

Algebra II Curriculum Map

Algebra 2 Common Assessments

Course: Algebra II	Unit Title / Timeframe: 1- Number Systems / Review /Equations and Inequalities- 6 weeks
Enduring Understandings	<ul style="list-style-type: none"> • Properties of the real number system may or may not hold in other mathematical systems. • There are many ways to represent a number. • Algebraic expressions and equations generalize relationships from specific cases.
Essential Questions	<ul style="list-style-type: none"> • What does it mean to be “symbolically fluent?” • How can verbal, numerical, graphical and analytical representations be used to analyze and solve problems. • How do we analyze and understand patterns, relations and functions?
Common Core/Massachusetts Standards / AP Standards	<ul style="list-style-type: none"> • Number Systems review 8-NS, N-CN • Solve linear equations/inequalities (simple and compound) review A- REI.1 • Solving fractional equations and rational equations (linear) using clearing method A-REI • Solving literal equations to highlight a quantity of interest A-CED.4
Learning Targets	
Unit Checklist	<p><u>Linear Inequalities</u></p> <ul style="list-style-type: none"> · Compound “AND” & “OR”-flipping signs, open/closed circles, etc. · Graphing on a number line · Absolute Value (GOLA) · Two-Variables Inequalities (graphing and shading on a coordinate plane) <p><u>Absolute Value</u></p> <ul style="list-style-type: none"> · Solving Equations-splitting up and doing 2 checks · Solving Absolute Value Inequalities (GOLA) · Using the graphing calculator to check if you can

	<p>Writing Equations</p> <ul style="list-style-type: none"> · Using point-slope or slope-intercept form · Utilizing a graph or given information · Parallel and Perpendicular Lines <p>Solving Equations</p> <ul style="list-style-type: none"> · 1 variable equations · Special solution sets · Proper solution checks · Isolating a variable in a 2-variable equation · Literal equations with multiple variables <p>Graphing Linear Equations</p> <ul style="list-style-type: none"> · 3 forms of a line · Using slope, intercepts, or a table of values · Solving an equation graphically (with the calculator)
<p>Instructional Strategies*</p> <p>TI = Technology Integration ID = Interdisciplinary Connections</p>	<p>Directed Notes, Practice</p> <p>Cooperative Learning-Partner Work,</p> <p>Use Rule of Four sheets with graphing calculator*</p>
<p>Assessment</p>	<p>List of Assessments</p> <p>*Additionally the use of IXL & Kuta Software</p>
<p>Major Resources</p>	<p>Text: Big Ideas Math Algebra 1 Chapters 1-4</p> <p>Resource Book: McDougal Littell Algebra 2 Chapter 1</p>

Course: Algebra II	Unit Title/Timeframe: 2 - Functions and their graphs - 6 weeks
Enduring Understandings	<ul style="list-style-type: none"> • Change is fundamental to understanding functions.
Essential Questions	<ul style="list-style-type: none"> • How does output change as input changes? • How can change be described algebraically?
Common Core/Massachusetts Standards / AP Standards	<ul style="list-style-type: none"> • Understand the concept of a function and function notation including domain and range F-IF.1, F-IF.2 • Interpret functions that arise in terms of the context. F-IF 4,5 • Solve and graph absolute value equations and inequalities A - REI 10-12 • Calculate and interpret the average rate of change of a function. Estimate the rate of change of a graph F-IF.6 • Graph linear functions using both standard and slope-intercept form F-IF 7 • Identify types of correlation and find lines of best fit S-ID 6 a,b,c,7,8,9 • Graph linear inequalities in two variables, piecewise functions, including step functions F-IF 7
Learning Targets	<ul style="list-style-type: none"> • Identify parent functions and transformations. • Describe transformations of parent functions. • Model with linear functions.
Unit Checklist	<p><u>General Function Vocabulary</u></p> <ul style="list-style-type: none"> • Using a graph to answer questions about a function • What is a function? One-to-one? • Increasing vs Decreasing • Function Notation • Maximums, Minimums, Intercepts <p><u>Domain and Range</u></p> <ul style="list-style-type: none"> • Finding the domain and range from a graph • Finding the domain (only) from an equation <p><u>Transformations</u></p>

