Abbott Lawrence Academy 2019-2020 Curriculum Map:
Year at a Glance
Subject: Advanced Honors Algebra II Grade: 9th, 10th, and 11th

Unit Title	Time Allocation	Essential Questions	Core Text and Supplemental Learnings	Performance Tasks
1. Mathematical Modeling	**6 weeks**	• How do we use evidence to support our mathematical reasoning? • What can we learn from critiquing others' work? • How can we use mathematics and technology to help us model and better understand phenomena in the world? • How do we model data using tables, graphs, and functions? • How do you combine and compose two or more functions? • Why do we have complex, or imaginary numbers? • What is the role of *i* in the real world?	CME Project – Algebra II Engage NY – Algebra II Edmodo: Virtual Classroom Desmos Graphing Calculator Kuta Software – Algebra II Supplemental Material	- Announced Quizzes: All announced quizzes will consist of multiple choice questions (including multi-select and multi-part), sample MCAS and SAT questions, short answer, and open response questions. Emphasis will be placed on application of material, rather than just calculations. • Quiz #1: Patterns and Arithmetic Sequences • Quiz #2: Quadratic and Geometric Sequences • Quiz #3: Function Combination & Composition • Quiz #4: Operations with Complex Numbers -Unit 1 Project: Students will create a Khan Academy style video in which they teach how to combine and compose functions. In the video, there must be at least one real world application. Students will then watch and review at least two students' videos utilizing the peer editing and review protocol. -Unit 1 Performance Assessment: Students will be engaged in a lab assignment that requires them to collect data from a variety of buggies and utilize regression techniques to write and analyze functions that show the distance vs. time of the various buggies. -Other Assessments: Binder Checks, Math Journal Entries, Vocabulary and Concept Index Cards, Homework, Classwork, Exit Tickets, Jigsaws, Student Observations, Student Interviews, Investigations
2. Quadratics	**8 weeks**	• How do we use evidence to support our mathematical reasoning? • What can we learn from critiquing others' work? • How can we use mathematics and technology to help us model and better understand phenomena in the world?	CME Project – Algebra II Engage NY – Algebra II	-Announced Quizzes: All announced quizzes will consist of multiple choice questions (including multi-select and multi-part), sample MCAS and SAT questions, short answer, and open response questions. Emphasis will be placed on application of material, rather than just calculations. • Quiz #1: Factoring • Quiz #2: Solving Quadratic Equations

		• How do we determine which method is most efficient for factoring polynomials? • Why do we not allow radicals and imaginary numbers in the denominator? • How are the vertex, x-intercept, and y-intercept of a quadratic function modeled in the real world? • What are the characteristics of systems of quadratic equations that have zero, one, two, three, and four solutions? • What does the "shaded region" on graphs of quadratic inequalities tell us? • What role does (0, 0) have when graphing quadratic inequalities? • What are the benefits of quadratic functions written in standard form? Vertex form? Intercept form? • To what extent are solutions to a quadratic equation, or system of quadratic equations, real?	Edmodo: Virtual Classroom Desmos Graphing Calculator Kuta Software – Algebra II Supplemental Material	• Quiz #3: Graphing Quadratic Functions and Inequalities • Quiz #4: Quadratic Function Applications -Unit 2 Project #1: Factoring & Rationalizing Tic-Tac-Toe – Students will be engaged in a project in which they have to choose three activities (Menu Board) that review the three main concepts from the first half of this unit (factoring, complex numbers, and rationalizing). In doing this project, students will be required to complete one artistic display, one written display, and one multi-media presentation. -Unit 2 Project #2: Quadratic Function Diorama Project: Students will create their own real world scenario in which a quadratic function is utilized. They will write the scenario and construct a 3D model (to scale) of it. They will then represent the model using an equation and graph and describe the key components of the graph. -Unit 2 Performance Assessment: Students will engage in a lab assignment in which they create their own experiment to model the height of a tennis ball at any given point. They will conduct numerous trials to gather the appropriate data and use that data to construct, graph, and analyze their function. -Other Assessments: Binder Checks, Math Journal Entries, Vocabulary and Concept Index Cards, Homework, Classwork, Exit Tickets, Jigsaws, Student Observations, Student Interviews, Investigations
3. Polynomial Functions	**5 weeks**	• How do we use evidence to support our mathematical reasoning? • What can we learn from critiquing others' work? • How can we use mathematics and technology to help us model and better understand phenomena in the world? • When can we use synthetic and long division of polynomials? • What do the x-intercepts, y-intercept, relative and absolute maxima and minima of a polynomial tell us? • How is end behavior of a polynomial related to its degree and the limits of a function?	CME Project – Algebra II Engage NY – Algebra II Edmodo: Virtual Classroom Desmos Graphing Calculator Kuta Software – Algebra II	-Announced Quizzes: All announced quizzes will consist of multiple choice questions (including multi-select and multi-part), sample MCAS and SAT questions, short answer, and open response questions. Emphasis will be placed on application of material, rather than just calculations. • Quiz #1: Dividing Polynomials • Quiz #2: Graphing Polynomials • Quiz #3: Applications of Polynomials -Unit 3 Project #1: Students will engage in a written analysis of division. Students will compare and contrast long division of polynomials with long division of real numbers. They will then discuss the use of the remainder theorem and its connection to integers, using graphical

