HS ALGEBRA I, ALGEBRA II, GEOMETRY & STATISTICS CURRICULUM

Middle Township Public Schools

216 S. Main Street

Cape May Court House, NJ 08210

Born: April 2024

Unit Overview

Content Area: Algebra 1

Unit Title: Unit 1: Solving Linear Equations and Inequalities

Grade Level: **9-12**   **Timeline: CP: 58-60 days; Adv: 50-52 days**

Unit Summary:

- Expressions: An expression is a record of a computation with numbers, symbols that represent numbers, arithmetic operations, exponentiation, and, at more advanced levels, the operation of evaluating a function. Reading an expression with comprehension involves analysis of its underlying structure. This may suggest a different but equivalent way of writing the expression that exhibits some different aspect of its meaning.
- Equations & Inequalities: An equation is a statement of equality between two expressions. An equation can often be solved by successively deducing from it one or more simpler equations. Strategic competence in solving included looking ahead for productive manipulations and anticipating the nature and number solutions. Inequalities can be solved by reasoning about the properties of inequality. Many, but not all, of the properties of equality continue to hold for inequalities and can be useful in solving them.
- Numbers & Number Systems: In high school, students will be exposed to yet another extension of numbers, when the real numbers are augmented by imaginary numbers to form complex numbers.
- Quantities: Quantities have a real application to real world problems. In real world problems, the answers are usually not numbers but quantities: numbers with units, which involves measurement. In high school, students encounter a wider variety of units in modeling, e.g., acceleration, currency conversions, derived quantities such as person-hours and heating degree days, social science rates such as per-capita income, and rates in everyday life such as points scored per game or batting averages.

Instruction	
Standard(s) & Math Practice(s)	**Learning Targets (objective) - Students will…**
All levels: ● A.REI.B.3: Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. ● A.REI.A.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. ● A.CED.A.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.CED.A.1: Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic function, and simple rational and exponential functions. Advanced: ● N-Q A.1: Use units to understand problems and guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and origin in graphs and data displays. ● N-RN.A.3: Simplify radicals, including algebraic radicals (e.g. $\sqrt[3]{54} = 3\sqrt[3]{2}$ simplify $\sqrt{32x^2}$	● Represent quantities, patterns, and relationships using different methods. ● Explain how properties are related to Algebra. ● Explain how equations that appear to be different can be equivalent. ● Solve equations and explain the process of doing so. ● Identify the relationships that proportions can represent. ● Represent relationships between quantities that are not equal. ● Identify that inequalities that appear to be different can be equivalent and explain their reasoning. ● Solve inequalities and explain the process.

Math Practice Standards:

- MP.1 Make sense of problems and persevere in solving them.
- MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning of others.
- MP.4 Model with mathematics.
- MP.5 Use appropriate tools strategically.
- MP.6 Attend to precision.
- MP.7 Look for and make use of structure.
- MP.8 Look for and express regularity in repeated reasoning.

Assessments	
Formative	- Independent problems during lessons - Lesson quizzes
Summative	Unit Test
Benchmark	Star Renaissance Math
Alternative	Teachers will expose students to higher order thinking problems that are like the NJSLA/NJGPA. These tasks will be used as additional support when covering the material in the unit. Students should receive feedback from the teacher on their performance.

Accommodations and Modifications	
Special Education	- Follow 504/IEP accommodations - Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Restate, reword, clarify directions - Provide Educational "breaks" as necessary - Utilize visual and audio cues
English Language Learners	- Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations

