

**MOORESTOWN TOWNSHIP PUBLIC SCHOOLS
MOORESTOWN, NEW JERSEY**

**Moorestown High School
Mathematics**

**Honors Algebra II
*Grades 9-10***

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Course Description and Fundamental Concepts

This rigorous course requires students to use independent thinking. Reading and problem solving are emphasized throughout the course. Major concepts include core functions, transformations, systems, quadratic equations, complex numbers, inequalities, polynomials, exponents, inverses, logarithms, variation, rational expressions/equations, sequences, series, trigonometry, probability, combinatorics, binomial expansion, matrices, and conics. The range of concepts is much greater than that of the college prep course, the pace is faster, and students are expected to share responsibility for their learning. A graphing calculator is required.

New Jersey Student Learning Standards (NJSLS)

Subject/Content Standards

Include grade appropriate subject/content standards that will be addressed

Standard #	Standard Description
N-RN	The Real Number System <ul style="list-style-type: none"> A. Extend the properties of exponents to rational exponents. <ul style="list-style-type: none"> 1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3) \cdot 3} = 5^1 = 5$ to hold, so $(5^{1/3})^3$ must equal 5. 2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.
N-Q	Quantities <ul style="list-style-type: none"> A. Reason quantitatively and use units to solve problems. <ul style="list-style-type: none"> 2. Define appropriate quantities for the purpose of descriptive modeling.
N-CN	The Complex Number System <ul style="list-style-type: none"> A. Perform arithmetic operations with complex numbers. <ul style="list-style-type: none"> 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. 2. Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. 3. Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers. C. Use complex numbers in polynomial identities and equations. <ul style="list-style-type: none"> 7. Solve quadratic equations with real coefficients that have complex solutions. 8. Extend polynomial identities to the complex numbers. For example, rewrite $x^2 + 4$ as $(x + 2i)(x - 2i)$. 9. Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.
N-VM	Vector and Matrix Quantities <ul style="list-style-type: none"> C. Perform operations on matrices and use matrices in applications. <ul style="list-style-type: none"> 6. Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network. 7. Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled. 8. Add, subtract, and multiply matrices of appropriate dimensions.

	<ol style="list-style-type: none"> 9. Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties. 10. Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse. 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. 12. Work with 2×2 matrices as a transformation of the plane, and interpret the absolute value of the determinant in terms of area. <p>A-SSE</p> <p>Seeing Structure in Expressions</p> <p>A. Interpret the structure of expressions</p> <ol style="list-style-type: none"> 1. Interpret expressions that represent a quantity in terms of its context. <ol style="list-style-type: none"> a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P 2. Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$. <p>B. Write expressions in equivalent forms to solve problems</p> <ol style="list-style-type: none"> 3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. <ol style="list-style-type: none"> a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. c. Use the properties of exponents to transform expressions for exponential functions. For example the expression $1.15t$ can be rewritten as $(1.15^{1/12})^{12t} \approx 1.01212t$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%. 4. Derive and/or explain the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments.
A-APR	<p>Arithmetic with Polynomials and Rational Expressions</p> <p>A. Perform arithmetic operations on polynomials</p> <ol style="list-style-type: none"> 1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. <p>B. Understand the relationship between zeros and factors of polynomials</p> <ol style="list-style-type: none"> 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 $p(x)$.

	<ol style="list-style-type: none"> 3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. <p>C. Use polynomial identities to solve problems</p> <ol style="list-style-type: none"> 4. Prove polynomial identities and use them to describe numerical relationships. For example, the difference of two squares; the sum and difference of two cubes; the polynomial identity $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples. 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. <p>D. Rewrite rational expressions</p> <ol style="list-style-type: none"> 6. Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system. 7. Understand 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-CED	<p>Creating Equations</p> <p>A. Create equations that describe numbers or relationships</p> <ol style="list-style-type: none"> 1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. 2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. 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. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods. 4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V = IR$ to highlight resistance R.
A-REI	<p>Reasoning with Equations and Inequalities</p> <p>A. Understand solving equations as a process of reasoning and explain the reasoning</p> <ol style="list-style-type: none"> 1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. 2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. <p>B. Solve equations and inequalities in one variable</p>

