.3	Uses a thermometer and has a basic understanding of the concept of temperature and its measurement
	4.4	Estimates lengths, widths, and time
	4.5	Compares the differences between any two measurements
4-6	4.6	Understands the basic characteristics of area and mass and how they are measured
	4.7	Uses a ruler, protractor, thermometer, and scale for making measurements
	4.8	Determines whether measurements of length, area, volume, weight, or time are reasonable by referring to typical values
	4.9	Understands the relationship among area, volume, weight, and the relationship between time and cost
	4.10	Applies measurement skills to everyday situations
	4.11	Converts units within a system of measurement
	4.12	Understands that area can be thought of as a collection of unit squares
	4.13	Understands that volume can be thought of as a collection of unit cubes

4. Cont'd   Understands and applies basic and advanced properties of the measurement concept

4-6	4.14	Approximates the area of irregular shapes using squares, rectangles, and triangles
	4.15	Understands that scale drawings can be used to represent shapes and compare locations of things very different in size
	4.16	Understands the basic characteristics of circumference and how it is measured
	4.17	Selects and uses appropriate units of measurement, according to type and size of the unit
	4.18	Estimates, calculates and compares perimeter, area, and volume with or without formulae
7-8	4.19	Understands the basic concept of rate and perimeter and how they are measured
	4.20	Determines the level of accuracy needed in measurement situations
	4.21	Converts from one measurement to another within the same system, e.g., customary or metric (e.g., feet to miles, minutes to hours)
	4.22	Identifies and uses appropriate measuring tools for a variety of real-world situations
	4.23	Estimates distances and travel times from maps and the actual size of objects from scale drawings
	4.24	Expresses answers using appropriate units of measurement (e.g., seconds, square inches, meters)
	4.25	Performs basic conversions between standard and metric involving weight, distance, and volume
	4.26	Calculates the perimeter and area of rectangles and triangles
	4.27	Calculates the circumference and area of circles
	4.28	Solves real-world problems involving weight, distance, and volume
	4.29	Applies measurement formulas for perimeter, area, volume, and surface area in problem situations
	4.30	Solves problems involving units of measurement and converts answers to a larger or smaller unit
	4.31	Given the dimensions of a shape, creates a scale drawing of the shape
	4.32	Understands that the scale chosen for a graph or drawing makes a big difference in how useful it is
	4.33	Selects and uses appropriate formulas and procedures to determine a measure
	4.34	Understands the basic characteristics of the concept of capacity and how it is measured

4. Cont'd — Understands and applies basic and advanced properties of the measurement concept

9-12	4.35	Understands the basic concepts of velocity, rate, and acceleration and how they are measured
	4.36	Determines precision and accuracy of measurements
	4.37	Estimates the effects of measurement errors on calculations to check reasonableness of procedures
	4.38	Understands that scale drawings can help measure distances and angles that are inconvenient to measure directly
	4.39	Finds perimeter, area, surface area, and volume of geometric figures
	4.40	Makes conversions within measurement systems using conversion tables and equivalence of units
	4.41	Selects and uses appropriate formulas and procedures to determine a measure
	4.42	Uses degree and radian measurement

5. Understands and applies basic and advanced properties of the concepts of geometry

K-3	5.1	Identifies, classifies, and describes common geometric figures and terms
	5.2	Understands the basic properties, similarities, and differences between two and three-dimensional shapes
	5.3	Understands that shapes such as circles, squares, and triangles can be found in nature and in things that people make
	5.4	Understands the basic characteristics of angles
	5.5	Predicts and verifies the effects of combining, subdividing, and changing basic shapes
	5.6	Compares shapes that are parallel, perpendicular, congruent, and symmetrical
	5.7	Uses motion geometry (e.g., turns, flips, slides) to investigate concepts of symmetry, similarity, and congruence.
4-6	5.8	Identifies, classifies, and describes common geometric figures and terms
	5.9	Understands characteristics and terminology of angles
	5.10	Compares shapes that are parallel, perpendicular, congruent, and symmetrical

