North Carolina Tutorials are designed specifically for the Common Core State Standards for English language arts, the North Carolina Standard Course of Study for Math, and the North Carolina Essential Standards, to prepare students for the READY End-of-Course Assessments.

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.

1. SOLVING ONE-VARIABLE EQUATIONS

- **ONE-STEP EQUATIONS AND INEQUALITIES**
  - **NC.M1.A-CED.1** *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** *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** *Solve linear equations and inequalities in one variable.*

- **MULTI-STEP EQUATIONS AND INEQUALITIES**
  - **NC.M1.A-CED.1** *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** *Solve linear equations and inequalities in one variable.*

2. EXPRESSIONS AND LITERAL EQUATIONS

- **AXIOMS OF EQUALITY**
  - **NC.M1.A-REI.1** *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.1** *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** *Solve linear equations and inequalities in one variable.*
  - **NC.M1.A-CED.4** *Solve for a quantity of interest in formulas used in science and mathematics using the same reasoning as in solving equations.*

3. WRITING EQUATIONS AND INEQUALITIES

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

- **NC.M1.A-CED.1** *Create equations and inequalities in one variable that represent linear, exponential, and quadratic relationships and use them to solve problems.*
- **NC.M1.F-BF.1a** *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.2** *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.A-SSE.1a** *Identify and interpret parts of a linear, exponential, or quadratic expression, including terms, factors, coefficients, and exponents.*
- **NC.M1.F.BF.1b** *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.*

- **FORMULATING AND SOLVING INEQUALITIES FROM WORD PROBLEMS**
  - **NC.M1.A-CED.1** *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** *Solve linear equations and inequalities in one variable.*

4. FUNCTIONS

- **FUNCTIONS AND RELATIONS**
  - **NC.M1.F-IF.2** *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** *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.1** *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.7** *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.9** *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** *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).*

- **DOMAIN AND RANGE**
  - **NC.M1.F-IF.5** *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** *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.1** *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** *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** *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.*

5. GRAPHING LINEAR EQUATIONS AND INEQUALITIES

- **GRAPHING AND ANALYZING LINEAR FUNCTIONS**
  - **NC.M1.F-BF.1a** *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.A-REI.10** *Understand that the graph of a two variable equation represents the set of all solutions to the equation.*
  - **NC.M1.A-CED.2** *Create and graph equations in two variables to represent linear, exponential, and quadratic relationships between quantities.*
  - **NC.M1.F-IF.2** *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.6** *Calculate and interpret the average rate of change over a specified interval for a function presented numerically, graphically, and/or symbolically.*
  - **NC.M1.F-LE.5** *Interpret the parameters a and b in a linear function $f(x) = ax + b$ or an exponential function $g(x) = ab^x$ in terms of a context.*
  - **NC.M1.F-IF.4** *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** *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.9** *Compare key features of two functions (linear, quadratic, or exponential) each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions).*

- **GRAPHING AND MANIPULATING Y = MX + B**
  - **NC.M1.A-CED.2** *Create and graph equations in two variables to represent linear, exponential, and quadratic relationships between quantities.*
  - **NC.M1.F-IF.6** *Calculate and interpret the average rate of change over a specified interval for a function presented numerically, graphically, and/or symbolically.*
  - **NC.M1.F-BF.1a** *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.S-ID.7** *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.F-IF.4** *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.S-ID.6a** *Fit a least squares regression line to linear data using technology. Use the fitted function to solve problems.*
  - **NC.M1.F-LE.5** *Interpret the parameters a and b in a linear function $f(x) = ax + b$ or an exponential function $g(x) = ab^x$ in terms of a context.*
  - **NC.M1.F-IF.7** *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** *Understand that the graph of a two variable equation represents the set of all solutions to the equation.*

- **GRAPHS OF LINEAR INEQUALITIES**
  - **NC.M1.A-REI.12** *Represent the solutions of a linear inequality or a system of linear inequalities graphically as a region of the plane.*
  - **NC.M1.A-CED.1** *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** *Solve linear equations and inequalities in one variable.*

6. SLOPES OF LINEAR EQUATIONS

- **SLOPE**
  - **NC.M1.F-IF.6** *Calculate and interpret the average rate of change over a specified interval for a function presented*

numerically, graphically, and/or symbolically.

- **NC.M1.F-IF.4** *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.*

PARALLEL AND PERPENDICULAR LINES

- **NC.M1.G-GPE.5** *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.*

7. LINEAR EQUATIONS

SLOPE-INTERCEPT FORM OF A LINEAR EQUATION

- **NC.M1.S-ID.7** *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.F-BF.1a** *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.A-REI.10** *Understand that the graph of a two variable equation represents the set of all solutions to the equation.*
- **NC.M1.G-GPE.5** *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.*
- **NC.M1.F-IF.6** *Calculate and interpret the average rate of change over a specified interval for a function presented numerically, graphically, and/or symbolically.*
- **NC.M1.F-IF.4** *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** *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.9** *Compare key features of two functions (linear, quadratic, or exponential) each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions).*

