Scope and Sequence – **Algebra IIA** **2019-20**

Course	**Algebra IIA**
Text	*Algebra 2 Common Core*, Pearson (2015)
Prerequisite	Geometry or Informal Geometry
Grade	11-12
Course Description	This college preparatory course, emphasizing the study of algebraic forms, linear and quadratic expressions, powers and roots, and other basic functions. Logarithmic, polynomial and other special functions are also studied. These forms and functions are used to model real world situations. Graphing calculators are used extensively.
Units	Unit 1&2 (13 days): Graphing and Solving Linear Equations, Absolute Values Equations, Piecewise Functions, & Inequalities Common Core State Standards Covered: A-CED.1, A-CED.2, A-CED.4, A-REI.10, A-REI .12, F-IF.1, F-IF.2, F-IF.5, F-IF.7, F-IF.7.b
	Unit 3 (13 days): Systems of Equations Common Core State Standards Covered: A-CED.1, A-CED.2, A-CED.3, A-CED.4, A-REI.6, A-REI.6, A-REI.7, A-REI.12,
	Unit 4 (10 days): Quadratics Part I-Vertex Form & Intercept Form Common Core State Standards Covered): A-SSE.1a, A-SSE.2, A-SSE.3.a, A-SSE.3.b, A-REI.4.a, A-REI.4.b, F-IF.4, F-IF.5, F-IF.7.a, F-IF.8.a, F-IF.8
	Unit 4 (14 days): Quadratics Part II-Standard Form & Imaginary Numbers Common Core State Standards Covered: A-APR.3, A-REI.7, N-CN.1, N-CN.2, N-CN.7, A.CED.3, A-REI.4.b
EA Opportunities	None
CRLE Opportunities	None

Unit 1&2: Absolute Values, Piecewise Functions, & Inequalities

Time Frame	13 days	
Summary of Unit	• *Solve and Graph Linear Equations* • *Graphing & Solving Absolute Value Equations* • *Graphing & Evaluating Piecewise Defined Functions* • *Graphing & Solving Inequalities Including Absolute Values*	
CCSS	**Code**	**Common Core State Standard**
	A-CED.1	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.*
	A-CED.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
	A-CED.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
	A-REI.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
	A-REI.12	Graph the solutions to a linear inequality in two variables as a half plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
	F-IF.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$.
	F-IF.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
	F-IF.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
	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.
	F-IF.7.b	Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
Major Assignments/ Learning Activities	Unit Exam	
Learning Targets	LT 1.1: I can solve linear and literal equations. LT 1.2: I can graph linear equations using t-table and slope intercept form. LT 1.3: I can graph an absolute value function and determine its domain and range LT 1.4: I can write the equation of an absolute value function given its graph. LT 1.5: I can solve absolute value functions algebraically and verify my solutions graphically. LT 1.6: I can solve linear inequalities. LT1.7: I can solve absolute value inequalities LT 1.8: I can write linear equations using point slope form. LT 1.9: I can graph, find the domain and range, and evaluate a piece-wise function (linear) LT 1.10a: I can graph, find the domain and range, and evaluate a piece-wise function (abs value). LT 1.10b: I can write piece-wise functions from a graph. LT 1.11: I can graph and write linear and absolute value inequalities.	
Essential Questions	How are graphing lines, absolute values, and piecewise functions similar?	
Academic Vocabulary	Linear, absolute value, transformations, domain, range, inequality, piecewise function	

Performance Tasks or Work Samples	

Unit 3: Systems of Equations

Time Frame	13 days	
Summary of Unit	• *Solving Systems of Linear & Absolute Value Equations by Graphing, Substitution, Elimination up to 3x3s* • *Solve Systems of Linear & Absolute Value Inequalities by Graphing* • *Linear Programming* • *Using Graph, Window, T-table, Intersection, & Trace Functions of Graphing Utilities.*	
CCSS	**Code**	**Common Core State Standard**
	A-CED.1	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.*
	A-CED.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
	A-CED.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
	A-CED.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
	A-REI.5	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions
	A-REI.6	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.
	A-REI.12	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
Major Assignments/ Learning Activities	Unit EXAM	
Learning Targets	LT 3.1: I can solve a system of equations by graphing. LT 3:2a: I can solve a system of equations using substitution. LT 3.2b: I can solve a system of equations using elimination. LT 3.2c: I can Solve Real-World problems by writing a system of equations LT 3.3: I can solve systems of linear inequalities by graphing. LT 3.4a: I can represent constraints using systems of inequalities LT 3.4b: I can interpret solutions to linear programming models. LT 3.5: I can solve a system of three equations with three variables.	
Essential Questions	How can Algebra be used to solve a problem?	
Academic Vocabulary	System of equations, substitution, elimination, linear programing, objective function, constraint, feasible region, optimize	
Performance Tasks or Work Samples	Work Sample Options - Linear Programming - - Algebraic Relations Systems of Equations - - Algebraic Relations	

