

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. REAL NUMBER SYSTEM

• LAWS OF EXPONENTS

- **NC.M2.N-RN.1** *Explain how expressions with rational exponents can be rewritten as radical expressions.*
- **NC.M2.N-RN.2** *Rewrite expressions with radicals and rational exponents into equivalent expressions using the properties of exponents.*
- **NC.M2.A-SSE.1a** *Identify and interpret parts of a quadratic, square root, inverse variation, or right triangle trigonometric expression, including terms, factors, coefficients, radicands, and exponents.*

• OPERATIONS ON RATIONAL AND IRRATIONAL NUMBERS

- **NC.M2.N-RN.3** *Use the properties of rational and irrational numbers to explain why: the sum or product of two rational numbers is rational; the sum of a rational number and an irrational number is irrational; the product of a nonzero rational number and an irrational number is irrational.*

2. SOLVING SYSTEMS OF LINEAR EQUATIONS

• SOLVING SYSTEMS OF LINEAR EQUATIONS: GRAPHING

- **NC.M2.A-CED.3** *Create systems of linear, quadratic, square root, and inverse variation equations to model situations in context.*
- **NC.M2.A-REI.7** *Use tables, graphs, and algebraic methods to approximate or find exact solutions of systems of linear and quadratic equations, and interpret the solutions in terms of a context.*
- **NC.M2.A-REI.11** *Extend the understanding that the x -coordinates of the points where the graphs of two square root and/or inverse variation 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 EQUATIONS: SUBSTITUTION

- **NC.M2.A-CED.3** *Create systems of linear, quadratic, square root, and inverse variation equations to model situations in context.*

- **NC.M2.A-REI.7** Use tables, graphs, and algebraic methods to approximate or find exact solutions of systems of linear and quadratic equations, and interpret the solutions in terms of a context.

- **SOLVING SYSTEMS OF LINEAR EQUATIONS: ELIMINATION**

- **NC.M2.A-CED.3** Create systems of linear, quadratic, square root, and inverse variation equations to model situations in context.
- **NC.M2.A-REI.7** Use tables, graphs, and algebraic methods to approximate or find exact solutions of systems of linear and quadratic equations, and interpret the solutions in terms of a context.

3. SOLVING QUADRATIC EQUATIONS

- **SOLVING QUADRATIC EQUATIONS BY FACTORING**

- **NC.M2.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: domain and range, rate of change, symmetries, and end behavior.
- **NC.M2.A-CED.2** Create and graph equations in two variables to represent quadratic, square root and inverse variation relationships between quantities.
- **NC.M2.F-BF.1** Write a function that describes a relationship between two quantities by building quadratic functions with real solution(s) and inverse variation functions given a graph, a description of a relationship, or ordered pairs (include reading these from a table).
- **NC.M2.F-IF.7** Analyze quadratic, square root, and inverse variation 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; intercepts; intervals where the function is increasing, decreasing, positive, or negative; rate of change; maximums and minimums; symmetries; and end behavior.
- **NC.M2.F-IF.8** Use equivalent expressions to reveal and explain different properties of a function by developing and using the process of completing the square to identify the zeros, extreme values, and symmetry in graphs and tables representing quadratic functions, and interpret these in terms of a context.
- **NC.M2.F-IF.9** Compare key features of two functions (linear, quadratic, square root, or inverse variation functions) each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions).

- **COMPLETING THE SQUARE**

- **NC.M2.A-REI.4a** Understand that the quadratic formula is the generalization of solving $ax^2 + bx + c$ by using the process of completing the square.
- **NC.M2.F-IF.8** Use equivalent expressions to reveal and explain different properties of a function by developing and using the process of completing the square to identify the zeros, extreme values, and symmetry in graphs and tables representing quadratic functions, and interpret these in terms of a context.
- **NC.M2.A-SSE.3** Write an equivalent form of a quadratic expression by completing the square, where a is an integer of a quadratic expression, $ax^2 + bx + c$, to reveal the maximum or minimum value of the function the expression defines.
- **NC.M2.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: domain and range, rate of change, symmetries, and end behavior.
- **NC.M2.F-IF.7** Analyze quadratic, square root, and inverse variation 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; intercepts; intervals where the function is increasing, decreasing, positive, or negative; rate of change; maximums and minimums; symmetries; and end behavior.
- **NC.M2.F-IF.9** Compare key features of two functions (linear, quadratic, square root, or inverse variation functions) each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions).
- **NC.M2.F-BF.1** Write a function that describes a relationship between two quantities by building quadratic functions with real solution(s) and inverse variation functions given a graph, a description of a relationship, or ordered pairs (include reading these from a table).

