Corsica Stickney Curriculum Map

Subject: Algebra 2 **Grade:** 10th/11th Unit 1 Functions Module 1 Analyzing Functions: 1.1, 1.2, 1.3	**Teacher:** Mrs. Jacque Boyle **Duration:** August 2019

Summary of unit:

Students will learn about analyzing functions, including domain, range and end behavior, transforming function graphs and inverses of functions, graphing, writing, and solving functions including absolute value functions, equations and inequalities.

Stage 1 – Desired Results

Standards	**Essential Questions:**
F-IF.B.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. A-CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. A-CED.A.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 F-IF.B.4 For a function that models a relationship between two quantities, interpret key features ... and sketch graphs showing key features… . F-IF.B.6 Calculate and interpret the average rate of change of a function, both symbolically and from a table over a specified interval. Estimate the rate of change from a graph. S-ID.B.6 Evaluate reports based on data. F-BF.B.3 Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k ... find the value of k given the graphs… .	How can you determine the domain, range, and end behavior of a function? What are some of the attributes of a function, and how are they related to the function's graph?

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F-IF.C.7b Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.	

Language objective	**Mathematical practices**	**Integrate mathematical practices**
With a partner, fill in a graphic organizer showing the domain, range, and end behavior of a function. Explain to a partner where the local maximum and minimum values are on a graph of a function, and where the zero of a function is located on its graph. Identify graphs of odd and even functions and justify reasoning with a partner.	MP.6 Precision MP.7 Using Structure	1.1 This lesson provides an opportunity to address Mathematical Practice MP.6, which calls for students to use the language of mathematics to communicate precisely and to "attend to precision." Students learn to describe intervals using inequalities, set notation, and interval notation. They also learn how to use mathematical notation to describe end behavior of a function. 1.2 This lesson provides an opportunity to address Mathematical Practice MP.7, which calls for students to find different ways of seeing situations by looking for patterns and making "use of structures." Students learn how the attributes of functions are represented graphically. They also learn how the graph of a set of data can be used to generate a function that approximates the data and can be used to make predictions about additional data points. Through these processes, students learn to make connections between functions and the situations they represent.
Vocabulary		**Differentiation**

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Interval End behavior Increasing Decreasing Average rate of change	Maximum value Minimum value Parameters Even function Odd function	Students who need extra help receive help from teacher one on one for independent working time. If appropriate, they complete worksheets or tests in an alternate setting.

Stage 2 – Assessment Evidence

Performance Tasks: Homework quizzes, worksheet, Tests.	Unit Pre-Assessment: Assign ready-made or customized practice tests to prepare students for high-stakes tests

Stage 3 – Learning Plan

- Learning Activities: procedures/topics
- Reading and discussing lesson with class as lecture time.
- Giving students examples to be completed in class. Most times using the Think, Pair, and Share to keep students active in their learning individually and together.
- Students take notes and use notes to complete homework assignments.
- Sometimes activities used to present things in multiple ways or for extra practice on struggling concepts.

Lesson Descriptions

LESSON 1.1 Domain, Range, and End Behavior
LESSON 1.2 Characteristics of Function Graphs
LESSON 1.3 Transformations of Function Graphs

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Subject: Algebra 2 **Grade:** 10th/11th Unit 1 Functions Module 1 Analyzing Functions: 1.4 Module 2: Absolute Value Functions, Equations and Inequalities. 2.1, 2.2, 2.3 Unit 2 Quadratic Functions, Equations, and Relations Module 3 Quadratic Equations 3.1	**Teacher:** Mrs. Jacque Boyle **Duration:** September 2019

Summary of unit:

Students will learn about analyzing functions, including domain, range and end behavior, transforming function graphs and inverses of functions, graphing, writing, and solving functions including absolute value functions, equations and inequalities.

Students will learn about quadratic equations, complex numbers, ways of solving quadratic equations, circles and parabolas, solving linear-quadratic systems of equations, and linear systems in three variables.

Stage 1 – Desired Results

Standards	**Essential Questions:**
F-BF.B.4 (a-c) Find inverse functions F-BF.A.1d Compose functions. F-BF.B.4b Verify by composition that one function is the inverse of another F-IF.C.7b Graph … piecewise-defined functions, including … absolute value functions. A-CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales F-IF.B.4For functions that model a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or	What is an inverse function, and how do you know it's an inverse function? How can you identify the features of the graph of an absolute value function? How can you solve an absolute value equation? What are two ways to solve an absolute value inequality? What is an imaginary number, and how is it useful in solving quadratic equations?

negative; relative maximums and minimums; symmetries (including even, odd, or neither); end behavior; and periodicity F-BF.B.3 A-CED.A.1 Create equations and inequalities in one variable and use them to solve problems. A-REI.B.3 Identify the effect on the graph of f(x) replaced with f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with contrasting cases and illustrate an explanation of the effects on the graph using technology. A-REI.D.11Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, including but not limited to using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. F-IF.C.7b Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. N-CN.A.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. A-REI.B.4b Select, justify and apply appropriate methods to solve quadratic equations in one variable. Recognize complex solutions and write them as a +/- bi for real numbers a and b.	

