TASC Test Assessing Secondary Completion™ Tutorials are based on specifications found in TASC Test information for publishers which includes alignment to Common Core State Standards and provide students a less stressful and more successful preparation effort as they work to achieve a TASC test passing score.

In each module, the Learn It and Try It make complex ideas accessible to students through focused content, guided analysis, and practice with personalized feedback so students are empowered to increase their Exam Readiness. The Review It offers an engaging and high impact video summary of key concepts and important to grasp connections. The Test It assesses students' mastery of the module's concepts, providing granular performance data to students and teachers, linking a student's performance to ACT key idea details and score ranges. To help students focus on the content most relevant to them, unit-level pretests and posttests can quickly identify where students are ready for test day and where they need to continue their review and practice.

This Tutorial is aligned to specifications found in TASC Test information for publishers for Mathematics, Reading, and Writing test subject areas.

1. REAL NUMBERS

- **LAWS OF EXPONENTS**
  - **N-RN.2** *Rewrite expressions involving radicals and rational exponents using the properties of exponents.*

- **OPERATIONS ON RATIONAL AND IRRATIONAL NUMBERS**
  - **N-RN.3** *Explain why the sum or product of rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.*

- **MONITORING PRECISION AND ACCURACY**
  - **N-Q.1** *Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.*
  - **N-Q.2** *Define appropriate quantities for the purpose of descriptive modeling.*
  - **N-Q.3** *Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.*

2. EXPRESSIONS, EQUATIONS, AND INEQUALITIES

- **FORMULATING AND SIMPLIFYING ALGEBRAIC EXPRESSIONS**
  - **A-SSE.1.b** *Interpret complicated expressions by viewing one or more of their parts as a single entity.*

- **ONE-STEP EQUATIONS AND INEQUALITIES**
  - **A-CED.1** *Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*
  - **A-REI.3** *Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.*

- **MULTI-STEP EQUATIONS AND INEQUALITIES**
  - **A-CED.1** *Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*

- **A-REI.3** *Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.*

3. APPLYING EQUATIONS AND INEQUALITIES

- **AXIOMS OF EQUALITY**
  - **A-REI.1** *Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.*

- **LITERAL EQUATIONS**
  - **A-REI.3** *Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.*
  - **A-CED.4** *Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.*

4. FORMULATING AND SOLVING EQUATIONS AND INEQUALITIES

- **FORMULATING AND SOLVING EQUATIONS FROM WORD PROBLEMS**
  - **A-CED.1** *Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*
  - **A-SSE.1.b** *Interpret complicated expressions by viewing one or more of their parts as a single entity.*

- **FORMULATING AND SOLVING INEQUALITIES FROM WORD PROBLEMS**
  - **A-CED.1** *Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*
  - **A-SSE.1.b** *Interpret complicated expressions by viewing one or more of their parts as a single entity.*

5. FUNCTIONS

- **FUNCTIONS AND RELATIONS**
  - **F-IF.2** *Use function notations, evaluates functions for inputs in their domains, and interprets statements that use function notation in terms of a context.*
  - **F-IF.1** *Understand 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. 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 off is the graph of the equation y = f(x).*
  - **F-IF.7.b** *Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.*

- **DOMAIN AND RANGE**
  - **F-IF.5** *Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.*

- **EVALUATING FUNCTIONS**
  - **F-IF.2** *Use function notations, evaluates functions for inputs in their domains, and interprets statements that use function notation in terms of a context.*

6. INTRODUCTION TO LINEAR FUNCTIONS

- **SLOPE**
  - **F-IF.4** *For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*
  - **F-IF.6** *Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.*

- **GRAPHING AND ANALYZING LINEAR FUNCTIONS**
  - **F-IF.4** *For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*
  - **F-LE.2** *Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*