		• Is the domain of a polynomial function always realistic when modeling real world scenarios? Explain.	Supplemental Material	displays to further justify their reasoning. Finally, students will explain why synthetic division works using their understanding of long division of polynomials and real numbers. -Unit 3 Performance Assessment: Students will work collaboratively to analyze store profits. They will be provided a set of data from store owners, generate and analyze the polynomial function, and help the store owners to make predictions based on the data and generate additional questions from the data. -Other Assessments: Binder Checks, Math Journal Entries, Vocabulary and Concept Index Cards, Homework, Classwork, Exit Tickets, Jigsaws, Student Observations, Student Interviews, Investigations
4. Rational Equations and Functions	**5 weeks**	• How do we use evidence to support our mathematical reasoning? • What can we learn from critiquing others' work? • How can we use mathematics and technology to help us model and better understand phenomena in the world? • What are the role of asymptotes in rational functions? • How is the domain of a radical function related to its possible solutions? • Is the domain of a rational function always realistic when modeling real world scenarios? Explain.	CME Project – Algebra II Engage NY – Algebra II Edmodo: Virtual Classroom Desmos Graphing Calculator Kuta Software – Algebra II Supplemental Material	-Announced Quizzes: All announced quizzes will consist of multiple choice questions (including multi-select and multi-part), sample MCAS and SAT questions, short answer, and open response questions. Emphasis will be placed on application of material, rather than just calculations. • Quiz #1: Simplifying Rational Expressions and Solving Rational Equations • Quiz #2: Graphing Rational Functions • Quiz #3: Solving and Graphing Radical Equations -Unit 4 Project #1: Chemical Treatments - In this performance assessment, students will analyze an organization's investment into chemical treatments to predict future income and decide which, if any, investment(s) make sense for the organization. To do this, they will review the information provided and use their understanding of rational functions and limits to make an informed, appropriate decision. -Unit 4 Performance Assessment: Students will engage in a lab assignment that requires them to collect and analyze the length of time it will take a tsunami to reach a specific location (i.e. Alaska, Hawaii) based on the epicenter, depth, and the speed of the tsunami. Students will be given a set of data to analyze and use based on historical data. They will present their data visually. -Other Assessments: Binder Checks, Math Journal Entries, Vocabulary and Concept Index Cards, Homework,

				Classwork, Exit Tickets, Jigsaws, Student Observations, Student Interviews, Investigations
5. Exponential and Logarithmic Functions	**6 weeks**	• How do we use evidence to support our mathematical reasoning? • What can we learn from critiquing others' work? • How can we use mathematics and technology to help us model and better understand phenomena in the world? • How do we extend our understanding of the Laws of Exponents to define rational exponents? • How do we create equivalent expressions using the Properties of Logarithms? • How do we fit a set of data to create a line of best fit? • To what extent does a line of best fit accurately represent the data provided? • What do the asymptotes in an exponential and/or logarithmic function represent? • How are exponential and logarithmic functions represented in real life?	CME Project – Algebra II Engage NY – Algebra II Edmodo: Virtual Classroom Desmos Graphing Calculator Kuta Software – Algebra II Supplemental Material	-Announced Quizzes: All announced quizzes will consist of multiple choice questions (including multi-select and multi-part), sample MCAS and SAT questions, short answer, and open response questions. Emphasis will be placed on application of material, rather than just calculations. • Quiz #1: Rational Exponents • Quiz #2: Logarithms • Quiz #3: Solving Exponential Equations • Quiz #4: Graphing Exponential and Logarithmic Functions -Unit 5 Project #1: Mortgage Project: Students will expand on their understanding of exponential and logarithmic functions to calculate the mortgage on a house that would be affordable based on their career choice. Students will research average starting salary, write an exponential model to represent salary after a few years of working (assuming an industry average raise each year), and calculate how many years they would have to work to afford their desired home. -Unit 5 Project #2: M&M Lab: Students will engage in a simulation of cell growth using M&Ms. They will collect data and use exponential regression (manually and using technology) to model and analyze the function. They will evaluate the strength of their model and compare their models to peers' models. -Unit 5 Performance Assessment: Students will be engaged in a real-world task that requires them to analyze the strength of earthquakes (and subsequent damage) using the Richter Scale. They will then analyze building codes for a major city to see what, if any, improvements should be made, based on historical accuracy and potential for damage in an earthquake. -Other Assessments: Binder Checks, Math Journal Entries, Vocabulary and Concept Index Cards, Homework, Classwork, Exit Tickets, Jigsaws, Student Observations, Student Interviews

