Tennessee
MATH III (Semester)
2018-2019 Pacing Guide

Unit	Standards	Major Topics/Concepts

Polynomial Expressions, Equations, and Functions	M3.A.SSE.A.1
	M3.A.APR.A.1
	M3.A.APR.A.2
	M3.A.APR.B.3
	M3.A.CED.A.1
	M3.A.CED.A.2
	M3.A.CED.A.3
	M3.A.REI.B.3
	M3.F.IF.A.1
	M3.F.IF.A.2
	M3.F.IF.B.3a
	M3.F.IF.B.3c
	M3.F.IF.B.4
	M3.F.BF.A.1
		Use the structure of an expression to identify ways to rewrite it.
		
		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.
		
		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 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.
		
		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 linear and quadratic functions and show intercepts, maxima, and minima.
		  ✓ 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).

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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.
Exponential and Logarithmic Equations and Functions	M3.A.SSE.B.2a M3.A.SSE.B.3 M3.A.CED.A.1 M3.A.CED.A.2 M3.A.CED.A.3 M3.A.REI.B.3 M3.F.IF.A.1 M3.F.IF.A.2 M3.F.IF.B.3d M3.F.IF.B.4 M3.F.BF.A.1 M3.F.BF.A.2a M3.F.LE.A.1 M3.F.LE.A.2	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. Recognize a finite geometric series (when the common ratio is not 1), and know and use the sum formula to solve problems in context. 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 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. 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 exponential and logarithmic functions, showing intercepts and end behavior. 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.

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		Find inverse functions. ✓ Find the inverse of a function when the given function is one-to-one*.* Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. 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.
Rational and Radical Equations and Functions	M3.A.APR.C.4 M3.A.REI.A.1 M3.A.REI.A.2 M3.A.CED.A.1 M3.A.CED.A.3 M3.F.IF.B.3b M3.F.BF.A.2a	Rewrite rational expressions in different forms. 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. 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. 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. 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)**	
Geometry and Modeling	M3.G.CO.A.1 M3.G.GPE.B.2 M3.G.GPE.B.3 M3.G.GPE.B.4 M3.G.GPE.B.5 M3.G.MG.A.1 M3.G.MG.A.2 M3.N.Q.A.1	Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Use coordinates to prove simple geometric theorems algebraically. Prove the slope criteria for parallel and perpendicular lines, and use them to solve geometric problems. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.

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		Know and use coordinates to compute perimeters of polygons and areas of triangles and rectangles. Use geometric shapes, their measures, and their properties to describe objects. Apply geometric methods to solve real-world problems. Identify, interpret, and justify appropriate quantities for the purpose of descriptive modeling.
Circles	M3.G.GPE.A.1 M3.G.C.A.1 M3.G.C.A.2 M3.G.C.A.3 M3.G.C.B.4	Know and write the equation of a circle of given center and radius using the Pythagorean Theorem. Recognize that all circles are similar. Identify and describe relationships among inscribed angles, radii, and chords. Construct the incenter and circumcenter of a triangle and use their properties to solve problems in context. Know the formula and find the area of a sector of a circle in a real-world context.
Trigonometry	M3.F.TF.A.1 M3.F.TF.A.2 M3.F.TF.B.3	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 $\sin\theta$, $\cos\theta$, and $\tan\theta$ 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. Use trigonometric identities to find values of trig functions. ✓ Given a point on a circle centered at the origin, recognize and use the right triangle ratio definitions of $\sin\theta$, $\cos\theta$, and $\tan\theta$ to evaluate the trigonometric functions. ✓ Given the quadrant of the angle, use the identity $\sin^2\theta + \cos^2\theta = 1$ to find $\sin\theta$ given $\cos\theta$, or vice versa.
Interpreting Data	M3.S.ID.A.1 M3.S.ID.B.2	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. Use given functions or choose a function suggested by the context. ✓ Fit a linear function for a scatter plot that suggests a linear association.

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Inferential Statistics	M3.S.IC.A.1 M3.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.
Final Comprehensive Benchmark (covering all content)		