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Language objective	**Mathematical practices**	**Integrate mathematical practices**
Show or explain what the inverse of the graph of a function would look like and justify your reasoning to a partner. Identify the vertex, slope, and direction of the opening for a variety of absolute value functions by describing them to a partner. Explain to a partner why solutions to a variety of absolute value equations make sense and contain more than one solution, one solution, or no solution. Match absolute value equations and inequalities with their graphs, explaining and justifying reasoning. Have students decide whether a given square root is an imaginary number (square root of a negative number) or a real number and explain their reasoning to a partner.	MP. 4 Modeling MP.6 Precision	2.1 This lesson provides an opportunity to address Mathematical Practice MP.4, which calls for students to "model with mathematics." Students learn the meaning of the parameters a, b, h, and k in an absolute value function, and use those parameters to graph and draw conclusions about absolute value functions 2.2 This lesson provides an opportunity to address Mathematical Practice MP.6, which calls for students to "attend to precision" and communicate precisely. Students find the solutions to absolute value equations both by graphing them, with and without technology, and through algebra. Students learn that a disjunction is often used to express the solutions to absolute value equations, and they use the properties of algebra to accurately and efficiently find the solutions to various types of absolute value equations.
Vocabulary		**Differentiation**

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<table>
<tr><td>Inverse relation
Inverse function
Composition of functions
Absolute value
Disjunction</td><td>Imaginary numbers
Imaginary unit</td><td>Students who need extra help receive help from teacher one on one for independent working time. If appropriate, they complete worksheets or tests in an alternate setting.</td></tr>
<tr><td colspan="3">Stage 2 – Assessment Evidence</td></tr>
<tr><td colspan="2">Performance Tasks:
Homework quizzes, worksheet, Tests.</td><td>Unit Pre-Assessment:
Assign ready-made or customized practice tests to prepare students for high-stakes tests</td></tr>
<tr><td colspan="3">Stage 3 – Learning Plan</td></tr>
<tr><td colspan="3">• Learning Activities: procedures/topics
• Reading and discussing lesson with class as lecture time.
• Giving students examples to be completed in class. Most times using the Think, Pair, and Share to keep students active in their learning individually and together.
• Students take notes and use notes to complete homework assignments.
• Sometimes activities used to present things in multiple ways or for extra practice on struggling concepts.</td></tr>
<tr><td colspan="3">Lesson Descriptions

LESSON 1.4 Inverses of Functions
LESSON 2.1 Graphing Absolute Value Functions
LESSON 2.2 Solving Absolute Value Equations
LESSON 2.3 Solving Absolute Value Inequalities
LESSON 3.1 Solving Quadratic Equations by Taking Square Roots</td></tr>
</table>

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Subject: Algebra 2 **Grade:** 10th/11th Unit 2 Quadratic Functions, Equations, and Relations Module 3 Quadratic Equations: 3.2, 3.3 Module 4 Quadratic Equations and Systems of Equations: 4.1, 4.2 4.3, 4.4	**Teacher:** Mrs. Jacque Boyle **Duration:** October 2019

Summary of unit:
Students will learn about quadratic equations, complex numbers, ways of solving quadratic equations, circles and parabolas, solving linear-quadratic systems of equations, and linear systems in three variables.

Stage 1 – Desired Results

Standards	**Essential Questions:**
N-CN.A.2 Use the relation i 2 = –1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. N-CN.A.1 Know there is a complex number i such that $i^2 = -1$, and every complex number has the form a + bi where a and b are real numbers. N-CN.C.7 Solve quadratic equations with real coefficients that have complex solutions A-REI.B.4b Select, justify and apply appropriate methods to solve quadratic equations in one variable. Recognize complex solutions and write them as a +/- bi for real numbers a and b. A-CED.A.3 Represent constraints by equations or inequalities, ... and interpret solutions as viable or nonviable options in a modeling context. A-CED.A.2Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. A-CED.A.2 Create equations in two or more variables to represent	What is a complex number and how do you add, subtract, and multiply complex numbers? How can you find the complex solutions of any quadratic equation? What is the standard form for the equation of a circle, and what does the standard form tell you about the circle? How is the distance formula connected with deriving equations for both vertical and horizontal parabolas? How can you solve a system composed of a linear equation in two variables and a quadratic equation in two variables? How can you find the solution(s) of a system of three linear equations in three variables?

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relationships between quantities; graph equations on coordinate axes with labels and scales A-CED.A.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-REI.C.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. A-REI.C.6 Solve systems of linear equations exactly …	

Language objective	**Mathematical practices**	**Integrate mathematical practices**
Work with a partner to classify and justify the classification of real, complex, and imaginary numbers. Work with a partner or small group to determine whether solutions to quadratic equations are real or not real and justify reasoning Work with a partner to match graphs of circles to their equations in standard form. Explain to a partner what the focus and directrix of a parabola are. Work with a partner to explain, orally and in writing, how to solve a simple linear-quadratic system.	MP.2 Reasoning	3.2 This lesson provides an opportunity to address Mathematical Practice MP.2, which calls for students to translate between multiple representations and to "reason abstractly and quantitatively." Students explore the relationship between operations with complex numbers and operations with binomials. They also describe how complex-number arithmetic operations follow from operations with rational numbers and square roots. 3.3 The discriminant can be used to distinguish between rational and irrational solutions. Give students several quadratic equations for which b 2 - 4ac is positive, some with rational solutions, and some with irrational solutions. Ask them to make a conjecture about how the value of the discriminant is related to whether the solutions are rational or irrational. Students should be

