

NCEOC Tutorials for North Carolina are designed specifically for the North Carolina Standard Course of Study, to prepare students for the North Carolina End of Course exam (NCEOC). EOC Categories are at the heart of NCEOC Tutorial structure – bringing category-based learning to the student experience, and category-based performance and progress tracking to the teacher experience.

Math Tutorials offer targeted instruction, practice and review designed to develop computational fluency, deepen conceptual understanding, and apply mathematical practices. They automatically identify and address learning gaps down to elementary-level content, using adaptive remediation to bring students to grade-level no matter where they start. Students engage with the content in an interactive, feedback-rich environment as they progress through standards-aligned modules. By constantly honing the ability to apply their knowledge in abstract and real world scenarios, students build the depth of knowledge and higher order skills required to demonstrate their mastery when put to the test.

In each module, the Learn It and Try It make complex ideas accessible to students through focused content, modeled logic and process, multi-modal representations, and personalized feedback as students reason through increasingly challenging problems. The Review It offers a high impact summary of key concepts and relates those concepts to students' lives. The Test It assesses students' mastery of the module's concepts, providing granular performance data to students and teachers after each attempt. To help students focus on the content most relevant to them, unit-level pretests and posttests can quickly identify where students are strong and where they're still learning.

Test-Taking Strategies for EOC Tutorials allow students to practice and apply learning approaches that will hone their test-taking skills and focus them for success on the day of their EOC test.

## Unit 1: Solving Equations

### • ONE-STEP EQUATIONS AND INEQUALITIES

- NC.M1.A-CED.1: Algebra Creating Equations Create equations that describe numbers or relationships. Create equations and inequalities in one variable that represent linear, exponential, and quadratic relationships and use them to solve problems.
- NC.M1.A-REI.1: Algebra Reasoning with Equations and Inequalities Understand solving equations as a process of reasoning and explain the reasoning. Justify a chosen solution method and each step of the solving process for linear and quadratic equations using mathematical reasoning.
- NC.M1.A-REI.3: Algebra Reasoning with Equations and Inequalities Solve equations and inequalities in one variable. Solve linear equations and inequalities in one variable.

- **MULTI-STEP EQUATIONS AND INEQUALITIES**

- NC.M1.A-CED.1: Algebra Creating Equations Create equations that describe numbers or relationships. Create equations and inequalities in one variable that represent linear, exponential, and quadratic relationships and use them to solve problems.
- NC.M1.A-REI.1: Algebra Reasoning with Equations and Inequalities Understand solving equations as a process of reasoning and explain the reasoning. Justify a chosen solution method and each step of the solving process for linear and quadratic equations using mathematical reasoning.
- NC.M1.A-REI.3: Algebra Reasoning with Equations and Inequalities Solve equations and inequalities in one variable. Solve linear equations and inequalities in one variable.

- **AXIOMS OF EQUALITY**

- NC.M1.A-CED.4: Algebra Creating Equations Create equations that describe numbers or relationships. Solve for a quantity of interest in formulas used in science and mathematics using the same reasoning as in solving equations.
- NC.M1.A-REI.1: Algebra Reasoning with Equations and Inequalities Understand solving equations as a process of reasoning and explain the reasoning. Justify a chosen solution method and each step of the solving process for linear and quadratic equations using mathematical reasoning.

- **LITERAL EQUATIONS**

- NC.M1.A-CED.4: Algebra Creating Equations Create equations that describe numbers or relationships. Solve for a quantity of interest in formulas used in science and mathematics using the same reasoning as in solving equations.

## Unit 2: Writing and Simplifying Expressions and Equations

- **FORMULATING AND SIMPLIFYING ALGEBRAIC EXPRESSIONS**

- NC.M1.A-SSE.1a: Algebra Seeing Structure in Expressions Interpret the structure of expressions. Interpret expressions that represent a quantity in terms of its context. Identify and interpret parts of a linear, exponential, or quadratic expression, including terms, factors, coefficients, and exponents.
- NC.M1.A-SSE.1b: Algebra Seeing Structure in Expressions Interpret the structure of expressions. Interpret expressions that represent a quantity in terms of its context. Interpret a linear, exponential, or quadratic expression made of multiple parts as a combination of entities to give meaning to an expression.

- **FORMULATING AND SOLVING EQUATIONS FROM WORD PROBLEMS**

- NC.M1.A-CED.1: Algebra Creating Equations Create equations that describe numbers or relationships. Create equations and inequalities in one variable that represent linear, exponential, and quadratic relationships and use them to solve problems.
- NC.M1.A-REI.3: Algebra Reasoning with Equations and Inequalities Solve equations and inequalities in one variable. Solve linear equations and inequalities in one variable.
- NC.M1.A-REI.1: Algebra Reasoning with Equations and Inequalities Understand solving equations as a process of reasoning and explain the reasoning. Justify a chosen solution method and each step of

the solving process for linear and quadratic equations using mathematical reasoning.

- **FORMULATING AND SOLVING INEQUALITIES FROM WORD PROBLEMS**

- NC.M1.A-CED.1: Algebra Creating Equations Create equations that describe numbers or relationships. Create equations and inequalities in one variable that represent linear, exponential, and quadratic relationships and use them to solve problems.
- NC.M1.A-REI.3: Algebra Reasoning with Equations and Inequalities Solve equations and inequalities in one variable. Solve linear equations and inequalities in one variable.

