

Math Department Curriculum Map Template, 2018-19

Subject: Algebra II CCSS

Textbook: EMathInstruction, McGraw Hill 2018

CC Algebra 2 Regents Examination Breakdown

- **Number & Quantity** 5% - 12%
- **Algebra** 35% - 44%
- **Functions** 30% - 40%
- **Statistics & Probability** 14% - 21%

Marking Periods	Unit Title (Big Idea/Major Focus)	Topics/Skills	Evidence of Learning (Assessments)	Resources (texts, online tools, etc.)
<p>Marking Period 1</p>	<p>Unit 0: Algebraic Essentials Review*</p> <p>Enduring Understanding:</p> <ul style="list-style-type: none"> ● Addition, subtraction, and multiplication are closed operations for polynomials. ● Exponents can be extended to include zero and negative exponents. ● Properties of exponents make it easier to simplify products or quotients of powers with the same base or powers raised to a power or products raised to a power. ● Use rational exponents to represent radicals. <p>Essential Questions:</p> <ul style="list-style-type: none"> ● How can you rewrite expressions to help you solve problems? ● How do you solve equations containing multiple operations? ● How do you add, subtract, factor, and multiply algebraic expressions? 	<ul style="list-style-type: none"> ● Variables, Terms and Expressions ● Solving Linear Equations ● Common Algebraic Expressions ● Basic Exponent Manipulation ● Multiplying Polynomials ● Factoring Polynomials ● Using Tables on Your Calculator <p>Vocabulary: Variable, Expression, Term, Polynomial, Variable, Factor, Product, Linear equation, factoring</p>	<ul style="list-style-type: none"> ● Pre-Assessment Check ● Performance Tasks ● Quizzes ● Castle Learning ● Exit Tickets ● Do Nows ● Class Discussion ● Daily Handouts ● Unit Review and Re-engagement Activities ● Unit Exam 	<p>Emath - Unit 1 (review)</p>
	<p>Unit 1: Functions as the Cornerstones of Algebra</p> <p>Enduring Understanding:</p> <ul style="list-style-type: none"> ● The domain and range of quadratic functions can be relative to a situation. ● An inverse function is a function that "undoes" another function; if $f(x)$ maps x to y, then $f^{-1}(y)$ maps y back to x. ● The inverse of a function may or may not be a function. <p>Essential Questions:</p> <ul style="list-style-type: none"> ● What makes a particular function family unique from other types of functions? ● What can key features of a function reveal about the nature of the function? 	<ul style="list-style-type: none"> ● Introduction to Functions ● Function Notation ● Function Composition ● The Domain and Range of a Function ● One to One Functions ● Onto Functions* ● Inverse Functions ● Key Features of Functions ● Interpreting Graphs of Functions ● More Work with Inverses ● Unit Review <p>Vocabulary: Function, Composition, Domain, Range, Inverse, Relative Min/Max, Absolute Min/Max, Intervals where function is increasing/decreasing</p>	<ul style="list-style-type: none"> ● Pre-Assessment Check ● Performance Tasks ● Quizzes ● Castle Learning ● Exit Tickets ● Do Nows ● Class Discussion ● Daily Handouts ● Unit Review and Re-engagement Activities ● Unit Exam 	<p>Emath - Unit 2 *Inverse Functions, * Composition of Functions [See (c.)]</p> <p>McGraw Hill 2018 - Chapter 2 McGraw Hill 2018 - Chapter 5</p>
	<p>Unit 2: Linear Functions, Equations and Their Algebra</p> <p>Enduring Understanding:</p> <ul style="list-style-type: none"> ● Mathematical models illustrate the behavior of real-world situations. ● Linear functions describe a common difference at which variables change. <p>Essential Questions:</p>	<ul style="list-style-type: none"> ● Direct Variation ● Average Rate of Change ● Forms of a Line ● Linear Modeling ● Inverses of Linear Functions ● Piecewise Linear Functions ● Systems of Linear Equations ● Solve a system of three linear equations in three variables* 	<ul style="list-style-type: none"> ● Pre-Assessment Check ● Performance Tasks ● Quizzes ● Castle Learning ● Exit Tickets ● Do Nows ● Class Discussion ● Daily Handouts ● Unit Review and Re-engagement Activities ● Unit Exam 	<p>Emath - Unit 3</p> <p>McGraw Hill 2018 - Chapter 1</p>