5. Cont'd   Understands and applies basic and advanced properties of the concepts of geometry

4-6	5.11	Uses motion geometry (e.g., turns, flips, slides, to investigate concepts of symmetry, similarity, and congruence
	5.12	Constructs geometric figures using compass and straight edge
	5.13	Demonstrates a knowledge of spatial visualization in two and three dimensions
7-8	5.14	Understands the basic characteristics of the concept of symmetry
	5.15	Uses the intersection of two-dimensional figures (e.g., lines, triangles, squares) to derive geometric definitions such as parallel, perpendicular, and midpoint
	5.16	Understands the basic characteristics of and the relationship between distance and midpoint
	5.17	Understands the basic characteristics of slope
	5.18	Determines ratios of measures in similar figures using properties of similarity
	5.19	Understands that a point can be located on a map given two perpendicular distances from the point, or given an angle and a distance from the point
	5.20	Solves real-world problems involving area of geometric figures
	5.21	Understands the basic properties, of, and the similarities and differences between a trapezoid, rhombus, and quadrilateral
	5.22	Uses a protractor, compass, and a straightedge to draw and measure angles and other geometric figures
	5.23	Explores transformations of geometric figures including translations, rotations, and reflections
	5.24	Uses and gives examples to represent geometric terms
	5.25	Uses knowledge of geometric terms, formulas, or relationships to solve problems
9-12	5.26	Understands the relationship between parallel, perpendicular, and oblique lines
	5.27	Understands basic characteristics of vectors and conic sections
	5.28	Classifies figures based on congruence and similarity
	5.29	Describes spatial relationships in geometric terms (e.g., perpendicular, parallel, tangent, similar, congruent, symmetrical)
	5.30	Solves real-world problems involving the Pythagorean theorem
	5.31	Performs algebraic transformations (e.g., translations, rotations, reflections, dilations) of geometric shapes

5.
Cont'd

Understands and applies basic and advanced properties of the concepts of geometry

9-12	5.32	Uses geometric models, diagrams, and graphs to solve real-world problems
	5.33	Uses coordinates and vectors to represent geometric figures and properties algebraically
	5.34	Uses properties of lines (e.g., distance, midpoint, slope, parallelism, perpendicularity) to describe figures algebraically
	5.35	Understands the relationship between surface area and volume of rectangular solids
	5.36	Demonstrates relationships involving geometric elements
	5.37	Uses knowledge of geometric terms, formulas, or relationships to solve problems
	5.38	Understands and applies the basic postulation definitions and theorems of Euclidean geometry
	5.39	Solves simple algebraic problems involving properties of polygons
	5.40	Understands areas and volumes and proportionality of three- dimensional figures

6.

Understands and applies basic and advanced concepts of data analysis and distributions, probability, and statistics

K-3	6.1	Understands that observations about objects or events can be organized and displayed quickly and easily in simple graphs
	6.2	Understands that data represents specific pieces of information about objects or activities
	6.3	Collects and organizes simple data sets to answer questions
	6.4	Creates a graph and understands that graphs and tables can make it easier to identity patterns
	6.5	Understands that one can find out about a group of things by studying just a few of them
	6.6	Understands that some events can be predicted fairly well but others cannot because we do not always know everything that may affect an event
4-6	6.7	Understands that data represents specific pieces of information about objects or activities

6. Cont'd — Understands and applies basic and advanced concepts of data analysis and distributions, probability, and statistics

4-6	6.8	Understands that tables and graphs can show how the values of one quantity are related to the values of another and that tables and graphs can make it easier to identify patterns
	6.9	Understands that spreading data out on a number line helps to see what the extremes are, where the data points pile up, and where the gaps are
	6.10	Graphs simple relations and functions in the first quadrant of the coordinate plane
	6.11	Understands that data comes in many different forms and that collecting, organizing, and displaying data can be done in many ways, including bar graphs, pie charts, and line graphs
	6.12	Understands basic characteristics and calculates measures of range and central tendency (e.g., mean, median, mode)
	6.13	Understands that the word 'chance' refers to the likelihood of an event
	6.14	Understands that when predictions are based on what is known about the past, one must assume that conditions stay the same from the past event to the predicted future event
	6.15	Understands that probability is generalized prediction rather than individualized outcomes
	6.16	Understands that summary predictions about large collections of events are usually more accurate than summary predictions about just a few events
	6.17	Understands that probabilities are ratios that can be expressed as fractions, percentages, or odds
	6.18	Understands the relationship between the numerical expression of a probability and the events that produce these numbers (e.g., 3/5 as it relates to the probability of pulling a green chip from a hat)
7-8	6.19	Understands basic characteristics of and calculates measures of central tendency (e.g., mean, median, mode) and interpreting data
	6.20	Identifies basic trends in tables and graphs including varying rates of change, gaps, and clusters, and uses these trends to make predictions about the phenomena being graphed
	6.21	Understands that comparison of data from two groups involves comparing their middles and the spreads around them (e.g., dispersion of data)
	6.22	Collects, constructs, reads, and interprets data in charts, tables, plots (e.g., stem-and-leaf, box-and-whiskers, scatter) and graphs (e.g., bar, circle, line)
	6.23	Understands and uses ratio and proportion to solve problems and represent the probability of an event as a fraction