POINT-SLOPE FORM OF A LINEAR EQUATION

- **NC.M1.F-BF.1a** *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.A-CED.2** *Create and graph equations in two variables to represent linear, exponential, and quadratic relationships between quantities.*
- **NC.M1.A-REI.10** *Understand that the graph of a two variable equation represents the set of all solutions to the equation.*
- **NC.M1.G-GPE.5** *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.*

8. GRAPHING LINEAR SYSTEMS OF EQUATIONS AND INEQUALITIES

SOLVING SYSTEMS OF LINEAR EQUATIONS: GRAPHING

- **NC.M1.A-CED.3** *Create systems of linear equations and inequalities to model situations in context.*
- **NC.M1.A-REI.6** *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** *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.*

SOLVING SYSTEMS OF LINEAR INEQUALITIES

- **NC.M1.A-CED.3** *Create systems of linear equations and inequalities to model situations in context.*

- **NC.M1.A-REI.12** *Represent the solutions of a linear inequality or a system of linear inequalities graphically as a region of the plane.*

9. SOLVING LINEAR SYSTEMS OF EQUATIONS ALGEBRAICALLY

- **SOLVING SYSTEMS OF LINEAR EQUATIONS: SUBSTITUTION**
  - **NC.M1.A-CED.2** *Create and graph equations in two variables to represent linear, exponential, and quadratic relationships between quantities.*
  - **NC.M1.A-CED.3** *Create systems of linear equations and inequalities to model situations in context.*
  - **NC.M1.A-REI.6** *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.5** *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.*

- **SOLVING SYSTEMS OF LINEAR EQUATIONS: ELIMINATION**
  - **NC.M1.A-CED.2** *Create and graph equations in two variables to represent linear, exponential, and quadratic relationships between quantities.*
  - **NC.M1.A-CED.3** *Create systems of linear equations and inequalities to model situations in context.*
  - **NC.M1.A-REI.6** *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.5** *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.*

10. EXPONENTIAL FUNCTIONS

- **LAWS OF EXPONENTS**
  - **NC.M1.N-RN.2** *Rewrite algebraic expressions with integer exponents using the properties of exponents.*

- **EXPONENTIAL FUNCTIONS**
  - **NC.M1.A-SSE.1a** *Identify and interpret parts of a linear, exponential, or quadratic expression, including terms, factors, coefficients, and exponents.*
  - **NC.M1.A-SSE.1b** *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.7** *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** *Interpret and explain growth and decay rates for an exponential function.*
  - **NC.M1.F-IF.9** *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-IF.6** *Calculate and interpret the average rate of change over a specified interval for a function presented numerically, graphically, and/or symbolically.*
  - **NC.M1.F-BF.1a** *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.4** *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-CED.1** *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** *Create and graph equations in two variables to represent linear, exponential, and quadratic relationships between quantities.*
  - **NC.M1.F-LE.5** *Interpret the parameters a and b in a linear function $f(x) = ax + b$ or an exponential function $g(x) = ab^x$ in terms of a context.*

11. EXPONENTIAL EQUATIONS AND INEQUALITIES

- **EXPONENTIAL GROWTH AND DECAY**
  - **NC.M1.A-SSE.1a** *Identify and interpret parts of a linear, exponential, or quadratic expression, including terms, factors, coefficients, and exponents.*
  - **NC.M1.A-SSE.1b** *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.8b** *Interpret and explain growth and decay rates for an exponential function.*
  - **NC.M1.F-BF.1a** *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** *Interpret the parameters a and b in a linear function $f(x) = ax + b$ or an exponential function $g(x) = ab^x$ in terms of a context.*
  - **NC.M1.S-ID.6c** *Fit a function to exponential data using technology. Use the fitted function to solve problems.*
  - **NC.M1.F-LE.1** *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** *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.A-CED.2** *Create and graph equations in two variables to represent linear, exponential, and quadratic relationships between quantities.*
  - **NC.M1.F-IF.7** *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.9** *Compare key features of two functions (linear, quadratic, or exponential) each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions).*

- **SOLVING EXPONENTIAL INEQUALITIES**
  - **NC.M1.F-BF.1a** *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.A-SSE.1b** *Interpret a linear, exponential, or quadratic expression made of multiple parts as a combination of entities to give meaning to an expression.*

12. FACTORING

- **FACTORING QUADRATIC TRINOMIALS**
  - **NC.M1.A-SSE.3** *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-REI.4** *Solve for the real solutions of quadratic equations in one variable by taking square roots and factoring.*

- **FACTORING SPECIAL CASES**
  - **NC.M1.F-IF.8a** *Rewrite a quadratic function to reveal and explain different key features of the function.*

13. QUADRATIC FUNCTIONS

- **REPRESENTATIONS OF QUADRATIC FUNCTIONS**
  - **NC.M1.A-SSE.3** *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.F-IF.4** *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** *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** *Rewrite a quadratic function to reveal and explain different key features of the function.*

- **NC.M1.F-IF.9** *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.A-CED.2** *Create and graph equations in two variables to represent linear, exponential, and quadratic relationships between quantities.*