- **LAWS OF EXPONENTS**

- NC.M1.N-RN.2: Number and Quantity The Real Number System Extend the properties of exponents to rational exponents. Rewrite algebraic expressions with integer exponents using the properties of exponents.

### Unit 3: Functions

- **FUNCTIONS AND RELATIONS**

- NC.M1.F-IF.1: Functions Interpreting Functions Understand the concept of a function and use function notation. Build an understanding that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range by recognizing that: if  $f$  is a function and  $x$  is an element of its domain, then  $f(x)$  denotes the output of  $f$  corresponding to the input  $x$ . The graph of  $f$  is the graph of the equation  $y = f(x)$ .
- NC.M1.F-IF.2: Functions Interpreting Functions Understand the concept of a function and use function notation. Use function notation to evaluate linear, quadratic, and exponential functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
- NC.M1.F-IF.5: Functions Interpreting Functions Interpret functions that arise in applications in terms of the context. Interpret a function in terms of the context by relating its domain and range to its graph and, where applicable, to the quantitative relationship it describes.

- **DOMAIN AND RANGE**

- NC.M1.F-IF.5: Functions Interpreting Functions Interpret functions that arise in applications in terms of the context. Interpret a function in terms of the context by relating its domain and range to its graph and, where applicable, to the quantitative relationship it describes.
- NC.M1.F-IF.2: Functions Interpreting Functions Understand the concept of a function and use function notation. Use function notation to evaluate linear, quadratic, and exponential functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
- NC.M1.F-IF.1: Functions Interpreting Functions Understand the concept of a function and use function notation. Build an understanding that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range by recognizing that: if  $f$  is a function and  $x$  is an element of its domain, then  $f(x)$  denotes the output of  $f$  corresponding to the input  $x$ . The graph of  $f$  is the graph of the equation  $y = f(x)$ .

- **EVALUATING FUNCTIONS**

- NC.M1.F-IF.2: Functions Interpreting Functions Understand the concept of a function and use function notation. Use function notation to evaluate linear, quadratic, and exponential functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
- NC.M1.F-IF.5: Functions Interpreting Functions Interpret functions that arise in applications in terms of the context. Interpret a function in terms of the context by relating its domain and range to its graph and, where applicable, to the quantitative relationship it describes.

#### Unit 4: Slopes of Linear Equations

- **SLOPE**

- NC.M1.F-IF.4: Functions Interpreting Functions Interpret functions that arise in applications in terms of the context. Interpret key features of graphs, tables, and verbal descriptions in context to describe functions that arise in applications relating two quantities, including: intercepts; intervals where the function is increasing, decreasing, positive, or negative; and maximums and minimums.
- NC.M1.F-IF.7: Functions Interpreting Functions Analyze functions using different representations. Analyze linear, exponential, and quadratic functions by generating different representations, by hand in simple cases and using technology for more complicated cases, to show key features, including: 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.G-GPE.5: Geometry Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically. Use coordinates to prove the slope criteria for parallel and perpendicular lines and use them to solve problems. Determine if two lines are parallel, perpendicular, or neither. Find the equation of a line parallel or perpendicular to a given line that passes through a given point.

- **PARALLEL AND PERPENDICULAR LINES**

- NC.M1.G-GPE.5: Geometry Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically. Use coordinates to prove the slope criteria for parallel and perpendicular lines and use them to solve problems. Determine if two lines are parallel, perpendicular, or neither. Find the equation of a line parallel or perpendicular to a given line that passes through a given point.

#### Unit 5: Graphing Linear Equations

- **GRAPHING AND ANALYZING LINEAR FUNCTIONS**

- NC.M1.A-CED.2: Algebra Creating Equations Create equations that describe numbers or relationships. Create and graph equations in two variables to represent linear, exponential, and quadratic relationships between quantities.
- NC.M1.F-IF.7: Functions Interpreting Functions Analyze functions using different representations. Analyze linear, exponential, and quadratic functions by generating different representations, by hand in simple cases and using technology for more complicated cases, to show key features, including: 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.F-BF.1a: Functions Building Functions Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. Build linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two ordered pairs (include reading these from a table).
- NC.M1.F-IF.5: Functions Interpreting Functions Interpret functions that arise in applications in terms of the context. Interpret a function in terms of the context by relating its domain and range to its graph and, where applicable, to the quantitative relationship it describes.
- NC.M1.F-LE.5: Functions Linear, Quadratic, and Exponential Models Interpret expressions for functions in terms of the situation they model. Interpret the parameters and in a linear function  $y = mx + b$  or an exponential function  $y = ab^x$  in terms of a context.
- NC.M1.F-IF.4: Functions Interpreting Functions Interpret functions that arise in applications in terms of the context. Interpret key features of graphs, tables, and verbal descriptions in context to describe functions that arise in applications relating two quantities, including: intercepts; intervals where the function is increasing, decreasing, positive, or negative; and maximums and minimums.
- NC.M1.A-REI.10: Algebra Reasoning with Equations and Inequalities Represent and solve equations and inequalities graphically. Understand that the graph of a two variable equation represents the set of all solutions to the equation.
- NC.M1.F-LE.1: Functions Linear, Quadratic, and Exponential Models Construct and compare linear and exponential models and solve problems. Identify situations that can be modeled with linear and exponential functions, and justify the most appropriate model for a situation based on the rate of change over equal intervals.
- NC.M1.F-LE.5: Functions Linear, Quadratic, and Exponential Models Interpret expressions for functions in terms of the situation they model. Interpret the parameters and in a linear function  $y = mx + b$  or an exponential function  $y = ab^x$  in terms of a context.
- NC.M1.F-LE.5: Functions Linear, Quadratic, and Exponential Models Interpret expressions for functions in terms of the situation they model. Interpret the parameters and in a linear function  $y = mx + b$  or an exponential function  $y = ab^x$  in terms of a context.
- NC.M1.F-LE.5: Functions Linear, Quadratic, and Exponential Models Interpret expressions for functions in terms of the situation they model. Interpret the parameters and in a linear function  $y = mx + b$  or an exponential function  $y = ab^x$  in terms of a context.
- **GRAPHING AND MANIPULATING  $y = mx + b$**
- NC.M1.A-CED.2: Algebra Creating Equations Create equations that describe numbers or relationships. Create and graph equations in two variables to represent linear, exponential, and quadratic relationships between quantities.
- NC.M1.F-IF.4: Functions Interpreting Functions Interpret functions that arise in applications in terms of the context. Interpret key features of graphs, tables, and verbal descriptions in context to describe functions that arise in applications relating two quantities, including: intercepts; intervals where the function is increasing, decreasing, positive, or negative; and maximums and minimums.