<p>F-IF</p>	<ol style="list-style-type: none"> 3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. 4. Solve quadratic equations in one variable. <ol style="list-style-type: none"> a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b. <p>C. Solve systems of equations</p> <ol style="list-style-type: none"> 6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. 7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$. 8. Represent a system of linear equations as a single matrix equation in a vector variable. 9. Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3×3 or greater). <p>D. Represent and solve equations and inequalities graphically</p> <ol style="list-style-type: none"> 10. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). 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, e.g., 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. <p>Interpreting Functions</p> <p>A. Understand the concept of a function and use function notation</p> <ol style="list-style-type: none"> 1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$. 2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. 3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$. <p>B. Interpret functions that arise in applications in terms of the context</p>
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<p>F-BF</p>	<ol style="list-style-type: none"> 4. For a function that models 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; end behavior; and periodicity. 5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function. 6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. <p>C. Analyze functions using different representations</p> <ol style="list-style-type: none"> 7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. <ol style="list-style-type: none"> a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. 8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. <ol style="list-style-type: none"> a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, and classify them as representing exponential growth or decay. 9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum. <p>Building Functions</p> <p>A. Build a function that models a relationship between two quantities</p> <ol style="list-style-type: none"> 1. Write a function that describes a relationship between two quantities.
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	<ol style="list-style-type: none"> <ol style="list-style-type: none"> a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model. c. Compose functions. For example, if $T(y)$ is the temperature in the atmosphere as a function of height, and $h(t)$ is the height of a weather balloon as a function of time, then $T(h(t))$ is the temperature at the location of the weather balloon as a function of time. 2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. B. Build new functions from existing functions <ol style="list-style-type: none"> 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 (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. 4. Find inverse functions. <ol style="list-style-type: none"> a. 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. For example, $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$. b. Verify by composition that one function is the inverse of another. c. Read values of an inverse function from a graph or a table, given that the function has an inverse. d. Produce an invertible function from a non-invertible function by restricting the domain. 5. Use the inverse relationship between exponents and logarithms to solve problems involving logarithms and exponents. <p>F-LE</p> <p>Linear and Exponential Models</p> <ol style="list-style-type: none"> A. Construct and compare linear and exponential models and solve problems <ol style="list-style-type: none"> 1. Distinguish between situations that can be modeled with linear functions and with exponential functions. <ol style="list-style-type: none"> a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. 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).
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<p>F-TF</p>	<ol style="list-style-type: none"> 3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function 4. Understand the inverse relationship between exponents and logarithms. For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology. <p>B. Interpret expressions for functions in terms of the situation they model</p> <ol style="list-style-type: none"> 5. Interpret the parameters in a linear or exponential function in terms of a context. <p>Trigonometric Functions</p> <p>A. Extend the domain of trigonometric functions using the unit circle</p> <ol style="list-style-type: none"> 1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. 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. 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, cosines, and tangent for πx, $\pi + x$, and $2\pi - x$ in terms of their values for x, where x is any real number. 4. Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions. <p>B. Model periodic phenomena with trigonometric functions</p> <ol style="list-style-type: none"> 5. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. 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. <p>C. Prove and apply trigonometric identities</p> <ol style="list-style-type: none"> 8. Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.
<p>G-GPE</p>	<p>Expressing Geometric Properties with Equations</p> <p>A. Translate between the geometric description and the equation for a conic section</p> <ol style="list-style-type: none"> 1. Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation. 2. Derive the equation of a parabola given a focus and directrix. 3. Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.
<p>S-ID</p>	<p>Interpreting Categorical and Quantitative Data</p> <p>A. Summarize, represent, and interpret data on a single count or measurement variable</p> <ol style="list-style-type: none"> 1. Represent data with plots on the real number line (dot plots, histograms, and box plots).

S-CP	<p>B. Summarize, represent, and interpret data on two categorical and quantitative variables</p> <ol style="list-style-type: none"> 5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. 6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. <ol style="list-style-type: none"> a. Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals, including with the use of technology. c. Fit a linear function for a scatter plot that suggests a linear association. <p>C. Interpret linear models</p> <ol style="list-style-type: none"> 7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. 8. Compute (using technology) and interpret the correlation coefficient of a linear fit. <p>Conditional Probability and the Rules of Probability</p> <p>A. Understand independence and conditional probability and use them to interpret data</p> <ol style="list-style-type: none"> 1. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”). 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, and use this characterization to determine if they are independent. 3. Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B. 4. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results. 5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday 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.
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<p>S-MD</p>	<p>B. Use the rules of probability to compute probabilities of compound events in a uniform probability model</p> <ol style="list-style-type: none"> 6. Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model. 7. Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model. 8. (+) Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B A) = P(B)P(A B)$, and interpret the answer in terms of the model. 9. (+) Use permutations and combinations to compute probabilities of compound events and solve problems. <p>Using Probability to Make Decisions</p> <p>B. Use probability to evaluate outcomes of decisions</p> <ol style="list-style-type: none"> 7. Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game). <p>Mathematical Practice Standards</p> <ol style="list-style-type: none"> 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.
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Career Awareness, Exploration, Preparation, and Training ([Standard 9.2](#))

