Pacing & Curriculum Guide

Algebra 2 – 1200330

[redacted]

Mathematical Thinking & Reasoning Standards
9-12 LAFS & ELL Standards
Proficiency Scale Units Pacing Guide
Units At-A-Glance 3 D Calendar
Part II
Teacher & Student Critical Concept Units with B.E.S.T. standards embedded

REVISED ~ June 202

The Pacing Guide and Units Guides will be reviewed and revised as necessary every year.

ELA& ELDGuide

Pacing Guide : Algebra 2

Approximate Time		Critical Concept Unit	Standards	Critical Concept Unit Overview – Level 3.0
1st Quarter	*17 Days* *3 Flex days*	**1** **Functions, Inequalities, and Systems**	MA.912.AR.3.8, MA.912.AR.4.4, MA.912.AR.3.3, MA.912.AR.4.2, MA.912.AR.9.2, MA.912.AR.9.3, MA.912.AR.9.5, MA.912.AR.9.7, MA.912.F.1.1, MA.912.F.1.7, MA.912.F.2.2, MA.912.F.2.3, MA.912.F.2.5	9 1.1: Understand that the key features of a graph, including the domain, range, and intercepts, reveal the relationship between two quantities. 9 1.2: Understand that a function of the form (Ez) = ‡ ®[ˆ(Ez F Ž)] + ‘ is transformed by changing the values of a, b, h, or k. Changing the value of k results in a horizontal or vertical translation, changing the sign of a or b results in a reflection across one of the axes, and changing the value of a or b results in a hori zontal or vertical stretch or compression. 9 1.5: Solve a quadratic or absolute value inequality, find the values that make an equality true, and then test points between those values. 9 1.6: Understand the solution of a system of equations or inequalities is the set of ordered pairs that satisfy all the equations or inequalities in the system.
	16 days *2 Flex days*	**2a** **Quadratic Functions and Equations**	MA.912.AR.3.8, MA.912.AR.4.4, MA.912.AR.3.4, MA.912.AR.1.1, MA.912.AR.3.2, MA.912.F.1.1, MA.912.F.1.7, MA.912.F.2.2, MA.912.F.2.3, MA.912.F.2.5, MA.912.NSO.2.1, MA.912.DP.2.8	9 2.1: Understand that all quadratic functions are transformations of th e parent function (Ez) = ž. The vertex form of a quadratic function highlights the key features of the function's graph and shows how the graph of the parent function can be transformed. 9 2.2: Understand that a quadratic function in vertex form can be rewritten in standard form to highlight different features of the function's graph. The key features are used to interpret values in context. 9 2.3: Understand that the factored form of a quadratic function is used to find the zeros of the function by identifying the values that make one or both of the factors equal to zero. 9 2.4: Understand that a complex number contains both real and imaginary parts. The four basic operations can be applied to complex numbers.

2nd

Approximate Time	Critical Concept Unit	Standards	Critical Concept Unit Overview – Level 3.0
3rd Quarter *20 days* *3 flex days*	**4** Rational Functions	MA.912.AR.1.9 , MA.912.AR.8.1, MA.912.AR.8.2 , MA.912.AR.8.3 , MA.912.F.1.1 , MA.912.F.2.2	9 4.1: Understand that the reciprocal function is used to model inverse variation, which is a proportional relationship between two variables such that when one variable increases, the other decreases. 9 4.2: Understand that a rational function is any function R(x) $=\frac{P(x)}{Q(x)}$ where P(x) and Q(x) are polynomial functions. The domain of a rational function is all real numbers except any x -value for which Q(x) equals zero. The graph of a rational function has one or more asymptotes, which guide the end behavior of the graph. 9 4.3: Understand rational expressions form a system similar to the system of rational numbers and can be multiplied and divided by applying properties of operations as they apply to rational expressions. 9 4.4: Understand the properties of operations used to add and subtract rational numbers can be applied to adding and subtracting expressions. 9 4.5: Understand that rational equations contain a rational expression and can be solved by multiplying each side of the equation by a common denominator to eliminate the fractions. Any solution that is excluded from the domain of the original equation is extraneous.
24 days *4 Flex days*	**5** Rational Exponents and Radical Functions	MA.912.NSO.1.3 ,	