7. LINEAR EQUATIONS

- **SLOPE-INTERCEPT FORM OF A LINEAR EQUATION**
  - **A-REI.10** *Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).*
  - **F-LE.2** *Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*
  - **F-IF.7.a** *Graph linear and quadratic functions and show intercepts, maxima, and minima.*

- **POINT-SLOPE FORM OF A LINEAR EQUATION**
  - **F-LE.2** *Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*
  - **F-IF.7.a** *Graph linear and quadratic functions and show intercepts, maxima, and minima.*
  - **A-REI.10** *Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).*

8. GRAPHS OF LINEAR FUNCTIONS AND INEQUALITIES

- **GRAPHING AND MANIPULATING Y = MX + B**
  - **F-IF.6** *Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.*
  - **A-CED.2** *Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.*
  - **F-IF.4** *For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*
  - **F-LE.5** *Interpret the parameters in a linear, quadratic, or exponential function in terms of a context.*
  - **F-LE.2** *Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*
  - **F-IF.7.a** *Graph linear and quadratic functions and show intercepts, maxima, and minima.*

- **GRAPHS OF LINEAR INEQUALITIES**
  - **A-CED.3** *Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context.*
  - **A-REI.12** *Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.*

9. SOLVING LINEAR SYSTEMS GRAPHICALLY

- **SOLVING SYSTEMS OF LINEAR EQUATIONS: GRAPHING**
  - **A-CED.2** *Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.*
  - **A-CED.3** *Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context.*

- **SOLVING SYSTEMS OF LINEAR INEQUALITIES**
  - **A-CED.2** *Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.*
  - **A-CED.3** *Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context.*
  - **A-REI.12** *Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.*

10. SOLVING SYSTEMS OF EQUATIONS ALGEBRAICALLY

- **SOLVING SYSTEMS OF LINEAR EQUATIONS: SUBSTITUTION**
  - **A-CED.2** *Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.*
  - **A-CED.3** *Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context.*

- **SOLVING SYSTEMS OF LINEAR EQUATIONS: ELIMINATION**
  - **A-CED.2** *Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.*
  - **A-CED.3** *Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context.*

11. EXPONENTIAL FUNCTIONS, EQUATIONS, AND INEQUALITIES

- **EXPONENTIAL FUNCTIONS**
  - **F-IF.7.e** *Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.*
  - **F-IF.4** *For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*
  - **F-LE.2** *Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*
  - **F-LE.5** *Interpret the parameters in a linear, quadratic, or exponential function in terms of a context.*
  - **A-SSE.1.b** *Interpret complicated expressions by viewing one or more of their parts as a single entity.*
  - **A-SSE.3.c** *Use the properties of exponents to transform expressions for exponential functions.*
  - **F-IF.8.b** *Use the properties of exponents to interpret expressions for exponential functions.*

- **EXPONENTIAL GROWTH AND DECAY**
  - **A-SSE.1.a** *Interpret parts of an expression, such as terms, factors, and coefficients.*
  - **F-IF.8.b** *Use the properties of exponents to interpret expressions for exponential functions.*
  - **A-CED.2** *Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.*
  - **F-LE.2** *Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*
  - **F-LE.3** *Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.*
  - **F-LE.5** *Interpret the parameters in a linear, quadratic, or exponential function in terms of a context.*
  - **F-LE.1.c** *Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.*

- **SOLVING EXPONENTIAL INEQUALITIES**
  - **A-CED.2** *Create equations in two or more variables to represent relationships between quantities; graph equations on*

coordinate axes with labels and scales.