- **ANALYZING GRAPHS OF QUADRATIC FUNCTIONS**
  - **NC.M1.F-IF.7** *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** *Rewrite a quadratic function to reveal and explain different key features of the function.*
  - **NC.M1.F-IF.9** *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-IF.5** *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.4** *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** *Understand that the graph of a two variable equation represents the set of all solutions to the equation.*
  - **NC.M1.A-APR.3** *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-CED.2** *Create and graph equations in two variables to represent linear, exponential, and quadratic relationships between quantities.*

14. SOLVING QUADRATIC EQUATIONS

- **QUADRATIC FUNCTIONS**
  - **NC.M1.F-IF.4** *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-CED.2** *Create and graph equations in two variables to represent linear, exponential, and quadratic relationships between quantities.*
  - **NC.M1.A-SSE.1a** *Identify and interpret parts of a linear, exponential, or quadratic expression, including terms, factors, coefficients, and exponents.*
  - **NC.M1.A-SSE.1b** *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-APR.3** *Understand the relationships among the factors of a quadratic expression, the solutions of a quadratic equation, and the zeros of a quadratic function.*

- **SOLVING QUADRATIC EQUATIONS BY FACTORING**
  - **NC.M1.A-SSE.3** *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** *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-REI.4** *Solve for the real solutions of quadratic equations in one variable by taking square roots and factoring.*
  - **NC.M1.F-IF.4** *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** *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** *Rewrite a quadratic function to reveal and explain different key features of the function.*
  - **NC.M1.F-IF.9** *Compare key features of two functions (linear, quadratic, or exponential) each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions).*

15. WORKING WITH FUNCTIONS

- **LINEAR VERSUS NONLINEAR FUNCTIONS**
  - **NC.M1.F-IF.4** *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.6** *Calculate and interpret the average rate of change over a specified interval for a function presented numerically, graphically, and/or symbolically.*
  - **NC.M1.F-BF.1a** *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** *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.5** *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.9** *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-LE.3** *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.*

- **SYSTEMS OF NONLINEAR EQUATIONS**
  - **NC.M1.A-REI.5** *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.11** *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.*
  - **NC.M1.F-BF.1a** *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).*

16. POLYNOMIAL EXPRESSIONS 1

- **POLYNOMIAL BASICS**
  - **NC.M1.A-SSE.1a** *Identify and interpret parts of a linear, exponential, or quadratic expression, including terms, factors, coefficients, and exponents.*

- **ADDITION AND SUBTRACTION OF POLYNOMIALS**
  - **NC.M1.A-APR.1** *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.*

17. POLYNOMIAL EXPRESSIONS 2

- **MULTIPLICATION OF POLYNOMIALS**
  - **NC.M1.A-APR.1** *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.*

- **ARITHMETIC OPERATIONS ON FUNCTIONS**
  - **NC.M1.F.BF.1b** *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.*

18. PERIMETER AND AREA ON THE COORDINATE PLANE

- **PERIMETER ON THE COORDINATE PLANE**
  - **NC.M1.G-GPE.4** *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** *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.*

19. COORDINATE GEOMETRY

- **MIDPOINT FORMULA ON THE COORDINATE PLANE**
  - **NC.M1.G-GPE.6** *Use coordinates to find the midpoint or endpoint of a line segment.*

- **CONJECTURES IN COORDINATE GEOMETRY**
  - **NC.M1.G-GPE.4** *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.*

20. SEQUENCES

- **SEQUENCES**
  - **NC.MI.F-IF.3** *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.2** *Translate between explicit and recursive forms of arithmetic and geometric sequences and use both to model situations.*
  - **NC.M1.F-BF.1a** *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).*

- **ARITHMETIC AND GEOMETRIC SEQUENCES**
  - **NC.MI.F-IF.3** *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** *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** *Translate between explicit and recursive forms of arithmetic and geometric sequences and use both to model situations.*

21. STATISTICS

- **DATA ANALYSIS**
  - **NC.M1.S-ID.1** *Use technology to represent data with plots on the real number line (histograms, and box plots).*
  - **NC.M1.S-ID.2** *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** *Examine the effects of extreme data points (outliers) on shape, center, and/or spread.*

- **SCATTERPLOTS**
  - **NC.M1.S-ID.6a** *Fit a least squares regression line to linear data using technology. Use the fitted function to solve problems.*
  - **NC.M1.S-ID.6b** *Assess the fit of a linear function by analyzing residuals.*
  - **NC.M1.S-ID.9** *Distinguish between association and causation.*
  - **NC.M1.F-IF.6** *Calculate and interpret the average rate of change over a specified interval for a function presented numerically, graphically, and/or symbolically.*
  - **NC.M1.S-ID.7** *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.8** *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.

- **SCATTERPLOTS AND MODELING**
  - **NC.M1.S-ID.6b** *Assess the fit of a linear function by analyzing residuals.*
  - **NC.M1.S-ID.6a** *Fit a least squares regression line to linear data using technology. Use the fitted function to solve problems.*
  - **NC.M1.S-ID.8** *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.7** *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.F-IF.8b** *Interpret and explain growth and decay rates for an exponential function.*
  - **NC.M1.S-ID.6c** *Fit a function to exponential data using technology. Use the fitted function to solve problems.*