List appropriate units below for which standards will be addressed

By Grade 12		
Unit Addressed	Core Idea	Standard / Description
Units 1, 2, 3, 4, 5, 6	There are strategies to improve one's professional value and marketability.	<p>9.2.12.CAP.1: Analyze unemployment rates for workers with different levels of education and how the economic, social, and political conditions of a time period are affected by a recession.</p> <p>9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.</p> <p>9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.</p>
Units 1, 2, 3, 4, 5, 6	Career planning requires purposeful planning based on research, self-knowledge, and informed choices.	<p>9.2.12.CAP.4: Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.</p> <p>9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p>9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.</p> <p>9.2.12.CAP.7: Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.</p> <p>9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p>9.2.12.CAP.9: Locate information on working papers, what is required to obtain them, and who must sign them.</p> <p>9.2.12.CAP.10: Identify strategies for reducing overall costs of postsecondary education (e.g., tuition assistance, loans, grants, scholarships, and student loans).</p>

		9.2.12.CAP.11: <i>Demonstrate an understanding of Free Application for Federal Student Aid (FAFSA) requirements to apply for postsecondary education.</i>
Units 1, 2, 4, 6	An individual's income and benefit needs and financial plan can change over time.	9.2.12.CAP.12: <i>Explain how compulsory government programs (e.g., Social Security, Medicare) provide insurance against some loss of income and benefits to eligible recipients.</i> 9.2.12.CAP.13: <i>Analyze how the economic, social, and political conditions of a time period can affect the labor market.</i>
Units 1, 2, 4, 6	Securing an income involves an understanding of the costs and time in preparing for a career field, interview and negotiation skills, job searches, resume development, prior experience, and vesting and retirement plans.	9.2.12.CAP.14: <i>Analyze and critique various sources of income and available resources (e.g., financial assets, property, and transfer payments) and how they may substitute for earned income.</i>
Units 1, 2, 4, 6	Understanding income involves an analysis of payroll taxes, deductions and earned benefits.	9.2.12.CAP.15: <i>Demonstrate how exemptions, deductions, and deferred income (e.g., retirement or medical) can reduce taxable income.</i> 9.2.12.CAP.16: <i>Explain why taxes are withheld from income and the relationship of federal, state, and local taxes (e.g., property, income, excise, and sales) and how the money collected is used by local, county, state, and federal governments.</i> 9.2.12.CAP.17: <i>Analyze the impact of the collective bargaining process on benefits, income, and fair labor practice.</i> 9.2.12.CAP.18: <i>Differentiate between taxable and nontaxable income from various forms of employment (e.g., cash business, tips, tax filing and withholding).</i> 9.2.12.CAP.19: <i>Explain the purpose of payroll deductions and why fees for various benefits (e.g., medical benefits) are taken out of pay, including the cost of employee benefits to employers and self-employment income.</i> 9.2.12.CAP.20: <i>Analyze a Federal and State Income Tax Return.</i>

Units 1, 2, 4, 6	There are ways to assess a business's feasibility and risk and to align it with an individual's financial goals.	<p>9.2.12.CAP.21: Explain low-cost and low-risk ways to start a business.</p> <p>9.2.12.CAP.22: Compare risk and reward potential and use the comparison to decide whether starting a business is feasible.</p> <p>9.2.12.CAP.23: Identify different ways to obtain capital for starting a business</p>
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Life Literacies and Key Skills ([Standard 9.4](#))

List appropriate units below for which standards will be addressed

By Grade 12		
Unit Addressed	Core Idea	Standard / Description
Units 1, 2, 3, 4, 5, 6	Creativity and Innovation: With a growth mindset, failure is an important part of success.	9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
Units 1, 2, 3, 4, 5, 6	Creativity and Innovation: Innovative ideas or innovation can lead to career opportunities.	<p>9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).</p> <p>9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p>
Units 1, 2, 3, 4, 5, 6	Critical Thinking and Problem-solving: Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.	<p>9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).</p> <p>9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).</p> <p>9.4.12.CT.3: Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).</p> <p>9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other projects and determine the strategies that contribute to effective outcomes.</p>