	● Small group & large group discussions ● Problem solving situations ● Utilize visual and audio cues ● Highlight, define, or demonstrate important vocabulary ● Restate, reword, clarify directions
Students At-Risk of School Failure	● Step by step examples ● Visual demonstration of skill or activity ● Allow for flexible grouping ● Student centered activities ● Learning Stations ● Small group & large group discussions ● Problem solving situations ● Utilize visual and audio cues ● Highlight, define, or demonstrate important vocabulary ● Restate, reword, clarify directions ● Chunking content into small segments ● Shorten or reduce assignment to focus on one specific skill
Gifted and Talented	● Student Choice ● Student centered activities ● Enhance skill or activity based on Individual Student Need ● Allow for flexible grouping ● Problem solving situations
Students with 504 Plans	● Follow 504/IEP accommodations ● Step by step examples ● Visual demonstration of skill or activity ● Allow for flexible grouping ● Student centered activities ● Learning Stations ● Small group & large group discussions ● Problem solving situations ● Restate, reword, clarify directions ● Provide Educational "breaks" as necessary ● Utilize visual and audio cues

Resources and Materials

● McGraw Hill Reveal Algebra 1 textbook and resources, Illustrative Mathematics https://www.illustrativemathematics.org/ , & EngageNY https://www.engageny.org/

Interdisciplinary Connections

● NJSLSA.W2: Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
● NJSLSA.W4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

Climate Change Integration
● A.CED.A.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.

Integration of Technology
● 8.1.5.A.1: Select and use the appropriate digital tools and resources to accomplish various tasks including solving problems.   ● 8.1.5.A.3: Use graphic organizers to organize information about problems or issues.   ● 8.2.2.C.1: Brainstorm ideas on how to solve a problem or build a product.   ● 8.2.5.C.4: Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.   ● 8.2.8.C.4: Identify the steps in the design process that would be used to solve designated consequences of other technologies and present your findings.   ● 8.2.2.D.1: Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade –offs to be considered.   ● 8.2.5.D.3: Follow step by step directions to assemble a product or solve a problem.   ● 8.2.2.E.1: List and demonstrate the steps to an everyday task.

Career Education- NJSLS 9
● 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.   ● 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.   ● 9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.

Unit Overview
Content Area: Algebra 1
Unit Title: Unit 2: Introduction to functions, Linear functions, & Exponents and Exponential Functions
Grade Level:　　**9-12**　　　　**Timeline: CP: CP: 52-54 days; Adv: 42-44 days**

Unit Summary:

- Equations & Inequalities plus Creating Equations: An equation is a statement of equality between two expressions. An equation can often be solved by successively deducing from it one or more simpler equations. Strategic competence in solving included looking ahead for productive manipulations and anticipating the nature and number solutions. Inequalities can be solved by reasoning about the properties of inequality. Many, but not all, of the properties of equality continue to hold for inequalities and can be useful in solving them.
- Building Functions, Interpreting Functions and Linear & Exponential Models: Functions presented as expressions can model many important phenomena. Two important families of functions characterized by laws of growth are linear functions, which grow at a constant rate, and exponential functions, which grow at a constant percent rate. Linear functions with a constant term of zero describe proportional relationships.
- The Real Number Systems: In high school, students will be exposed to yet another extension of numbers, when the real numbers are augmented by imaginary numbers to form complex numbers.
- Expressing Geometric Properties with Equations: The correspondence between numerical coordinates and geometric points allows methods from algebra to be applied to geometry and vice versa. The solution set of an equation becomes a geometric curve, making visualization a tool for doing and understanding algebra. Geometric shapes can be described by equations, making algebraic manipulation into a tool for geometric understanding, modeling, and proof.
- Quantities: Quantities have a real application to real world problems. In real world problems, the answers are usually not numbers but quantities: numbers with units, which involves measurement. In high school, students encounter a wider variety of units in modeling, e.g., acceleration, currency conversions, derived quantities such as person-hours and heating degree days, social science rates such as per-capita income, and rates in everyday life such as points scored per game or batting averages.
- Interpreting Categorical & Quantitative Data: Data is gathered, summarized, examined, and interpreted to discover patterns and deviations from patterns. Quantitative data can be described in terms of key characteristics: measure of shape, center, and spread. The shape of the distribution might be described as symmetric, skewed, flat, or bell shaped, and it might be summarized by a statistical measuring center (such as mean or median) and a statistical measuring spread (such as standard deviation or interquartile range).