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Label the kind of solution methods shown to solve systems of three linear equations in three variables. Explain to a partner which method is easiest to use in a particular context and why.	MP.7 Using Structure MP.1 Problem Solving	able to explain why the solutions will be rational when the value of the discriminant is a perfect square. 4.2 This lesson provides an opportunity to address Mathematical Practice MP.7, which calls for students to "look for and make use of structure." Students learn the relationships between quadratic equations and their graphs. Students learn that equations in the forms $(y - k)^2 = 4p(x - h)$ and $(x - h)^2 = 4p(y - k)$ have vertices (h, k), focus at either $(h + p, k)$ or $(h, k + p)$, and have the directrix $y = k - p$ or $x = h - p$. 4.3 Solving a linear-quadratic system by substitution will result in a quadratic equation. If the discriminant ($b^2 - 4ac$) is negative, there are no solutions. If the discriminant is 0, there is one solution, and if the discriminant is positive, there are two solutions. 4.4 This lesson provides an opportunity to address Mathematical Practice MP.1, which calls for students to "makes sense of problems and persevere in solving them." Students solve systems of linear equations in three variables using three different methods: substitution, elimination, and matrices. Students are asked to choose among these methods to solve real-world problems, and verify that the solution is indeed reasonable.
Vocabulary		**Differentiation**
Complex number Parabola Directrix Focus	linear equation in three variables ordered triple	Students who need extra help receive help from teacher one on one for independent working time. If appropriate, they complete

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Standard form for a horizontal parabola Second degree equation in two variables		worksheets or tests in an alternate setting.

Stage 2 – Assessment Evidence

Performance Tasks: Homework quizzes, worksheet, Tests.	Unit Pre-Assessment: Assign ready-made or customized practice tests to prepare students for high-stakes tests

Stage 3 – Learning Plan

- Learning Activities: procedures/topics
- Reading and discussing lesson with class as lecture time.
- Giving students examples to be completed in class. Most times using the Think, Pair, and Share to keep students active in their learning individually and together.
- Students take notes and use notes to complete homework assignments.
- Sometimes activities used to present things in multiple ways or for extra practice on struggling concepts.

Lesson Descriptions

LESSON 3.2 Complex Numbers
LESSON 3.3 Finding Complex Solutions of Quadratic Equations
LESSON 4.1 Circles
LESSON 4.2 Parabolas
LESSON 4.3 Solving Linear Quadratic Systems
LESSON 4.4 Solving Linear Systems in Three Variables

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Subject: Algebra 2 **Grade:** 10th/11th Unit 2 Module 4:Finish Module and took unit Test Unit 3 Polynomial Functions, Expressions, and Equations Module 5 Polynomial Functions: 5.1, 5.2	**Teacher:** Mrs. Jacque Boyle **Duration:** November 2019
Summary of unit: Students will learn about polynomial functions, operations with polynomials, finding rational solutions of polynomial equations, and finding complex solutions of polynomial equations.	
Stage 1 – Desired Results	
Standards F-BF.B.3 Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k ... find the value of k given the graphs F.BF.A.1 F-IF.C.7c Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. A-SSE.A.1a Determine an explicit expression, a recursive process, or steps for calculation from a context. A-APR.B.3 Identify zeros of polynomials by factoring. a. When suitable factorizations are available, use the zeros to construct a rough graph of the related function. b. When given a graph, use the zeros to construct a possible factorization of a polynomial. F-IF.B.4 For functions that model a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or	**Essential Questions:** How are the graphs of f(x) = a (x - h) 3 + k and f(x) = (__1 b (x - h)) 3 + k related to the graph of f(x) = x3 ? How do you sketch the graph of a polynomial function in intercept form?

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negative; relative maximums and minimums; symmetries (including even, odd, or neither); end behavior; and periodicity.	

Language objective	**Mathematical practices**	**Integrate mathematical practices**
Explain to a partner how to predict transformations of a basic cubic function. Work with a partner or small group to match function types to their equations or definitions.	MP.7 Using Structure	5.2 This lesson provides an opportunity to address Mathematical Practice MP.7, which calls for students to "look for and make use of structure." Students analyze some of the attributes of polynomial functions. Specifically, they examine domain, range, intercepts, turning points, and end behavior. They also investigate the x-intercepts of graphs of polynomial functions, and how they relate to the factored form of the related polynomial expression. Students also analyze polynomial functions in real-world contexts.

Vocabulary		**Differentiation**
Cubic function Polynomial function of degree n		Students who need extra help receive help from teacher one on one for independent working time. If appropriate, they complete worksheets or tests in an alternate setting.