	<ul style="list-style-type: none"> · Using a given graph to create a new one · Using a table or visually moving points · Understand $f(x)$ notation and parent functions <p>Absolute Value in 2-D</p> <ul style="list-style-type: none"> · Graphing absolute value functions · Finding an equation given a graph or points · Knowing what “a”, “h”, and “k” do <p>Piecewise Functions</p> <ul style="list-style-type: none"> · Evaluating a piecewise function and finding an ordered pair · Writing the equation given a graph · Word problems
<p>Instructional Strategies*</p> <p>TI = Technology Integration</p> <p>ID = Interdisciplinary Connections</p>	<p>Directed Notes, Practice</p> <p>Cooperative Learning-Partner Work,</p> <p>Visual Representation: Students will manually graph and use the graphing calculator to display relationships and find domain and range of functions. TI</p> <p>Use calculator to find linear regressions Forensic Case 1 TI-84</p> <p>Representational Graphs graphs</p> <p>Louisiana Unit 1 Activity 7 Translating functions</p> <p>Louisiana Unit 1 Activity 10 Greatest Integer Discovery Worksheet</p> <p>DESE AMDM Unit V.C.8 Hurricanes and Shipping Costs</p> <p>V.C.9 Commute Home</p> <p>Activity 2.7 -graphing piecewise functions page 121 TI</p>
Assessment	<p>List of Assessments</p> <p>*Additionally the use of IXL & Kuta Software</p>
Major Resources	<p>Text: Big Ideas Math Algebra 2 Chapter 1.1-1.3</p> <p>Resource Book: McDougal Littell Algebra 2 Chapter 2</p>

Course: Algebra II	Unit Title/Timeframe 3- Systems of Linear Equations and Inequalities - 6 weeks
Enduring Understandings	<ul style="list-style-type: none"> Algebraic representations are used to communicate and generalize patterns in mathematics. Changes in quantities can be used to predict outcomes and solve problems.
Essential Questions	<ul style="list-style-type: none"> How can expressions and equations be used to represent practical problems symbolically?
Common Core/Massachusetts Standards / AP Standards	<ul style="list-style-type: none"> Solve systems of linear equations in two variables algebraically and graphically A-CED, A-REI.5,6,7, F-IF Solve systems of linear equations in 3 variables algebraically only A-CED, A-REI, F-IF
Learning Targets	<ul style="list-style-type: none"> Describe different methods for solving systems of linear equations. Solve systems of linear equations. Solve systems of linear inequalities.
Unit Checklist	<p><u>Systems of Equations</u></p> <ul style="list-style-type: none"> 2 Variable Systems graphically and algebraically 3 Variable Systems by elimination and substitution Word Problems in either 2 or 3 variables <p><u>Systems of Inequalities</u></p> <ul style="list-style-type: none"> Dotted Lines, Shading, etc. Final Solution Region Up to four inequalities at once, including one variable
Instructional Strategies* TI = Technology Integration	Directed Notes, Practice Cooperative Learning-Partner Work,

ID = Interdisciplinary Connections	Visual Representation: Students will manually graph and use the graphing calculator to display relationships. TI
Assessment	List of Assessments *Additionally the use of IXL & Kuta Software
Major Resources	Text: Big Ideas Math Algebra 2 Chapter 1.4, Big Ideas Math Algebra 1 Chapter 5 Resource Book: McDougal Littell Algebra 2 Chapter 3