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	<ul style="list-style-type: none"> Why are relations and functions represented in multiple ways? How are the properties of functions and functional operations useful? How do you represent relations and functions? 	<ul style="list-style-type: none"> <i>Matrices*</i> Unit Review <p>Vocabulary: Direct variation, Rate of Change, Piecewise, System, Matrix, inverse</p>		
	<p>Unit 3: Radicals and the Quadratic Formula</p> <p>Enduring Understanding:</p> <ul style="list-style-type: none"> You can combine like radicals using properties of real numbers. You can write a radical expression in an equivalent form using a fractional (rational) exponent instead of a radical sign. Solving a square root equation may require that you square each side of the equation. This process can introduce extraneous solutions. A square root function is the inverse of a quadratic function that has a restricted domain. <p>Essential Questions:</p> <ul style="list-style-type: none"> To simplify the nth root of an expression, what must be true about the expression? When you square each side of an equation, is the resulting equation equivalent to the original? How are a function and its inverse function related? 	<ul style="list-style-type: none"> Square Root Functions Solving Square Root Equations A Closer Look at Extraneous Roots The Basic Exponent Properties Fractional Exponents More Exponent Practice (including negative & zero exponents) The Quadratic Formula More Work with the Quadratic Formula Unit Review <p>Vocabulary: Exponents, Quadratic formula, extraneous, radical</p>	<ul style="list-style-type: none"> Pre-Assessment Check Performance Tasks Quizzes Castle Learning Exit Tickets Do Nows Class Discussion Daily Handouts Unit Review and Re-engagement Activities Unit Exam 	<p>Emath - Unit 8</p> <p>McGraw Hill 2018 - Chapter 3 McGraw Hill 2018 - Chapter 5</p>
Quarterly Exam #1 (Cumulative with emphasis on Unit 3)				
Marking Period 2	<p>Unit 4: Complex Numbers</p> <p>Enduring Understanding:</p> <ul style="list-style-type: none"> Solutions that exist can exist beyond the real number system. The nature of the roots of a quadratic can be determined by the discriminant <p>Essential Questions:</p> <ul style="list-style-type: none"> How does understanding complex numbers relate to The Fundamental Theorem of Algebra? 	<ul style="list-style-type: none"> Imaginary Numbers & Negative Radicands Complex Numbers: Operations & Simplify Division of Complex Numbers Solving Quadratic Equations with Complex Solutions The Discriminant of a Quadratic The Complex Plane Unit Review <p>Vocabulary: Imaginary, radicand, Complex solution, discriminant, conjugate</p>	<ul style="list-style-type: none"> Pre-Assessment Check Performance Tasks Quizzes Castle Learning Exit Tickets Do Nows Class Discussion Daily Handouts Unit Review and Re-engagement Activities Unit Exam 	<p>Emath - Unit 9</p> <p>McGraw Hill 2018 - Chapter 3</p>
	<p>Unit 5: Quadratic Functions and Their Algebra, Transformations* of Functions</p> <p>Enduring Understanding:</p> <ul style="list-style-type: none"> The structure of quadratic graphs and equations gives insights into their roots. A circle is symmetrical and its points are related by a center and radius. Functions within a family are transformations of the parent function. <p>Essential Questions:</p> <ul style="list-style-type: none"> How does understanding how to find the vertex of a quadratic function help in making decisions in real-life applications? What are the advantages of a quadratic 	<ul style="list-style-type: none"> Quadratic Function Review Factoring Factoring Trinomials Complete Factoring Factoring by Grouping Factoring Trinomials Using the AC Method Using Structure to Factor The Zero Product Law Quadratic Inequalities in One Variable* Completing the Square and Shifting Parabolas Modeling with Quadratic Functions Equations of Circles Quadratic-Linear Systems and others The Locus Definition of a Parabola Shifting Functions (include determining points on the transformed graph) 	<ul style="list-style-type: none"> Mid-Unit Quiz Unit Exam 	<p>Emath - Unit 6 *Emath - Unit 7</p> <p>McGraw Hill 2018 - Chapter 3</p>

