NC Math 1 Pacing Guide

This pacing guide is the collaborative work of math teachers, coaches, and curriculum leaders from 38 NC public school districts. The teams worked through two face-to-face meetings and digitally to compile the information presented. NC Math 1, 2, and 3 standards were used to draft possible units of study for these courses. This is a first draft living document. Teams plan to meet throughout the year to continually tweak, update and refine these guides. Updates will be posted as available to this google document.

Please reference the NC Math 1, 2, or 3 standards for any questions or discrepancies. This document should be used only **after** reading the NC Math 1, 2, and 3 standards and instructional guides provided by NC DPI.

If you have suggestions or comments that you would like the collaborative writing team to consider for revisions, please email sdupree@wcpss.net or stefanie.buckner@bcsemail.org.

Unit	Number of Days (Block)	Number of Days (Traditional)
Unit 1: Equations & Introduction to Functions	10	20
Unit 2: Linear Functions	15	30
Unit 3: Systems of Equations and Inequalities	12	24
Unit 4: Exponential Functions	14	28
Unit 5: Quadratic Functions	15	30
Unit 6: Statistics	9	18
Total (allowing for flex days)	**75**	**150**

Learning Intentions: These are big ideas, understandings, important math that needs to be developed. They are not necessarily measurable statements. Ideally a unit will have a handful of learning intentions.

Success Criteria: These are directly associated with a learning intention and articulate to students measurable, tangible, observable demonstrations of the learning intention. Typically one learning intention has around 3 to 5 success criteria.

Unit 1: Equations & Introduction to Functions
Suggested Order: 1 of 6 Suggested Time (Semester long: 10 days Year long: 20 days)

Standards	Learning Intentions	Success Criteria
NC.M1.A-SSE.1a NC.M1.A-REI.3 NC.M1.A-REI.1 NC.M1.A.REI.12 NC.M1.A-CED.1 NC.M1.A-CED.4	Construct expressions, equations, and inequalities from a given context and determine the appropriateness of the solution(s).	(NC.M1.A-SSE.1a) I can identify parts of an expression including terms, constants, coefficients, and exponents. (NC.M1.A-REI.3) I can find the solution of an equation or an inequality. (NC.M1.A-REI.1) I can justify my chosen solution method when solving equations. (NC.M1.A.REI.12) I can find and graph the solution of an inequality. (NC.M1.A-CED.1) I can create an equation and inequality in one variable to solve a problem. (NC.M1.A-CED.4) I can solve an equation for a given variable.
NC.M1.F-IF.2 NC.M1.F-IF.1 NC.M1.F-IF.4	Distinguish key features of a function given multiple representations.	(NC.M1.F-IF.2) I can evaluate using function notation. (NC.M1.F-IF.1) I can identify domain and range when given a relation, table, or graph. (NC.M1.F-IF.4) I can identify key features of graphs and tables including increasing, decreasing, maximums and minimums.
Possible honors topic:		
8th Grade Standards that can be integrated into this unit	**Expressions & Equations** ***Analyze and solve linear equations and pairs of simultaneous linear equations.***	
	8.EE.7 8.EE.7.a	Solve linear equations in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).
	8.EE.7.b	b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

	Functions ***Define, evaluate, and compare functions.***	
	8.F.1	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.
	Functions ***Use functions to model relationships between quantities.***	
	8.F.5	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Unit 2: Linear Functions
Suggested Order: 2 of 6 Suggested Time (Semester long: 15 days Year long: 30 days)

Standards	Learning Intentions	Success Criteria
Key Features: NC.M1.A-SSE.1a NC.M1.A-SSE.1b NC.M1.F-IF.6 NC.M1.A-CED.1 NC.M1.A-CED.2 NC.M1.F-BF.1a NC.M1.F-LE.1 NC.M1.A-REI.10 NC.M1.G-GPE.5	A. Identify, create, and graph linear equations and their key features.	(NC.M1.A-SSE.1ab) I can identify and interpret the slope and y-intercept of a linear equation. (NC.M1.F-IF.6) I can calculate and interpret the rate of change (slope) numerically, graphically, and/or symbolically. (NC.M1.A-CED.1) I can create and graph linear equations. (NC.M1.A-CED.2) I can create an equation to graph horizontal and vertical lines. (NC.M1.F-BF.1a) I can write a linear equation from a table, graph, or relation. (NC.M1.F-LE.1) I can determine if given situation is linear or nonlinear. (NC.M1.A-REI.10) I can identify the set of all solutions to a linear equation by interpreting the graph. (NC.M1.G-GPE.5) I can use slope to determine if lines are parallel or perpendicular. (NC.M1.G-GPE.5) I can find the equation of a parallel or perpendicular line that passes through a given point.
NC.M1.F-IF.3 NC.M1.F-BF.2	B. Determine the explicit and recursive formula for given	(NC.M1.F-IF.3) I can write a recursive formula from a sequence. (i.e. informal: NEXT*NOW; formal: a_n) (NC.M1.F-BF.2) I can use an explicit form of an arithmetic sequence to write the recursive form and vice versa.