Course: <i>Algebra II <u>Honors</u></i>	Unit Title/Timeframe: 4 - Matrices and Determinants - 3 weeks
Enduring Understandings	<ul style="list-style-type: none"> Matrices are an alternate way to solve systems of equations.
Essential Questions	<ul style="list-style-type: none"> How can multiple representations of information be used to express relationships? How can you use matrices to represent and manipulate data to model real-life situations?
Common Core/Massachusetts Standards / AP Standards	<ul style="list-style-type: none"> Add and subtract matrices N-VM Multiply a matrix by a scalar and multiply two matrices N-VM Evaluate determinants of 2X2 and 3X3 matrices N-VM Use Cramer's rule to solve systems of linear equations A-REI Find inverses of 2X2 matrices, use technology for 3X3 matrices N-VM
Unit Checklist	<p><u>Matrix Operations</u></p> <ul style="list-style-type: none"> Adding, Subtractions, Equating Matrix Multiplication <p><u>Determinants</u></p> <ul style="list-style-type: none"> Finding Determinant of a 2x2 Finding Determinant of a 3x3

	<ul style="list-style-type: none"> • Cramer's Rule <p><u>Inverses</u></p> <ul style="list-style-type: none"> • Inverse of a 2x2 by hand • Inverse of a 3x3 with a graphing calculator <p><u>Solving Systems</u></p> <ul style="list-style-type: none"> • Solving using Inverse Matrices • Solving using Cramer's Rule
Instructional Strategies* TI = Technology Integration ID = Interdisciplinary Connections	Directed Notes, Practice Cooperative Learning-Partner Work, Use a graphing calculator for verifying inverses and determinants. All 3X3 matrix work to be done using calculator Activity 4.1 Using Matrix Operations p 207 TI
Assessment	List of Assessments *Additionally the use of IXL & Kuta Software
Major Resources	Text: McDougal Littell Algebra 2 Chapter 4 Resource Book: McDougal Littell Algebra 2 Chapter 4

Course: Algebra II	Unit Title/Timeframe: 5 - Quadratic Functions - 6 weeks
Enduring Understandings	<ul style="list-style-type: none"> • Algebraic representations are used to communicate and generalize patterns in mathematics • Patterns enable us to discover, analyze, describe, extend and formulate concrete understandings of real world phenomena through mathematics.
Essential Questions	<ul style="list-style-type: none"> • How can expressions and equations be used to represent practical problems symbolically? • How can change be described mathematically?
Common Core/Massachusetts	<ul style="list-style-type: none"> • Introduce vertex, standard and intercept forms of quadratic functions F-IF

Standards / AP Standards	<ul style="list-style-type: none"> • Graph quadratic equations F-IF • Solve quadratic equations using: factoring, square roots, completing the square, quadratic formula and graphing calculator A-REI, N-CN • Write a quadratic equation given characteristics of their graphs, include systems of 3 equations in 3 unknowns A-CED • Model real life problems using quadratic equations, include applications of vertex and zeros Modeling • Perform arithmetic operations with complex numbers N-CN • Factoring over complex numbers A.SS.E.2
Learning Targets	<ul style="list-style-type: none"> • Describe transformations of quadratic functions. • Identify characteristics of quadratic functions. • Write equations of parabolas. • Model with quadratic functions. • Perform operations with complex numbers. • Solve quadratic equations by completing the square. • Describe how to use the quadratic formula. • Solve nonlinear systems and quadratic inequalities. • Solving efficiently using the 4 methods/Identify proper methods based on different problems.
Unit Checklist	<p><u>Graphing Parabolas</u></p> <ul style="list-style-type: none"> · 3 Forms: Standard, Vertex, and Intercept Form · Axis of symmetry, reflection, vertex and other vocabulary/concepts · Quadratic Inequalities (2D and 1D) · Writing Equations of Parabolas (Vertex & Intercept Form) <p><u>Simplifying</u></p> <ul style="list-style-type: none"> · Square roots (real and imaginary) · Operations with complex imaginary numbers <p><u>Solving</u></p> <ul style="list-style-type: none"> · By Square Rooting