Instruction	
Standard(s) & Math Practice(s)	**Learning Targets (objective) - Students will…**
<u>All levels:</u> ● F-IF.A.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). ● F-IF.A.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. ● F-IF.A.3: Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.	● Interpret functions that arise in applications in terms of the context. ● Analyze functions using different representations. ● Understand the concept of a function and use function notation. ● Represent and solve equations and inequalities graphically. ● Construct and compare linear and exponential models and solve. ● Create equations that describe numbers or relationships. ● Extend the properties of exponents to rational exponents

- F-IF.B.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. - F-IF.B.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. - S-ID.C.7: Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. - N-RN.A.1: Explain how the definition of the meaning of rational exponents follows from extending the properties of integer's exponents to those values, allowing for a notation for radicals in terms of ratio. - A-CED.A.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes and 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.	
<u>Advanced:</u> - N-Q.A.3: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. - S-ID.B.6a: Fit a function to the data (including 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, quadratic, and exponential models. - S-ID.B.6b: Informally address the fit of a function by plotting and analyzing residuals, including with the use of technology. - S-ID.B.6c: Fit a linear function for a scatter plot that suggests a linear association. - S-ID.C.8: Compute (using technology) and interpret the correlation coefficient of a linear fit. - S-ID.C.9: Distinguish between correlation and causation.	<u>Adv: The above CP understandings plus the following:</u> - Reason Quantitatively and use units to solve problems. - Use coordinates to prove simple geometric theorems algebraically. - Summarize, represent, and interpret data on two categorical and quantitative variables. - Build new functions from existing functions - Build a function that models a relationship between two quantities.

● N-RN.A.2: Rewrite expressions involving radicals and rational exponents using the properties of exponents. ● F-BF.A.1: Write a function that describes a relationship between two quantities. ● 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. ● 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 (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. ● F-IF.C.7a: Graph linear and quadratic function and show intercepts, maxima, and minima. ● F-IF.C.7b: Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. ● F-IF.C.9: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). ● F-LE.A.1: Distinguish between situations that can be modeled with linear functions and with exponential functions. ● F-LE.A.1a: Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. ● F-LE.A.1c: Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. ● 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). ● F-LE.B.5: Interpret the parameters in a linear or exponential function in terms of a context. ● A-SSE.A.1b: Interpret complicated expressions by viewing one or more of their parts as a single entity.	
Math Practice Standards: ● MP.1 Make sense of problems and persevere in solving them. ● MP.2 Reason abstractly and quantitatively. ● MP.3 Construct viable arguments & critique the reasoning of others.	

- MP.4 Model with mathematics.
- MP.5 Attend to precision.
- MP.6 Look for and make use of structure.

Assessments	
Formative	- Independent problems during lessons - Lesson quizzes
Summative	Unit Test
Benchmark	Star Renaissance Math
Alternative	Teachers will expose students to higher order thinking problems that are like the NJSLA/NJGPA. These tasks will be used as additional support when covering the material in the unit. Students should receive feedback from the teacher on their performance.

Accommodations and Modifications	
Special Education	- Follow 504/IEP accommodations - Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Restate, reword, clarify directions - Provide Educational "breaks" as necessary - Utilize visual and audio cues
English Language Learners	- Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Utilize visual and audio cues - Highlight, define, or demonstrate important vocabulary - Restate, reword, clarify directions
Students At-Risk of School Failure	- Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions

	• Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions • Chunking content into small segments • Shorten or reduce assignment to focus on one specific skill
Gifted and Talented	• Student Choice • Student centered activities • Enhance skill or activity based on Individual Student Need • Allow for flexible grouping • Problem solving situations
Students with 504 Plans	• Follow 504/IEP accommodations • Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Restate, reword, clarify directions • Provide Educational "breaks" as necessary • Utilize visual and audio cues

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- NJSLSA.W4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

Climate Change Integration

- A.CED.A.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.

Integration of Technology

- 8.1.5.A.1: Select and use the appropriate digital tools and resources to accomplish various tasks

including solving problems.