- **A-SSE.1.a** *Interpret parts of an expression, such as terms, factors, and coefficients.*
- **F-LE.1.c** *Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.*

12. LOGARITHMIC EXPRESSIONS AND FUNCTIONS

- **EVALUATING LOGARITHMIC EXPRESSIONS**
  - **F-IF.5** *Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.*
  - **F-BF.5** *Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.*

- **LOGARITHMIC FUNCTIONS**
  - **F-BF.5** *Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.*

13. SOLVING EXPONENTIAL AND LOGARITHMIC EQUATIONS

- **SOLVING LOGARITHMIC EQUATIONS**
  - **F-BF.5** *Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.*

- **SOLVING EXPONENTIAL EQUATIONS**
  - **F-BF.5** *Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.*

14. ARITHMETIC WITH POLYNOMIALS

- **POLYNOMIAL BASICS**
  - **A-SSE.1.a** *Interpret parts of an expression, such as terms, factors, and coefficients.*

- **ADDITION AND SUBTRACTION OF POLYNOMIALS**
  - **A-APR.1** *Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.*

- **MULTIPLICATION OF POLYNOMIALS**
  - **A-APR.1** *Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.*

15. WORKING WITH QUADRATIC FUNCTIONS

- **QUADRATIC FUNCTIONS**
  - **F-IF.4** *For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*

- **QUADRATIC PARENT FUNCTION**
  - **F-IF.5** *Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.*

- **TRANSFORMATIONS OF THE QUADRATIC PARENT FUNCTION**

- **F-BF.3** *Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology.*

16. SOLVING QUADRATIC EQUATIONS

- **SOLVING QUADRATIC EQUATIONS BY FACTORING**
- **COMPLETING THE SQUARE**
- **QUADRATIC FORMULA**
  - **F-IF.4** *For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*

17. REPRESENTATIONS OF QUADRATIC FUNCTIONS

- **ANALYZING GRAPHS OF QUADRATIC FUNCTIONS**
  - **F-IF.5** *Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.*
  - **F-IF.1** *Understand 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. 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 off is the graph of the equation y = f(x).*
  - **F-IF.4** *For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*
  - **A-REI.4.b** *Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.*
  - **F-IF.7.a** *Graph linear and quadratic functions and show intercepts, maxima, and minima.*
  - **F-IF.8.a** *Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.*

- **REPRESENTATIONS OF QUADRATIC FUNCTIONS**
  - **A-SSE.3.c** *Use the properties of exponents to transform expressions for exponential functions.*
  - **F-IF.8.a** *Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.*
  - **A-APR.3** *Identify zeroes of polynomials when suitable factorizations are available, and use the zeroes to construct a rough graph of the function defined by the polynomial.*
  - **F-IF.4** *For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*
  - **A-REI.4.b** *Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.*
  - **A-CED.2** *Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.*

18. WORKING WITH FUNCTIONS 1

- **LINEAR VERSUS NONLINEAR FUNCTIONS**
  - **F-IF.4** *For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*

- **F-IF.6** *Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.*
- **F-LE.1.b** *Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.*
- **F-LE.1.c** *Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.*

- **ARITHMETIC AND GEOMETRIC SEQUENCES**
  - **F-LE.2** *Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*
  - **F-BF.2** *Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.*
  - **F-BF.1.a** *Determine an explicit expression, a recursive process, or steps for calculation from a context.*

19. WORKING WITH FUNCTIONS 2

- **ARITHMETIC OPERATIONS ON FUNCTIONS**
  - **F-BF.1.b** *Combine standard function types using arithmetic operations.*

- **INVERSE FUNCTIONS**
  - **F-BF.4.a** *Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse.*
  - **F-BF.4.d** *Produce an invertible function from a non-invertible function by restricting the domain.*
  - **F-BF.4.c** *Read values of an inverse function from a graph or a table, given that the function has an inverse.*

20. TRANSFORMING FUNCTIONS

- **LINEAR AND EXPONENTIAL PARENT FUNCTIONS**
  - **A-REI.10** *Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).*
  - **F-IF.5** *Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.*

- **TRANSFORMATIONS OF THE LINEAR AND EXPONENTIAL PARENT FUNCTIONS**
  - **F-BF.3** *Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, and $f(x + k)$ for specific values of (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology.*

- **ABSOLUTE VALUE FUNCTIONS**
  - **F-BF.3** *Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, and $f(x + k)$ for specific values of (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology.*
  - **F-IF.7.b** *Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.*

21. STATISTICAL DESIGN AND ANALYSIS

- **EXPERIMENTAL AND OBSERVATIONAL DESIGN**
  - **S-IC.3** *Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.*

- **DATA ANALYSIS**
  - **S-ID.1** *Represent data with plots on the real number line (dot plots, histograms, and box plots).*
  - **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.