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	<p>function in vertex form? In standard form?</p> <ul style="list-style-type: none"> How is any quadratic function related to the parent quadratic function $f(x)=x^2$? 	<ul style="list-style-type: none"> Reflecting Parabolas* Vertically Stretching of Functions* Horizontal Stretching of Functions* Even and Odd Functions (include functions that are neither) Unit Review <p>Vocabulary: Factor, zero product, Locus, Focus, Directrix, Even/odd/neither, standard form, vertex form, system, grouping</p>		
	<p>Unit 6: Polynomials</p> <ul style="list-style-type: none"> The degree of a polynomial function determines its possible solutions, behaviors and properties. The structure of polynomial graphs and equations gives insights into their roots. Rational functions describe the quotient of two polynomial functions. Mathematical models illustrate the behavior of real-world situations. <p>Essential Questions:</p> <ul style="list-style-type: none"> How can you graph rational functions? How can you solve rational equations? What kinds of asymptotes may exist in rational functions and why? Why do rational expressions need to have a defined domain? 	<ul style="list-style-type: none"> Power Functions Investigating end behavior in polynomials Graphs and Zeros of a Polynomial (include multiplicity & recognizing factorizations of polynomials functions from the graph) Creating Polynomial Equations Polynomial Identities Introduction to Rational Functions Simplifying Rational Expressions Multiplying and Dividing Rational Expressions Combining Rational Expressions Using Addition and Subtraction Complex Fractions Polynomial Long Division The Remainder Theorem Factor Theorem* <i>Synthetic Division</i> Sum and Difference of Perfect Cubes Solving Rational Equations Solve rational equations that result in quadratic equations that have extraneous roots* Solving Rational Inequalities* Reasoning About Radical and Rational Equations Unit Review <p>Vocabulary: Power function, multiplicity, Polynomial, Synthetic Division, rational function, remainder</p>	<ul style="list-style-type: none"> Pre-Assessment Check Performance Tasks Quizzes Castle Learning Exit Tickets Do Nows Class Discussion Daily Handouts Unit Review and Re-engagement Activities Unit Exam 	<p>Emath - Unit 10</p> <p>McGraw Hill 2018 - Chapter 4 McGraw Hill 2018 - Chapter 7</p>
Midterm (Quarterly Exam #2)				
<p>Marking Period 3</p>	<p>Unit 7: Exponential and Logarithmic Functions</p> <p>Enduring Understanding:</p> <ul style="list-style-type: none"> Exponential functions describe a common ratio at which variables change. Expressions with exponents can be written in multiple, equivalent ways. A logarithm is the inverse of an exponential function. Logarithms can be written in multiple, equivalent ways. Mathematical models illustrate the behavior of real-world situations. <p>Essential Questions:</p> <ul style="list-style-type: none"> How do you model a quantity that changes regularly over time by the same percentage? How are exponents and logarithms related? 	<ul style="list-style-type: none"> Integer Exponents Rational Exponents Exponential Function Basics Finding Equations of Exponentials The Method of Common Bases Exponential Modeling with Percent Growth and Decay Mindful Percent Manipulations Exponential Modeling Revisited Introduction to Logarithms Graphs of Logarithms Logarithm Laws Solving Exponential Equations Using Logarithms The Number e and the Natural Logarithm Compound Interest Newton's Law of Cooling Asymptotes of Exponential and Log Functions 	<ul style="list-style-type: none"> Pre-Assessment Check Performance Tasks Quizzes Castle Learning Exit Tickets Do Nows Class Discussion Daily Handouts Unit Review and Re-engagement Activities Unit Exam 	<p>Emath - Unit 4</p> <p>McGraw Hill 2018 - Chapter 6</p>