Units 1, 2, 4, 6	Digital Citizenship: Laws govern the use of intellectual property and there are legal consequences to utilizing or sharing another's original works without permission or appropriate credit.	<i>9.4.12.DC.1: Explain the beneficial and harmful effects that intellectual property laws can have on the creation and sharing of content (e.g., 6.1.12.CivicsPR.16.a).</i> <i>9.4.12.DC.2: Compare and contrast international differences in copyright laws and ethics</i>
Units 1, 2, 4, 6	Digital Citizenship: Laws govern many aspects of computing, such as privacy, data, property, information, and identity. These laws can have beneficial and harmful effects, such as expediting or delaying advancements in computing and protecting or infringing upon people's rights.	<i>9.4.12.DC.3: Evaluate the social and economic implications of privacy in the context of safety, law, or ethics (e.g., 6.3.12.HistoryCA.1).</i> <i>9.4.12.DC.4: Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users (e.g., 8.1.12.NI.3).</i> <i>9.4.12.DC.5: Debate laws and regulations that impact the development and use of software.</i>
Units 1, 2, 4, 6	Digital Citizenship: Cultivating online reputations for employers and academia requires separating private and professional digital identities.	<i>9.4.12.DC.6: Select information to post online that positively impacts personal image and future college and career opportunities.</i>
Units 1, 2, 4, 6	Digital Citizenship: Digital communities influence many aspects of society, especially the workforce. The increased connectivity between people in different cultures and different career fields have changed the nature, content, and responsibilities of many careers.	<i>9.4.12.DC.7: Evaluate the influence of digital communities on the nature, content and responsibilities of careers, and other aspects of society (e.g., 6.1.12.CivicsPD.16.a).</i>
Units 1, 2, 4, 6	Digital Citizenship: Network connectivity and computing capability extended to objects, sensors and everyday items not normally considered computers allows these devices to generate, exchange, and consume data with minimal human intervention. Technologies such as Artificial Intelligence (AI) and blockchain can help minimize the effect of climate change.	<i>9.4.12.DC.8: Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.</i>

Units 1, 2, 4, 6	Global and Cultural Awareness: Solutions to the problems faced by a global society require the contribution of individuals with different points of view and experiences.	9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).
Units 1, 2, 4, 6	Information and Media Literacy: Advanced search techniques can be used with digital and media resources to locate information and to check the credibility and the expertise of sources to answer questions, solve problems, and inform the decision-making.	9.4.12.IML.1: Compare search browsers and recognize features that allow for filtering of information. 9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources).
Units 1, 2, 4, 6	Information and Media Literacy: Digital tools such as artificial intelligence, image enhancement and analysis, and sophisticated computer modeling and simulation create new types of information that may have profound effects on society. These new types of information must be evaluated carefully	9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8) 9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience (e.g., S-ID.B.6b, HS-LS2-4).
Units 1, 2, 4, 6	Information and Media Literacy: In order for members of our society to participate productively, information needs to be shared accurately and ethically.	9.4.12.IML.5: Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSNT.2). 9.4.12.IML.6: Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).
Units 1, 2, 4, 6	Information and Media Literacy: Accurate information may help in making valuable and ethical choices.	9.4.12.IML.7: Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).

Units 1, 2, 4, 6	Information and Media Literacy: Media have embedded values and points of view.	<i>9.4.12.IML.8: Evaluate media sources for point of view, bias, and motivations (e.g., NJSLSA.R6, 7.1.AL.IPRET.6).</i> <i>9.4.12.IML.9: Analyze the decisions creators make to reveal explicit and implicit messages within information and media (e.g., 1.5.12acc.C2a, 7.1.IL.IPRET.4).</i>
Units 1, 2, 4, 6	Technology Literacy: Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.	<i>9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specific task (e.g., W.11-12.6).</i> <i>9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.</i>
Units 1, 2, 4, 6	Technology Literacy: Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.	<i>9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments.</i> <i>9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).</i>

Interdisciplinary Connections ([2020 NJSL](#))

List any other content standards addressed as well as appropriate units. All arts integration connections may be listed within this chart.