- NC.M1.F-IF.7: Functions Interpreting Functions Analyze functions using different representations. Analyze linear, exponential, and quadratic functions by generating different representations, by hand in simple cases and using technology for more complicated cases, to show key features, including: 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.F-LE.5: Functions Linear, Quadratic, and Exponential Models Interpret expressions for functions in terms of the situation they model. Interpret the parameters and in a linear function  $y = mx + b$  or an exponential function  $y = a(b)^x + c$  in terms of a context.
- NC.M1.F-LE.5: Functions Linear, Quadratic, and Exponential Models Interpret expressions for functions in terms of the situation they model. Interpret the parameters and in a linear function  $y = mx + b$  or an exponential function  $y = a(b)^x + c$  in terms of a context.
- NC.M1.A-REI.10: Algebra Reasoning with Equations and Inequalities Represent and solve equations and inequalities graphically. Understand that the graph of a two variable equation represents the set of all solutions to the equation.
- NC.M1.F-LE.1: Functions Linear, Quadratic, and Exponential Models Construct and compare linear and exponential models and solve problems. Identify situations that can be modeled with linear and exponential functions, and justify the most appropriate model for a situation based on the rate of change over equal intervals.

## Unit 6: Linear Equations

### • SLOPE-INTERCEPT FORM OF A LINEAR EQUATION

- NC.M1.F-IF.7: Functions Interpreting Functions Analyze functions using different representations. Analyze linear, exponential, and quadratic functions by generating different representations, by hand in simple cases and using technology for more complicated cases, to show key features, including: 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.F-BF.1a: Functions Building Functions Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. Build linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two ordered pairs (include reading these from a table).
- NC.M1.G-GPE.5: Geometry Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically. Use coordinates to prove the slope criteria for parallel and perpendicular lines and use them to solve problems. Determine if two lines are parallel, perpendicular, or neither. Find the equation of a line parallel or perpendicular to a given line that passes through a given point.

### • POINT-SLOPE FORM OF A LINEAR EQUATION

- NC.M1.F-IF.7: Functions Interpreting Functions Analyze functions using different representations. Analyze linear, exponential, and quadratic functions by generating different representations, by hand in simple cases and using technology for more complicated cases, to show key features, including:



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.F-BF.1a: Functions Building Functions Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. Build linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two ordered pairs (include reading these from a table).
- NC.M1.G-GPE.5: Geometry Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically. Use coordinates to prove the slope criteria for parallel and perpendicular lines and use them to solve problems. Determine if two lines are parallel, perpendicular, or neither. Find the equation of a line parallel or perpendicular to a given line that passes through a given point.

## Unit 7: Systems of Linear Equations

### • SOLVING SYSTEMS OF LINEAR EQUATIONS: GRAPHING

- NC.M1.A-CED.3: Algebra Creating Equations Create equations that describe numbers or relationships. Create systems of linear equations and inequalities to model situations in context.
- NC.M1.A-REI.6: Algebra Reasoning with Equations and Inequalities Solve systems of equations. Use tables, graphs, or algebraic methods (substitution and elimination) to find approximate or exact solutions to systems of linear equations and interpret solutions in terms of a context.
- NC.M1.A-REI.11: Algebra Reasoning with Equations and Inequalities Represent and solve equations and inequalities graphically. Build an understanding of why the x-coordinates of the points where the graphs of two linear, exponential, and/or quadratic equations  $= ()$  and  $= ()$  intersect are the solutions of the equation  $() = ()$  and approximate solutions using graphing technology or successive approximations with a table of values.
- NC.M1.A-REI.10: Algebra Reasoning with Equations and Inequalities Represent and solve equations and inequalities graphically. Understand that the graph of a two variable equation represents the set of all solutions to the equation.
- NC.M1.A-REI.11: Algebra Reasoning with Equations and Inequalities Represent and solve equations and inequalities graphically. Build an understanding of why the x-coordinates of the points where the graphs of two linear, exponential, and/or quadratic equations  $= ()$  and  $= ()$  intersect are the solutions of the equation  $() = ()$  and approximate solutions using graphing technology or successive approximations with a table of values.
- NC.M1.A-REI.11: Algebra Reasoning with Equations and Inequalities Represent and solve equations and inequalities graphically. Build an understanding of why the x-coordinates of the points where the graphs of two linear, exponential, and/or quadratic equations  $= ()$  and  $= ()$  intersect are the solutions of the equation  $() = ()$  and approximate solutions using graphing technology or successive approximations with a table of values.