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	<ul style="list-style-type: none"> How are logarithmic and exponential functions related? 	<ul style="list-style-type: none"> Unit Review <p>Vocabulary: Exponential Function, Logarithm, Natural Log, Newton's Law of Cooling, Asymptotes</p>		
	<p>Unit 8: Sequences and Series</p> <p>Enduring Understanding:</p> <ul style="list-style-type: none"> Sequences are discrete functions defined by their rates of change. Sequences and series can model many mathematical ideas and realistic situations. Sequences help us recognize and apply patterns to familiar and unfamiliar situations. <p>Essential Questions:</p> <ul style="list-style-type: none"> How can you determine the rule for a pattern? What is the difference between a sequence and a series? How much should your monthly payment be for a mortgage? 	<ul style="list-style-type: none"> Sequences Arithmetic and Geometric Sequences Summation Notation Arithmetic Series Geometric Series Mortgage Payments* Unit Review <p>Vocabulary: Sequence, Series, Sigma, Arithmetic, Geometric, Compound, Interest, Mortgage,</p>	<ul style="list-style-type: none"> Pre-Assessment Check Performance Tasks Quizzes Castle Learning Exit Tickets Do Nows Class Discussion Daily Handouts Unit Review and Re-engagement Activities Unit Exam 	<p>Emath - Unit 5</p> <p>McGraw Hill 2018 - Chapter 6</p>
	<p>Unit 9: Probability</p> <p>Enduring Understanding:</p> <ul style="list-style-type: none"> The accuracy of a prediction of a random event increases with the number of events considered. Probability calculations can be applied to solve problems and make decisions. <p>Essential Questions:</p> <ul style="list-style-type: none"> How likely are random events to occur? What is the difference between theoretical and experimental probability? 	<ul style="list-style-type: none"> Introduction to Probability Sets and Probability Adding Probabilities Conditional Probability* Independent Events* Multiplying Probabilities* Unit Review <p>Vocabulary: Likelihood, Change, Probability, Set, Conditional, Independent, event</p>	<ul style="list-style-type: none"> Pre-Assessment Check Performance Tasks Quizzes Castle Learning Exit Tickets Do Nows Class Discussion Daily Handouts Unit Review and Re-engagement Activities Unit Exam 	<p>Emath - Unit 12</p> <p>McGraw Hill 2018 - Chapter 8</p>
Quarterly Exam #3 (Cumulative)				
Marking Period 4	<p>Unit 10: Statistics</p> <p>Enduring Understanding:</p> <ul style="list-style-type: none"> Measures of center are used to interpret univariate data. Visual models illustrate the correlation of bivariate data. Statistical data from random processes can be predicted using probability calculations. <p>Essential Questions:</p> <ul style="list-style-type: none"> How do we compare different data sets? How can we represent data? Why do we conduct simulations? What is bias? Is all data "created equal"? 	<ul style="list-style-type: none"> Variability and Sampling Population Parameters The Normal Distributions The Normal Distributions and Z-Scores Sampling a Population Samples Means Sample Proportions The Difference in Sample Means The Distribution of Sample Means The Distribution of Sample Proportions Margin of Error Linear Regression and Lines of Best Fit Other Types of Regression Unit Review <p>Vocabulary: Normal Distribution, bell curve, bias, variability, population, sample, mean, quartile, inter-quartile range, median, box-and-whisker plot, census, proportion, placebo, randomization, outcome, standard deviation, z-score</p>	<ul style="list-style-type: none"> Pre-Assessment Check Performance Tasks Quizzes Castle Learning Exit Tickets Do Nows Class Discussion Daily Handouts Unit Review and Re-engagement Activities Unit Exam 	<p>Emath - Unit 13</p> <p>McGraw Hill 2018 - Chapter 8</p>
	<p>Unit 11: The Circular Functions</p>	<ul style="list-style-type: none"> Rotations and Angle Terminology 	<ul style="list-style-type: none"> Pre-Assessment Check Performance Tasks 	<p>Emath - Unit 11</p>

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	<p>Enduring Understanding:</p> <ul style="list-style-type: none"> • The Unit Circle illustrates properties of trigonometric functions. • The features of a periodic function repeat over a constant interval. • Trigonometric functions are characterized by the period and amplitude. <p>Essential Questions:</p> <ul style="list-style-type: none"> • How can we model periodic behavior? • What are the historical and current uses of trigonometry? • Why do we use radians versus degrees? • Which situations call for trigonometric equations and how are these equations solved? • How are the trigonometric identities useful? • What is unique about sinusoidal and trigonometric curves? 	<ul style="list-style-type: none"> • Radian and Angle Measurement • The Unit Circle • The Definition of the Sine and Cosine Functions • More Work with the Sine and Cosine Functions • Basic Graphs of Sine and Cosine • Vertical Shifting of Sinusoidal Graphs • The Frequency and Period of a Sinusoidal Graph • More work graphing Sine and Cosine Functions • <i>Horizontal Phase Shift</i> • Sinusoidal Modeling • The Tangent Function • The Reciprocal Functions • Unit Review <p><i>Vocabulary: Unit circle, radian, reference angle, Trigonometric Functions, Sine, Cosine, Tangent, Reciprocal, Cosecant, Secant, Cotangent, phase, frequency, altitude, period, shift</i></p>	<ul style="list-style-type: none"> • Quizzes • Castle Learning • Exit Tickets • Do Nows • Class Discussion • Daily Handouts • Unit Review and Re-engagement Activities • Unit Exam 	<p>McGraw Hill 2018 - Chapter 9 McGraw Hill 2018 - Chapter 10</p>
	<p>Unit 12: Review</p>	<ul style="list-style-type: none"> • Unit Reviews 	<ul style="list-style-type: none"> • Pre-Assessment Check • Performance Tasks • Quizzes • Castle Learning • Exit Tickets • Do Nows • Class Discussion • Daily Handouts • Unit Review and Re-engagement Activities • Unit Exam 	<ul style="list-style-type: none"> • https://www.nysmathregentsprep.com/
<p>Quarterly Exam #4 - Algebra II CC Regents Exam</p>				
<p>Summer</p>	<p>Summer Assignment:</p>			