Stage 2 – Assessment Evidence	
Performance Tasks: Homework quizzes, worksheet, Tests.	Unit Pre-Assessment: Assign ready-made or customized practice tests to prepare students for high-stakes tests

Stage 3 – Learning Plan

- Learning Activities: procedures/topics
- Reading and discussing lesson with class as lecture time.
- Giving students examples to be completed in class. Most times using the Think, Pair, and Share to keep students active in their learning individually and together.
- Students take notes and use notes to complete homework assignments.
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Lesson Descriptions
LESSON 5.1 Graphing Cubic Functions LESSON 5.2 Graphing Polynomial Functions

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Subject: Algebra 2 **Grade:** 10th/11th Unit 3 Polynomial Functions, Expressions, and Equations Module 6 Polynomials: 6.1, 6.2, 6.4, 6.5	**Teacher:** Mrs. Jacque Boyle **Duration:** December 2019
Summary of unit: Students will learn about polynomial functions, operations with polynomials, finding rational solutions of polynomial equations, and finding complex solutions of polynomial equations.	
Stage 1 – Desired Results	
Standards A-APR.A.1 Understand that polynomials form a system … closed under the operations of addition, subtraction, ...; add, subtract, … polynomials. F-BF.A.1b Determine an explicit expression from a graph. F-BF.A.1c Combine standard function types using arithmetic operations. A-APR.A.1 Understand that polynomials form a system ... closed under ... multiplication; … multiply polynomials A-APR.C.5(+) Know and apply the Binomial Theorem for the expansion of (x + y) n in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle. (JUST TOUCHED ON THIS IDEA) A-SSE.A.2 Use the structure of an expression to identify ways to rewrite it. A-SSE.A.1a Interpret parts of an expression, such as terms, factors, and coefficients. A-APR.B.3 Identify zeros of polynomials by factoring. a. When suitable factorizations are available, use the zeros to construct a rough graph of the related function. b. When given a graph,	**Essential Questions:** How do you add or subtract two polynomials, and what type of expression is the result? How do you multiply polynomials, and what type of expression is the result? What are some ways to factor a polynomial, and how is factoring useful? What are some ways to divide polynomials, and how do you know when the divisor is a factor of the dividend?

use the zeros to construct a possible factorization of a polynomial. A-CED.A.1 . Create equations and inequalities in one variable and use them to solve problems. A-APR.D.6 Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), … using inspection, long division, … .	

Language objective	**Mathematical practices**	**Integrate mathematical practices**
Students work in pairs to create a "parts of a polynomial" chart. Work in pairs to complete a compare and contrast chart for adding/ subtracting and multiplying polynomials. Work with a partner to complete a chart detailing how factoring can be used. Work in small groups to complete a compare and contrast chart for dividing polynomials.	MP.8 Patterns	6.4 This lesson provides an opportunity to address Mathematical Practice MP.8, which calls for students to "look for and express regularity in repeated reasoning." Students are already familiar with multiplying polynomials but, in this lesson, they must analyze the conditions that help them factor a polynomial, or rewrite it as the product of individual factors of lesser degree. These factors, when multiplied, give the original polynomial. Many methods of factoring, including special factoring patterns, are presented so that students can analyze the polynomial and explain which method gives the factorization more easily. Factoring polynomials is a useful tool for solving polynomial equations by using the zero-product property.

Vocabulary		**Differentiation**
Polynomial Monomial Binomial Trinomial Polynomial identity	Irreducible factor Synthetic substitution Synthetic division Remainder theorem Factor theorem	Students who need extra help receive help from teacher one on one for independent working time. If appropriate, they complete worksheets or tests in an alternate setting.

Stage 2 – Assessment Evidence	
Performance Tasks:	Unit Pre-Assessment:

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Homework quizzes, worksheet, Tests.	Assign ready-made or customized practice tests to prepare students for high-stakes tests

Stage 3 – Learning Plan

- Learning Activities: procedures/topics
- Reading and discussing lesson with class as lecture time.
- Giving students examples to be completed in class. Most times using the Think, Pair, and Share to keep students active in their learning individually and together.
- Students take notes and use notes to complete homework assignments.
- Sometimes activities used to present things in multiple ways or for extra practice on struggling concepts.

Lesson Descriptions

LESSON 6.1 Adding and Subtracting Polynomials
LESSON 6.2 Multiplying Polynomials
LESSON 6.3 The Binomial Theorem (just touched on pascal's triangle)
LESSON 6.4 Factoring Polynomials
LESSON 6.5 Dividing Polynomials

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Subject: Algebra 2 **Grade:** 10th/11th Unit 3 Polynomial Functions, Expressions, and Equations Module 7 Polynomial Equations: 7.1, 7.2 Unit 5 Radical Functions, Expressions, and Equations Module 10 Radical Functions: 10.1, 10.2, 10.3 Module 11Radical Expressions and Equations: 11.1	**Teacher:** Mrs. Jacque Boyle **Duration:** January 2020

Summary of unit:

Students will learn about polynomial functions, operations with polynomials, finding rational solutions of polynomial equations, and finding complex solutions of polynomial equations.