- **QUADRATIC FORMULA**

- **NC.M2.A-SSE.1a** Identify and interpret parts of a quadratic, square root, inverse variation, or right triangle trigonometric expression, including terms, factors, coefficients, radicands, and exponents.

- **NC.M2.A-SSE.1b** Interpret quadratic and square root expressions made of multiple parts as a combination of single entities to give meaning in terms of a context.
- **NC.M2.A-REI.4b** Explain when quadratic equations will have non-real solutions and express complex solutions as $a \pm bi$ for real numbers a and b .
- **NC.M2.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: domain and range, rate of change, symmetries, and end behavior.
- **NC.M2.F-IF.7** Analyze quadratic, square root, and inverse variation 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; intercepts; intervals where the function is increasing, decreasing, positive, or negative; rate of change; maximums and minimums; symmetries; and end behavior.
- **NC.M2.F-IF.9** Compare key features of two functions (linear, quadratic, square root, or inverse variation functions) each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions).
- **NC.M2.A-REI.4a** Understand that the quadratic formula is the generalization of solving $ax^2 + bx + c$ by using the process of completing the square.
- **NC.M2.A-CED.2** Create and graph equations in two variables to represent quadratic, square root and inverse variation relationships between quantities.
- **NC.M2.F-BF.1** Write a function that describes a relationship between two quantities by building quadratic functions with real solution(s) and inverse variation functions given a graph, a description of a relationship, or ordered pairs (include reading these from a table).

4. QUADRATIC FUNCTIONS

• QUADRATIC FUNCTIONS

- **NC.M2.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: domain and range, rate of change, symmetries, and end behavior.
- **NC.M2.A-CED.2** Create and graph equations in two variables to represent quadratic, square root and inverse variation relationships between quantities.
- **NC.M2.A-SSE.1a** Identify and interpret parts of a quadratic, square root, inverse variation, or right triangle trigonometric expression, including terms, factors, coefficients, radicands, and exponents.
- **NC.M2.A-SSE.1b** Interpret quadratic and square root expressions made of multiple parts as a combination of single entities to give meaning in terms of a context.
- **NC.M2.A-SSE.3** Write an equivalent form of a quadratic expression by completing the square, where a is an integer of a quadratic expression, $ax^2 + bx + c$, to reveal the maximum or minimum value of the function the expression defines.
- **NC.M2.F-IF.8** Use equivalent expressions to reveal and explain different properties of a function by developing and using the process of completing the square to identify the zeros, extreme values, and symmetry in graphs and tables representing quadratic functions, and interpret these in terms of a context.
- **NC.M2.F-BF.1** Write a function that describes a relationship between two quantities by building quadratic functions with real solution(s) and inverse variation functions given a graph, a description of a relationship, or ordered pairs (include reading these from a table).

• REPRESENTATIONS OF QUADRATIC FUNCTIONS

- **NC.M2.A-REI.4a** Understand that the quadratic formula is the generalization of solving $ax^2 + bx + c$ by using the process of completing the square.
- **NC.M2.A-SSE.1b** Interpret quadratic and square root expressions made of multiple parts as a combination of single entities to give meaning in terms of a context.
- **NC.M2.A-CED.2** Create and graph equations in two variables to represent quadratic, square root and inverse variation relationships between quantities.
- **NC.M2.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: domain and range, rate of change, symmetries, and end behavior.
- **NC.M2.F-IF.7** Analyze quadratic, square root, and inverse variation 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; intercepts; intervals where the function is increasing, decreasing, positive, or negative; rate of change; maximums and minimums; symmetries; and end behavior.

- **NC.M2.F-IF.9** Compare key features of two functions (linear, quadratic, square root, or inverse variation functions) each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions).
- **NC.M2.F-BF.1** Write a function that describes a relationship between two quantities by building quadratic functions with real solution(s) and inverse variation functions given a graph, a description of a relationship, or ordered pairs (include reading these from a table).