- 8.1.5.A.3: Use graphic organizers to organize information about problems or issues.
- 8.2.2.C.1: Brainstorm ideas on how to solve a problem or build a product.
- 8.2.5.C.4: Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.
- 8.2.8.C.4: Identify the steps in the design process that would be used to solve designated consequences of other technologies and present your findings.
- 8.2.2.D.1: Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade –offs to be considered.
- 8.2.5.D.3: Follow step by step directions to assemble a product or solve a problem.
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Career Education- NJSLS 9

- 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

- 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.

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Unit Overview

Content Area: Algebra 1

Unit Title: Unit 3: Systems of Equations, Polynomials & Factoring, Quadratic Functions & Equations, and Rational Expressions & Functions

Grade Level: 9-12   Timeline: CP: 58-60 days; Adv: 49-51 days

Unit Summary:

- Expressions: An expression is a record of a computation with numbers, symbols that represent numbers, arithmetic operations, exponentiation, and, at more advanced levels, the operation of evaluating a function. Reading an expression with comprehension involves analysis of its underlying structure. This may suggest a different but equivalent way of writing the expression that exhibits some different aspect of its meaning.

- Equations & Inequalities plus Creating Equations: An equation is a statement of equality between two expressions. An equation can often be solved by successively deducing from it one or more simpler equations. Strategic competence in solving included looking ahead for productive manipulations and anticipating the nature and number solutions. Inequalities can be solved by reasoning about the properties of inequality. Many, but not all, of the properties of equality continue to hold for inequalities and can be useful in solving them.

- Building Functions, Interpreting Functions and Linear & Exponential Models: Functions presented as expressions can model many important phenomena. Two important families of functions characterized

by laws of growth are linear functions, which grow at a constant rate, and exponential functions, which grow at a constant percent rate. Linear functions with a constant term of zero describe proportional relationships.

Instruction	
Standard(s) & Math Practice(s)	**Learning Targets (objective) - Students will…**
<u>All levels:</u> ● A-REI.B.4a: Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(\square - \square)^2 = \square$ that has the same solutions. Derive the quadratic formula. ● A-REI.B.4b: Solve quadratics equations by inspection (e.g., for $\square^2 = 49$), 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 ± bi for real numbers a and b. ● 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, 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. ● A-REI.D.12: Graph the solutions to a linear inequality in two variables as a half plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. ● A-APR.A.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. ● A-SSE.A.1: Interpret expressions that represent a quantity in terms of its context.	CP: ● Representing and solving equations and inequalities graphically ● Solving equations and inequalities in one variable ● Performing arithmetic operations on polynomials ● Interpreting the structure of expressions, inequalities and explaining the process. ● Creating equations that describe numbers or relationships. ● Interpreting functions that arise in applications in terms of the context

- A.SSE.A.1a: Interpret parts of an expression, such as terms, factors, and coefficient. - A-SSE.A.2: Use the structure of an expression to identify ways to rewrite it. - A-SSE.B.3a: Factor a quadratic expression to reveal the zeros of the function it defines. - A-SSE.B.3b: Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. - A-CED.A.1: Create equations and inequalities in one variable and use to solve problems, Include equations arising from linear and quadratic functions, and simple rational and exponential functions - A.REI.B.3: Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. - A.REI.A.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. - A.CED.A.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.CED.A.1: Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic function, and simple rational and exponential functions.	
<u>Advanced:</u> - A-REI.C.5: Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solution. - A-REI.C.6: Solve systems of linear equations exactly and appropriately (e.g., with graphs), focusing on pairs of linear equations in two variables. - A-REI.C.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	Adv: the above CP understandings plus the following: - Understand the concept of a function and use function notation - Analyzing functions using different representations - Solving systems of equations

line $\square = -3\square$ and the circle $\square^2 + \square^2 = 3$.