Students will learn about inverses of quadratic and cubic functions, graphing square root functions, graphing cube root functions, simplifying radical expressions, and solving radical equations

Stage 1 – Desired Results

Standards	**Essential Questions:**
A-APR.B.2 Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x). A-APR.B.3 Identify zeros of polynomials by factoring. a. When suitable factorizations are available, use the zeros to construct a rough graph of the related function. b. When given a graph, use the zeros to construct a possible factorization of a polynomial. A-CED.A.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-APR.B.2 Know and apply the Remainder Theorem: …	How do you find the rational roots of a polynomial equation? What do the Fundamental Theorem of Algebra and its corollary tell you about the roots of the polynomial equation p(x) = 0 where p(x) has degree n? What functions are the inverses of quadratic and cubic functions, and how can you find them? How can you use transformations of a parent square root function to graph functions of the form g (x) = a √——(x-h) + k or g (x) = √——— __1 b (x-h) + k ? How can you use transformations of the parent cube root function to graph functions of the form f (x) = a 3 ——x - h + k or g(x)= 3 ———— __1 b (x - h) + k ? How are rational exponents related to radicals and roots?

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F-BF.B.4a Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse F-BF.B.4b(+) Verify by composition that one function is the inverse of another. F-BF.B.4c(+) Read values of an inverse function from a graph or a table, given that the function has an inverse. F-BF.B.4d(+) Produce an invertible function from a non-invertible function by restricting the domain F-IF.C.7b Graph square root ... functions. F-IF.C.7b Graph … cube root ... functions F-IF.B.4 For functions that model a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries (including even, odd, or neither); end behavior; and periodicity F-IF.B.6 Calculate and interpret the average rate of change of a function, both symbolically and from a table over a specified interval. Estimate the rate of change from a graph. F-BF.B.3 Identify the effect on the graph of f(x) replaced with f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with contrasting cases and illustrate an explanation of the effects on the graph using technology.	

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N-RN.A.1 Explain how the definition … of rational exponents follows from ... properties of integer exponents ..., allowing for a notation for radicals in terms of rational exponents. A-REI.D.11 Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, including but not limited to using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. A-APR.B.3 Identify zeros of polynomials by factoring. a. When suitable factorizations are available, use the zeros to construct a rough graph of the related function. b. When given a graph, use the zeros to construct a possible factorization of a polynomial. F-IF.C.7c Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	

Language objective	**Mathematical practices**	**Integrate mathematical practices**
Explain to a partner how to identify the factors of a polynomial function. Complete a "Solving Polynomial Equations" chart with a partner. Fill in an organizer of quadratic and cubic functions and their inverses.	MP.2 Reasoning	7.1 This lesson provides an opportunity to address Mathematical Practice MP.2, which calls for students to translate between multiple representations and to "reason abstractly and quantitatively." Students explore the relationship between the factors of a polynomial function and its zeros. They learn how to identify the zeros given the factors, and the factors given the zeros.

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Discuss with a partner how the graphs of square root functions compare with quadratic functions. Describe how the graph of a cube root function differs from the graph of a square root function. Identify, with a partner, matching radical expressions and rational equations.		They then explore the relationships between the rational zeros of a function and its leading coefficient and constant term, establishing the Rational Zero Theorem.
Vocabulary		**Differentiation**
Root Multiplicity Square root function The parent square root function	Cube root function Parent cube root function Index	Students who need extra help receive help from teacher one on one for independent working time. If appropriate, they complete worksheets or tests in an alternate setting.
Stage 2 – Assessment Evidence		
Performance Tasks: Homework quizzes, worksheet, Tests.	Unit Pre-Assessment: Assign ready-made or customized practice tests to prepare students for high-stakes tests	
Stage 3 – Learning Plan		
• Learning Activities: procedures/topics • Reading and discussing lesson with class as lecture time. • Giving students examples to be completed in class. Most times using the Think, Pair, and Share to keep students active in their learning individually and together. • Students take notes and use notes to complete homework assignments. • Sometimes activities used to present things in multiple ways or for extra practice on struggling concepts.		
Lesson Descriptions LESSON 7.1 Finding Rational Solutions of Polynomial Equations LESSON 7.2 Finding Complex Solutions of Polynomial Equations LESSON 10.1 Inverses of Simple Quadratic and Cubic Functions LESSON 10.2 Graphing Square Root Functions LESSON 10.3 Graphing Cube Root Functions LESSON 11.1 Radical Expressions and Rational Exponents		

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Subject: Algebra 2 **Grade:** 10th/11th Unit 5 Radical Functions, Expressions, and Equations Module 11Radical Expressions and Equations: 11.2, 11.3 Unit 4 Rational Functions, Expressions, and Equations Module 8 Rational functions: 8.1, 8.2 Module 9 Rational Expressions and Equations: 9.1, 9.2, 9.3	**Teacher:** Mrs. Jacque Boyle **Duration:** February 2020

Summary of unit:

Students will learn about inverses of quadratic and cubic functions, graphing square root functions, graphing cube root functions, simplifying radical expressions, and solving radical equations.

Students will learn about graphing rational functions, adding and subtracting rational expressions, multiplying and dividing rational expressions, and graphing and solving rational equations.

Stage 1 – Desired Results

Standard	**Essential Questions:**
N-RN.A.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents. F-IF.C.7d Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available and showing end behavior. A-REI.A.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise A-CED.A.1 Create equations and inequalities in one variable and use them to solve problems. F-IF.C.7d(+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior (JUST Touched Quickly on this)	How can you simplify expressions containing rational exponents or radicals involving nth roots? How can you solve equations involving square roots and cube roots? What features of the graph of a rational function should you identify in order to sketch the graph? How do you identify those features? How can you add and subtract rational expressions? How can you multiply and divide rational expressions? What methods are there for solving rational equations?

