CASE Benchmark Assessments
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Tennessee
MATH II (Traditional)
2018-2019 Pacing Guide

Unit	Standards	Major Topics/Concepts
Number Systems: Real and Complex	M2.N.RN.A.1 M2.N.RN.A.2 M2.N.CN.A.1 M2.N.CN.A.2 M2.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	M2.N.Q.A.1 M2.A.SSE.A.1a M2.A.SSE.A.2 M2.A.SSE.B.3a M2.A.SSE.B.3b M2.A.APR.A.1	Identify, interpret, and justify appropriate quantities for the purpose of descriptive modeling. Interpret expressions that represent a quantity in terms of its context. ✓ Interpret complicated expressions by viewing one or more of their parts as a single entity. 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. 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.
Creating and Reasoning with Equations and Inequalities	M2.A.CED.A.1 M2.A.CED.A.2 M2.A.CED.A.3 M2.A.REI.A.1 M2.A.REI.B.2 M2.A.REI.C.3 M2.A.REI.C.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. 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

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		that the original equation has a solution. Construct a viable argument to justify a solution method. 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, 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.
Interpreting and Building Linear and Polynomial Functions	M2.F.IF.A.1 M2.F.IF.A.2 M2.F.IF.A.3 M2.F.IF.B.4a M2.F.IF.B.4b M2.F.IF.B.5a M2.F.IF.B.6 M2.F.BF.A.1 M2.F.BF.B.2	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. 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. ✓ Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. 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. 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.

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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.
1st Cumulative Benchmark (covering all content to this point)		
Exponential and Logarithmic Functions	M2.F.IF.B.4c M2.F.IF.B.5b M2.F.IF.B.6 M2.F.BF.A.1 M2.F.BF.B.2	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. 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.
Similarity and Right Triangles	M2.G.SRT.A.1 M2.G.SRT.A.2 M2.G.SRT.A.3 M2.G.SRT.B.4 M2.G.SRT.B.5	Verify informally the properties of dilations given by a center and a scale factor. 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. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. Prove theorems about similar triangles. Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures.
Trigonometry	M2.G.SRT.C.6 M2.G.SRT.C.7 M2.G.SRT.C.8	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. Explain and use the relationship between the sine and cosine of complementary angles.

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		Solve triangles. ✓ Know and use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. ✓ Know and use the Law of Sines and Law of Cosines to solve problems in real-life situations. Recognize when it is appropriate to use each.
2nd Cumulative Benchmark (covering all content to this point)		
Volume and Surface Area	M2.G.GMD.A.1 M2.G.GMD.A.2	Give an informal argument for the formulas for the circumference of a circle and the volume and surface area of a cylinder, cone, prism, and pyramid. Know and use volume and surface area formulas for cylinders, cones, prisms, pyramids, and spheres to solve problems.
Probability	M2.S.CP.A.1 M2.S.CP.A.2 M2.S.CP.A.3 M2.S.CP.A.4 M2.S.CP.B.5 M2.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.
Regression	M2.S.ID.A.1a	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)		