Corsica Stickney Curriculum Map

Unit 1: Linear Relations and Functions Chapter 1.1, 1.2, 1.3	**Time:** August 2019

Standards Taught

- F.IF. B.5 (ii) Relate the domain of a function to its graph and find an appropriate domain in the context of the problem.
- F.IF.B.4 (ii) 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.*
- PC.L.B.2(+)Demonstrate knowledge of both the definition and graphical interpretation of limits of values of functions and sequences. Verify and estimate limits using graphs, tables, and technology.

Differentiation/Assessment	**Classroom Management and Environment**	**What will the students be doing?**
Students ask questions after working independently on homework. If needed we take extra days on concepts not grasped. These students are also high achieving so if some concepts seem review we touch on them quickly to get to new concepts. Challenging real world questions are used often to keep them problem solving.	Students work on their own and together to help in learning on a daily basis. Students take notes and are involved in the lecture.	Students will be working actively working on notes throughout the chapter. They then work independently for at least the last 10 to 20 minutes throughout class.
Relevance	**Vocabulary**	**Assessments**
The review of functions are used to get their minds back in the mode of math, with details they may not remember as quickly. We then touch on calculus to give them an idea of how we focus later in the school year. This will be helpful for all high level math classes students may see in the future.	Set-builder notation Interval notation Function Function notation Independent variable Dependent variable Implied domain Piece-wised defined function Relevant domain Zeros Roots Line symmetry Point symmetry Even functions	Daily assignments. Teacher observation Chapter Quizzes Chapter Tests Class Discussion

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	Odd functions Continuous function Limit Discontinuous function Infinite discontinuity Jump discontinuity Removable discontinuity Non removable discontinuity End behavior	

Essential Questions

- How do you describe subsets of real numbers and identify and evaluate functions and state their domains?
- How do you use graphs of functions to estimate functions values and find domains, ranges, y-intercepts, and zeros of functions and explore symmetries of graphs and identify even and odd functions?
- How do you use limits to determine the continuity of a function, and apply the intermediate value theorem to continuous functions and use limits to describe end behavior of functions?
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Unit 1: Linear Relations and Functions Chapter 1.4, 1.5, 1.6 ,1.7 Unit 3: Advanced Functions and Relations Chapters 8.1, 8.2	**Time:** September 2019

Standards Taught

- F.IF.B.4(ii) 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

- F.IF.C.7b Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions
- F.IF.C.7c Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
- F.BF.A.1c(+)Combine standard function types using arithmetic operations.
- F.BF.B.4d(+)Produce an invertible function from a non-invertible function by restricting the domain.
- 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.
- N.VM.A. 1 (+) Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes
- N.VM.A.2 (+) Write a vector in component form.
- N.VM.A.3 (+)Solve problems involving velocity and other quantities that can be represented by vectors.
- N.VM.B.4a(+) Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.
- N.VM.B.4b(+) Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.
- N.VM.B.4c (+) Understand vector subtraction $v - w$ as $v + (-w)$, where $-w$ is the additive inverse of w, with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.
- N.VM.B.5a (+) Represent scalar multiplication graphically by scaling vectors and/or reversing their direction; perform scalar multiplication component-wise
- N.VM.B.5b (+) Compute the magnitude of a scalar multiple cv. Compute the direction of cv knowing that when $|c|v \neq 0$, the direction of cv is either along v (for $c > 0$) or against v (for $c < 0$).

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Challenging real world questions are used often to keep them problem solving.		
Relevance	**Vocabulary**	**Assessments**
The review of functions are used to get their minds back in the mode of math, with details they may not remember as quickly. We then touch on calculus to give them an idea of how we focus later in the school year. This will be helpful for all high level math classes students may see in the future. We then start working with vectors of the physics aspect of our math class.	Increasing Decreasing Constant Maximum Minimum Extrema Average rate of change Secant line Transformation Translation Refelction Dilation Parent square root Constant identity Quadratic Cubic Reciprocal absolute value step Greatest integer Composition Inverse relation Inverse function One-to-one Vector Initial point Terminal point Standard position Direction Magnitude Quadrant bearing True bearing Parallel vectors Equivalent vectors Opposite vectors Resultant Triangle method Parallelogram method Zero vector Components Rectangular components Component form Unit vector Linear combination	Daily assignments. Teacher observation Chapter Quizzes Chapter Tests Class Discussion
Essential Questions		

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- Determine intervals on which functions are increasing, constant, or decreasing, and determine maxima and minima of functions and determine the average rate of change of a function.
- Identify, graph, and describe parent functions, and graph transformations of parent functions.
- Perform operations with functions and compositions of functions.
- Use the horizontal line test to determine inverse functions, and find inverse functions algebraically and graphically.
- Represent and operate with vectors geometrically and solve vector problems, and resolve vectors into their rectangular components.
- Represent and operate with vectors in the coordinate plane and write a vector as a linear combination of unit vectors.