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A-APR.D.6 Rewrite simple rational expressions in different forms; using inspection, synthetic division, long division, box method or, for the more complicated examples, a computer algebra system. F-BF.B.3 Identify the effect on the graph of f(x) replaced with f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with contrasting cases and illustrate an explanation of the effects on the graph using technology. A-APR.D.7(+) Understand that rational expressions form a system analogous to the rational numbers, ...; add, subtract, … rational expressions. A-SSE.A.1b Interpret complicated expressions by viewing one or more of their parts as a single entity in context. A-APR.D.7(+) Understand that rational expressions form a system … closed under addition, subtraction, multiplication, and division by a nonzero rational expression; ... multiply, and divide rational expressions A-SSE.A.2 Recognize and use the structure of an expression to identify ways to rewrite it. F-BF.A.1b Determine an explicit expression from a graph. A-REI.A.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. A-CED.A.1 Create equations and inequalities in one variable and use them to solve problems.	

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A-CED.A.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.	

Language objective	**Mathematical practices**	**Integrate mathematical practices**
Explain to a partner the steps for simplifying rational exponents and radical expressions. Work with a partner to complete a table to solve rational and radical equations. Explain to a partner the characteristics of the graphs of rational functions. Students describe and explain the key features of the graph of a complicated rational function. Explain to a partner how to simplify a rational expression and how to add and subtract rational expressions. Explain to a partner the steps for multiplying and dividing rational expressions. Describe to a partner how to solve rational equations.	MP.7 Using Structure MP.3 Logic	9.2 Operations on rational expressions are similar to operations on fractions. For example, a (x) ____ b (x) + c (x) ____ d (x) = a(x)d(x) + b(x)c(x) _____ b(x)d(x) except where b (x) = 0 and/or d (x) = 0. As with fractions, it is generally best to simplify rational expressions before adding, subtracting, multiplying, or dividing. Note that in the above equation, the denominator b (x)d (x) may not be the least common denominator of the two rational expressions. 9.3 This lesson provides an opportunity to address Mathematical Practice MP.3, which calls for students to "construct viable arguments." Students learn that they can solve rational equations graphically, by writing a related function and finding the zeros of the function. They also learn to solve rational equations algebraically, multiplying the equation by the LCD and converting it into an equivalent polynomial equation. Students draw connections between the excluded values of the expressions and the extraneous solutions of the equation.
Vocabulary		**Differentiation**

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<table>
<tr><td>Rational function
Closure
Extraneous solution</td><td></td><td>Students who need extra help receive help from teacher one on one for independent working time. If appropriate, they complete worksheets or tests in an alternate setting.</td></tr>
<tr><td colspan="3">Stage 2 – Assessment Evidence</td></tr>
<tr><td colspan="2">Performance Tasks:
Homework quizzes, worksheet, Tests.</td><td>Unit Pre-Assessment:
Assign ready-made or customized practice tests to prepare students for high-stakes tests</td></tr>
<tr><td colspan="3">Stage 3 – Learning Plan</td></tr>
<tr><td colspan="3">• Learning Activities: procedures/topics
• Reading and discussing lesson with class as lecture time.
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• Students take notes and use notes to complete homework assignments.
• Sometimes activities used to present things in multiple ways or for extra practice on struggling concepts.</td></tr>
<tr><td colspan="3">Lesson Descriptions

LESSON 8.1 Graphing Simple Rational Functions
LESSON 8.2 Graphing More Complicated Rational Functions
LESSON 9.1 Adding and Subtracting Rational Expressions
LESSON 9.2 Multiplying and Dividing Rational Expressions
LESSON 9.3 Solving Rational Equations</td></tr>
</table>

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Subject: Algebra 2 **Grade:** 10th/11th Unit 6 Exponential and Logarithmic Functions and Equations Module 12 Sequence and Series: 12.1, 12.2, 12.3 Module 13 Exponential Functions: 13.1, 13.2, 13.3, 13.4	**Teacher:** Mrs. Jacque Boyle **Duration:** March 2020
Summary of unit: Students will learn about exponential and logarithmic functions, arithmetic and geometric sequences, exponential growth and decay, and the base e.	
Stage 1 – Desired Results	
Standards F-BF.A.2 Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms A-CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales F-BF.A.1a Determine an explicit expression, a recursive process, or steps for calculation from a context. F.BF.A.2 Write ... geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms F.IF.C.7e Graph logarithmic functions, showing intercepts and end behavior A-SSE.B.4 Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems A-SSE.A.2 Recognize and use the structure of an expression to identify ways to rewrite it	**Essential Questions:** What are algebraic ways to define an arithmetic sequence? How can you define a geometric sequence algebraically? How do you find the sum of a finite geometric series? How is the graph of g (x) = a b x - h + k where b >1 related to the graph of f (x) = b x ? How is the graph of g (x) = a b x - h + k where 0 < b < 1 related to the graph of ƒ (x) = b How is the graph of g(x) = aex - h + k related to the graph of f(x) = ex ? How do you model the value of an investment that earns compound interest?