- **ANALYZING GRAPHS OF QUADRATIC FUNCTIONS**

- **NC.M2.F-IF.7** Analyze quadratic, square root, and inverse variation 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; intercepts; intervals where the function is increasing, decreasing, positive, or negative; rate of change; maximums and minimums; symmetries; and end behavior.
- **NC.M2.F-IF.8** Use equivalent expressions to reveal and explain different properties of a function by developing and using the process of completing the square to identify the zeros, extreme values, and symmetry in graphs and tables representing quadratic functions, and interpret these in terms of a context.
- **NC.M2.F-IF.9** Compare key features of two functions (linear, quadratic, square root, or inverse variation functions) each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions).
- **NC.M2.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: domain and range, rate of change, symmetries, and end behavior.
- **NC.M2.F-BF.1** Write a function that describes a relationship between two quantities by building quadratic functions with real solution(s) and inverse variation functions given a graph, a description of a relationship, or ordered pairs (include reading these from a table).

5. COMPLEX NUMBERS AND QUADRATIC FUNCTIONS

- **COMPLEX NUMBERS**

- **NC.M2.N-CN.1** Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ where a and b are real numbers.

- **COMPLEX NUMBERS AND QUADRATIC FUNCTIONS**

- **NC.M2.A-REI.4b** Explain when quadratic equations will have non-real solutions and express complex solutions as $a \pm bi$ for real numbers a and b .
- **NC.M2.N-CN.1** Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ where a and b are real numbers.

6. TRANSFORMATIONS OF FUNCTIONS

- **TRANSFORMATIONS OF THE LINEAR AND EXPONENTIAL PARENT FUNCTIONS**

- **NC.M2.F-BF.3** Understand the effects of the graphical and tabular representations of a linear, quadratic, square root, and inverse variation function f with $k \times f(x)$, $f(x) + k$, $f(x + k)$ for specific values of k (both positive and negative).

- **TRANSFORMATIONS OF THE QUADRATIC PARENT FUNCTION**

- **NC.M2.F-BF.3** Understand the effects of the graphical and tabular representations of a linear, quadratic, square root, and inverse variation function f with $k \times f(x)$, $f(x) + k$, $f(x + k)$ for specific values of k (both positive and negative).
- **NC.M2.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: domain and range, rate of change, symmetries, and end behavior.

7. RADICAL FUNCTIONS

- **SOLVING SQUARE ROOT EQUATIONS**

- **NC.M2.A-REI.2** Solve and interpret one variable inverse variation and square root equations arising from a context, and explain how extraneous solutions may be produced.

- **NC.M2.A-REI.1** Justify a chosen solution method and each step of the solving process for quadratic, square root and inverse variation equations using mathematical reasoning.
- **NC.M2.A-SSE.1b** Interpret quadratic and square root expressions made of multiple parts as a combination of single entities to give meaning in terms of a context.

- **ANALYZING GRAPHS OF SQUARE ROOT FUNCTIONS**

- **NC.M2.F-BF.3** Understand the effects of the graphical and tabular representations of a linear, quadratic, square root, and inverse variation function f with $k \times f(x)$, $f(x) + k$, $f(x + k)$ for specific values of k (both positive and negative).
- **NC.M2.F-IF.7** Analyze quadratic, square root, and inverse variation 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; intercepts; intervals where the function is increasing, decreasing, positive, or negative; rate of change; maximums and minimums; symmetries; and end behavior.
- **NC.M2.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: domain and range, rate of change, symmetries, and end behavior.

8. OPERATIONS WITH POLYNOMIALS

- **ADDITION AND SUBTRACTION OF POLYNOMIALS**

- **NC.M2.A-APR.1** Extend the understanding that operations with polynomials are comparable to operations with integers by adding, subtracting, and multiplying polynomials.

- **MULTIPLICATION OF POLYNOMIALS**

- **NC.M2.A-APR.1** Extend the understanding that operations with polynomials are comparable to operations with integers by adding, subtracting, and multiplying polynomials.