- **S-ID.3** *Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).*

22. STATISTICS

- **ANALYZING STATISTICAL SAMPLES**
  - **S-IC.1** *Understand statistics as a process for making inferences about population parameters based on a random sample from that population.*
  - **S-IC.2** *Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.*
  - **S-IC.4** *Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.*

- **CONCLUSIONS IN DATA**
  - **S-IC.5** *Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.*
  - **S-IC.6** *Evaluate reports based on data.*

23. DISPLAYS OF DATA

- **FREQUENCY TABLES**
  - **S-ID.5** *Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.*

- **SCATTERPLOTS**
  - **S-ID.6.c** *Fit a linear function for a scatter plot that suggests a linear association.*
  - **S-ID.9** *Distinguish between correlation and causation.*
  - **S-ID.6.b** *Informally assess the fit of a function by plotting and analyzing residuals.*
  - **S-ID.7** *Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.*

24. WORKING WITH DATA

- **SCATTERPLOTS AND MODELING**
  - **S-ID.6.a** *Fit a function to the data; use functions fitted to data to solve problems in the context of the data.*
  - **S-ID.6.b** *Informally assess the fit of a function by plotting and analyzing residuals.*
  - **S-ID.8** *Compute (using technology) and interpret the correlation coefficient of a linear fit.*
  - **S-ID.6.c** *Fit a linear function for a scatter plot that suggests a linear association.*
  - **S-ID.7** *Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.*

- **NORMAL DISTRIBUTION**
  - **S-IC.4** *Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.*
  - **S-ID.4** *Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.*

25. POINTS AND LINES

- **POINTS, RAYS, LINE SEGMENTS, LINES, AND FIGURES**
  - **G-CO.1** *Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.*

- **PARALLEL AND PERPENDICULAR LINES**
  - **G-CO.1** *Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.*

26. LINES AND ANGLES

- **PARALLEL LINES AND ANGLE RELATIONSHIPS**
  - **G-CO.1** *Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.*
  - **G-CO.9** *Prove theorems about lines and angles.*

- **PERPENDICULAR BISECTOR AND ANGLE BISECTOR THEOREMS**
  - **G-CO.9** *Prove theorems about lines and angles.*
  - **G-CO.10** *Prove theorems about triangles.*

27. INTRODUCTION TO COORDINATE GEOMETRY

- **CONJECTURES IN COORDINATE GEOMETRY**
  - **G-CO.10** *Prove theorems about triangles.*

- **TRANSFORMATIONS ON THE COORDINATE PLANE**
  - **G-CO.2** *Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).*
  - **G-CO.3** *Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.*
  - **G-CO.5** *Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.*
  - **G-CO.6** *Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.*
  - **G-CO.4** *Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.*
  - **G-SRT.1.a** *A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.*
  - **G-SRT.1.b** *The dilation of a line segment is longer or shorter in the ratio given by the scale factor.*

- **DILATIONS, TRANSLATIONS, ROTATIONS, AND REFLECTIONS**
  - **G-CO.4** *Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.*
  - **G-CO.2** *Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).*
  - **G-CO.3** *Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.*
  - **G-CO.5** *Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.*
  - **G-SRT.1.a** *A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.*
  - **G-SRT.1.b** *The dilation of a line segment is longer or shorter in the ratio given by the scale factor.*

28. CONGRUENCE

- **TRIANGLES AND CONGRUENCE TRANSFORMATIONS**

- **G-SRT.5** *Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.*
- **G-CO.8** *Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.*
- **G-CO.7** *Use the definition of congruence in terms 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.*

