MARLBORO CENTRAL SCHOOL DISTRICT – CURRICULUM MAP -2018

Subject: **Algebra 2**			Grade: High School (11th)	
Month	Unit / Theme	Content	CC Standards / Skills	Assessment
September	Polynomial, Rational, and Radical Relationships	Polynomial Functions • Successive Differences of Polynomials • Multiplying Polynomials: Different Methods • Division of Polynomials • Long Division of Polynomials • Putting it All Together: Standard Form, Factored Form, Vertex Form(Complete the Square) • Using Division to obtain Factored Form • Operations with Polynomials • Solving Polynomials in Factored Form	**Reason quantitatively and use units to solve problems.** **N-Q.2**[51] Define appropriate quantities for the purpose of descriptive modeling. **Understand the relationship between zeros and factors of polynomials** **A-APR.2**[53] 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 $p(x)$. **A-APR.3**[54] 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. **Use polynomial identities to solve problems** **A-APR.4** Prove[55] polynomial identities and use them to describe numerical relationships. For example, the polynomial identity $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples. **Rewrite rational expressions** **A-APR.6**[56] Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system. **Understand solving equations as a process of reasoning and explain the reasoning** **A-REI.1**[57] 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. **Solve equations and inequalities in one variable** **A-REI.4**[58] Solve quadratic equations in one variable. 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. **Analyze functions using different representations** **F-IF-7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases.	• Homework • Quizzes • Unit Test
October		• Solving Quadratics using Complete the Square & Quadratic Formula • Mastering Factoring • Solve Quadratics by Factoring • Graphing Factored Polynomials • Structure of Graphed Polynomials: Odd or Even • Modeling with Polynomials: Word Problems • Factoring with a Remainder • Remainder Theorem • Modeling Real World Situations with Polynomials		

			c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	
November	Polynomial, Rational, and Radical Relationships	Rational and Radical Functions • Equivalent Rational Expressions • Comparing Rational Expressions • Multiplying & Dividing Rational Expressions • Adding & Subtracting Rational Expressions • Solving Rational Equations • Word Problems Leading to Rational Equations • Radicals and Conjugates • Rationalize Denominators & Solve Radical Equations: Linear Equations • Radical Equations	**Interpret the structure of expressions** **A-SSE.2**[52] Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.* **Understand solving equations as a process of reasoning and explain the reasoning** **A-REI.1**[57] 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. **A-REI.2** Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	• Homework • Quizzes • Unit Test
December	Polynomial, Rational, and Radical Relationships	Systems and Parabolic Functions • Solving Systems of Equations: Linear & Quadratics • Graphing Systems of Quadratics: Distance Formula, Completing the Square • Definition of a Parabola: Axis of Symmetry, Vertex • Vertex Form of a Parabola • The Effects of Scale Factors on Parabolas	**Understand solving equations as a process of reasoning and explain the reasoning** **A-REI.1**[57] 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. **Solve systems of equations** **A-REI.6**[59] Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. **A-REI.7** Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. *For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.* **Solve equations and inequalities in one variable** **A-REI.4**[58] Solve quadratic equations in one variable. 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.	• Homework • Quizzes • Unit Test

January	Polynomial, Rational, and Radical Relationships	Complex Numbers • Systems with No Real Solutions: Algebraically & Graphically • Operations with Complex Numbers • Complex Solution & the Discriminant • All types of roots & their equations • The Fundamental Theorem of Algebra	**Perform arithmetic operations with complex numbers.** **N-CN.1** 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. **N-CN.2** Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. **Use complex numbers in polynomial identities and equations.** **N-CN.7** Solve quadratic equations with real coefficients that have complex solutions. **Solve equations and inequalities in one variable** **A-REI.4**[58] Solve quadratic equations in one variable. 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.	• Homework • Quizzes • Unit Test
February	Trigonometric Functions	Unit Circle • Ferris Wheel: Exploring a Non-Linear Relationship • Ferris Wheel: Height & Co-Height Functions • Unit Circle • Sine & Cosine Functions: Domain, Range, Coterminal Angles • Tangent • Discover the Reciprocal Functions • Problems involving reciprocal functions & the unit circle • Sketch the Sine & Cosine Functions • Radian Measure • Discover Basic Trig Identities Using Graphs	**Extend the domain of trigonometric functions using the unit circle** **F-TF.1** Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. **F-TF.2**[60] 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.	• Homework • Quizzes • Unit Test
February	Trigonometric Functions	• The Pythagorean Identities • Proving Trig Identities	**F-TF.8** Prove the Pythagorean identity $\sin_2(\Theta) + \cos_2(\Theta) = 1$ and use it to find $\sin(\Theta)$, $\cos(\Theta)$, or $\tan(\Theta)$ given $\sin(\Theta)$, $\cos(\Theta)$, or $\tan(\Theta)$ and the quadrant of the angle.	• Homework • Quizzes • Unit Test

