Academic Algebra II Curriculum
Crawford Central School District

Concept	Competency	Vocabulary	Strategy	PA Core Standards	PA Academic Standards	Time Frame (weeks)
Essential Question: How can we show that algebraic properties and processes are extensions of arithmetic properties and processes, and how can we use algebraic properties and processes to solve problems?						
Simplify numerical and evaluate expressions and formulas.	Apply the order of operations and absolute value.	sum, difference, product, quotient, power, base, exponent, grouping symbols, equation, inequalities, algebraic expression formula, variable, replacement set, simplify, evaluate, coefficient	Use inequality symbols, evaluate expressions, and simplify.	CC.2.2 HS.D.3	2.2.A1.C	1
Properties of real numbers	Review, identify and apply the properties of real numbers.	reflexive, symmetric, transitive, addition, multiplication, closure, commutative, distributive, associative, identify, and inverse properties.	Illustrate the use of properties of real numbers.	CC.2.2 HS.D.1	2.1.A1.A	1
Review and apply the rules for addition, subtraction, multiplication and division.	Simplify and evaluate expressions using the rules of signed numbers.	Addition, subtraction, multiplication, division, like terms, negative number	Stress the sign rules and practice using them.	C.C.2.2 HS.D.1	2.1.A1.A	1
Apply the properties of real numbers and their graphs.	Compare/order and identify real numbers and their graphs.	whole number, natural number, integers, rational number, irrational number	Characteristics of rational vs irrational	CC.2.2 HS.D.1	2.1.A1.A	1
Essential Question: How can we show that algebraic properties and processes are extensions of arithmetic properties and processes, and how can we use algebraic properties and processes to solve problems?						
Products and factors of polynomials	Simplify, add, subtract, multiply and divide polynomials	constant, monomial, coefficient, degree of a variable, degree of a monomial, similar monomial, polynomial, simplified polynomial, degree of a polynomial, binomial, trinomial, extended distribution,	Combine like terms, apply the FOIL method, Area Model, Algebra Tiles, extended distribution	C.C.2.2HS.D.3	2.8.A1.B	4 to 5

	Use and apply the laws of exponents.	laws of exponents, counter examples, zero exponent, negative exponent, scientific notation.	Apply the laws of exponents	C.C.2.1HS.F.1	2.8.A1.B	
	Find and apply the use of GCF and LCM	factor, factor set, prime, composite numbers, prime factorization, GCF, LCM	Prime factorization tree	C.C.2.2HS.D.3	2.8.A1.E	
	Factor algebraic expressions	difference of squares, trinomials, difference of cubes, sum of cubes, quadratic trinomial, factor completely	factoring, distributive property, special cases	C.C.2.2HS.D.3	2.1.A1.B	
	Solve polynomial equations and word problems.	zero product property, double roots, multiple roots and mathematical model	Solving multi step equations and word problems	C.C.2.2H.S.D.5	2.8.A2.E	
Essential Question: How can expressions, equations, and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?						
Solving equations, inequalities, and word problems.	Solve equations and inequalities and apply to word problems.	open sentence, solution, root, solving, empty set, identity, formula, inequality, solution sets extraneous solutions	Problem solving strategies, check and verify solutions.	CC.2.2 HS.D.2	2.1.A1.F and 2.8.A1.E	2
Solve graphing linear equations and functions using various methods.	Graphing on the number line	properties of order, equivalent, equalities, conjunctions, disjunction, between, inclusive at least, at most, not less than, no greater than	Placement on number line of all number forms	CC.2.2 HS.D.2	2.1.A1.A	
	write, solve, graph, and/or apply linear equations. (including problem situations)	linear equation, slope, intercept, slope-intercept form, standard form, point-slope form, ordered pair cartesian plane, coordinate plane, x-y plane, rectangular plance, origin, quadrants, abscias, ordinate	Solving multistep equations for a specified variable, graphing a linear equation using intercepts, slope intercept and point slope form, converting between forms of a linear equation.	C.C.2.2 HS.D.2	2.1.A1.F, 2.8.A1.E and 2.8.A1.F	3 to 4
	Draw scatter plot and find Line of Regression	scatter plot, Line of Regression (or Best Fit)	Drawing scatter plot and fine line of best fit using slope	CC.2.2HS.C.5	2.1.A1.F, 2.8.A1.E	