*NC.M1.A-REI.1 - embedded throughout entire unit	arithmetic sequences.	
Applications: NC.M1.F-LE.5 NC.M1.F-IF.5 NC.M1.S-ID.9 NC.M1.F-IF.9 NC.M1.F-IF.7 NC.M1.S.ID.6 NC.M1.S-ID.7 NC.M1.S-ID.8 NC.M1.S-ID.6b NC.M1.S-ID.6a NC.M1.G-GPE.6 NC.M1.G-GPE.4	A. Understand and compare the key features of linear functions. B. Assess the line of best fit for a given set of data by using the correlation coefficient, residuals, and least squares regression line. C. Apply the distance and midpoint formulas in context.	(NC.M1.F-LE.5) I can interpret the slope and y-intercept of a linear function in a given context. (NC.M1.F-IF.5) I can interpret the domain and range of a linear equation in context. (NC.M1.S-ID.9) I can distinguish between association and causation. (NC.M1.F-IF.9) I can compare slopes and intercepts of linear functions given different representations. (NC.M1.F-IF.7) I can compare key features of linear functions given different representations. (NC.M1.S.ID.6) I can represent two variable data on a scatter plot. (NC.M1.S-ID.7) I can predict future values and assess the validity of a linear function. (NC.M1.S-ID.8) I can analyze patterns and find the correlation coefficient using technology. (NC.M1.S-ID.6b) I can use the line of best fit to analyze residuals. (NC.M1.S-ID.6a) I can use technology to fit a least squares regression line a set of data. (NC.M1.G-GPE.6) I can find the midpoint and endpoint of a line segment. (NC.M1.G-GPE.4) I can apply the distance formula to find the perimeter and area of polygons.
Possible honors topic:		
8th Grade Standards that can be integrated into this unit	**Functions** ***Define, evaluate, and compare functions.***	
	8.F.2	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*

	8.F.3	Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function A = s^2 giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*
	Functions ***Use functions to model relationships between quantities.***	
	8.F.4	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
	Statistics and Probability ***Investigate patterns of association in bivariate data.***	
	8.SP.1	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
	8.SP.2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
	8.SP.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*

Unit 3: Systems of Equations & Inequalities Suggested Order: _3_ of _6_		Suggested Time (Semester long: 12 days Year long: 24 days)
Standards	**Learning Intentions**	**Success Criteria**

NC.M1.A-CED.3 NC.M1.A-REI.5	A. Create systems of linear equations in context.	(NC.M1.A-CED.3) I can write systems of linear equations to model situations. (NC.M1.A-REI.5) I can demonstrate that the two-variable linear equation that represents the sum of the linear equations in a system contains the solution of the system. (NC.M1.A-REI.5) I can replace one equation with the sum of that equation and a multiple of the other to create a system with the same solutions as the original system. (NC.M1.A-REI.5) I can transform a given system into an equivalent system that has the same solution as the original system.
NC.M1.A-REI.6 NC.M1.A-REI.11 NC.M1.A-REI.12	B. Solve systems of linear equations and interpret solutions in context.	(NC.M1.A-REI.6) I can find exact solutions to systems of linear equations by elimination. (NC.M1.A-REI.6) I can find approximate or exact solutions to systems of linear equations by graphing and by using graphing technology. (NC.M1.A-REI.6) I can find exact solutions to systems of linear equations by the substitution method. (NC.M1.A-REI.11) I can infer that since y = f(x) and y= g(x), f(x) = g(x) represents a solution to the system. (NC.M1.A-REI.12) I can use systems of equations to solve real world applications and interpret solutions in terms of a context.
	C. Create and solve systems of linear inequalities and interpret solutions in context.	(NC.M1.A-CED.3) I can write systems of linear inequalities to model situations. (NC.M1.A-CED.3). I can represent the solutions of a linear inequality graphically as a region of the plane. (NC.M1.A-REI.12) I can represent the solutions of a system of linear inequalities graphically as a region of the plane.
Possible honors topic:		
8th Grade Standards that can be integrated into this unit		

Unit 4: Exponential Functions Suggested Order: 4 of 6		Suggested Time (Semester long: 14 days Year long: 28 days)
Standards	**Learning Intentions**	**Success Criteria**