6. Cont'd Understands and applies basic and advanced concepts of data analysis and distributions, probability, and statistics

7-8	6.24	Determines and predicts theoretical and experimental probabilities of events given a sample space
	6.25	Identifies and explains the uses and misuses of statistical measures
	6.26	Understands the concept of a random variable
9-12	6.27	Understands the basic features of data sets (matrices)
	6.28	Understands the basic measures of dispersion (e.g., standard deviation, variance)
	6.29	Understands the basic features of outliers and procedures to deal with them
	6.30	Represents data using stem-and-leaf plots and scatter plots
	6.31	Understands that the same set of data can be represented using a variety of tables, graphs, and symbols and that different modes of representation often convey different messages
	6.32	Understands that the middle of a distribution may be misleading under certain circumstances (e.g., when data are not distributed symmetrically, when extreme high or low values exist, when the distribution is not reasonably smooth)
	6.33	Calculates measures of central tendency (e.g., mean, median, mode) for complex sets of data and analyzes the relative merits of those measures for the various data sets
	6.34	Solves real-world problems involving data matrices
	6.35	Interpolates and extrapolates from data presented in various forms
	6.36	Understands and uses ratio and proportion to solve problems
	6.37	Describes the normal curve and uses properties to answer questions about sets of data
	6.38	Represents the probability of an event as a fraction
	6.39	Finds the probability of complementary and mutually exclusive events; understands the difference
	6.40	Uses curve fitting to predict from data
	6.41	Uses simulations and probabilities to solve problems and derive expected values
	6.42	Selects an appropriate sampling method and design a statistical experiment to study a problem and communicate the outcomes

7. Understands and applies basic and advanced properties of patterns, functions, and algebra

K-3	7.1	Understands simple patterns of geometric shapes and numbers
	7.2	Constructs a pattern and articulates why the pattern works (e.g., the rule of the pattern)
	7.3	Finds a pattern in a sequence of whole numbers and extends the sequence
	7.4	Finds replacements for variables that make simple number sentences true
4-6	7.5	Understands that at a very basic level, mathematics is the study of many kinds of patterns, including numbers and shapes, and operations applied to them
	7.6	Uses patterns and relationships to represent real-world situations
	7.7	Given general constraints, constructs a pattern and articulates why the pattern works (or 'the rule of the pattern')
	7.8	Formulates mathematical definitions, expresses generalizations discovered through investigations
	7.9	Solves word problems, including estimation and approximation using algebraic expressions
	7.10	Understands the basic concept of equation and formula with or without variables
	7.11	Understands that mathematical statements can be used to describe functional relationships for which one quantity changes when another changes
7-8	7.12	Uses substitution within given formulas and expressions with real-world problems
	7.13	Uses patterns and functions to represent and solve real-world problems
	7.14	Solves real-world problems involving formulas with one variable
	7.15	Simplifies algebraic expressions involving numbers and variables
	7.16	Extends patterns represented in tables or ordered pairs and proposes a rule to describe the relationship
	7.17	Identifies and graphs points in the coordinate plane and describes the result
	7.18	Graphs simple relations in all quadrants of the coordinate plane
	7.19	Represents relations several ways: with a graph, as ordered pairs of numbers, verbally, or as an algebraic rule, given a set of data
	7.20	Graphs linear inequalities in two variables

7. Cont'd — Understands and applies basic and advanced properties of patterns, functions, and algebra

7-8	7.21	Represents mathematical patterns using variables
	7.22	Formulates and solves systems of linear equations or inequalities algebraically or graphically
	7.23	Simplifies and evaluates algebraic expressions involving positive and negative integral exponents and square roots
	7.24	Performs the operations of addition, subtractions, and multiplication on binomials
	7.25	Factors polynomials by removing the greatest common monomial factor
	7.26	Solves word problems, including estimation and approximation
	7.27	Uses variables in algebraic expressions to represent arithmetic relationships and represents basic properties of numbers
	7.28	Translates English phrases and sentences into algebraic expressions and vice versa
	7.29	Solves linear equations of the form 'a+b=c' using integers, fractions, and decimals
	7.30	Solves simple inequalities and displays solution sets on the number line
9-12	7.31	Uses appropriate terminology and notation to define functions and their properties, including domain, range, function composition, and inverses
	7.32	Understands the characteristics and uses of basic trigonometric functions
	7.33	Investigates the effects of parameter changes on the graphs of functions, three dimensional equations and recursive relations
	7.34	Has a basic understanding of polynomial equations
	7.35	Determines the maximum and minimum points on a graph
	7.36	Compares and applies the numerical symbolic, and graphical properties of a variety of functions
	7.37	Solves systems of equations and inequalities graphically, algebraically, and using matrices
	7.38	Uses a variety of algebraic and graphical methods to solve polynomial equations with real and complex roots
	7.39	Identifies and analyzes linear and nonlinear patterns in data using line graphs
	7.40	Represents real-world problems using algebraic functions and graphs of those functions