6. Piecewise Functions	**4 weeks**	• How do we use evidence to support our mathematical reasoning? • What can we learn from critiquing others' work? • How can we use mathematics and technology to help us model and better understand phenomena in the world? • Are any events "truly random?" • What role does probability have in the decision-making process for organizations? • What does it really mean to be "fair?" • When are the odds really in your favor? • How are binomial and geometric situations represented in real life?	CME Project – Algebra II Engage NY – Algebra II Edmodo: Virtual Classroom Desmos Graphing Calculator Kuta Software – Algebra II Supplemental Material	-Announced Quizzes: All announced quizzes will consist of multiple choice questions (including multi-select and multi-part), sample MCAS and SAT questions, short answer, and open response questions. Emphasis will be placed on application of material, rather than just calculations. • Quiz #1: Evaluating and Graphing Piecewise Functions • Quiz #2: Applications of Piecewise Functions -Unit 6 Project: Students will describe their own piecewise function using precise mathematical vocabulary (from a word bank) and draw the model they anticipate. They will then swap with a partner and draw a piecewise function based on their partner's description. -Unit 6 Performance Assessment: Roller Coaster Project: Students will design their own roller coaster using polynomial functions. They will be required to create functions and graphs to represent the height vs. time, distance vs. time, and speed vs. time for the roller coaster. They will use available supplies to create a scaled version of the roller coaster and test it using a marble. Applications of kinetic and potential energy will be utilized in this project. -Other Assessments: Binder Checks, Math Journal Entries, Vocabulary and Concept Index Cards, Homework, Classwork, Exit Tickets, Jigsaws, Student Observations, Student Interviews
7. Probability and Statistics	**5 weeks**	• How do we use evidence to support our mathematical reasoning? • What can we learn from critiquing others' work? • How can we use mathematics and technology to help us model and better understand phenomena in the world? • Are any events "truly random?" • What role does probability have in the decision-making process for organizations? • What does it really mean to be "fair?" • When are the odds really in your favor? • How are binomial and geometric situations represented in real life?	CME Project – Algebra II Engage NY – Algebra II Edmodo: Virtual Classroom Desmos Graphing Calculator Kuta Software – Algebra II	-Announced Quizzes: All announced quizzes will consist of multiple choice questions (including multi-select and multi-part), sample MCAS and SAT questions, short answer, and open response questions. Emphasis will be placed on application of material, rather than just calculations. • Quiz #1: Probability Models • Quiz #2: Conditional Probability & Independence • Quiz #3: Probability Distributions & Expected Values -Unit 7 Project: Snow Day Probability: Students will utilize data collected from multiple variables (i.e. depth of snow, time of snow ending) to help create a formula they can use to calculate the probability of a snow day. They will then be given a snowstorm and use their formula to justify whether or not their should be a snow day based on past

			Supplemental Material	practices. They will write a letter to the Superintendent with their findings and recommendations. -Unit 7 Performance Assessment: ALA Carnival Students will complete a performance assessment in which they analyze why the lottery system and casinos continue to be profitable even with all the technology available to us. To do this, they will look at the impact of randomization on these events, the expected values, and the probability distributions. -Other Assessments: Binder Checks, Math Journal Entries, Vocabulary and Concept Index Cards, Homework, Classwork, Exit Tickets, Jigsaws, Student Observations, Student Interviews