MATHEMATICS CURRICULUM PROJECT

GOAL 8: Use algebraic and analytical methods to identify and describe patterns and relationships in data, solve problems and predict results.
Standard A: Describe numerical relationships using variables and patterns.

As a result of their schooling students will be able to…

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
1. Identify and describe simple patterns. 2. Continue a given pattern. 3. Sort objects and describe sorting process.	1. Describe common and uncommon attributes (all, some, none) in a set. 2. Recognize, describe and extend patterns such as sequences of sounds, motions, shapes, or simple numeric patterns and translate from one representation to another (e.g., red-blue-red-blue translates to snap-clap-snap-clap). 3. Describe given patterns using letters. 4. Analyze repeating patterns.	1. Sort, classify and order objects by multiple properties. 2. Create rules for multiple sortings in a single set. 3. Recognize, describe and extend geometric and numeric patterns. 4. Create patterns concretely and numerically to match a given letter description (e.g., AAB) and make predictions. 5. Extend numeric patterns involving addition and/or subtraction (e.g., 1, 3, 5, … what are the next two terms?). 6. Change patterns by manipulation of concrete materials. 7. Describe missing units in a pattern. 8. Analyze growing patterns.	1. Write, tell and show family patterns with manipulatives. 2. Discover the pattern in a sequence of numbers and extend the pattern. 3. Identify missing variables in addition, subtraction, multiplication and division number sentences. 4. Represent the idea of a variable as an unknown quantity using a letter or a symbol in a numerical sentence. 5. Identify fact families in multiplication and division	1. Identify a number pattern, both increasing and decreasing, and extend the number sequence. 2. Determine the missing number(s) in a complex repeating pattern. 3. Construct and solve simple number sentences using a symbol for a variable. 4. Make generalizations given a specific pattern. 5. Create, describe and extend patterns. 6. Describe a pattern with one operation, verbally and symbolically, given a table of input/output numbers.

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Grade 5	Grade 6	Grade 7	Grade 8/Pre-Algebra/Algebra
1. Describe, extend and make generalizations about given geometric and numeric patterns. 2. Describe a pattern, with at least two operations, verbally and symbolically, given a table of input/output numbers. 3. Demonstrate equality of two expressions with variables (e.g., 28 + 35 = 35 + *n*). 4. Describe situations involving inverse relationships (e.g., the more people, the fewer cookies per person).	1. Investigate, extend and describe arithmetic and geometric sequences of numbers whether presented in numeric or pictorial form. 2. Evaluate algebraic expressions for given values. 3. Express properties of numbers and operations using variables (e.g., the commutative property is m + n = n + m). 4. Recognize and generate equivalent forms of simple algebraic expressions.	1. Investigate, describe and generalize a variety of patterns using variable or recursive techniques. 2. Represent situations using variables. 3. Recognize and generate equivalent forms of simple algebraic expressions.	1. Analyze, extend and create sequences or linear functions and determine algebraic expressions to describe the n^{th} term of a sequence. 2. Write an expression using variables to represent unknown quantities. 3. Investigate and describe linear and quadratic patterns. 4. Write, evaluate and simplify algebraic expressions, equations and inequalities. 5. Recognize, generate and write equivalent forms for linear equations, inequalities and systems of equations. 6. Model and describe slope as a constant rate of change. 7. Determine an equation of a line of best fit from a set of ordered pairs or set of data points. 8. Simplify algebraic expressions using a variety of methods including factoring. 9. Justify results (explain reasoning) including those carried out by technology. 10. Solve and graph equations and inequalities containing absolute value.

GOAL 8: Use algebraic and analytical methods to identify and describe patterns and relationships in data, solve problems and predict results.
Standard B: Interpret and describe numerical relationships using tables, graphs and symbols.

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Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
1. Make and read graphs.	1. Describe and compare qualitative change, (e.g., student grows taller). 2. Read and complete a concrete pictorial and bar graph. 3. Use information to make a concrete pictorial and bar graph. 4. Complete hundred chart and find pattern.	1. Describe and compare quantitative change (e.g., student grows two inches in one year).	1. Solve a problem using a table when data is given. 2. Create a table by extracting the data from a word problem. 3. Accurately read and interpret information on graphs, charts and tables. 4. Complete a multiplication table.	1. Create a table that describes a function rule for a single operation. 2. Demonstrate, in simple situations, how a change in one quantity results in a change in another quantity (e.g., increase the measure of the side of a square and the perimeter increases). 3. Identify situations with well-defined patterns and varying rates of change using words, tables and graphs (e.g., represent temperature and time in a line graph).