Unit 3: Advanced Functions and Relations Chapters 8.3, 8.4, 8.5, Unit 1: Linear Relations Functions Chapter 2.1, 2.2, 2.3	**Time:** October 2019

Standards Taught

- N.VM.C.11 . (+) Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.
- F.IF.C.7b Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
- F.IF.C.7c Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
- A.APR.B.2 Know and apply the Remainder Theorem.
- A.APR.B.3 Identify zeros of polynomials by factoring.

  a. When suitable factorizations are available, use the zeros to construct rough graph of the related function.

  b. When given a graph, use the zeros to construct a possible factorization of a polynomial.
- 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.

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Relevance	**Vocabulary**	**Assessments**
Use Vectors to understand how to display values with direction and magnitude. Students will be able to use this knowledge in application of math to physics. Then we go back to review polynomials to remember how to solve and see critical values in a graph later used with calculus.	Dot product Orthogonal Vector projection Work Three dimensional coordinate system z-axis octant ordered triple cross product torque parallelepiped triple scalar product power function monomial function radical function extraneous solutions polynomial function leading coefficient leading-term test turning point quadratic form repeated zero multiplicity synthetic division depressed polynomial synthetic substitution	Daily assignments. Teacher observation Chapter Quizzes Chapter Tests Class Discussion
Essential Questions		

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- Find the dot product of two vectors and use the dot product of two vectors, and use the dot product to find the angle between them, and find the projection of one vector onto another.
- Plot points and vectors in the three-dimensional coordinate system and express algebraically and operate with vectors in space.
- Find do products of and angles between vectors in space and find products of vectors in space and use cross products to find area and volume.
- Graph and analyze power functions, radical functions, and solve radical equations.
- Graph polynomial functions and model real-world data with polynomial functions.
- Divide polynomials using long division and synthetic division and use the remainder and factor theorem.
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Unit 1: Linear Functions and Relations Chapters 2.4, 2.5, 2.6 Chapter 3.1	**Time:** November 2019

Standards Taught

- N.CN.A.3 (+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.
- N.CN.B.8 (+) Extend polynomial identities to the complex numbers. For example, rewrite x 2 + 4 as (x + 2i)(x - 2i).
- N.CN.B.9(+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.
- F.IF.C.7d(+) Graph rational functions, identify zeros and vertical, horizontal, and slant asymptotes, and determine end behavior.
- A.APR.D.7Discover that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions
- A.REI.E.13 (+) Solve linear, quadratic, polynomial, and rational inequalities in two variables algebraically and graphically.
- F.IF.C.7e (+) Graph exponential and logarithmic functions, showing relationships, intercepts and end behavior

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- F.BF.B.5 (+) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents

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Relevance	**Vocabulary**	**Assessments**
The review of polynomials in solving to our complex values and the complex number system. Students then are reminding of the logarithmic graphs as the inverse of exponential and where to use these types of graphs.	Rational zero theorem Descrates' rule of signs Fundamental theorem of algebra Linear factorization theorem Complex conjugates Rational function Asymptote Vertical asymptote Horizontal asymptote Oblique asymptote Holes Polynomial inequality Sign chart Rational inequality Algebraic function Transcendental function Exponential function Natural base Continuous compound interest	Daily assignments. Teacher observation Chapter Quizzes Chapter Tests Class Discussion

Essential Questions

- Find real zeros of polynomial functions and complex zeros of polynomial functions.
- Analyze and graph rational functions and solve rational equations
- Solve polynomial inequalities and solve rational inequalities.

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- Evaluate, analyze, and graph exponential functions and solve problems involving exponential growth and decay.