### • SOLVING SYSTEMS OF LINEAR EQUATIONS: SUBSTITUTION

- NC.M1.A-CED.3: Algebra Creating Equations Create equations that describe numbers or relationships. Create systems of linear equations and inequalities to model situations in context.

- NC.M1.A-REI.6: Algebra Reasoning with Equations and Inequalities Solve systems of equations. Use tables, graphs, or algebraic methods (substitution and elimination) to find approximate or exact solutions to systems of linear equations and interpret solutions in terms of a context.
- **SOLVING SYSTEMS OF LINEAR EQUATIONS: ELIMINATION**
- NC.M1.A-CED.3: Algebra Creating Equations Create equations that describe numbers or relationships. Create systems of linear equations and inequalities to model situations in context.
- NC.M1.A-REI.5: Algebra Reasoning with Equations and Inequalities Solve systems of equations. Explain why replacing one equation in a system of linear equations by the sum of that equation and a multiple of the other produces a system with the same solutions.
- NC.M1.A-REI.6: Algebra Reasoning with Equations and Inequalities Solve systems of equations. Use tables, graphs, or algebraic methods (substitution and elimination) to find approximate or exact solutions to systems of linear equations and interpret solutions in terms of a context.

### Unit 8: Linear Inequalities

- **GRAPHS OF LINEAR INEQUALITIES**
- NC.M1.A-REI.12: Algebra Reasoning with Equations and Inequalities Represent and solve equations and inequalities graphically. Represent the solutions of a linear inequality or a system of linear inequalities graphically as a region of the plane.
- **SOLVING SYSTEMS OF LINEAR INEQUALITIES**
- NC.M1.A-CED.3: Algebra Creating Equations Create equations that describe numbers or relationships. Create systems of linear equations and inequalities to model situations in context.
- NC.M1.A-REI.12: Algebra Reasoning with Equations and Inequalities Represent and solve equations and inequalities graphically. Represent the solutions of a linear inequality or a system of linear inequalities graphically as a region of the plane.

### Unit 9: Exponential Functions

- **EXPONENTIAL FUNCTIONS**
- NC.M1.A-SSE.1a: Algebra Seeing Structure in Expressions Interpret the structure of expressions. Interpret expressions that represent a quantity in terms of its context. Identify and interpret parts of a linear, exponential, or quadratic expression, including terms, factors, coefficients, and exponents.
- NC.M1.A-SSE.1b: Algebra Seeing Structure in Expressions Interpret the structure of expressions. Interpret expressions that represent a quantity in terms of its context. Interpret a linear, exponential, or quadratic expression made of multiple parts as a combination of entities to give meaning to an expression.
- NC.M1.F-IF.2: Functions Interpreting Functions Understand the concept of a function and use function notation. Use function notation to evaluate linear, quadratic, and exponential functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
- NC.M1.F-IF.4: Functions Interpreting Functions Interpret functions that arise in applications in terms of the context. Interpret key features of graphs, tables, and verbal descriptions in context to describe



functions that arise in applications relating two quantities, including: intercepts; intervals where the function is increasing, decreasing, positive, or negative; and maximums and minimums.

- NC.M1.F-IF.7: Functions Interpreting Functions Analyze functions using different representations. Analyze linear, exponential, and quadratic functions by generating different representations, by hand in simple cases and using technology for more complicated cases, to show key features, including: 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.A-REI.10: Algebra Reasoning with Equations and Inequalities Represent and solve equations and inequalities graphically. Understand that the graph of a two variable equation represents the set of all solutions to the equation.
- NC.M1.F-IF.8b: Functions Interpreting Functions Analyze functions using different representations. Use equivalent expressions to reveal and explain different properties of a function. Interpret and explain growth and decay rates for an exponential function.
- NC.M1.F-LE.5: Functions Linear, Quadratic, and Exponential Models Interpret expressions for functions in terms of the situation they model. Interpret the parameters and in a linear function  $f(x) = mx + b$  or an exponential function  $f(x) = a(b)^x + c$  in terms of a context.
- NC.M1.F-LE.5: Functions Linear, Quadratic, and Exponential Models Interpret expressions for functions in terms of the situation they model. Interpret the parameters and in a linear function  $f(x) = mx + b$  or an exponential function  $f(x) = a(b)^x + c$  in terms of a context.
- NC.M1.F-IF.5: Functions Interpreting Functions Interpret functions that arise in applications in terms of the context. Interpret a function in terms of the context by relating its domain and range to its graph and, where applicable, to the quantitative relationship it describes.
- NC.M1.A-CED.2: Algebra Creating Equations Create equations that describe numbers or relationships. Create and graph equations in two variables to represent linear, exponential, and quadratic relationships between quantities.
- NC.M1.F-BF.1a: Functions Building Functions Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. Build linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two ordered pairs (include reading these from a table).
- NC.M1.F-LE.1: Functions Linear, Quadratic, and Exponential Models Construct and compare linear and exponential models and solve problems. Identify situations that can be modeled with linear and exponential functions, and justify the most appropriate model for a situation based on the rate of change over equal intervals.
- **EXPONENTIAL GROWTH AND DECAY**
  - NC.M1.A-SSE.1a: Algebra Seeing Structure in Expressions Interpret the structure of expressions. Interpret expressions that represent a quantity in terms of its context. Identify and interpret parts of a linear, exponential, or quadratic expression, including terms, factors, coefficients, and exponents.
  - NC.M1.A-SSE.1b: Algebra Seeing Structure in Expressions Interpret the structure of expressions. Interpret expressions that represent a quantity in terms of its context. Interpret a linear, exponential,

or quadratic expression made of multiple parts as a combination of entities to give meaning to an expression.

