CASE Benchmark Assessments
Product of TE21, Inc.

Tennessee
ALGEBRA I (Traditional)
2018-2019 Pacing Guide

Unit	Standards	Major Topics/Concepts
Quantities	A1.N.Q.A.1 A1.N.Q.A.2 A1.N.Q.A.3	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. Identify, interpret, and justify appropriate quantities for the purpose of descriptive modeling. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Expressions and Equations	A1.A.SSE.A.1 A1.A.CED.A.1 A1.A.CED.A.4 A1.A.REI.A.1 A1.A.REI.B.2	Interpret expressions that represent a quantity in terms of its context. ✓ Interpret parts of an expression, such as terms, factors, and coefficients. ✓ Interpret complicated expressions by viewing one or more of their parts as a single entity. Create equations and inequalities in one variable and use them to solve problems. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. Explain each step in solving an 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. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
Linear Functions	A1.F.IF.A.1 A1.F.IF.A.2 A1.F.IF.B.3 A1.F.IF.B.4 A1.F.IF.B.5 A1.F.IF.C.6a A1.F.IF.C.8 A1.F.LE.A.1b	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 of f is the graph of the equation $y = f(x)$. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. 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. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. 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.

Unit	Standards	Major Topics/Concepts
		Graph functions expressed symbolically, and show key features of the graph, by hand and using technology. ✓ Graph linear and quadratic functions, and show intercepts, maxima, and minima. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). Distinguish between situations that can be modeled with linear functions and with exponential functions. ✓ Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
1st Cumulative Benchmark (covering all content to this point)		
Modeling Linear Functions	A1.F.BF.A.1a A1.F.BF.B.2 A1.F.LE.A.1 A1.F.LE.A.2 A1.F.LE.B.4	Write a function that describes a relationship between two quantities. ✓ Determine an explicit expression, a recursive process, or steps for calculation from a context. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k \cdot f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (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. Distinguish between situations that can be modeled with linear functions and with exponential functions. ✓ Recognize that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. ✓ Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. ✓ Recognize situations in which a quantity grows or decays by a constant factor per unit interval relative to another. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a table, a description of a relationship, or input-output pairs. Interpret the parameters in a linear or exponential function in terms of a context.
Quadratic and Polynomial Functions	A1.A.APR.A.1 A1.A.APR.B.2 A1.A.SSE.A.1 A1.A.SSE.A.2 A1.A.SSE.B.3ab A1.A.CED.A.1 A1.A.CED.A.2 A1.A.REI.B.3 A1.A.REI.D.6 A1.F.IF.A.1 A1.F.IF.A.2 A1.F.IF.B.3	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. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. Interpret expressions that represent a quantity in terms of its context. ✓ Interpret parts of an expression, such as terms, factors, and coefficients. ✓ Interpret complicated expressions by viewing one or more of their parts as a single entity.

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	A1.F.IF.C.6a A1.F.IF.C.7a A1.F.IF.C.8 A1.F.BF.B.2	Use the structure of an expression to identify ways to rewrite it. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. ✓ Factor a quadratic expression to reveal the zeros of the function it defines. ✓ Complete the square in a quadratic expression in the form $Ax^2 + Bx + C$ to reveal the maximum or minimum value of the function it defines. Create equations and inequalities in one variable, and use them to solve problems. Create equations in two or more variables to represent relationships between quantities; graph equations with two variables on coordinate axes with labels and scales. Solve quadratic equations and inequalities in one variable. ✓ Use the method of completing the square to rewrite any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. ✓ Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, knowing and applying the quadratic formula, and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions. Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the approximate solutions using technology. 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 of f is the graph of the equation $y = f(x)$. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. 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. Graph functions expressed symbolically, and show key features of the graph, by hand and using technology. ✓ Graph linear and quadratic functions, and show intercepts, maxima, and minima. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. ✓ 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.

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		Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k \cdot f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (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.
2nd Cumulative Benchmark (covering all content to this point)		
Exponential Functions	A1.A.CED.A.1 A1.A.CED.A.2 A1.A.REI.D.5 A1.A.REI.D.6 A1.A.SSE.B.3c A1.F.IF.A.1 A1.F.IF.A.2 A1.F.IF.B.3 A1.F.IF.B.4 A1.F.IF.B.5 A1.F.IF.C.8 A1.F.BF.B.2 A1.F.LE.A.1bc A1.F.LE.A.3 A1.F.LE.B.4	Create equations and inequalities in one variable and use them to solve problems. Create equations in two or more variables to represent relationships between quantities; graph equations with two variables on coordinate axes with labels and scales. 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). Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the approximate solutions using technology. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. ✓ Use the properties of exponents to rewrite exponential expressions. 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 of f is the graph of the equation $y = f(x)$. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. 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. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. 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. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

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		Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k \cdot f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (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. Distinguish between situations that can be modeled with linear functions and with exponential functions. ✓ Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. ✓ Recognize situations in which a quantity grows or decays by a constant factor per unit interval relative to another. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. Interpret the parameters in a linear or exponential function in terms of a context.
Systems of Equations	A1.A.CED.A.3 A1.A.CED.A.4 A1.A.REI.C.4 A1.A.REI.D.6 A1.A.REI.D.7	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. Write and solve a system of linear equations in context. Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the approximate solutions using technology. 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.
Graphing Functions	A1.F.IF.C.6b	Graph functions expressed symbolically, and show key features of the graph, by hand and using technology. ✓ Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
One-Variable Statistics	A1.S.ID.A.1 A1.S.ID.A.2 A1.S.ID.A.3	Represent single or multiple data sets with dot plots, histograms, stem plots (stem and leaf), and box plots. 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, accounting for possible effects of extreme data points (outliers).
Two-Variable Statistics	A1.S.ID.B.4 A1.S.ID.C.5 A1.S.ID.C.6 A1.S.ID.C.7	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ✓ Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or

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		choose a function suggested by the context. ✓ Fit a linear function for a scatter plot that suggests a linear association. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. Use technology to compute and interpret the correlation coefficient of a linear fit. Distinguish between correlation and causation.
Final Comprehensive Benchmark (covering all content)		