Unit 1

- MA.912.F.1.1: Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it.
- MA.912.F.1.7: Compare key features of two functions each represented algebraically, graphically, in tables or written descriptions.
- MA.912.F.2.2: Identify the effect on the graph of a given function of two or more transformations defined by adding a real number to the *T*- or *U*-values or multiplying the *T*- or *U*-values by a real number.
- MA.912.F.2.3: Given the graph or table of *B*(*T*) and the graph or table of *B*(*T*)+*G*, *G*B(*T*), *B*(*GT*) and *B*(*T*+*G*), state the type of transformation and find the value of the real number *G*
- MA.912.F.2.5: Given a table, equation or graph that represents a function, create a corresponding table, equation or graph of the transformed function defined by adding a real number to the *T*- or *U*-values or multiplying the *T*- or *U*-values by a real number.

General Algebra 2 does not cover Lesson 1.3 and Lesson 1.4.

1.5: Solve a quadratic or absolute value inequality, find the values that make an equality true, and then test points between those values.

- MA.912.AR.3.3: Write and solve one-variable quadratic inequalities over the real number system. Represent solutions algebraically or graphically.
- MA.912.AR.3.8: Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context.
- MA.912.AR.4.2: Given a mathematical or real-world context, write and solve one-variable absolute value inequalities. Represent solutions algebraically or graphically.

1.6:

The student will:

1.1:

2.0

Algebra 2	Teacher Critical Quarter 5 & Equal	Unit 2a: Pacing 21 - 24 MA2A38, MA2A44, MA2A3. 4, MA2A11, MA2A. 32 , MA2F11, MA2F17, MA2F22, MA2F23, MA2F25, MA2P1, MA2P8

o [illegible]

T-o U- [illegible] *T-o U-*

9 2 [illegible]

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

2i3i:ero ( )Tj EM t5.94 (.12 r

Student Name:	Student Critical Concept Quadratic Functions & Equations	UNIT 2a: Topic 2.1 -2.4

Enrichment

lgebra 2	Teacher Critical Concept Quadratic Functions & Equations M.C. Formative Assessment Name: DFA Algebra 2 Unit 2b Quadratic Functions & Equations (Topic 2. 5-2. 8)	UNIT 2b: Topic 2. 5-2. 8 MA.912.AR.3.8, MA.912.AR.3. 4, MA.912.AR. 3.2, MA.912.AR.3.9, MA.912.AR.3.10, MA.912.AR.9.2, MA.912.AR.9.5

ctivity :	Resources & Assignments
ants to design a fountain for his backyard. He wants the height of the s water stream to be at least 2 m. The height of a fountain's water an be modeled by a quadratic function $D(T) = -8(T-0.5)^6 + 2$. In the h is the height of the jet of the water and x is the horizontal distance et of water from the nozzle, measured in meters. How far will the water n the nozzle? (Enrichment 2 -6)	

9 2.8: Understand that a linear- quadratic system consists of a linear equation and a quadratic equation. The points of intersection are the solutions.

- MA.912.AR.9.2: Given a mathematical or real -world context, solve a system consisting of a two -variable linear equation and a non -linear equation algebraically or graphically.
- MA.912.AR.9.5: Graph the solution set of a system of two -variable inequalities. Clarification 1: Within the Algebra 2 course, two -variable inequalities are limited 40s(11..13.5 (11.4 (a)B3660 Td ( )Tj E)TjQBq)-23.7 (i)-4.542 T

Enrichment

Teacher Critical Concept

Polynomial functions

UNIT 3: Topic 3

Algebra 2

o

transformed function defined by adding a real nu mber to the *T* or *U* values or multiplying the *T* or *U* values by a real number.