- NC.M1.F-IF.4: Functions Interpreting Functions Interpret functions that arise in applications in terms of the context. Interpret key features of graphs, tables, and verbal descriptions in context to describe functions that arise in applications relating two quantities, including: intercepts; intervals where the function is increasing, decreasing, positive, or negative; and maximums and minimums.
  - NC.M1.F-IF.7: Functions Interpreting Functions Analyze functions using different representations. Analyze linear, exponential, and quadratic functions by generating different representations, by hand in simple cases and using technology for more complicated cases, to show key features, including: 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.F-IF.8b: Functions Interpreting Functions Analyze functions using different representations. Use equivalent expressions to reveal and explain different properties of a function. Interpret and explain growth and decay rates for an exponential function.
  - NC.M1.F-LE.5: Functions Linear, Quadratic, and Exponential Models Interpret expressions for functions in terms of the situation they model. Interpret the parameters and in a linear function  $f(x) = +$  or an exponential function  $f(x) =$  in terms of a context.
  - NC.M1.A-REI.10: Algebra Reasoning with Equations and Inequalities Represent and solve equations and inequalities graphically. Understand that the graph of a two variable equation represents the set of all solutions to the equation.
  - NC.M1.F-LE.1: Functions Linear, Quadratic, and Exponential Models Construct and compare linear and exponential models and solve problems. Identify situations that can be modeled with linear and exponential functions, and justify the most appropriate model for a situation based on the rate of change over equal intervals.
  - NC.M1.F-LE.5: Functions Linear, Quadratic, and Exponential Models Interpret expressions for functions in terms of the situation they model. Interpret the parameters and in a linear function  $f(x) = +$  or an exponential function  $f(x) =$  in terms of a context.
  - NC.M1.A-CED.1: Algebra Creating Equations Create equations that describe numbers or relationships. Create equations and inequalities in one variable that represent linear, exponential, and quadratic relationships and use them to solve problems.
  - NC.M1.A-CED.2: Algebra Creating Equations Create equations that describe numbers or relationships. Create and graph equations in two variables to represent linear, exponential, and quadratic relationships between quantities.
  - NC.M1.F-BF.1a: Functions Building Functions Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. Build linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two ordered pairs (include reading these from a table).
- **SOLVING EXPONENTIAL INEQUALITIES**

- NC.M1.F-IF.7: Functions Interpreting Functions Analyze functions using different representations. Analyze linear, exponential, and quadratic functions by generating different representations, by hand in simple cases and using technology for more complicated cases, to show key features, including: 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.A-CED.1: Algebra Creating Equations Create equations that describe numbers or relationships. Create equations and inequalities in one variable that represent linear, exponential, and quadratic relationships and use them to solve problems.

## Unit 10: Sequences

### • SEQUENCES

- NC.M1.F-BF.1a: Functions Building Functions Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. Build linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two ordered pairs (include reading these from a table).
- NC.M1.F-IF.3: Functions Interpreting Functions Understand the concept of a function and use function notation. Recognize that recursively and explicitly defined sequences are functions whose domain is a subset of the integers, the terms of an arithmetic sequence are a subset of the range of a linear function, and the terms of a geometric sequence are a subset of the range of an exponential function.
- NC.M1.F-LE.1: Functions Linear, Quadratic, and Exponential Models Construct and compare linear and exponential models and solve problems. Identify situations that can be modeled with linear and exponential functions, and justify the most appropriate model for a situation based on the rate of change over equal intervals.

### • ARITHMETIC AND GEOMETRIC SEQUENCES

- NC.M1.F-IF.3: Functions Interpreting Functions Understand the concept of a function and use function notation. Recognize that recursively and explicitly defined sequences are functions whose domain is a subset of the integers, the terms of an arithmetic sequence are a subset of the range of a linear function, and the terms of a geometric sequence are a subset of the range of an exponential function.
- NC.M1.F-BF.1a: Functions Building Functions Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. Build linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two ordered pairs (include reading these from a table).
- NC.M1.F-BF.2: Functions Building Functions Build a function that models a relationship between two quantities. Translate between explicit and recursive forms of arithmetic and geometric sequences and use both to model situations.
- NC.M1.F-LE.1: Functions Linear, Quadratic, and Exponential Models Construct and compare linear and exponential models and solve problems. Identify situations that can be modeled with linear and exponential functions, and justify the most appropriate model for a situation based on the rate of change over equal intervals.

## Unit 11: Arithmetic with Polynomials

- **POLYNOMIAL BASICS**

- NC.M1.A-APR.1: Algebra Arithmetic with Polynomial Expressions Perform arithmetic operations on polynomials. Build an understanding that operations with polynomials are comparable to operations with integers by adding and subtracting quadratic expressions and by adding, subtracting, and multiplying linear expressions.

- **ADDITION AND SUBTRACTION OF POLYNOMIALS**

- NC.M1.A-APR.1: Algebra Arithmetic with Polynomial Expressions Perform arithmetic operations on polynomials. Build an understanding that operations with polynomials are comparable to operations with integers by adding and subtracting quadratic expressions and by adding, subtracting, and multiplying linear expressions.