Unit 1: Linear Relations and Functions Chapters 3.2, 3.3	**Time:** December 2019	
Standards Taught		
• 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 exponential and logarithmic functions, showing relationships, intercepts and end behavior.		
Differentiation/Assessment	**Classroom Management and Environment**	**What will the students be doing?**
Students ask questions after working independently on homework. If needed we take extra days on concepts not grasped. These students are also high achieving so if some concepts seem review we touch on them quickly to get to new concepts. Challenging real world questions are used often to keep them problem solving.	Students work on their own and together to help in learning on a daily basis. Students take notes and are involved in the lecture.	Students will be working actively working on notes throughout the chapter. They then work independently for at least the last 10 to 20 minutes throughout class.
Relevance	**Vocabulary**	**Assessments**
Finish the review on logarithmic functions and properties and the relation to biological aspects as well as interest rates.	Logarithimic function with base b Logarithm Common logarithm Natural logarithm	Daily assignments. Teacher observation Chapter Quizzes Chapter Tests Class Discussion
Essential Questions		

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- Evaluate expressions involving logarithms, and sketch and analyze graphs of logarithmic functions. - Apply properties of logarithms and apply the change of base formula.

Unit 1: Linear Relations and Functions 4.3, 4.4, 4.5, 4.6, 4.7 Unit 2: Quadratic, Polynomial, and Radical Functions and Relations 5.1, 5.2, 5.4, 5.5	**Time:** January 2020
Standards Taught	
• F.TF.A.3(+) Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for π-x, π+x, and 2π–x in terms of their values for x, where x is any real number. • F.TF.A.4 (+) Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions. • F.BF.B.6 (+) Use reciprocal properties to develop definitions for cotangent, cosecant, and secant. • F.TF.B.5(+) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents • F.IF.C.7f (+) Graph all trigonometric functions, showing key features and applying transformations. • F.TF.B.6 (+) Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed. • F.TF.B.7 (+) Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context. • G.SRT.D.9 (+) Derive the formula A = 1/2 ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side and use the formula to solve problems. • G.SRT.D.10 . (+) Prove the Laws of Sines and Cosines and use them to solve problems involving right and non-right triangles • F.TF.C.10a (+) Verify trigonometric identities	

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<tr><td colspan="3">

- F.TF.C.10b (+) Evaluate trigonometric functions
- F.TF.C.10c (+) Write equivalent trigonometric expressions
- F.TF.C.9 (+) Prove the addition and subtraction, half-angle, and double-angle formulas for sine, cosine, and tangent and use them to solve problems.

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<tr><td>Differentiation/Assessment</td><td>Classroom Management and Environment</td><td>What will the students be doing?</td></tr>
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<tr><td>Relevance</td><td>Vocabulary</td><td>Assessments</td></tr>
<tr><td>Review in Trigonometric concepts with ratios, unit circle, and transformations ins graphs. Aspects of sound waves are seen in the graphs as the frequency type functions.</td><td>Quadrantal angle
Reference angle
Unit circle
Circular function
Periodic function
Period
Sinusoid
Amplitude
Frequency
Phase shift
Vertical shift
Midline
Damped trigonometric function
Damped oscillation
Damped wave
Damped harmonic motion
Arcsine function
Arccosine function
Arctangent function
Oblique triangles
Law of sines
Law of cosines
Heron’s formula
Identity
Trigonometric identity</td><td>Daily assignments.
Teacher observation
Chapter Quizzes
Chapter Tests
Class Discussion</td></tr>
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	Cofunction Odd-even identities Verify and identity Reduction identity	

Essential Questions

- Find values of trigonometric functions for any angle and use the unit circle.
- Graph the transformations of sine and cosine functions, and use sinusoidal functions to solve problems.
- Graph tangent and reciprocal trigonometric functions, and damped trigonometric functions.
- Evaluate and graph inverse trigonometric functions and find compositions of trigonometric functions.
- Solve oblique triangles by using the Law of Sines or the Law of Cosines and find the areas of oblique triangles.
- Identify and use basic trigonometric identities to find trigonometric values and use basic trigonometric identities to simplify and rewrite trigonometric expressions.
- Verify trigonometric identities and determine whether equations are identities.
- Use sum and difference identities to evaluate trigonometric functions and solve trigonometric equations.
- Use double-angle, power-reducing, and half-angle identities to evaluate trigonometric expressions and solve trigonometric equations and use product-to-sum identities to evaluate trigonometric expressions and solve trigonometric equations.

Unit 4: Discrete Mathematics Limits	**Time:** February 2020

Standards Taught

- PC.L.A.1 (+) Determine if a function is continuous at a point. Find the types of discontinuities of a function and relate them to finding limits of a function. Use the concept of limits to describe discontinuity and end-behavior of the function.
- PC.L.B.2 (+) Demonstrate knowledge of both the definition and graphical interpretation of limits of values of functions and sequences. Verify and estimate limits using graphs, tables, and technology.