Key Features: NC.M1.N-RN.2	A. Understand and apply exponent properties.	(NC.M1.N-RN.2) I can rewrite algebraic expressions involving integer exponents using the properties of exponents.
NC.M1.F-IF.3 NC.M1.F-BF.2	B. Determine the explicit and recursive formula for given geometric sequences.	(NC.M1.F-IF.3) I can recognize that recursively and explicitly defined sequences are linear or exponential. (NC.M1.F-BF.2) I can translate between explicit and recursive forms of geometric sequences and use both to model situations.
NC.M1.F-IF.2 NC.M1.F-IF.4 NC.M1.A-CED.1 NC.M1.A-CED.2 NC.M1.A-REI.10 NC.M1.F-IF.6 NC.M1.F-LE.5	C. Evaluate, create, and interpret exponential functions in context.	(NC.M1.F-IF.2) I can use function notation to evaluate exponential functions and interpret statements that use function notation within context. (NC.M1.F-IF.4) I can interpret the key features in context of an exponential function given a graph, table, or verbal descriptions. (NC.M1.A-CED.1) I can create an exponential function to solve problems. (NC.M1.A-CED.2)(NC.M1.A.REI.10) I can create and graph an exponential function to solve problems and understand that the graph is the set of all solutions. (NC.M1.F-IF.6) I can calculate and interpret the rate of change over a specific interval given a function. (NC.M1.F-LE.5) I can determine and explain the rate of change and initial value of an exponential function within context.
Applications: NC.M1.F-LE.1 NC.M1.F-IF.5 NC.M1.F-IF.7	A. Identify situations and practical domains for exponential functions.	(NC.M1.F-LE.1) I can identify situations that can be modeled appropriately with exponential functions. (NC.M1.F-IF.5) I can provide a reasonable domain for an exponential function given a contextual situation. (NC.M1.F-IF.7) I can analyze an exponential function by identifying and using the key features of different representations.
NC.M1.F-IF.8b NC.M1.F-LE.3 NC.M1.A-SSE.1 NC.M1.F-IF.9 NC.M1.A-REI.11	B. Compare, interpret, and explain key features of exponential functions.	(NC.M1.F-IF.8b) I can interpret and explain growth and decay rates for an exponential function. (NC.M1.F-LE.3) I can compare the end behavior of exponential functions to show an increase exceeding a linear or quadratic quantity. (NC.M1.A-SSE.1) I can interpret expressions that represent a quantity in terms of its context. (NC.M1.F-IF.9) I can compare key features of two functions, linear and exponential. (NC.M1.A-REI.11) I can infer that since y = f(x) and y= g(x), f(x) = g(x) represents a solution

NC.M1.F-BF.1a NC.M1.F-BF.1b NC.M1.S-ID.6c	C. Write and apply exponential functions given multiple representations.	to the system. (NC.M1.F-BF.1a) I can write an exponential equation from a table, graph, or relation. (NC.M1.F-BF.1b) I can write an exponential function to represent the relationship between two quantities (NC.M1.S-ID.6c) I can use technology to find an appropriate function for a set of data and use it to solve problems in the context of the data.
Possible honors topic:		
8th Grade Standards that can be integrated into this unit		

Unit 5: Quadratic Functions Suggested Order: 5 of 6		Suggested Time (Semester long: 15 days Year long: 30 days)
Standards	**Learning Intentions**	**Success Criteria**
Key Features: NC.M1.A-APR.1 NC.M1.N-RN.2 NC.M1.A-SSE.1ab	A. Understand the terms and properties of polynomials.	(NC.M1.A-APR.1) I can add and subtract quadratic expressions. (NC.M1.A-APR.1) I can add, subtract, and multiply linear expressions. (NC.M1.N-RN.2) I can rewrite algebraic expressions with integer exponents using the properties of exponents. (NC.A-SSE.1ab) I can identify and interpret the meanings of a, b, and c in a quadratic expression in standard form and explain what the graph and table would look like.
NC.M1.F-IF.7 NC.M1.F-IF.9 NC.M1.F-LE.3 NC.M1.F-IF.6 NC.M1.F-IF.8a	B. Understand how the values of a, b, and c in the quadratic expression affect the key features of the	(NC.M1.F-IF.7) I can identify and interpret key features of a quadratic function. (NC.M1.F-IF.9) I can compare key features of two functions (linear, quadratic, or exponential) with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions). (NC.M1.F-LE.3) I can compare two functions in graph or table form to determine that a