Visual & Performing Arts Integration ([Standard 1](#))

List appropriate units below for which standards (1.1 through 1.5) may be addressed

Unit Addressed	Artistic Process	Anchor Standard
Units 1, 2, 4, 6	Creating	<i>Anchor Standard 1: Generating and conceptualizing ideas.</i> <i>Anchor Standard 2: Organizing and developing ideas.</i> <i>Anchor Standard 3: Refining and completing products.</i>
Units 1, 2, 4, 6	Connecting	<i>Anchor Standard 10: Synthesizing and relating knowledge and personal experiences to create products.</i> <i>Anchor Standard 11: Relating artistic ideas and works within societal, cultural, and historical contexts to deepen understanding.</i>

Units 1, 2, 3, 4, 5, 6	Performing/ Presenting/ Producing	<i>Anchor Standard 4: Selecting, analyzing, and interpreting work.</i> <i>Anchor Standard 5: Developing and refining techniques and models or steps needed to create products.</i> <i>Anchor Standard 6: Conveying meaning through art.</i>
Units 1, 2, 3, 4, 5, 6	Responding	<i>Anchor Standard 7: Perceiving and analyzing products.</i> <i>Anchor Standard 8: Applying criteria to evaluate products.</i> <i>Anchor Standard 9: Interpreting intent and meaning.</i>

Other Interdisciplinary Content Standards <i>List appropriate units below for any other content/standards that <u>may be addressed</u></i>		
Unit Addressed	Content / Standard #	Standard Description
Units 1, 3, 4	HS-ETS1-3	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
Units 1, 3, 5, 6	HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
Unit 1	HS-PS2-1	Analyze data to support the claim that Newton’s second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.
Unit 3	HS-PS1-2	Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.
Unit 2	HS-LS4-5	Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.
Units 2, 4	9.1.12.C.2	Compare and compute interest and compound interest and develop an amortization table using business tools.
Units 2, 4, 5	9.1.12.D.1	Calculate short- and long-term returns on various investments (e.g., stocks, bonds, mutual funds, IRAs, deferred pension plans, and so on).

Pacing Guide (All Dates are approximate based on the school calendar)

Unit/ Topic	Month (w/Approx number of Teaching Days)
UNIT 1 Polynomial Functions	September (~10 days)
UNIT 1 Polynomial Functions	Sept/Oct (~10 days)
UNIT 1 Polynomial Functions	October (~13 days)
UNIT 1 Polynomial Functions	November (~17 days)
UNIT 2 Rational, Exponential, & Logarithmic Functions	December (~14 days)
UNIT 2 Rational, Exponential, & Logarithmic Functions	January (~12 days)
UNIT 2 Rational, Exponential, & Logarithmic Functions	February (~12 days)
UNIT 3 Trigonometric Ratios and Functions	Feb/March (~13 days)
UNIT 4 Sequences, Series, & Probability	March/April (~22 days)
UNIT 4 Sequences, Series, & Probability	April/May (~11 days)
UNIT 5 Matrices	May (~13 days)
UNIT 6 Analytic Geometry & Conics	June (~8 days)

Units Scope and Sequence

Unit 1: Polynomial Functions

Chapter 1 - Linear Functions

Chapter 2 - Quadratic Functions

Chapter 3 - Quadratic Equations and Complex Numbers

Chapter 4 - Polynomial Functions

Learning Goals: What do I want my students to learn?

Standards

[NJSLS](#) - N-Q.A, N-Q.A.1, N-Q.A.2, N-CN.A, N-CN.A.1, N-CN.A.2, N-CN.A.3, N-CN.C, N-CN.C.7, N-CN.C.8, N-CN.C.9, A-SSE.A, A-SSE.A.1, A-SSE.A.1a, A-SSE.A.1b, A-SSE.A.2, A-SSE.B, A-SSE.B.3, A-SSE.B.3a, A-SSE.B.3b, A-APR.A, A-APR.A.1, A-APR.B, A-APR.B.2, A-APR.B.3, A-APR.C, A-APR.C.4, A-CED.A, A-CED.A.1, A-CED.A.2, A-CED.A.3, A-CED.A.4, A-REI.A, A-REI.A.1, A-REI.B, A-REI.B.4, A-REI.B.4a, A-REI.B.4b, A-REI.C, A-REI.C.6, A-REI.C.7, A-REI.D, A-REI.D.11, F-IF.A, F-IF.A.1, F-IF.A.2, F-IF.A.3, F-IF.B, F-IF.B.4, F-IF.B.5, F-IF.B.6, F-IF.C, F-IF.C.7, F-IF.C.7a, F-IF.C.7c, F-IF.C.8, F-IF.C.8a, F-IF.C.9, B-BF.A, B-BF.A.1, B-BF.A.1a, B-BF.A.1b, B-BF.B, B-BF.B.3, B-BF.B.4, B-BF.B.4a, B-BF.B.4b, F-LE.A, F-LE.A.1, F-LE.A.1a, F-LE.A.1b, F-LE.A.1c, F-LE.A.2, G-GPE.A, G-GPE.A.1, G-GPE.A.2, S-ID.B, S-ID.B.6, S-ID.B.6a, S-ID.B.6b, S-ID.B.6c, MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8