March	Functions	Real Numbers • Integer Exponents • Base 10 & Scientific Notation • Positive & Negative Rational Exponents • Properties of Exponents & Radicals	**Extend the properties of exponents to rational exponents.** **N-RN.1** 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. *For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.* **N-RN.2**[63] Rewrite expressions involving radicals and rational exponents using the properties of exponents. **Reason quantitatively and use units to solve problems.** **N-Q.2**[64] Define appropriate quantities for the purpose of descriptive modeling. **F-IF.6**[71] 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.★ **Build a function that models a relationship between two quantities** **F-BF.1** Write a function that describes a relationship between two quantities.★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context.[74] **F-LE.2**[77] 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).★	• Homework • Quizzes • Unit Test
March	Functions	Logarithms • Exponential Equations: Common Bases • Calculating Simple Logarithms • Applying Logarithms to Counting • Using Log Tables to Discover Log Product Property • Expanding on the Product Rule • The Rest of the Log Properties • Change of Base Formula • Solving Logarithmic Equations	**Reason quantitatively and use units to solve problems.** **N-Q.2**[64] Define appropriate quantities for the purpose of descriptive modeling. **Create equations that describe numbers or relationships** **A-CED.1**[67] 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.*★ **F-BF.1** Write a function that describes a relationship between two quantities.★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context.[74] **F-LE.4**[78] 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.★	• Homework • Quizzes • Unit Test

April	Functions	Exponential and Logarithm Functions and their Graphs • Graphing Log Functions • Graphing Logarithmic & Exponential Functions • Inverse Functions • Transformations of Exponential & Logarithmic Functions • Graphing the Natural Log	**Interpret functions that arise in applications in terms of the context** **F-IF.4**[70] 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.*★ **Interpret expressions for functions in terms of the situation they model** **F-LE.5**[79] Interpret the parameters in a linear or exponential function in terms of a context.★ **Analyze functions using different representations** **F-IF.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ e. Graph exponential and logarithmic functions, showing intercepts and end behavior. **Build a function that models a relationship between two quantities** **F-BF.1** Write a function that describes a relationship between two quantities.★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context.[74] **Build new functions from existing functions** **F-BF.3**[76] 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 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. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.* **F-BF.4** Find inverse functions. 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. *For example,* $f(x) = 2x^3$ *or* $f(x) = (x+1)/(x-1)$ *for* $x \neq 1$. **Construct and compare linear, quadratic, and exponential models and solve problems** **F-LE.2**[77] 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).★	• Homework • Quizzes • Unit Test

			F-LE.4[78] 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.⋆	
May	Functions	Using Logarithms in Modeling Situations • Modeling with Linear, Quadratic, Exponential • Solving Exponential Equations • Solving Exponential Systems & Inequalities • Applications of Exponential Functions: Percent Rate of Change • Modeling with Exponential Functions	**Write expressions in equivalent forms to solve problems** **A-SSE.3**[65] Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.⋆ c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression 1.15^t can be rewritten as $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.* **Create equations that describe numbers or relationships** **A-CED.1**[67] 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.*⋆ **Represent and solve equations and inequalities graphically** **A-REI.11**[68] 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 solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.⋆ **F-IF.6**[71] 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.⋆ **Analyze functions using different representations** **F-IF.8**[72] Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. b. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, and classify them as representing exponential growth or decay.* **F-IF.9** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). **F-BF.1** Write a function that describes a relationship between two quantities.⋆	• Homework • Quizzes • Unit Test

			a. Determine an explicit expression, a recursive process, or steps for calculation from a context. (Real world context.) b. Write a function that describes a relationship between two quantities. **F-BF.4** Find inverse functions. 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. *For example,* $f(x) = 2x^3$ *or* $f(x) = (x+1)/(x-1)$ *for* $x \neq 1$.	
June	Course Final Exam			