9. WORKING WITH FUNCTIONS AND EQUATIONS

- **MULTIPLE REPRESENTATIONS OF FUNCTIONS**

- **NC.M2.F-IF.9** Compare key features of two functions (linear, quadratic, square root, or inverse variation functions) each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions).
- **NC.M2.F-IF.7** Analyze quadratic, square root, and inverse variation 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; intercepts; intervals where the function is increasing, decreasing, positive, or negative; rate of change; maximums and minimums; symmetries; and end behavior.
- **NC.M2.F-BF.1** Write a function that describes a relationship between two quantities by building quadratic functions with real solution(s) and inverse variation functions given a graph, a description of a relationship, or ordered pairs (include reading these from a table).

- **SYSTEMS OF NONLINEAR EQUATIONS**

- **NC.M2.A-REI.7** Use tables, graphs, and algebraic methods to approximate or find exact solutions of systems of linear and quadratic equations, and interpret the solutions in terms of a context.
- **NC.M2.A-CED.3** Create systems of linear, quadratic, square root, and inverse variation equations to model situations in context.
- **NC.M2.A-REI.11** Extend the understanding that the x -coordinates of the points where the graphs of two square root and/or inverse variation 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.

10. LINES AND ANGLES

- **PARALLEL LINES AND ANGLE RELATIONSHIPS**

- **NC.M2.G-CO.9** Prove theorems about lines and angles and use them to prove relationships in geometric figures including:

Vertical angles are congruent. When a transversal crosses parallel lines, alternate interior angles are congruent. When a transversal crosses parallel lines, corresponding angles are congruent. Points are on a perpendicular bisector of a line segment if and only if they are equidistant from the endpoints of the segment. Use congruent triangles to justify why the bisector of an angle is equidistant from the sides of the angle.

- **PERPENDICULAR BISECTOR AND ANGLE BISECTOR THEOREMS**

- **NC.M2.G-CO.9** Prove theorems about lines and angles and use them to prove relationships in geometric figures including: Vertical angles are congruent. When a transversal crosses parallel lines, alternate interior angles are congruent. When a transversal crosses parallel lines, corresponding angles are congruent. Points are on a perpendicular bisector of a line segment if and only if they are equidistant from the endpoints of the segment. Use congruent triangles to justify why the bisector of an angle is equidistant from the sides of the angle.

11. TRIANGLES

- **TRIANGLE ANGLE THEOREMS**

- **NC.M2.G-CO.10** Prove theorems about triangles and use them to prove relationships in geometric figures including: The sum of the measures of the interior angles of a triangle is 180° . An exterior angle of a triangle is equal to the sum of its remote interior angles. The base angles of an isosceles triangle are congruent. The segment joining the midpoints of two sides of a triangle is parallel to the third side and half the length.

- **TRIANGLE BISECTORS**

- **NC.M2.G-SRT.4** Use similarity to solve problems and to prove theorems about triangles. Use theorems about triangles to prove relationships in geometric figures. A line parallel to one side of a triangle divides the other two sides proportionally and its converse. The Pythagorean Theorem.

12. TRANSFORMATIONS ON THE COORDINATE PLANE

- **TRANSFORMATIONS ON THE COORDINATE PLANE**

- **NC.M2.G-CO.5** Given a geometric figure and a rigid motion, find the image of the figure. Given a geometric figure and its image, specify a rigid motion or sequence of rigid motions that will transform the pre-image to its image.
- **NC.M2.G-CO.6** Determine whether two figures are congruent by specifying a rigid motion or sequence of rigid motions that will transform one figure onto the other.
- **NC.M2.G-CO.4** Verify experimentally properties of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
- **NC.M2.G-SRT.1a** When a line segment passes through the center of dilation, the line segment and its image lie on the same line. When a line segment does not pass through the center of dilation, the line segment and its image are parallel.
- **NC.M2.G-SRT.2a** Determine whether two figures are similar by specifying a sequence of transformations that will transform one figure into the other.
- **NC.M2.G-CO.2** Experiment with transformations in the plane. Represent transformations in the plane. Compare rigid motions that preserve distance and angle measure (translations, reflections, rotations) to transformations that do not preserve both distance and angle measure (e.g. stretches, dilations). Understand that rigid motions produce congruent figures while dilations produce similar figures.
- **NC.M2.G-SRT.1b** The length of the image of a line segment is equal to the length of the line segment multiplied by the scale factor.
- **NC.M2.G-SRT.1c** The distance between the center of a dilation and any point on the image is equal to the scale factor multiplied by the distance between the dilation center and the corresponding point on the pre-image.
- **NC.M2.G-SRT.1d** Dilations preserve angle measure.