7.
Cont'd

Understands and applies basic and advanced properties of patterns, functions, and algebra

9-12	7.41	Solves real-world problems using a variety of functions
	7.42	Approximates solutions of equations
	7.43	Solves arithmetic and geometric sequences and series
	7.44	Identifies functions and inverse functions by inspection of their graphs
	7.45	Translates graphs vertically and horizontally
	7.46	Identifies series-limits and sums of arithmetic and geometric sequences
	7.47	Uses algebra to represent patterns of change
	7.48	Solves a linear equation or inequality in one variable and two variables
	7.49	Solves practical problems involving direct and inverse variations
	7.50	Performs the operations of addition, subtraction, and multiplication on binomials
	7.51	Simplifies algebraic expressions, including fractional exponents and radicals
	7.52	Solves quadratic equations by factoring, completing the square, using a formula, and properties of roots
	7.53	Solves polynomial equations with rational roots and Descartes' Rule of Signs
	7.54	Solves word problems, including estimation and approximation
	7.55	Uses determinants and matrices
	7.56	Graphs, solves, and analyzes exponential and logarithmic equations
	7.57	Evaluates derivative of a function using algebraic procedures

Arlee Grade Level Teaching Standards - Grades 1-6

First Grade Standards

- \#   Patterns: identify, extend, create and translate
- \#   Count and recognize numbers through 100
- \#   Skip count by fives and tens
- \#   Addition and subtraction facts through 10, with or without concrete materials
- \#   Problem solving strategies
- \#   Estimation
- \#   Graphing
- \#   Geometry: recognizes basic two and three dimensional shapes
- \#   Measurement: length, weight, and volume with non-standard units
- \#   Computer exploration
- \#   Timed daily math facts

Second Grade Standards

- \#   Timed daily math facts
- \#   Problem solve brainstorm, draw pictures, classify, sort, story problems
- \#   Numbers: number line order, fractions
- \#   Estimation: all areas
- \#   Computation: add, subtract, facts to 20, use calculator, introduction to multiplication
- \#   Measurement: ruler, thermometer, time
- \#   Geometry: 2-3 dimensional shapes, movement
- \#   Data analysis: simple tables, charts, and graphs
- \#   Patterns: shapes, number, name rule
- \#   Computer exploration
- \#   Place value
- \#   Money

Third Grade Standards

- #   Place value to 100,000
- #   Addition and subtraction to 20 memorized
- #   Geometry (transformations and polygons)
- #   Multiplication facts (concrete with some memorization)
- #   Measurement (length, weight, capacity, time, temperature)
- #   Fractions (concrete and pictorially)
- #   < > Estimation
- #   Problem solving everyday experiences
- #   Division (concrete)
- #   Collecting, organizing, and analyzing data
- #   Computer and calculator explorations
- #   Money
- #   Timed daily math facts
- #   Graphing

Fourth Grade Standards

- #   Decimals
- #   Problem solving strategies
- #   Addition and subtraction facts
- #   Mastery of multiplication facts
- #   Division facts
- #   Geometry and measurement
- #   Multiplying two-digit by two-digit numbers
- #   Dividing by one-digit numbers
- #   Fractions
- #   Time and measurement
- #   Timed daily math facts
- #   Estimation
- #   Rounding
- #   Graphing

Fifth Grade Standards

- # Problem solving strategies
- # Place value and rounding
- # Addition and subtraction
- # Multiplication
- # Dividing 2 digit numbers into four digit numbers
- # Geometry and measurement
- # Fractions: addition and subtraction
- # Appropriate use of data
- # Decimals: estimation and computation
- # Measurement
- # Timed daily math facts

Sixth Grade Standards

- # Problem solving strategies
- # Addition and subtraction (rounding and place value)
- # Multiplication
- # Division
- # Mean, median, mode and range
- # Fractions: addition and subtraction
- # Fractions: multiplication and division
- # Geometry
- # Decimals: addition and subtraction
- # Decimals: multiplication and division
- # Perimeter, area, and volume
- # Integers (adding and subtracting positive and negative numbers)
- # Ratio and percent
- # Statistics and probability
- # Measurement (conversions, metric)
- # Timed daily math facts