	Find and graph the slope of a line.	y-form	subtract y's over subtractx's, rise over run	CC.2.2HS.C.5	2.1.A1.F, 2.8.A1.E	
	Find an equation of a line given its slope and a point on the line, or two points, or its slope and the y-intercept.	parallel line, perpendicular line, negative reciprocal, x-intercept, y-intercept	Find an equation in different forms.	C.C.2.2HS.C.5	2.1A1.F, 2.8.A1.E and 2.8.A1.F	
Solving linear systems of equations and inequalities and word problems in two variables.	Write, solve, graph and/or apply linear systems of equations and inequalities.	linear systems, intersecting, coinciding lines, consistent, independent, dependent, inconsistent, elimination, substitution, half plane, open half plane	Use the different algebraic methods as well as graphing method to solve.	C.C.2.2HS.D.10	2.8.A1.E and 2.8.A1.F	2
Essential Question: What are the characteristics that make a relation a function?						
Find and graph functions and relations.	Write, graph, and express the values of functions and relations. Find domain and range.	mapping diagram, function, vertical line test, domain, range, linear function, rate of change, 1 to 1 correspondence, relation	Make tables and graph ordered pairs	C.C.2HS.C.2	2.8.A1.D	2
	Evaluate the composition of a function.	composite function, function notation, domain, range	Use functiional notation to calculate composition of functions.	C.C.2HS.C.4	2.8.A1.D	
Essential Question: How can expressions, equations, and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?						
Simplifying and solving rational expresions and equations.	Simplify rational expressions by addition, subtraction, multiplication and division.	rational algebraic expressions, rational functions, zeros, reciprocal, least common denominator, complex fractions, fractional coefficiants	Factoring, LCD, simplifying rational expressions	C.C.2HS.D.6	2.8.A2.B	2
	Solve rational equations and word problems.	fractional equations, extraneous root	Solving multi step equations and word problems	CC.2HSD.2	2.8.A2.B	

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Essential Question: How are mathematical operations performed with imaginary and complex numbers?						
Simplifying irrational and complex numbers	Find and simplify roots of real numbers.	square root, principal root, cube root, inch root, radical, radicand, index, properties of radicals, simpliest radical form	Find perfect squares/cubes to factor	C.C.2HS.F.7	2.2.A2.C	
	Add, subtract, multiply and divide radicals.	like radicals, conjugate, patterns	Simplify using like radicals, FOIL, special cases, multiply by the conjugate	CC.2HS.F.1	2.1.A2.A	3 to 4
	Solve radical equations	radical equations	Solve multistep radical expressions, isolate the radical	CC.2HS.F.1	2.8.A2.B, 2.8.A2.E	
	Writing, simplifying, and solving complex numbers	complex numbers, imaginary numbers, complex conjugate, pure imaginary	Simplify complex numbers by using the complex conjugate	C.C.2H.S.F.6	2.2.A2.C	
Essential Question: How do quadratic equations and their graphs and/or tables help us interpret events that occur in the world around us?						
Writing and solving quadratic equations and functions	Solve quadratic equations by completing the square.	quadratic formula, complete the square, discriminant, quadratic form	Use multiple strategies and steps to solve equations	C.C.2H.S.F.7	2.8.A2.B, 2.8.A2.E and	3
	Graph quadratic functions	axis of symmetry, vertex, max value, min value, quadratic function		C.C.2H.S.C.2	2.8.A2.B	
	Write quadratic functions	sum/product of roots, integral coefficients	Use multiple strategies and steps to solve equations	C.C.2HS.D.3	2.8.A2.B	
Essential Question: How can you extend algebraic properties and processes to quadratic, exponential and polynomial expressions and equations and then apply them to solve real world problems?						
Simplify and solve polynomial equations.	Divide polynomials by polynomials	division algorithm, quotient, remainder, divisor, dividend synthetic division, remainder theorem, factor theorem, rational root		C.C.2HS.F.7	2.8A2.B	1
Essential Question: What are the advantages/disadvantages of the various methods to represent exponential functions (table, graph, equation) and how do we choose the most appropriate representation?						

Exponential and logarithmic functions	Write and simplify rational exponents.	rational exponents, exponential form	Translate rational exponents to radical form	C.C.2H.S.F.1	2.2.A2.C, 2.8.A2.B	2