- **MULTIPLICATION OF POLYNOMIALS**

- NC.M1.A-APR.1: Algebra Arithmetic with Polynomial Expressions Perform arithmetic operations on polynomials. Build an understanding that operations with polynomials are comparable to operations with integers by adding and subtracting quadratic expressions and by adding, subtracting, and multiplying linear expressions.

## Unit 12: Factoring

- **FACTORING QUADRATIC TRINOMIALS**

- NC.M1.A-SSE.3: Algebra Seeing Structure in Expressions Write expressions in equivalent forms to solve problems. Write an equivalent form of a quadratic expression  $ax^2 + bx + c$ , where  $a$  is an integer, by factoring to reveal the solutions of the equation or the zeros of the function the expression defines.

- **FACTORING SPECIAL CASES**

- NC.M1.A-SSE.3: Algebra Seeing Structure in Expressions Write expressions in equivalent forms to solve problems. Write an equivalent form of a quadratic expression  $ax^2 + bx + c$ , where  $a$  is an integer, by factoring to reveal the solutions of the equation or the zeros of the function the expression defines.

## Unit 13: Quadratic Equations and Functions

- **QUADRATIC FUNCTIONS**

- NC.M1.A-SSE.1a: Algebra Seeing Structure in Expressions Interpret the structure of expressions. Interpret expressions that represent a quantity in terms of its context. Identify and interpret parts of a linear, exponential, or quadratic expression, including terms, factors, coefficients, and exponents.
- NC.M1.A-SSE.1b: Algebra Seeing Structure in Expressions Interpret the structure of expressions. Interpret expressions that represent a quantity in terms of its context. Interpret a linear, exponential, or quadratic expression made of multiple parts as a combination of entities to give meaning to an expression.
- NC.M1.F-IF.8a: Functions Interpreting Functions Analyze functions using different representations. Use equivalent expressions to reveal and explain different properties of a function. Rewrite a quadratic function to reveal and explain different key features of the function.

- NC.M1.A-APR.3: Algebra Arithmetic with Polynomial Expressions Understand the relationship between zeros and factors of polynomials. Understand the relationships among the factors of a quadratic expression, the solutions of a quadratic equation, and the zeros of a quadratic function.
- NC.M1.F-IF.4: Functions Interpreting Functions Interpret functions that arise in applications in terms of the context. Interpret key features of graphs, tables, and verbal descriptions in context to describe functions that arise in applications relating two quantities, including: intercepts; intervals where the function is increasing, decreasing, positive, or negative; and maximums and minimums.
- NC.M1.F-IF.7: Functions Interpreting Functions Analyze functions using different representations. Analyze linear, exponential, and quadratic functions by generating different representations, by hand in simple cases and using technology for more complicated cases, to show key features, including: 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.A-CED.2: Algebra Creating Equations Create equations that describe numbers or relationships. Create and graph equations in two variables to represent linear, exponential, and quadratic relationships between quantities.
- NC.M1.A-REI.10: Algebra Reasoning with Equations and Inequalities Represent and solve equations and inequalities graphically. Understand that the graph of a two variable equation represents the set of all solutions to the equation.
- **REPRESENTATIONS OF QUADRATIC FUNCTIONS**
  - NC.M1.A-CED.2: Algebra Creating Equations Create equations that describe numbers or relationships. Create and graph equations in two variables to represent linear, exponential, and quadratic relationships between quantities.
  - NC.M1.F-IF.7: Functions Interpreting Functions Analyze functions using different representations. Analyze linear, exponential, and quadratic functions by generating different representations, by hand in simple cases and using technology for more complicated cases, to show key features, including: 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.F-IF.8a: Functions Interpreting Functions Analyze functions using different representations. Use equivalent expressions to reveal and explain different properties of a function. Rewrite a quadratic function to reveal and explain different key features of the function.
  - NC.M1.A-APR.3: Algebra Arithmetic with Polynomial Expressions Understand the relationship between zeros and factors of polynomials. Understand the relationships among the factors of a quadratic expression, the solutions of a quadratic equation, and the zeros of a quadratic function.
  - NC.M1.F-IF.4: Functions Interpreting Functions Interpret functions that arise in applications in terms of the context. Interpret key features of graphs, tables, and verbal descriptions in context to describe functions that arise in applications relating two quantities, including: intercepts; intervals where the function is increasing, decreasing, positive, or negative; and maximums and minimums.
  - NC.M1.A-REI.10: Algebra Reasoning with Equations and Inequalities Represent and solve equations and inequalities graphically. Understand that the graph of a two variable equation represents the set

of all solutions to the equation.