9 3.7 : Understand that polynomial functions are categorized as even, odd, or neither. Even functions are symmetric about the y -axis, and for all x in the domain f(x) = f(-x). Odd functions are symmetric about the origin, and for all x in the domain, f(-x) = - f(x)

- MA.912.F.1.9: Determine whether a function is even, odd or neither when represented algebraically, graphically or in a table.
- MA.912.F.2.2: Identify the effect on the graph of a given function of two or more transformations defined by adding a real number to the *T* or *U* values or multiplying the *T* or *U* values by a real number.
- MA.912.F.2.3: Given the graph or table of *f(T)* and the graph or tav by Tf 10.98 0 3.6-49(t)1.7 (6>h 10.98 0 3.66)3326 Tm <074

	9	3.2: Compare a polynomial function represented algebraically with one represented graphically. 9 3.3: Prove polynomial identities and use them to multiply and factor polynomials. 9 3.4: Divide polynomial expressions using long division. 9 3.4: Use synthetic division to rewrite rational expressions 9 3.5 : Solve for the zeros of a function by factoring or using synthetic division. 9 3.5: Sketch a graph of a polynomial function using its zeros 9 3.6 : Extend polynomial theorems and identities to find the real and complex solutions of polynomial equations. 9 3.6: Rewrite polynomial functions using conjugates. 9 3.7 : Determine whether functions are even or odd from their graphs and algebraic equations. 9 3.7: Identify the effect on the graphs of cubic and quartic functions of replacing f(x) with f(x) + k, kf(x), f(kx) and f(x+k), 9 3.7: Given a graph, determine the equation as it is related to its parents cubic function or quartic function.	
1.5		Partial success at score 2.0 content, and major errors or omissions regarding score 3.0 content.	

Student Name:	Student Critical Concept **Polynomial Functions**	UNIT 3: Topic 3
M.C. Formative Assessment Name: DFA Algebra 2 Unit 3 Polynomial Functions	My Score:	MA.912.AR.1.1, MA.912.AR.1.3, MA.912.AR.1.5, MA.912.AR.1.6, MA.912.AR.1.7, MA.912.AR.1.8, MA.912.AR.6.1, MA.912.AR.6.5, MA.912.F.1.1, MA.912.F.1.7, MA.912.F.1,9, MA.912.F.2.2, MA.912.F.2.3, MA.912.F.2.5, MA.912.F.3.2

		Resources & Assignments
4.0	How could you use polynomial identities to factor the expression ž^ß F Ÿ^ß ?	
3.5	I have mastered 3.0 content and with help I am successful at 4.0 content .	
3.0	By the end of the unit, I will be able to: ‰3.1: Demonstrate an understanding that a polynomial function is either a monomial or sum of monomials. Be able to identify the key features of the graph of a polynomial function including its end behavior, intercepts, an d turning points and be used to sketch a graph of the function. ‰3.2: Perform operations on polynomial s; add, subtract, multiply. Use polynomial functions to represent and compare real-world situations ‰3.3: Demonstrate an understanding that polynomial identities are helpful tools for efficiently rewriting expressions and describing mathematical relationships. ‰3.4 : Demonstrate understanding that polynomial functions can be written as a product of factors found by dividing linear factors using synthetic or long division. ‰3.5: Find the solutions of polynomial functions by factoring or synthetic division. ‰3:5 Build the graph of a polynomial function using solutions found through synthetic or long division. ‰3.6: Use the Rational Root Theorem and the Fundamental Theorem of Algebra as tools for determining the roots of a polynomial function. ‰3.7: Understand that polynomial functions are categorized as even, odd, or neither.	
2.5	I have mastered 2.0 content and with help I am	

I can:

I will be able to

‰3.1: Construct a graph of polynomial functions and show the key features of the graph

‰3.1: Identify the end behavior of polynomial functions by interpreting the leading coefficients and degrees.

‰3.1: Sketch graphs showing key features, given a verbal description

‰3.2: Add, subtract, and multiply polynomials

2.0 ‰3.2: Compare a polynomial function represented algebraically with one represented graphically.

‰3.3: Prove polynomial identities and use them to multiply and fac tor polynomials.

‰3.4: Divide polynomial expressions using long division and synthetic division .

‰3.4: Write polynomials as a product of factors found by using synthetic or long division.

‰3.5: Solve for the solutions of a polynomial .