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F.BF.B.3 Identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x + k) for specific values of k (both positive and negative); ... A.REI.D.11 Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, including but not limited to using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions F-LE.A.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table)	

Language objective	**Mathematical practices**	**Integrate mathematical practices**
Work with a partner to match the graph of an arithmetic sequence to its explicit and recursive rule. Complete a geometric sequences chart using words, symbols, and graphs. Explain to a partner how to find the sum of a finite geometric series. In a small group, match graphs to their corresponding exponential growth functions.	MP.1 Problem Solving	13.3 This lesson provides an opportunity to address Mathematical Practice MP.1, which calls for students to "make sense of problems and persevere in solving them." The natural base, e, is used in many applications of continuous change, from compound interest to applications of probability, statistics, and trigonometry. Students are introduced to the base e, the graph of f(x) = e x , and transformations of the graph. They write equations for combined transformations of f(x) = e x , model exponential functions with base e, and solve related real-world problems.

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Work with a partner to compare and contrast exponential decay and exponential growth functions. Work with a partner to explain, in words, how the graph of a transformed exponential function with base e compares to the same transformation on graphs of other exponential functions. Explain to a partner what simple interest is and what compound interest is.		
Vocabulary		**Differentiation**
Sequence Explicit rule Recursive rule Arithmetic sequence Geometric sequence Explicit form Common ratio	Recursive rule Series Finite geometric series Exponential growth function Growth factor Growth rate	Students who need extra help receive help from teacher one on one for independent working time. If appropriate, they complete worksheets or tests in an alternate setting.
Stage 2 – Assessment Evidence		
Performance Tasks: Homework quizzes, worksheet, Tests.	Unit Pre-Assessment: Assign ready-made or customized practice tests to prepare students for high-stakes tests	
Stage 3 – Learning Plan		
• Learning Activities: procedures/topics • Reading and discussing lesson with class as lecture time. • Giving students examples to be completed in class. Most times using the Think, Pair, and Share to keep students active in their learning individually and together. • Students take notes and use notes to complete homework assignments. • Sometimes activities used to present things in multiple ways or for extra practice on struggling concepts.		

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Lesson Descriptions
LESSON 12.1 Arithmetic Sequences LESSON 12.2 Geometric Sequences LESSON 12.3 Geometric Series LESSON 13.1 Exponential Growth Functions LESSON 13.2 Exponential Decay Functions LESSON 13.3 The Base e LESSON 13.4 Compound Interest

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Subject: Algebra 2 **Grade:** 10th/11th Unit 6 Exponential and Logarithmic Functions and Equations Module 15 Logarithmic Functions: 15.1, 15.2 Module 16 Logarithmic Properties and Exponential Equations: 16.1, 16.2 Unit 7 Trigonometric Functions Module 17 Unit-Circle Definition of Trigonometric Functions:17.1, 17.2 Unit 8 Probability Module 19 Introduction to Probability: 19.1 19.4 Module 20 Conditional Probability an Independence of Events 20.1	**Teacher:** Mrs. Jacque Boyle **Duration:** April 2020

Summary of unit:

Students will learn about exponential and logarithmic functions, arithmetic and geometric sequences, exponential growth and decay, and the base e.

Students will learn about, defining trigonometric functions with the unit circle, and angles of rotation and radian measure.

Students will learn about, probability and set theory, and independent and dependent events.

Stage 1 – Desired Results

Standards	**Essential Questions:**
F.BF.B.5(+) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents. F.IF.C.7e Graph logarithmic functions, showing intercepts and end behavior. f. Graph trigonometric functions (sine and cosine), showing period, mid F.BF.B.3 Identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x + k) for specific values of k (both positive and negative); ... F-LE.A.4 For exponential models, express as a logarithm the solution to ab	What is the inverse of the exponential function f(x) = b x where b > 0 and b ≠ 1, and what is the value of f -1 (b m) for any real number m? How is the graph of g (x) = a lo gb (x – h) + k where b > 0 and b ≠ 1 related to the graph of f (x) = log b x? What are some ways you can solve an equation of the form ab x = c, where a and c are nonzero real numbers and b is greater than 0 and not equal to 1? What is the relationship between the unit circle and radian measure?

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ct = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology. F-TF.A.1 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. Also G-C.C.5 F-TF.A.2 Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. S-CP.A.1 Describe events as subsets of a sample space (the set of outcomes) using characteristics ... of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not"). S-CP.B.7 Apply the Addition Rule, P(A or B), and interpret the result S-CP.A.4... Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. S-CP.A.3 Determine conditional probabilities and interpret independence by analyzing conditional probability S-CP.A.5 Recognize and explain the concepts of conditional probability and independence in everyday language and situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer. S-CP.B.6 Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the result.	How does the unit circle allow the trigonometric functions to be defined for all real numbers instead of just for acute angles? How are sets and their relationships used to calculate probabilities? How are probabilities affected when events are mutually exclusive or overlapping? How do you calculate a conditional probability?