- NC.M1.A-SSE.1a: Algebra Seeing Structure in Expressions Interpret the structure of expressions. Interpret expressions that represent a quantity in terms of its context. Identify and interpret parts of a linear, exponential, or quadratic expression, including terms, factors, coefficients, and exponents.
- NC.M1.A-SSE.1b: Algebra Seeing Structure in Expressions Interpret the structure of expressions. Interpret expressions that represent a quantity in terms of its context. Interpret a linear, exponential, or quadratic expression made of multiple parts as a combination of entities to give meaning to an expression.
- **ANALYZING GRAPHS OF QUADRATIC FUNCTIONS**
  - NC.M1.F-IF.5: Functions Interpreting Functions Interpret functions that arise in applications in terms of the context. Interpret a function in terms of the context by relating its domain and range to its graph and, where applicable, to the quantitative relationship it describes.
  - NC.M1.F-IF.7: Functions Interpreting Functions Analyze functions using different representations. Analyze linear, exponential, and quadratic functions by generating different representations, by hand in simple cases and using technology for more complicated cases, to show key features, including: 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.A-APR.3: Algebra Arithmetic with Polynomial Expressions Understand the relationship between zeros and factors of polynomials. Understand the relationships among the factors of a quadratic expression, the solutions of a quadratic equation, and the zeros of a quadratic function.
  - NC.M1.F-IF.4: Functions Interpreting Functions Interpret functions that arise in applications in terms of the context. Interpret key features of graphs, tables, and verbal descriptions in context to describe functions that arise in applications relating two quantities, including: intercepts; intervals where the function is increasing, decreasing, positive, or negative; and maximums and minimums.
  - NC.M1.F-IF.8a: Functions Interpreting Functions Analyze functions using different representations. Use equivalent expressions to reveal and explain different properties of a function. Rewrite a quadratic function to reveal and explain different key features of the function.

#### Unit 14: Quadratic Equations

- **SOLVING EQUATIONS USING ROOTS**
  - NC.M1.A-CED.1: Algebra Creating Equations Create equations that describe numbers or relationships. Create equations and inequalities in one variable that represent linear, exponential, and quadratic relationships and use them to solve problems.
  - NC.M1.A-REI.4: Algebra Reasoning with Equations and Inequalities Solve equations and inequalities in one variable. Solve for the real solutions of quadratic equations in one variable by taking square roots and factoring.
- **SOLVING QUADRATIC EQUATIONS BY FACTORING**
  - NC.M1.A-SSE.1a: Algebra Seeing Structure in Expressions Interpret the structure of expressions. Interpret expressions that represent a quantity in terms of its context. Identify and interpret parts of a



linear, exponential, or quadratic expression, including terms, factors, coefficients, and exponents.

- NC.M1.A-SSE.1b: Algebra Seeing Structure in Expressions Interpret the structure of expressions. Interpret expressions that represent a quantity in terms of its context. Interpret a linear, exponential, or quadratic expression made of multiple parts as a combination of entities to give meaning to an expression.
- NC.M1.A-SSE.3: Algebra Seeing Structure in Expressions Write expressions in equivalent forms to solve problems. Write an equivalent form of a quadratic expression  $ax^2 + bx + c$ , where  $a$  is an integer, by factoring to reveal the solutions of the equation or the zeros of the function the expression defines.
- NC.M1.A-CED.1: Algebra Creating Equations Create equations that describe numbers or relationships. Create equations and inequalities in one variable that represent linear, exponential, and quadratic relationships and use them to solve problems.
- NC.M1.A-REI.1: Algebra Reasoning with Equations and Inequalities Understand solving equations as a process of reasoning and explain the reasoning. Justify a chosen solution method and each step of the solving process for linear and quadratic equations using mathematical reasoning.
- NC.M1.A-REI.4: Algebra Reasoning with Equations and Inequalities Solve equations and inequalities in one variable. Solve for the real solutions of quadratic equations in one variable by taking square roots and factoring.
- NC.M1.A-SSE.3: Algebra Seeing Structure in Expressions Write expressions in equivalent forms to solve problems. Write an equivalent form of a quadratic expression  $ax^2 + bx + c$ , where  $a$  is an integer, by factoring to reveal the solutions of the equation or the zeros of the function the expression defines.
- NC.M1.A-APR.3: Algebra Arithmetic with Polynomial Expressions Understand the relationship between zeros and factors of polynomials. Understand the relationships among the factors of a quadratic expression, the solutions of a quadratic equation, and the zeros of a quadratic function.
- NC.M1.A-SSE.3: Algebra Seeing Structure in Expressions Write expressions in equivalent forms to solve problems. Write an equivalent form of a quadratic expression  $ax^2 + bx + c$ , where  $a$  is an integer, by factoring to reveal the solutions of the equation or the zeros of the function the expression defines.
- **SYSTEMS OF NONLINEAR EQUATIONS**
  - NC.M1.A-REI.11: Algebra Reasoning with Equations and Inequalities Represent and solve equations and inequalities graphically. Build an understanding of why the  $x$ -coordinates of the points where the graphs of two linear, exponential, and/or quadratic equations  $y = f(x)$  and  $y = g(x)$  intersect are the solutions of the equation  $f(x) = g(x)$  and approximate solutions using graphing technology or successive approximations with a table of values.

## Unit 15: Working with Functions

- **LINEAR VERSUS NONLINEAR FUNCTIONS**
  - NC.M1.F-LE.5: Functions Linear, Quadratic, and Exponential Models Interpret expressions for functions in terms of the situation they model. Interpret the parameters and in a linear function  $f(x) = mx + b$  or an exponential function  $f(x) = a(b)^x + c$  in terms of a context.