- **DILATIONS, TRANSLATIONS, ROTATIONS, AND REFLECTIONS**

- **NC.M2.G-CO.5** Given a geometric figure and a rigid motion, find the image of the figure. Given a geometric figure and its image, specify a rigid motion or sequence of rigid motions that will transform the pre-image to its image.
- **NC.M2.G-CO.6** Determine whether two figures are congruent by specifying a rigid motion or sequence of rigid motions that

will transform one figure onto the other.

- **NC.M2.G-SRT.1a** When a line segment passes through the center of dilation, the line segment and its image lie on the same line. When a line segment does not pass through the center of dilation, the line segment and its image are parallel.
- **NC.M2.G-SRT.2a** Determine whether two figures are similar by specifying a sequence of transformations that will transform one figure into the other.
- **NC.M2.F-IF.2** Extend the use of function notation to express the image of a geometric figure in the plane resulting from a translation, rotation by multiples of 90 degrees about the origin, reflection across an axis, or dilation as a function of its pre-image.
- **NC.M2.G-SRT.1b** The length of the image of a line segment is equal to the length of the line segment multiplied by the scale factor.
- **NC.M2.G-SRT.1c** The distance between the center of a dilation and any point on the image is equal to the scale factor multiplied by the distance between the dilation center and the corresponding point on the pre-image.
- **NC.M2.F-IF.1** Extend the concept of a function to include geometric transformations in the plane by recognizing that: the domain and range of a transformation function f are sets of points in the plane; the image of a transformation is a function of its pre-image.
- **NC.M2.G-CO.4** Verify experimentally properties of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
- **NC.M2.G-CO.2** Experiment with transformations in the plane. Represent transformations in the plane. Compare rigid motions that preserve distance and angle measure (translations, reflections, rotations) to transformations that do not preserve both distance and angle measure (e.g. stretches, dilations). Understand that rigid motions produce congruent figures while dilations produce similar figures.

13. CONGRUENCE AND SIMILARITY

• TRIANGLES AND CONGRUENCE TRANSFORMATIONS

- **NC.M2.G-CO.6** Determine whether two figures are congruent by specifying a rigid motion or sequence of rigid motions that will transform one figure onto the other.
- **NC.M2.G-CO.7** Use the properties of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
- **NC.M2.G-CO.8** Use congruence in terms of rigid motion. Justify the ASA, SAS, and SSS criteria for triangle congruence. Use criteria for triangle congruence (ASA, SAS, SSS, HL) to determine whether two triangles are congruent.
- **NC.M2.F-IF.2** Extend the use of function notation to express the image of a geometric figure in the plane resulting from a translation, rotation by multiples of 90 degrees about the origin, reflection across an axis, or dilation as a function of its pre-image.
- **NC.M2.F-IF.1** Extend the concept of a function to include geometric transformations in the plane by recognizing that: the domain and range of a transformation function f are sets of points in the plane; the image of a transformation is a function of its pre-image.
- **NC.M2.G-CO.3** Given a triangle, quadrilateral, or regular polygon, describe any reflection or rotation symmetry i.e., actions that carry the figure onto itself. Identify center and angle(s) of rotation symmetry. Identify line(s) of reflection symmetry.

• CONGRUENCE OF OTHER POLYGONS

- **NC.M2.G-CO.5** Given a geometric figure and a rigid motion, find the image of the figure. Given a geometric figure and its image, specify a rigid motion or sequence of rigid motions that will transform the pre-image to its image.
- **NC.M2.G-CO.6** Determine whether two figures are congruent by specifying a rigid motion or sequence of rigid motions that will transform one figure onto the other.
- **NC.M2.G-CO.3** Given a triangle, quadrilateral, or regular polygon, describe any reflection or rotation symmetry i.e., actions that carry the figure onto itself. Identify center and angle(s) of rotation symmetry. Identify line(s) of reflection symmetry.

• TRIANGLES AND SIMILARITY TRANSFORMATIONS

- **NC.M2.G-SRT.2a** Determine whether two figures are similar by specifying a sequence of transformations that will transform one figure into the other.
- **NC.M2.G-SRT.6** Verify experimentally that the side ratios in similar right triangles are properties of the angle measures in the

triangle, due to the preservation of angle measure in similarity. Use this discovery to develop definitions of the trigonometric ratios for acute angles.

