Tennessee
ALGEBRA II (Traditional)
2020-2021 Pacing Guide
CASE Benchmark Assessments

Unit	Standards	Major Topics/Concepts
Number Systems: Real and Complex	A2.N.RN.A.1 A2.N.RN.A.2 A2.N.CN.A.1 A2.N.CN.A.2 A2.N.CN.B.3	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. Rewrite expressions involving radicals and rational exponents using the properties of exponents. Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real. Know and use the relation $i^2 = -1$ and the Commutative, Associative, and Distributive Properties to add, subtract, and multiply complex numbers. Solve quadratic equations with real coefficients that have complex solutions.
Structure and Operations with Expressions and Quantity	A2.N.Q.A.1 A2.A.SSE.A.1 A2.A.SSE.B.2a A2.A.APR.A.1 A2.A.APR.A.2 A2.A.APR.B.3 A2.A.APR.C.4	Identify, interpret, and justify appropriate quantities for the purpose of descriptive modeling. 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. ✓ Use the properties of exponents to rewrite expressions for exponential functions. Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$. 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. Know and use polynomial identities to describe numerical relationships. Rewrite simple rational expressions in different forms.
Creating and Reasoning with Equations and Inequalities	A2.A.CED.A.1 A2.A.CED.A.2 A2.A.REI.A.1 A2.A.REI.A.2 A2.A.REI.B.3a A2.A.REI.C.4 A2.A.REI.C.5 A2.A.REI.D.6	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 rational and radical equations in one variable, and identify extraneous solutions when they exist.

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		Solve quadratic equations and inequalities in one variable. ✓ 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, and write them as $a \pm bi$ for real numbers a and b. Write and solve a system of linear equations in context. Solve a system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. 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.
Interpreting and Building Linear and Polynomial Functions	A2.F.IF.A.1 A2.F.IF.A.2 A2.F.IF.B.3ab A2.F.IF.B.5 A2.F.BF.A.1 A2.F.BF.B.3 A2.F.BF.B.4a	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. 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. 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. ✓ Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). Write a function that describes a relationship between two quantities. ✓ Determine an explicit expression, a recursive process, or steps for calculation from a context. ✓ Combine standard function types using arithmetic operations. 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. Find inverse functions. ✓ Find the inverse of a function when the given function is one-to-one.
1st Cumulative Benchmark (covering all content to this point)		
Exponential and	A2.A.SSE.B.3 A2.F.IF.B.3c A2.F.IF.B.4a	Recognize a finite geometric series (when the common ratio is not 1), and know and use the sum formula to solve problems in context.

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Logarithmic Functions	A2.F.BF.A.1 A2.F.BF.A.2 A2.F.BF.B.3 A2.F.BF.B.4a A2.F.LE.A.1 A2.F.LE.A.2 A2.F.LE.B.3	Graph functions expressed symbolically, and show key features of the graph, by hand and using technology. ✓ Graph exponential and logarithmic functions, showing intercepts and end behavior. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. ✓ Know and use the properties of exponents to interpret expressions for exponential functions. Write a function that describes a relationship between two quantities. ✓ Determine an explicit expression, a recursive process, or steps for calculation from a context. ✓ Combine standard function types using arithmetic operations. Know and write arithmetic and geometric sequences with an explicit formula and use them to model situations. 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. Find inverse functions. ✓ Find the inverse of a function when the given function is one-to-one. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a table, a description of a relationship, or input-output pairs. For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers, and the base b is 2, 10, or e; evaluate the logarithm using technology. Interpret the parameters in a linear or exponential function in terms of a context.
The Unit Circle, Trigonometric Identities, and Modeling Trigonometric Functions	A2.F.TF.A.1 A2.F.TF.A.2 A2.F.TF.B.3 A2.F.BF.B.3 A2.F.BF.4a	Understand and use radian measure of an angle. ✓ Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. ✓ Use the unit circle to find sin(θ), cos(θ), and tan(θ), when θ is a commonly recognized angle between 0 and 2π. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. Know and use trigonometric identities to find values of trigonometric functions. ✓ Given a point on a circle centered at the origin, recognize and use the right triangle ratio definitions of sin(θ), cos(θ), and tan(θ) to evaluate the trigonometric functions.

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		✓ Given the quadrant of the angle, use the identity $\sin^2(\theta) + \cos^2(\theta) = 1$, and use it to find $\sin(\theta)$ given $\cos(\theta)$, or vice versa. 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. Find inverse functions. ✓ Find the inverse of a function when the given function is one-to-one.
Interpreting Data, Making Inferences, and Justifying Conclusions	A2.S.IC.A.1 A2.S.IC.A.2	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. Use data from a sample survey to estimate a population mean or proportion; use a given margin of error to solve a problem in context.
2nd Cumulative Benchmark (covering all content to this point)		
Probability	A2.S.CP.A.1 A2.S.CP.A.2 A2.S.CP.A.3 A2.S.CP.A.4 A2.S.CP.B.5 A2.S.CP.B.6	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not"). Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent. Know and understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. 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 terms of the model. Know and apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.
Making Inferences and Justifying Conclusions	A2.S.ID.A.1 A2.S.ID.B.2a	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages using the Empirical Rule. 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.
Final Comprehensive Benchmark (covering all content)		