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1. Model problem situations with objects and equations to draw conclusions. Represent and analyze patterns and functions using words, tables and graphs. 2. Demonstrate, in simple situations, how a change in one quantity results in a change in another quantity (e.g., input-output tables). 3. Interpret and express different representations (tables and graphs) of whole number relationships.	1. Graph simple inequalities on a number line. 2. Create a table of values that satisfy a simple linear equation and plot the points on the Cartesian plane. 3. Describe verbally, symbolically and graphically, a simple relationship presented by a set of ordered pairs of numbers.	1. Create a table of values that satisfy a power or exponential relationship and plot the points on the Cartesian plane. 2. Graph two inequalities with a single variable, including the intersection or union of these inequalities, on a number line.	1. Recognize, describe and extend patterns using rate of change. 2. Interpret the meaning of slope and intercepts in linear situations. 3. Graph linear equations, inequalities and absolute values on the Cartesian plane. 4. Graph absolute values on a number line. 5. Determine the slope of a line from a graph, in an equation and from a table of values. 6. Interpret the role of the coefficients and constants on the graph of linear and quadratic functions given a set of equations. 7. Identify the graphs of linear, absolute value and quadratic functions.

GOAL 8: Use algebraic and analytical methods to identify and describe patterns and relationships in data, solve problems and predict results.
Standard C: Solve problems using systems of numbers and their properties.
Standard D: Use algebraic concepts and procedures to represent and solve problems.

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Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
1. Solve story problems using manipulative, pictures and numbers. 2. Use manipulatives to represent and solve addition and subtraction problems. 3. Explain the concept of "adding on" and "taking away."	1. Use manipulatives or draw pictures to find sums, differences, missing addends, missing subtrahends. 2. Solve simple number sentences with variables (e.g., missing addend problems). 3. Solve real life word problems using patterns.	1. Solve word problems involving unknown quantities. 2. Apply the relationship of addition and subtraction families to solve for an unknown quantity. 3. Solve problems and justify solutions using patterns.	1. Identify and use the associative, commutative and zero properties in multiplication and addition. 2. Identify the identity property in addition and multiplication. 3. Write multiplication and division facts and use manipulatives to show groupings. 4. Use addition to check answers in subtraction problems with two, three, and four digit numbers. 5. Find the missing factors in multiplication problems. 6. Find the missing dividend or divisor in division problems. 7. Demonstrate how to select and use an appropriate operation to solve problems involving patterns (e.g., save one penny on day 1, double that amount each day for 10 days). 8. Solve word problems involving unknown quantities.	1. Solve problems with whole numbers using appropriate properties of operations. 2. Solve one-step linear equations with one missing value in isolation and in problem solving situations.

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Grade 5	Grade 6	Grade 7	Grade 8/Pre-Algebra/Algebra
1. Solve problems with whole numbers using order of operations, equality properties and appropriate properties (commutative, associative, zero, identity). 2. Create and solve linear equations involving whole numbers using a variety of methods (e.g., guess and check, bean stick counters).	1. Identify and explain incorrect uses of the commutative, associative and distributive properties. 2. Identify and provide examples of the identity property of addition and multiplication. 3. Identify and provide examples of inverse operations. 4. Explain why division by zero is undefined. 5. Create, model and solve algebraic equations using concrete materials. 6. Solve linear equations, including direct variation, with whole number coefficients and solutions using algebraic or graphical representations.	1. Solve arithmetic and linear equations using the properties of equality and inequality. 2. Solve simple linear equations, including direct variation, with integral coefficients, using algebraic or graphical representations. 3. Solve simple problems involving quadratic relationships using technology for graphing.	1. Use linear systems to solve real life problems. 2. Describe the relationship of a mathematical model of a problem to the real problem. 3. Represent and solve algebraic equations or word problems that involve linear equations or inequalities using algebraic or graphical representations. 4. Solve absolute value equations or inequalities in one variable. 5. Solve equivalent forms of equations, inequalities and systems of equations. 6. Identify and provide examples or counter examples as appropriate for the reflexive, symmetric and transitive properties of inequality. 7. Solve simple quadratic equations using algebraic or graphical representations.