[NJSLS - Career Awareness, Exploration, Preparation, and Training](#)

[NJSLS - Life Literacies and Key Skills](#)

[NJSLS - Interdisciplinary Standards](#)

Fundamental Concepts / Big Ideas

- How do the properties of real and imaginary numbers complement one another to produce a complex number system?
- How do the laws of algebra (i.e. properties of equality, order of operations, laws of exponents) interconnect to allow us to solve algebraically?
- What processes and skills are relevant to solving a linear equation versus a quadratic equation?
- How can we best represent a situation algebraically and/or geometrically and then use the basic concepts of algebra to solve?
- What strategies can be used to solve polynomial equations?
- How can we use mathematical models to describe real world situations?

Learning Objectives

Students will be able to...

- Identify families of functions.
- Describe transformations of parent functions and combinations of transformations.
- Write functions representing translations, reflections, stretches and shrinks.
- Write linear functions using points and slopes.
- Find lines of best fit.
- Visualize solutions of systems of linear equations in three variables.
- Solve linear systems algebraically and real life problems.
- Describe transformations of quadratic functions.
- Write transformations of quadratic functions.

- Graph parabolas and find the vertices and axis of symmetry.
- Analyze quadratic function, graph, and find its minimum or maximum value.
- Use graphs to determine the number of real solutions of a quadratic system.
- Solve real life problems.
- Write quadratic equations to model data sets.
- Solve quadratic equations by graphing, using square roots, quadratic formula and algebraically.
- Define and use the imaginary unit i .
- Add, subtract and multiply complex numbers.
- Find complex solutions and zeros.
- Write quadratic equations in vertex form.
- Analyze the discriminant to determine the number and type of solutions.
- Solve systems of nonlinear equations.
- Graph quadratic inequalities in one and two variables.
- Identify polynomial functions.
- Graph polynomial functions using tables and end behavior.
- Add, subtract, and multiply polynomials.
- Use long division to divide polynomials.
- Use synthetic division to divide polynomials.
- Use the Remainder Theorem.
- Factor polynomials and use the Factor Theorem.
- Find solutions of polynomial equations and zeros of polynomial functions.
- Use the Rational Root and Irrational Conjugate Theorems.
- Use the Fundamental Theorem of Algebra.
- Find conjugate pairs of complex zeros of polynomial functions.
- Describe and write transformations of polynomial functions.
- Use x-intercepts to graph polynomial functions.
- Use location principle and find turning points of polynomial functions.
- Identify even and odd functions.
- Write polynomial functions for sets of points and using finite differences.
- Use technology to find models for data sets

Unit 2: Rational, Exponential, & Logarithmic Functions

Chapter 5 - Rational Exponents and Radical Functions

Chapter 6 - Exponential and Logarithmic Functions

Chapter 7 - Rational Functions

Learning Goals: What do I want my students to learn?

Standards

[NJSL](#)- N-RN.A, N-RN.A.1, A-RN.A.2, A-SSE.A, A-SSE.A.1, A-SSE.A.1a, A-SSE.A.1b, A-SSE.B, A-SSE.B.3, A-SSE.B.3c, A-APR.D, A-APR.D.6, A-APR.D.7, A-REI.A, A-REI.A.1, A-REI.A.2, A-REI.D, A-REI.D.11, F-IF.B, F-IF.B.4, F-IF.B.5, F-IF.B.6, F-IF.C, F-IF.C.7, F-IF.C.7b, F-IF.C.7d, F-IF.C.7e, F-IF.C.8, F-IF.C.8b, F-IF.C.9, B-BF.A, B-BF.A.1, B-BF.A.1a, B-BF.A.1b, B-BF.B, B-BF.B.3, B-BF.B.4, B-BF.B.4a, B-BF.B.4b, B-BF.B.5, F-LE.A, F-LE.A.1, F-LE.A.1a, F-LE.A.1b, F-LE.A.1c, F-LE.A.2, F-LE.A.4, F-LE.B, F-LE.B.5, MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8

[NJSL](#) - *Career Awareness, Exploration, Preparation, and Training*

[NJSL](#) - *Life Literacies and Key Skills*

[NJSL](#) - *Interdisciplinary Standards*

Fundamental Concepts / Big Ideas

- How would you describe the similarities and differences between logarithmic and exponential functions and their graphs?
- What is the relationship between a function and its inverse?
- What real life situations/objects can be modeled by exponential, logarithmic, and rational functions?
- How can functions serve as a model for real life situations?
- What real life situations might cause asymptotic behavior in a graph?
- Why do you need logarithms and how do they relate to exponents?