NC.M1. A-REI.10 NC.M1.F-IF.2 NC.M1.A-CED.2 NC.M1.A-CED.1	function to include: the direction of opening, steepness, maximum, minimum, y-intercept, axis of symmetry, end behavior and placement on the graph.	quantity increasing exponentially will eventually exceed a function increasing linearly or quadratically. (NC.M1.F-IF.6) I can calculate and interpret the rate of change given an interval numerically, graphically, and/or symbolically. (NC.M1.F-IF.8a) I can rewrite quadratic functions to reveal and interpret key features (NC.M1.A-REI.10) I can determine and explain why a sample set of given points are solutions to a given equation and its graph. (NC.M1.F-IF.2) I can use function notation to evaluate quadratic functions given values in their domains and interpret in context. (NC.M1.A-CED.2) I can write/create a quadratic equation to model the relationship between two variables. (NC.M1.A-CED.1) I can create and use a quadratic equation in one variable that represents a quadratic relationship and use them to solve problems.
NC.M1.A-SSE.3 NC.M1.A-REI.4 NC.M1.A-APR.3 NC.M1.A-REI.1 NC.M1.A-REI.11	C. Understand how to factor and solve quadratics.	(NC.M1.A-SSE.3) I can find the factored form of a quadratic expression given the standard form to determine the solutions (*given a is an integer*). (NC.M1.A-REI.4) I can solve for real solutions of quadratic equations in one variable by taking square roots and factoring. (NC.M1.A-APR.3) I can understand the relationships between the factors, solutions and zeros of a quadratic function. (NC.M1.A-REI.1) I can justify the steps taken to solve a quadratic equation. (NC.M1.A-REI.11) I can determine the solutions of a quadratics system and understand why the x-coordinates are the solutions of the equation f(x) = g(x). (NC.M1.A-REI.11) I can approximate solutions to a quadratic system using graphing technology or a table of values.
Applications: NC.M1.F-IF.4 NC.M1.A-APR.1 NC.M1.A-SSE.1b NC.M1.F-BF.1b NC.M1.F-IF.5 NC.M1.A-REI.11 NC.M1.F-IF.7	A. Understand equivalent forms of quadratic expressions can be created by applying operations to expressions. B. Understand the key	(NC.M1.F-IF.4) I can identify and interpret key features of graphs, tables and verbal descriptions in context to describe functions relating two quantities to include: intercepts, intervals where the function is increasing, decreasing, positive, or negative, and maximums and minimums. (NC.M1.A-APR.1) I can create quadratic expressions by adding, subtracting, and multiplying linear expressions or combining two or more quadratic expressions. (NC.M1.A-SSE.1b) I can interpret parts of a quadratic expression to give meaningful context

NC.M1.S-ID.8	features of quadratic functions in context and their graph. ***Note:*** *Incorporate the use of technology to approximate solutions or successive approximations with a table of values.*	to the expression. (NC.M1.F-BF.1b) I can build a function that models a relationship between two quantities by combining linear, exponential, or quadratic functions with addition and subtraction or two linear functions with multiplication. (NC.M1.F-IF.5) I can interpret and describe a function by relating its domain and range to its graph. (NC.M1.A-REI.11) I can identify and describe the meaning of the intersection of the functions y = f(x) and y = g(x) for two quadratic equations. (NC.M1.F-IF.7) I can analyze key features of quadratic functions in different representations to include: domain and range, rate of change, intercepts, intervals where the function is increasing, decreasing, positive or negative, maximums and minimums, and end behavior. (NC.M1.S-ID.8) I can analyze patterns and describe relationships between two variables in context by using technology to determine the correlation coefficient to interpret the strength and direction of a linear relationship. (NC.M1.S-ID.8) I can use a scatter plot, correlation coefficient, and a residual plot to determine the appropriateness of using a linear function to model a relationship between two variables.
Possible honors topic:		
8th Grade Standards that can be integrated into this unit		

Unit 6: Statistics Suggested Order: 6 of 6		Suggested Time (Semester long: 9 days Year long: 18 days)
Standards	**Learning Intentions**	**Success Criteria**
NC.M1.S-ID.1 NC.M1.S-ID.2	Understand how to summarize, represent,	(NC.M1.S-ID.1) I can use technology to represent data with histograms or box plots on the real number line.

NC.M1.S-ID.3	and interpret categorical and quantitative data on a single count or measurement variable.	(NC.M1.S-ID.2) I can use statistics to compare median and mean of two or more different data sets. (NC.M1.S-ID.2)I can use statistics to compare interquartile range and standard deviation of two or more different data sets. (NC.M1.S-ID.2) I can interpret differences in the shape, center, and spread of data sets. (NC.M1.S-ID.3) I can explain the effect of an outlier on the shape, center, and spread.
Possible honors topic:		
8th Grade Standards that can be integrated into this unit		