	<ul style="list-style-type: none"> · By Factoring and using the ZPP · By the Quadratic Formula · By Completing the Square · Complex Solution Checks - Applications of word problems.
Instructional Strategies* TI = Technology Integration ID = Interdisciplinary Connections	Directed Notes, Practice Cooperative Learning-Partner Work, Heavy use of graphing calculator to find vertex, minimum and maximum of parabolas TI Suggested Activity 5-3 Solving Quadratic Equations page 271 using TI 84 Suggested Activity 5-5 Finding Minimums and Maximums page 290 using TI 84 Common Experiences: Quadratic Rule of Four/max, min
Assessment	List of Assessments *Additionally the use of IXL & Kuta Software
Major Resources	Text: Big Ideas Math Algebra 2 Chapters 2-3 Resource Book: McDougal Littell Algebra 2 Chapter 5

Course: Algebra II	Unit Title/Timeframe: 6- Polynomials Functions - 6 weeks
Enduring Understandings	<ul style="list-style-type: none"> • Reasoning allows us to make conjectures and to prove conjectures. • Patterns enable us to discover, analyze, describe, extend and formulate concrete understandings of real world phenomena through mathematics.
Essential Questions	<ul style="list-style-type: none"> • Why does a cubic equation have to have at least one real root? • How does end behavior change in the polynomial family?

Common Core/Massachusetts Standards / AP Standards	<ul style="list-style-type: none"> • Use properties of exponents to simplify expressions 8-EE • Discuss end behavior of polynomial functions and graph them A-APR, F-IF • Evaluate polynomial functions by substitution • Add/subtract/multiply polynomials A-APR • Factor by grouping, sum/difference of cubes and “quadratic form” to solve polynomial equations A-APR • Divide polynomials using long division, and synthetic division A-APR • Relate remainder theorem and factor theorem to long division A-APR • Find rational roots of polynomial equations using Possible Rational Root theorem A-APR • Analyzing graphs of polynomial functions including real-life models Modeling
Learning Targets	<ul style="list-style-type: none"> • Graph polynomial functions. • Add, subtract, multiply, divide, and factor polynomials. • Solve polynomial equations. • Model with and analyze graphs of polynomial functions. (Intercepts/Multiplicities)
Unit Checklist	<p><u>Polynomial Basics</u></p> <ul style="list-style-type: none"> · Exponent Rules · Synthetic Substitution · End Behavior <p><u>Multiplying Polynomials</u></p> <ul style="list-style-type: none"> · Multiple Distributing with more than 2 terms · Raising a binomial to a power · Using special patterns and Pascal’s Triangle · Sum & Product of Roots <p><u>Factoring/Solving</u></p> <ul style="list-style-type: none"> · Special Patterns (Sum/Difference of Cubes) · Quadratic Form (substituting “u”) · Grouping · Solving with the ZPP and possible quad formula · Checking the Fundamental Theorem of Algebra <p><u>Unfactorable Polynomials</u></p> <ul style="list-style-type: none"> · Synthetic Division and Polynomial Division

	<ul style="list-style-type: none"> · Solving/Factoring a polynomial after given one root/factor · Listing all possible rational roots using the Rational Root Theorem <p>Graphing</p> <ul style="list-style-type: none"> · Factored form-using multiplicity rules · Standard form-finding roots first
Instructional Strategies* TI = Technology Integration ID = Interdisciplinary Connections	Directed Notes, Practice Cooperative Learning-Partner Work,
Assessment	List of Assessments *Additionally the use of IXL & Kuta Software
Major Resources	Text: Big Ideas Math Algebra 2 Chapter 4 Resource Book: McDougal Littell Algebra 2 Chapter 6