Learning Objectives

Students will be able to...

- Find the n^{th} roots of numbers.
- Evaluate expressions with rational exponents.
- Solve equations using n^{th} roots.
- Use properties of rational exponents to simplify expressions with rational exponents.
- Use properties of radicals to simplify and write radical expressions in simplest form.
- Graph radical functions.
- Write transformations of radical functions.
- Graph parabolas and circles.
- Solve equations containing radicals and rational exponents.
- Solve radical inequalities.
- Add, subtract, multiply, and divide functions.
- Explore inverses of functions.
- Find and verify inverses of nonlinear functions.
- Solve real life problems using inverse functions
- Graph exponential growth and decay functions.

- Use exponential models to solve real life problems.
- Define and use the natural base e .
- Graph natural base functions.
- Define and evaluate logarithms.
- Use inverse properties of logarithmic and exponential functions.
- Graph log functions.
- Transform graphs of exponential and log functions.
- Write transformations of graphs of exponential and log functions.
- Use the properties of logs to evaluate, condense, or expand.
- Use the change of base formula to evaluate logs.
- Solve exponential and logarithmic equations.
- Solve exponential and logarithmic inequalities.
- Classify data sets.
- Write exponential functions.
- Use technology to find exponential and logarithmic models.
- Classify direct and inverse variation.
- Write inverse variation equations.
- Graph simple rational functions.
- Translate simple rational functions.
- Graph other rational functions.
- Simplify, multiply, and divide rational expressions.
- Add and subtract rational expressions.
- Rewrite rational expressions and graph the related function.
- Simplify complex fractions.
- Solve rational equations by cross multiplying.
- Solve rational equations by using the least common denominator.
- Use inverses of functions.

Unit 3: Trigonometric Ratios and Functions

Chapter 9 - Trigonometric Ratios and Functions

Learning Goals: What do I want my students to learn?

Standards

[NJSLs](#)- F-IF.C, F-IF.C.7, F-IF.C.7e, F-TF.A, F-TF.A.1, F-TF.A.2, F-TF.A.3, F-TF.A.4, F-TF.B, F-TF.B.5, F-TF.C, F-TF.C.8, MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8

[NJSLs - Career Awareness, Exploration, Preparation, and Training](#)

[NJSLs - Life Literacies and Key Skills](#)

[NJSLs - Interdisciplinary Standards](#)

Fundamental Concepts / Big Ideas

- How does our knowledge of angle measurement enhance our knowledge of the right triangle relationships?
- How does changing the length of one side of a right triangle impact the trigonometric ratios?
- Are there any advantages to using radian measure over degree measure in solving trigonometric problems?
- What real life problems could be solved with trigonometry?

Learning Objectives

Students will be able to...

- Evaluate trig functions of acute angles.
- Find unknown side lengths and angle measures of right triangles.
- Use trig functions to solve real life problems.
- Draw angles in standard position.
- Find coterminal angles.
- Use radian measure.
- Evaluate trig functions of any angle.
- Find and use reference angles to evaluate trig functions.
- Explore characteristics of sine and cosine functions.
- Translate, stretch, shrink, and reflect sine and cosine functions.
- Explore characteristics of tangent and cotangent functions.
- Graph 4 other trig functions.
- Interpret and use frequency.
- Write trig functions.
- Use technology to find trig models.
- Simplify trig expressions.
- Verify trig identities.

Unit 4: Sequences, Series, & Probability

Chapter 8 - Sequences and Series

Chapter 10 - Probability

Chapter 11 - Data Analysis and Statistics

Learning Goals: What do I want my students to learn?