- **CONGRUENCE OF OTHER POLYGONS**
  - **G-CO.6** *Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.*
  - **G-CO.5** *Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.*
  - **G-CO.3** *Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.*

29. SIMILARITY

- **TRIANGLES AND SIMILARITY TRANSFORMATIONS**
  - **G-SRT.2** *Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.*
  - **G-SRT.5** *Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.*
  - **G-SRT.3** *Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.*
  - **G-CO.10** *Prove theorems about triangles.*
  - **G-SRT.4** *Prove theorems about triangles.*

- **SIMILARITY OF OTHER POLYGONS**
  - **G-SRT.2** *Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.*
  - **G-SRT.3** *Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.*

30. TRIANGLES

- **TRIANGLE ANGLE THEOREMS**
  - **G-CO.10** *Prove theorems about triangles.*

- **TRIANGLE BISECTORS**
  - **G-SRT.5** *Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.*
  - **G-CO.10** *Prove theorems about triangles.*
  - **G-SRT.4** *Prove theorems about triangles.*

- **MEDIANS AND ALTITUDES OF TRIANGLES**
  - **G-CO.10** *Prove theorems about triangles.*

31. POLYGONS

- **SQUARES AND RHOMBI**
  - **G-CO.11** *Prove theorems about parallelograms.*

- **PARALLELOGRAMS AND RECTANGLES**

- **G-CO.11** *Prove theorems about parallelograms.*

- **CONSTRUCTIONS**
  - **G-CO.12** *Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).*
  - **G-CO.13** *Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.*

32. RIGHT TRIANGLES AND TRIGONOMETRY

- **PYTHAGOREAN THEOREM**
  - **G-SRT.8** *Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*
  - **G-CO.10** *Prove theorems about triangles.*
  - **G-SRT.4** *Prove theorems about triangles.*

- **TRIGONOMETRIC RATIOS**
  - **G-SRT.6** *Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.*
  - **G-SRT.7** *Explain and use the relationship between the sine and cosine of complementary angles.*
  - **G-SRT.8** *Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*

33. TRIGONOMETRY

- **RADIANS AND THE UNIT CIRCLE**
  - **G-SRT.8** *Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*

- **LAWS OF SINE AND COSINE**
  - **G-SRT.10** *Prove the Laws of Sines and Cosines and use them to solve problems.*
  - **G-SRT.11** *Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).*
  - **G-SRT.9** *Derive the formula* $A = 1/2\ ab\ \sin(C)$ *for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.*

34. CIRCLES AND ANGLES 1

- **CIRCLE BASICS**
  - **G-CO.1** *Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.*

- **CENTRAL ANGLES, INSCRIBED ANGLES, AND CHORDS**
  - **G-CO.9** *Prove theorems about lines and angles.*

35. CIRCLES AND ANGLES 2

- **SECANTS, ANGLES, AND INTERCEPTED ARCS**
  - **G-CO.9** *Prove theorems about lines and angles.*

- **TANGENTS, ANGLES, AND INTERCEPTED ARCS**
  - **G-CO.9** *Prove theorems about lines and angles.*

36. THREE-DIMENSIONAL GEOMETRY

- **RELATING TWO-DIMENSIONAL FIGURES TO THREE-DIMENSIONAL SOLIDS**
  - **G-GMD.4** *Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.*

- **MODELING SITUATIONS WITH GEOMETRY**
  - **G-MG.2** *Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).*

37. VOLUME

- **VOLUME OF PRISMS AND PYRAMIDS**
  - **G-GMD.3** *Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.*
  - **G-GMD.4** *Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.*

- **VOLUME OF CYLINDERS AND CONES**
  - **G-GMD.3** *Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.*
  - **G-GMD.4** *Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.*

- **SURFACE AREA AND VOLUME OF SPHERES**
  - **G-GMD.4** *Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.*
  - **G-GMD.3** *Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.*