- NC.M1.F-LE.3: Functions Linear, Quadratic, and Exponential Models Construct and compare linear and exponential models and solve problems. Compare the end behavior of linear, exponential, and quadratic functions using graphs and tables to show that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.
- NC.M1.F-LE.1: Functions Linear, Quadratic, and Exponential Models Construct and compare linear and exponential models and solve problems. Identify situations that can be modeled with linear and exponential functions, and justify the most appropriate model for a situation based on the rate of change over equal intervals.
- NC.M1.F-IF.6: Functions Interpreting Functions Interpret functions that arise in applications in terms of the context. Calculate and interpret the average rate of change over a specified interval for a function presented numerically, graphically, and/or symbolically.
- **MULTIPLE REPRESENTATIONS OF FUNCTIONS**
  - NC.M1.F-IF.9: Functions Interpreting Functions Analyze functions using different representations. Compare key features of two functions (linear, quadratic, or exponential) each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions).
  - NC.M1.F-BF.1a: Functions Building Functions Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. Build linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two ordered pairs (include reading these from a table).
  - NC.M1.F-LE.5: Functions Linear, Quadratic, and Exponential Models Interpret expressions for functions in terms of the situation they model. Interpret the parameters and in a linear function  $f(x) = mx + b$  or an exponential function  $f(x) = a(b)^x + c$  in terms of a context.
  - NC.M1.F-LE.1: Functions Linear, Quadratic, and Exponential Models Construct and compare linear and exponential models and solve problems. Identify situations that can be modeled with linear and exponential functions, and justify the most appropriate model for a situation based on the rate of change over equal intervals.
  - NC.M1.F-LE.3: Functions Linear, Quadratic, and Exponential Models Construct and compare linear and exponential models and solve problems. Compare the end behavior of linear, exponential, and quadratic functions using graphs and tables to show that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.
  - NC.M1.F-LE.5: Functions Linear, Quadratic, and Exponential Models Interpret expressions for functions in terms of the situation they model. Interpret the parameters and in a linear function  $f(x) = mx + b$  or an exponential function  $f(x) = a(b)^x + c$  in terms of a context.
- **ARITHMETIC OPERATIONS ON FUNCTIONS**
  - NC.M1.F-BF.1b: Functions Building Functions Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. 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.

## Unit 16: Coordinate Geometry

- **PERIMETER ON THE COORDINATE PLANE**

- NC.M1.G-GPE.4: Geometry Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically. Use coordinates to solve geometric problems involving polygons algebraically. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles. Use coordinates to verify algebraically that a given set of points produces a particular type of triangle or quadrilateral.

- **AREA ON THE COORDINATE PLANE**

- NC.M1.G-GPE.4: Geometry Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically. Use coordinates to solve geometric problems involving polygons algebraically. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles. Use coordinates to verify algebraically that a given set of points produces a particular type of triangle or quadrilateral.

- **MIDPOINT FORMULA ON THE COORDINATE PLANE**

- NC.M1.G-GPE.6: Geometry Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically. Use coordinates to find the midpoint or endpoint of a line segment.

- **CONJECTURES IN COORDINATE GEOMETRY**

## Unit 17: Statistics

- **DATA ANALYSIS**

- NC.M1.S-ID.1: Statistics and Probability Interpreting Categorical and Quantitative Data Summarize, represent, and interpret data on a single count or measurement variable. Use technology to represent data with plots on the real number line (histograms, and box plots).
- NC.M1.S-ID.2: Statistics and Probability Interpreting Categorical and Quantitative Data Summarize, represent, and interpret data on a single count or measurement variable. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. Interpret differences in shape, center, and spread in the context of the data sets.
- NC.M1.S-ID.3: Statistics and Probability Interpreting Categorical and Quantitative Data Summarize, represent, and interpret data on a single count or measurement variable. Examine the effects of extreme data points (outliers) on shape, center, and/or spread.

- **SCATTERPLOTS**

- NC.M1.S-ID.8: Statistics and Probability Interpreting Categorical and Quantitative Data Interpret linear models. Analyze patterns and describe relationships between two variables in context. Using technology, determine the correlation coefficient of bivariate data and interpret it as a measure of the strength and direction of a linear relationship. 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.

- NC.M1.S-ID.9: Statistics and Probability Interpreting Categorical and Quantitative Data Interpret linear models. Distinguish between association and causation.
- **SCATTERPLOTS AND MODELING**
- NC.M1.S-ID.7: Statistics and Probability Interpreting Categorical and Quantitative Data Interpret linear models. Interpret in context the rate of change and the intercept of a linear model. Use the linear model to interpolate and extrapolate predicted values. Assess the validity of a predicted value.
- NC.M1.S-ID.6a: Statistics and Probability Interpreting Categorical and Quantitative Data Summarize, represent, and interpret data on two categorical and quantitative variables. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. Fit a least squares regression line to linear data using technology. Use the fitted function to solve problems.
- NC.M1.S-ID.6b: Statistics and Probability Interpreting Categorical and Quantitative Data Summarize, represent, and interpret data on two categorical and quantitative variables. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. Assess the fit of a linear function by analyzing residuals.
- NC.M1.S-ID.8: Statistics and Probability Interpreting Categorical and Quantitative Data Interpret linear models. Analyze patterns and describe relationships between two variables in context. Using technology, determine the correlation coefficient of bivariate data and interpret it as a measure of the strength and direction of a linear relationship. 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.
- **QUADRATIC AND EXPONENTIAL MODELS**
- NC.M1.S-ID.6c: Statistics and Probability Interpreting Categorical and Quantitative Data Summarize, represent, and interpret data on two categorical and quantitative variables. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. Fit a function to exponential data using technology. Use the fitted function to solve problems.

## Unit 18: Test-Taking Strategies

- **STUDY HABITS**
- **BEING PREPARED AND GETTING STARTED**
- **WORDING IN TEST QUESTIONS**
- **WORDING IN ANSWER CHOICES**
- **QUESTIONS WITH PASSAGES AND VISUAL DATA**
- **ESSAY AND SHORT ANSWER QUESTIONS**
- **WORD PROBLEMS**