Standards

[NJSL](#)- A-SSE.B, A-SSE.B.4, A-APR.C, A-APR.C.5, F-BF.A, F-BF.A.2, S-ID.A, S-ID.A.1, S-ID.A.2, S-ID.A.3, S-ID.A.4, S-ID.B, S-ID.B.5, S-IC.A, S-IC.A.1, S-IC.A.2, S-IC.B, S-IC.B.3, S-IC.B.4, S-IC.B.5, S-IC.B.6, S-CP.A, S-CP.A.1, S-CP.A.2, S-CP.A.3, S-CP.A.4, S-CP.A.5, S-CP.B, S-CP.B.6, S-CP.B.7, S-CP.B.8, S-CP.B.9, S-MD.A, S-MD.A.S-MD.A.2, S-MD.A.3, S-MD.A.4, 1, S-MD.B, S-MD.B.5, S-MD.B.5a, S-MD.B.5b, S-MD.B.6, S-MD.B.7, MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8

[NJSL](#) - *Career Awareness, Exploration, Preparation, and Training*

[NJSL](#) - *Life Literacies and Key Skills*

[NJSL](#) - *Interdisciplinary Standards*

Fundamental Concepts / Big Ideas

- How are patterns identified as arithmetic or geometric series, or neither?
- What is the difference between a sequence and series?
- What is the difference between discrete and sampling distributions?
- What determines the best way to calculate a probability?
- How can the collection, organization, interpretation and display of data be used to answer questions?
- How can experimental and theoretical probabilities be used to make predictions or draw conclusions?
- How can the patterns found in sequences and series be used as tools to best describe and help explain real-life situations?

Learning Objectives

Students will be able to...

- Write a rule for the n^{th} term of a sequence.
- Write a series using summation notation.
- Find the sum of certain types of series.
- Classify sequences/series by type.
- Classify graphical representations of sequences.
- Write a repeating decimal as a fraction using an infinite geometric series.
- Find sample spaces.
- Find theoretical probabilities.
- Find experimental probabilities.
- Determine whether events are independent events.
- Find probabilities of independent and dependent events.
- Find conditional probabilities.
- Make two-way tables.
- Find relative and conditional relative frequencies.
- Use conditional relative frequencies to find conditional probabilities.

- Find probabilities of compound events.
- Use more than one probability rule to solve real-life problems.
- Use the formula for permutations and combinations.
- Use combinations and the Binomial Theorem to expand binomials
- Summarize, represent, and interpret data.
- Understand and evaluate statistical experiments.
- Solve simple counting problems.
- Use the Fundamental Counting Principle to solve counting problems.
- Use permutations to solve counting problems.
- Use combinations to solve counting problems.
- Find the probabilities of events.
- Find the probabilities of mutually exclusive events.
- Find the probabilities of independent events.
- Find the probability of the complement of an event.
- Calculate expected values and use them to solve problems.

Unit 5: Matrices

Learning Goals: What do I want my students to learn?

Standards

[NJSL](#)- N-VM.C.6, N-VM.C.7, N-VM.C.8, N-VM.C.9, N-VM.C.10, N-VM.C.11, N-VM.C.12, MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8

[NJSL](#) - *Career Awareness, Exploration, Preparation, and Training*

[NJSL](#) - *Life Literacies and Key Skills*

[NJSL](#) - *Interdisciplinary Standards*

Fundamental Concepts / Big Ideas

- What is a matrix?
- How can we matrices to perform operations?
- How can determinants be used to make conclusions about real world situations?
- How can Cramer's rule be applied to solve systems of equations?
- When and why can technology be an asset for solving matrices or systems of equations?

Learning Objectives

Students will be able to...

- Perform matrix operations.
- Solve systems of linear equations with matrices and various solving methods.
- Calculate determinants of square matrices (dimensions 4x4 and lower).
- Find the inverse of square matrices (dimensions 2x2 and lower).
- Solve system of linear equations with Cramer's Rule.
- Use technology for matrix operations and applications.

Unit 6: Analytic Geometry & Conics

Learning Goals: What do I want my students to learn?

Standards

[NJSLS](#)- A-CED.A.2, G-GPE.A1, G-GPE.A.3, MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8
[NJSLS - Career Awareness, Exploration, Preparation, and Training](#)
[NJSLS - Life Literacies and Key Skills](#)
[NJSLS - Interdisciplinary Standards](#)

Fundamental Concepts / Big Ideas

- What real life situations/objects can be modeled by conic sections?
- Given a conic section or a function, how does varying the constants affect the graph?

Learning Objectives

Students will be able to...

- Graph ellipses, hyperbolas, and their other characteristics.
- Find the equation of ellipses and hyperbolas given various characteristics.
- Differentiate between various conic sections based on their graphs and equations.

Please contact the Content Supervisor for any questions.