Course: Algebra II	Unit Title/Timeframe: 7. Rational Functions - 3 weeks
Enduring Understandings	<ul style="list-style-type: none"> • Patterns enable us to discover, analyze, describe, extend, and formulate concrete understandings of mathematical and real world phenomena. • Changes in quantities can be used to predict outcomes and solve problems
Essential Questions	<ul style="list-style-type: none"> • Compare and contrast working with numerical fractions and polynomial fractions.
Common Core/Massachusetts Standards / AP Standards	<ul style="list-style-type: none"> • Simplify rational expressions using factoring A-APR, A-SSE • Multiply and divide rational expressions A-APR, A-SSE • Add and subtract rational expressions A-APR, A-SSE • Solving rational expressions A-REI
Learning Targets	<ul style="list-style-type: none"> • Add, subtract, multiply, and divide rational expressions. • Solve rational equations. • Describe how to graph rational functions.
Unit Checklist	<p><u>Multiplying and Dividing</u></p> <ul style="list-style-type: none"> · Factoring in order to reduce · NOT reducing parts of polynomials · Taking the reciprocal when dividing <p><u>Adding and Subtracting</u></p> <ul style="list-style-type: none"> · Writing the LCD out · Each factor the # of times it appears most · Simplifying complex fractions (1 of 2 methods) <p><u>Solving Equations</u></p> <ul style="list-style-type: none"> · Cross multiplying when possible · Multiplying through by the LCD · Extraneous solutions <p><u>Applications to Graphs</u></p> <ul style="list-style-type: none"> · Checking for extraneous solutions

	· Excluded values (open circles and asymptotes)
Instructional Strategies* TI = Technology Integration ID = Interdisciplinary Connections	Directed Notes, Practice Cooperative Learning-Partner Work, Technology Activity in text page 561 TI
Assessment	List of Assessments *Additionally the use of IXL & Kuta Software
Major Resources	Text: Big Ideas Math Algebra 2 Chapter 7 Resource Book: McDougal Littell Algebra 2 Chapter 9

Course: Algebra II	Unit Title/Timeframe: 8. Radical Functions - 6 weeks
Enduring Understandings	<ul style="list-style-type: none"> • Radical rules for simplifying are analogous to exponent rules • Using a function's inverse can help you understand the function
Essential Questions	<ul style="list-style-type: none"> • How do I find an inverse function? • Will a function always have an inverse that is also a function? • What families of functions are inverses of each and how do we use them?
Common Core/Massachusetts Standards / AP Standards	<ul style="list-style-type: none"> • Apply properties of integer exponents to fractional exponents. F-IF-8 • Show that rational exponent properties are analogous to radical properties and use them to simplify radical expressions. F-IF-8 • Write and graph radical functions for both square roots and cube roots. F-IF-7 • Define and show examples of inverse functions graphically and algebraically. F-BF-4 • Find and prove inverses of a function, restricting the domain where necessary. F-BF-4

Learning Targets	<ul style="list-style-type: none"> • Represent roots using rational exponents. • Describe the properties of rational exponents and radicals. • Solve radical equations and inequalities. • Explore inverses of functions
Unit Checklist	<p><u>Simplifying Expressions</u></p> <ul style="list-style-type: none"> • Converting exponent/radical forms • Using the same exponent rules with fractions • Evaluating a number to a fractional power • Like radicals and other basic radical properties • Simplifying under a radical with index > 2 <p><u>Function Composition</u></p> <ul style="list-style-type: none"> • Basic operations on functions • Performing composition with functions • Using radical and exponent rules within composition <p><u>Graphing Radical Functions</u></p> <ul style="list-style-type: none"> • Square & cube root differences • Transformation rules <p><u>Solving Equations</u></p> <ul style="list-style-type: none"> • Squaring/cubing both sides for radical equations • “Rooting” both sides for power equations • NOT distributing an exponent/radical • Extraneous solutions
Instructional Strategies* TI = Technology Integration ID = Interdisciplinary Connections	Directed Notes, Practice Cooperative Learning-Partner Work, Technology Activities
Assessment	List of Assessments *Additionally the use of IXL & Kuta Software
Major Resources	Text: Big Ideas Math Algebra 2 Chapter 5 Resource Book: McDougal Littell Algebra 2 Chapter 7