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• PC.L.B.3 (+) Evaluate limits of functions and apply properties of limits, including one-sided limits and limits at infinity using algebra.		
Differentiation/Assessment	**Classroom Management and Environment**	**What will the students be doing?**
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Relevance	**Vocabulary**	**Assessments**
Use the review of our functions continuity and discontinuity to evaluate limits as well as see aspects of what things reach at certain values. It helps with abstractly visualizing rates of change.	One-sided limit Two-sided limit Direct substitution Indeterminate form	Daily assignments. Teacher observation Chapter Quizzes Chapter Tests Class Discussion
Essential Questions - Estimate limits of functions at a point and infinity. - Evaluate limits of polynomial and rational functions at selected points and infinity.		

Unit 4: Discrete Mathematics Limits and Derivatives	**Time:** March 2020
Standards Taught	

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- PC.L.A.1(+) Determine if a function is continuous at a point. Find the types of discontinuities of a function and relate them to finding limits of a function. Use the concept of limits to describe discontinuity and end-behavior of the function.
- PC.L.B.2(+) Demonstrate knowledge of both the definition and graphical interpretation of limits of values of functions and sequences. Verify and estimate limits using graphs, tables, and technology
- PC.L.B.3 (+) Evaluate limits of functions and apply properties of limits, including one-sided limits and limits at infinity using algebra.
- Definition of Derivative using function notation, limits, and algebraic simplification
- A.APR.C.5 Know and apply the Binomial Theorem for the expansion of (□ + □) □ in powers of □ and □ for a positive integer □, where □ and □ are any numbers, with coefficients determined for example by Pascal's Triangle.
- The Power rule of Derivatives

Differentiation/Assessment	**Classroom Management and Environment**	**What will the students be doing?**
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Relevance	**Vocabulary**	**Assessments**
The strong push of using limits to find points of tangency and rates of change at certain value which in turn relates to velocity and economical type trends.	Tangent line Instantaneous rate of change Difference quotient Instantaneous velocity Derivative Differentiation Differential equation Differential operator	Daily assignments. Teacher observation Chapter Quizzes Chapter Tests Class Discussion

Essential Questions

- Find instantaneous rates of change by calculating slopes of tangent lines and velocity.
- Find instantaneous rates of change by calculating derivatives and use the product and quotient rule to calculate derivatives.

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Unit 4: Discrete Mathematics Derivatives	**Time:** April 2020

Standards Taught

- F.BF.A.1c (+) Compose functions in context.
- Definition of Derivatives
- Curve sketching using 1st and 2nd derivatives as well as critical points in a graph. extrema, points of inflection, and zeros.
- F.IF.B.4(ii) 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.C.7cGraph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
- F.IF.C.7d (+) Graph rational functions, identify zeros and vertical, horizontal, and slant asymptotes, and determine end behavior.
- Application of derivative for optimization and minimize material and cost with maximizing volume or profit.
- F.BF.A.1(+) Write a function that describes a relationship between two quantities.

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Challenging real world questions are used often to keep them problem solving.		
Relevance	**Vocabulary**	**Assessments**
The application back to graphs of functions of our polynomials and back to finding minimize cost and maximize profit or minimize material and maximize volume. Relating functions.	Tangent line Instantaneous rate of change Difference quotient Instantaneous velocity Derivative Differentiation Differential equation Differential operator	Daily assignments. Teacher observation Chapter Quizzes Chapter Tests Class Discussion
Essential Questions		

Unit 4: Discrete Mathematics Anti-Derivatives	**Time:** May 2020	
Standards Taught		
• Finding the Anti-Derivative and the Idea of Integral. • Understanding that the Integral is finding the area under a curve.		
Differentiation/Assessment	**Classroom Management and Environment**	**What will the students be doing?**
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Challenging real world questions are used often to keep them problem solving.		
Relevance	**Vocabulary**	**Assessments**
The application of find the area under curves at given intervals for finding important use of statistics.	Definite Integral Antiderivative Indefinite integral Fundamental theorem of calculus	Daily assignments. Teacher observation Chapter Quizzes Chapter Tests Class Discussion
Essential Questions - Approximate the area under the curve using rectangles, and using definite integrals and integration. - Find antiderivatives using the power rule, multiple of a power, and sum and difference.		