- **NC.M2.G-SRT.2b** Use the properties of dilations to show that two triangles are similar when all corresponding pairs of sides are proportional and all corresponding pairs of angles are congruent.
- **NC.M2.G-SRT.3** Use transformations (rigid motions and dilations) to justify the AA criterion for triangle similarity.
- **NC.M2.G-SRT.4** Use similarity to solve problems and to prove theorems about triangles. Use theorems about triangles to prove relationships in geometric figures. A line parallel to one side of a triangle divides the other two sides proportionally and its converse. The Pythagorean Theorem.

14. RIGHT TRIANGLES AND TRIGONOMETRY

• THE PYTHAGOREAN THEOREM

- **NC.M2.G-SRT.8** Use trigonometric ratios and the Pythagorean Theorem to solve problems involving right triangles in terms of a context.
- **NC.M2.G-SRT.4** Use similarity to solve problems and to prove theorems about triangles. Use theorems about triangles to prove relationships in geometric figures. A line parallel to one side of a triangle divides the other two sides proportionally and its converse. The Pythagorean Theorem.

• TRIGONOMETRIC RATIOS

- **NC.M2.G-SRT.6** Verify experimentally that the side ratios in similar right triangles are properties of the angle measures in the triangle, due to the preservation of angle measure in similarity. Use this discovery to develop definitions of the trigonometric ratios for acute angles.
- **NC.M2.G-SRT.8** Use trigonometric ratios and the Pythagorean Theorem to solve problems involving right triangles in terms of a context.
- **NC.M2.A-CED.1** Create equations and inequalities in one variable that represent quadratic, square root, inverse variation, and right triangle trigonometric relationships and use them to solve problems.
- **NC.M2.A-CED.2** Create and graph equations in two variables to represent quadratic, square root and inverse variation relationships between quantities.
- **NC.M2.G-SRT.12** Develop properties of special right triangles (45-45-90 and 30-60-90) and use them to solve problems.

• RADIANS AND THE UNIT CIRCLE

- **NC.M2.A-SSE.1a** Identify and interpret parts of a quadratic, square root, inverse variation, or right triangle trigonometric expression, including terms, factors, coefficients, radicands, and exponents.
- **NC.M2.G-SRT.12** Develop properties of special right triangles (45-45-90 and 30-60-90) and use them to solve problems.

15. PROBABILITY AND STATISTICS

• INTRODUCTION TO PROBABILITY

- **NC.M2.S-CP.3b** Understand that event A is independent from event B if the probability of event A does not change in response to the occurrence of event B . That is $P(A|B)=P(A)$.
- **NC.M2.S-CP.8** Apply the general Multiplication Rule $P(A \text{ and } B) = P(A)P(B|A) = P(B)P(A|B)$, and interpret the answer in context. Include the case where A and B are independent: $P(A \text{ and } B) = P(A) P(B)$.
- **NC.M2.S-CP.5** Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.
- **NC.M2.S-CP.7** Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in context.
- **NC.M2.S-CP.1** Describe events as subsets of the outcomes in a sample space using characteristics of the outcomes or as unions, intersections and complements of other events.

• CONDITIONAL PROBABILITY

- **NC.M2.S-CP.5** Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.

- **NC.M2.S-CP.6** Find the conditional probability of A given B as the fraction of B 's outcomes that also belong to A , and interpret the answer in context.
- **NC.M2.S-CP.3b** Understand that event A is independent from event B if the probability of event A does not change in response to the occurrence of event B . That is $P(A|B)=P(A)$.
- **NC.M2.S-CP.4** Represent data on two categorical variables by constructing a two-way frequency table of data. Interpret the two-way table as a sample space to calculate conditional, joint and marginal probabilities. Use the table to decide if events are independent.
- **NC.M2.S-CP.3a** Use a 2-way table to develop understanding of the conditional probability of A given B (written $P(A|B)$) as the likelihood that A will occur given that B has occurred. That is, $P(A|B)$ is the fraction of event B 's outcomes that also belong to event A .

- **ANALYZING STATISTICAL SAMPLES**

- **NC.M2.S-IC.2** Use simulation to determine whether the experimental probability generated by sample data is consistent with the theoretical probability based on known information about the population.