‰3.5: Sketch a graph of a polynomial function using its zeros

‰3.6: Use polynomial theorems and identities to find the real and complex solutions of polynomial equations.

‰3.6: Rewrite polynomial functions using conjugates.

‰3.7: Determine whether functions are even or odd from their graphs and algebraic equations.

Teacher Critical Concept

Rational Functions

UNIT 4

Algebra 2

- MA.912.AR.1.9: Apply previous understanding of rational number operations to add, subtract, multiply and divide rational algebraic expressions.

9 4.4: Understand the properties of operations used to add and subtract rational numbers can be applied to adding and subtracting expressions.

- MA.912.AR.1.9: Apply previous understanding of rational number operations to

9 4.2: Rewrite simple rational expressions in different forms using long division.

9 4.3: Use the structure of rational expressions to rewrite simple rational expressions in different forms.

9 4.3: Apply previous understanding that rational expressions form a system analogous to the system of rational numbers and use that

Student Name:	Student Critical Concept Rational Functions	UNIT 4: Topic 4
M.C. Formative Assessment Name: DFA Algebra 2 Unit 4 Rational Functions	My Score:	MA.912.A.R.1.9, MA.912.A.R.8.1,MA.912.AR.8.2, MA.912.AR.8.3, MA.912.F.1.1, MA.912.F.2.2

		Resour ces & Assignments
4.0 Enrichment	An airplane completes a round trip, traveling 2238.6 miles each way. The airplane's average speed without wind is 560 mph. The inbound flight going against the wind takes 12 minutes longer than the outbound flight going with the wind. What is the speed of the wind.	

3.5 I have

- MA.912.F.3.4 : Represent the composition of two functions algebraically or in a table. Determine the domain and range of the composite function.

There are limited problems in the text calculating the domain of a composition that does includes non -polynomial functions. For example, if one of the functions is a radical equation.

9 5.6 : Understand the inverse of a function is found by exchanging the roles of the independent and dependent variables. Composition can be used to verify that two functions are inverses.

u

	9 5.3: Identify the effect of transformations on the key features of the graphs of radical functions. 9 5.3 : Solve word problems involving radical equations. 9 5.4: Solve radical equations in one variable. 9 5.4: Explain how extraneous solutions may arise when solving radical equations. 9 5.4: Solve radical inequalities and apply the solution within a real-world context. 9 5.5: Combine functions by addition, subtraction, multiplication, or division, and identify the domain of the result. 9 5.5: Represent the composition of two or more functions algebraically, specifying the order in which the functions are applied and describing the domain of the composite function. 9 5.6: Represent the inverse of a function algebraically, graphically or in a table. 9 5.6: Write an equation for the inverse of a function and determine if the inverse is also a function. 9 5.6: Use composition of functions to verify that one function is the inverse of another.	
1.5	Partial success at score 2.0 content, and major errors or omissions regarding score 3.0 content.	
1.0	With help, partial success at score 2.0, content and score 3.0 content.	
0.5	With help, partial success at score 2.0 content but not at score 3.0 content.	
0	Even with help, no success.	

Student Name:	Student Critical Concept Rational Exponents & Radical Functions	UNIT 5: Topic 5
M.C. Formative Assessment Name: DFA Algebra 2 Unit 5 Rational Exponents & Radical Functions	My Score:	MA.912.NSO.1.3, MA.912.NSO.1.5, MA.912.MA.AR.7.1, MA.912.AR.7.2, MA.912.AR.7.3, MA.912.F.1.7, MA.912.F.2.2, MA.912.F.2.3, MA.912.F.2.5, MA.912.F.3.2, MA.912.F.3.4, MA.912.F.3.6, MA.912.F.3.7

4.0 Enrichment

Let „ = ¨ Û+ § Û+ ¥ Û+ ¾ Û+ ®, where the radical is repeated infinitely many times.