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Language objective	Mathematical practices	Integrate mathematical practices
Discuss with a partner the relationship between exponential and logarithmic functions. Work with a partner to compare and contrast the graphs of exponential and logarithmic functions. Work with a small group to discuss and record the properties of logarithms and exponents. Have students work with a partner to describe the steps for solving linear, exponential, and now logarithmic equations algebraically and graphically. Work with a partner to complete a chart that shows an angle's initial and terminal sides, and the defining standard position of an angle. Label sine, cosine, and tangent in right triangles drawn within a unit circle Explain to a partner how to find the probability of rolling a certain number on a number cube and how to find its complement. Give a partner an example of a mutually exclusive event. Explain how you know the events are mutually exclusive. Repeat	MP.6 Precision MP.8 Patterns	16.1 This lesson provides an opportunity to address Mathematical Practice MP.6, which calls for students to "attend to precision." Students learn that, because of the inverse relationship between logarithms and exponents, the properties of logarithms are similar to the properties of exponents, and that exponents can be manipulated in logarithmic form using properties analogous to those in exponential form. They make explicit use of the properties of logarithms to evaluate expressions and to solve problems using logarithmic models. This lesson includes opportunities to address Mathematical Practice Standard MP.8, "Look for and express regularity in repeated reasoning." Drawing angles helps students visualize the fact that the measures of coterminal angles differ by multiples of ±360°. Students apply this fact to calculate measures of angles coterminal with a given angle.

with an example of overlapping events. Explain to a partner how to find conditional probabilities		
Vocabulary		**Differentiation**
Logarithmic function Angle of rotation Coterminal angles Radian measure Reference anlge Set Element Empty set Universal set	Subset Intersection Union Complement Theoretical probability Mutually exclusive events Overlapping events Conditional probability Independent events	Students who need extra help receive help from teacher one on one for independent working time. If appropriate, they complete worksheets or tests in an alternate setting.
Stage 2 – Assessment Evidence		
Performance Tasks: Homework quizzes, worksheet, Tests.	Unit Pre-Assessment: Assign ready-made or customized practice tests to prepare students for high-stakes tests	
Stage 3 – Learning Plan		
• Learning Activities: procedures/topics • Reading and discussing lesson with class as lecture time. • Giving students examples to be completed in class. Most times using the Think, Pair, and Share to keep students active in their learning individually and together. • Students take notes and use notes to complete homework assignments. • Sometimes activities used to present things in multiple ways or for extra practice on struggling concepts.		
Lesson Descriptions LESSON 15.1 Defining and Evaluating a Logarithmic Function LESSON 15.2 Graphing Logarithmic Functions LESSON 16.1 Properties of Logarithms LESSON 16.2 Solving Exponential Equations LESSON 17.1 Radian Measure LESSON 17.2 Defining and Evaluating the Basic Trigonometric Functions LESSON 19.1 Probability and Set Theory LESSON 19.4 Mutually Exclusive and Overlapping Events LESSON 20.1 Conditional Probability		

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Subject: Algebra 2 **Grade:** 10th/11th Unit 8 Probability Module 20 Conditional Probability and Independence of Events: 20.2 Unit 9 Statistics Module 22 Gathering and Displaying Data: 22.1, 22.2	**Teacher:** Mrs. Jacque Boyle **Duration:** May

Summary of unit:

Students will learn about, probability and set theory, and independent and dependent events.

Students will learn about, statistics, gathering and displaying data, and shape, center, and spread.

Stage 1 – Desired Results

Standards	**Essential Questions:**
S-CP.A.2 Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, ... S-IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population. S-ID.A.4 Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.	What does it mean for two events to be independent? Under what circumstances should a sample statistic be used as an estimator of a population parameter? Which measures of center and spread are appropriate for a normal distribution, and which are appropriate for a skewed distribution?

Language objective	**Mathematical practices**	**Integrate mathematical practices**
Work with a partner to brainstorm examples of independent events. Create a graphic organizer that shows the relationships among population, census, and parameter, as well as sample, sampling, and statistic.	MP.2 Reasoning	22.2 The Explore activities in this lesson provide opportunities to address Mathematical Practice MP.2, which asks students to "reason abstractly and quantitatively." Students review various ways to display data, and they learn to recognize various shapes of data distributions. They also calculate measures of center and spread and relate them to the

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Have students work in pairs to fill in a table showing the shape of distributions of data.		shapes of the distributions. Finally, they learn that certain measures of center and spread are better statistics for nonnormal distributions.
Vocabulary		**Differentiation**
Population Census Parameter Sampling Statistic Representative sample Biased sample	Numerical Categorical Proportion Distribution Uniform distribution Normal distribution Skewed distribution	Students who need extra help receive help from teacher one on one for independent working time. If appropriate, they complete worksheets or tests in an alternate setting.
Stage 2 – Assessment Evidence		
Performance Tasks: Homework quizzes, worksheet, Tests.	Unit Pre-Assessment: Assign ready-made or customized practice tests to prepare students for high-stakes tests	
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• Learning Activities: procedures/topics • Reading and discussing lesson with class as lecture time. • Giving students examples to be completed in class. Most times using the Think, Pair, and Share to keep students active in their learning individually and together. • Students take notes and use notes to complete homework assignments. • Sometimes activities used to present things in multiple ways or for extra practice on struggling concepts.		
Lesson Descriptions LESSON 20.2 Independent Events LESSON 22.1 Data-Gathering Techniques LESSON 22.2 Shape, Center, and Spread		