Unit 4A: Quadratics Part I

Time Frame	10 days	
Summary of Unit	• *Graphing Quadratics* • *Vertex, Intercept, and Standard Form of Quadratic Equations* • *Quadratic Transformations* • *Factoring Perfect Square Trinomials* • *Isolating the x^2* • *Completing the Square* • *Factoring Trinomials & Binomials (a=1 or gcf)*	
CCSS	**Code**	**Common Core State Standard**
	A-SSE.1a	Interpret parts of an expression, such as terms, factors, and coefficients.
	A-SSE.2	Use the structure of an expression to identify ways to rewrite it.
	A-SSE.3.a	Factor a quadratic expression to reveal the zeros of the function it defines.
	A-SSE.3.b	Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
	A-REI.4.a	Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.
	A-REI.4.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.
	F-IF.B4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the graph.
	F-IF.B5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes
	F-IF.7.a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
	F-IF.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
	F-IF.8.a	Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.
Major Assignments/ Learning Activities	UNIT EXAM Warm-ups: Factor quadratics when a=1 Simplify radicals Simplify for quad formula	
Learning Targets	LT 4.1a: I can convert to standard form. LT4.1b: I can graph a quadratic equation that is written in standard, vertex, or intercept form and identify its important features. LT 4.1c: I can graph a transformation of a quadratic from an equation written in vertex form. (ID vertex, axis of symmetry from equation, know normal pattern). LT 4.2a: I can graph a quadratic from standard form. LT 4.2b: I can convert standard to vertex form. LT 4.6a: I can solve a quadratic equation by isolating the squared term. LT 4.6b: I can solve a quadratic equation by isolating the squared term and writing answer in simplest radical form. LT 4.6c: I can solve a quadratic by completing the square. LT 4.6d: I can complete the square to change a quadratic into vertex form.	
Essential Questions	How can a quadratic be graphed and solved?	

Academic Vocabulary	Binomial, parabola, standard form, vertex form, intercept form, complete the square, factor
Performance Tasks or Work Samples	None this unit

Unit 4B: Quadratics Part II

Time Frame	14 days	
Summary of Unit	• *Solve by Factoring* • *Standard Form of Quadratics* • *Quadratic Formula* • *Imaginary Solutions* • *Systems Including Quadratics* • *Writing/Converting Quadratic Equations Given Vertex, Points, & x-intercepts* • *Quadratic Applications & Regression* • *Using Graph, Window, Zeros, Extrema, & Regression Functions of Graphing Utilities.*	
CCSS	**Code**	**Common Core State Standard**
	A-APR.3	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.
	A-REI.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.
	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.
	N-CN.7	Solve quadratic equations with real coefficients that have complex solutions.
	A-CED.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context.
	A-REI.4.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.
Major Assignments/ Learning Activities	UNIT EXAM Warm-ups: 5/(x-2) Identify the domain Mental Math for Fractions (again) Simplify Complex fraction (1/2)/(3/x) Basic Proportions – cross multiply	
Learning Targets	LT 4.4a: I can rewrite a quadratic expression by factoring. a = 1 LT 4.4b: I can rewrite a quadratic expression by factoring (a not equal 1) LT 4.5: I can solve a quadratic equation by factoring and using the Zero Product Property LT 4.2a: I can graph a quadratic from standard form LT 4.7: I can solve a quadratic equation using the quadratic formula LT 4.8a: I can perform operations of complex numbers LT 4.8b: I can determine the number and nature of solutions using a graph a table or an equation. LT 4.8c I can solve quadratic equations that have imaginary solutions. LT 4.10a: Given important points from a parabola, I can write the corresponding quadratic equation in vertex form or intercept form. LT 4.10c: Given three points from a parabola, I can write the corresponding quadratic equation in standard form using technology. LT 4.11 I can create quadratic models and use them to solve problems.	
Essential Questions	How can a quadratic be graphed and solved?	
Academic Vocabulary	Axis of Symmetry, vertex, imaginary number/solutions, discriminant	

Performance Tasks or Work Samples	Work sample - - Write Quadratic Equations (Regression) - - Statistics