Squaring both sides results in „ Û = Û+ ¨ Û+ § Û+ ¥ Û+ ¾ Û+ ®

	I can:	I will be able to recognize or recall specific vocabulary:
2.0	‰ 5.1 : Use properties of exponents to generate expressions involving radicals in terms of rational exponents. ‰ 5.1: Find all the n th roots of a number. ‰ 5.1: Evaluate expressions with rational exponents. ‰ 5.1: Use n th roots to solve equations by rewriting expressions using the properties of exponents. ‰ 5.2: Use the properties of exponents and radicals to identify ways to generate radical expressions. ‰ 5.2: Interpret radical expressions that represent a quantity in terms of its context. ‰ 5.3: Graph radical functions, including square root and cube root functions. ‰ 5.3: Identify the effect of transformations on the key features of the graphs of radical functions. ‰ 5.4: Solve radical equations in one variable. ‰ 5.4: Explain how extraneous solutions may arise when solving radical equations. ‰ 5.4: Solve radical inequalities and apply the solution within a real- world context. ‰ 5.5: Combine functions by addition, subtraction, multiplication, or division, and identify the domain of the result. ‰ 5.5: Represent the composition of two or more functions algebraically, specifying the order in which the functions are applied and describing the domain of the composite function. ‰ 5.6: Represent the inverse of a function algebraically, graphically or in a table. ‰ 5.6: Write an equation for the inverse of a function and determine if the inverse is also a function. ‰ 5.6: Use composition of functions to verify that one function is the inverse of another.	‰ composite function ‰ composition of functions ‰ extraneous solution ‰ Index ‰ inverse function ‰ inverse relation ‰ nth root ‰ radical function ‰ radical symbol ‰ radicand

- MA.912.AR.5.4 Write an exponential function to represent a relationship between two quantities f rom a graph, a written description or a table of values within a mathematical or real -world context.
- MA.912.AR.5.5: Given an expression or equation representing an exponential function, reveal the constant percent rate of change per unit interval using the properties of exponents. Interpret the constant percent rate of change in terms of a real -world context.
- MA.912.AR.5.7: Solve and graph mathematical and real -world problems that are modeled with exponential functions. Interpret key features and determine constraints in terms of the context.
- MA.912.F.1.1: Given an equation or graph that defines a function, determine the function type. Given an inpu (G)-7.5 (i).6 (expl3)-4.4 ( ) on output table, determine a function type that could represent it.

- MA.912.FL.3.1 Compare simple, compound an d continuously compounded interest over time.
- MA.912.FL.3.2: Solve real -world problems involving simple, compound and continuously compounded interest.
- MA.912.FL.3.4: Explain the relationship between simple interest and linear growth. Explain the relationship between compound interest and exponential growth and the relationship between continuously compounded interest and exponential growth.
    - MA.912.DP.2.9: Fit an exponential function to bivariate numerical data that suggests an exponential association. Use the model to solve real -world problems in terms of the context of the data.

9 6-3: Understand that a logarithmic function is the inverse of an exponential function. Logarithms are found by determining the exponent that must be applied to a base to yield a given result.

- MA.912.NSO.1.6: Given a numerical logarithmic expression, evaluate and generate equivalent numerical expressions using the properties of logarithms or exponents.
- MA.912.AR.5.2: Solve one- variable equations involving logarithms or exponential expressions. Interpret solutions as viable in terms of the context and identify any extraneous solutions.
- MA.912.AR.5.7: Solve and graph mathematical and real -world problems that are modeled with exponential functions. Interpret key features a nd determine constraints in terms of the context.
- MA.912.F.3.7 Represent the inverse of a function algebraically, graphically or in a table. Use composition of functions to verify that one function is the inverse of the other.

9

both functions. Logarithmic functions can be used to model several real-world situations.

- MA.912.AR.5.8: Given a table, equation or written description of a logarithmic function, graph that function and determine its key features.
- MA.912.AR.5.9: Solve and graph mathematical and real -world problems that are modeled with logarithmic functions. Interpret key features and determine constraints in terms of the context.
- MA.912.F.1.7: Compare key features of two functions each represented

2.5	No major error or omissions regarding score 2.0 content, and partial success at score 3.0 content.	

Exponential and Logarithmic Functions

Enrichment

I can:

‰

2.0