Course: Algebra II	Unit Title/Timeframe: 9. Exponential Functions - 3 weeks
Enduring Understandings	<ul style="list-style-type: none"> • Exponential growth is different from linear or quadratic growth • Exponential functions can be used to model real world phenomena including many applications to finance and compound interest
Essential Questions	<ul style="list-style-type: none"> • How can I tell if a function is exponential growth, decay, or neither? • What is an asymptote and what it is used to show graphically
Common Core/Massachusetts Standards / AP Standards	<ul style="list-style-type: none"> • Graph exponential growth and decay functions and identifying asymptotes F-IF-8 • Identifying growth, decay, etc. from equations and graphs F-IF-8 • Model real life problems with exponential functions F-IF-5 • Understand that “e” is a constant used for continuous growth and apply to real life problems F-IF-5 • Interpret functions including polynomial, rational, logarithmic, exponential, trigonometric (end of year review) F.IF.MA.10
Learning Targets	<ul style="list-style-type: none"> • Determine whether a function represents exponential growth or decay. • Simplify exponential expressions. • Solve exponential equations. • Model exponential functions.
Unit Checklist	<u>Growth & Decay</u> <ul style="list-style-type: none"> · Identifying Growth vs. Decay depending on the “b” value · Using a negative “a” value

	<ul style="list-style-type: none"> · Graphing and using an asymptote · Identifying Linear, Quadratic, and Exponential models <p>Word Problems</p> <ul style="list-style-type: none"> · “Initial Value” and “Growth Factor” · Writing exponential equations from a word problem · Using/understanding the number “e” · Calculating an amount after a given time
Instructional Strategies* TI = Technology Integration ID = Interdisciplinary Connections	Directed Notes, Practice Cooperative Learning-Partner Work, Technology
Assessment	List of Assessments *Additionally the use of IXL & Kuta Software
Major Resources	Text: Big Ideas Math Algebra 2 Chapter 6 Resource Book: McDougal Littell Algebra 2 Chapter 8

Course: Algebra II	Unit Title/Timeframe: 10. Probability- 3 weeks (extension if time permits)
Enduring Understandings	<ul style="list-style-type: none"> • Sample space is a list of all possible outcomes of an event • An event and its complement create a probability of 1 • Events that are mutually exclusive have no effect on each other • Events that are dependent on a previous outcome are termed conditional probabilities
Essential Questions	<ul style="list-style-type: none"> • How are our mathematical calculations different when dealing with dependent vs. independent events? • How can I use conditional probability to find out the likelihood of outcomes of events?

	<ul style="list-style-type: none"> How can I use the counting principle to calculate a sample space?
Common Core/Massachusetts Standards / AP Standards	<ul style="list-style-type: none"> Describe events as subsets of a sample space using characteristics of the outcomes, or as unions, intersections, or complements of other events S-CP-1 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. S-CP-2 Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, and interpret independence of A and B. S-CP-3 Construct and interpret two-way frequency tables of data S-CP-4 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations S-CP-5 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 S-CP-6 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. S-CP-7
Learning Targets	<ul style="list-style-type: none"> Define theoretical and experimental probability. Use two-way tables to find probabilities. Compare independent and dependent events. Interpret and construct probability and binomial distributions.
Instructional Strategies* TI = Technology Integration ID = Interdisciplinary Connections	Directed Notes, Practice Cooperative Learning-Partner Work, Technology
	List of Assessments *Additionally the use of IXL & Kuta Software
Major Resources	Text: Big Ideas Math Algebra 2 Chapter 10 Resource Book: McDougal Littell Algebra 1 Chapter 2.8