- F-IF.A.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
- F-IF.B.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.
- F-IF.B.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.
- F-IF.C.7: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
- F-IF.C.7a: Graph linear and quadratic function and show intercepts, maxima, and minima.
- F-IF.C.8: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
- F.IF.C.8a: 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.
- F-IF.C.9: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
- F-BF.A.1: Write a function that describes a relationship between two quantities.
- 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 (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.
- A-CED.A.2: Create equations in two or

more variables to represent relationships between quantities; graph equations on coordinate axes and 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. ● S-ID.B.6a: Fit a function to the data (including 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, quadratic, and exponential models. ● S-ID.B.6b: Informally address the fit of a function by plotting and analyzing residuals, including with the use of technology. ● F-LE.A.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. ● A-APR.B.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. ● A-SSE.B.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression	
Math Practice Standards: ● MP.1 Make sense of problems and persevere in solving them. ● MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning of others. ● MP.4 Model with mathematics. ● MP.5 Use appropriate tools strategically. ● MP.6 Attend to precision. ● MP.7 Look for and make use of structure. ● MP.8 Look for and express regularity in repeated reasoning.	

Assessments	
Formative	● Independent problems during lessons ● Lesson quizzes
Summative	● Unit Test
Benchmark	● Star Renaissance Math
Alternative	● Teachers will expose students to higher order thinking problems that are like the NJSLA/NJGPA. These tasks will be used as additional support when covering the material in the unit. Students should receive feedback from the teacher on their performance.

Accommodations and Modifications	
Special Education	● Follow 504/IEP accommodations ● Step by step examples ● Visual demonstration of skill or activity ● Allow for flexible grouping ● Student centered activities ● Learning Stations ● Small group & large group discussions ● Problem solving situations ● Restate, reword, clarify directions ● Provide Educational "breaks" as necessary ● Utilize visual and audio cues
English Language Learners	● Step by step examples ● Visual demonstration of skill or activity ● Allow for flexible grouping ● Student centered activities ● Learning Stations ● Small group & large group discussions ● Problem solving situations ● Utilize visual and audio cues ● Highlight, define, or demonstrate important vocabulary ● Restate, reword, clarify directions
Students At-Risk of School Failure	● Step by step examples ● Visual demonstration of skill or activity ● Allow for flexible grouping ● Student centered activities ● Learning Stations ● Small group & large group discussions ● Problem solving situations ● Utilize visual and audio cues ● Highlight, define, or demonstrate important vocabulary ● Restate, reword, clarify directions ● Chunking content into small segments ● Shorten or reduce assignment to focus on one specific skill

Gifted and Talented	- Student Choice - Student centered activities - Enhance skill or activity based on Individual Student Need - Allow for flexible grouping - Problem solving situations
Students with 504 Plans	- Follow 504/IEP accommodations - Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Restate, reword, clarify directions - Provide Educational "breaks" as necessary - Utilize visual and audio cues

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Climate Change Integration

- A.CED.A.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.

Integration of Technology

- 8.1.5.A.1: Select and use the appropriate digital tools and resources to accomplish various tasks including solving problems.
- 8.1.5.A.3: Use graphic organizers to organize information about problems or issues.
- 8.2.2.C.1: Brainstorm ideas on how to solve a problem or build a product.
- 8.2.5.C.4: Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.
- 8.2.8.C.4: Identify the steps in the design process that would be used to solve designated consequences of other technologies and present your findings.
- 8.2.2.D.1: Identify and collect information about a problem that can be solved by technology, generate

ideas to solve the problem, and identify constraints and trade –offs to be considered.
- 8.2.5.D.3: Follow step by step directions to assemble a product or solve a problem.
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Career Education- NJSLS 9

- 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
- 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.
- 9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.

Unit Overview

Content Area: Algebra 1

Unit Title: Unit 4: Radical Expressions and Equations plus Data Analysis and Probability

Grade Level: 9-12   Timeline: Adv: 25 days

Unit Summary:

- Reasoning with Equations & Inequalities: An equation is a statement of equality between two expressions. An equation can often be solved by successively deducing from it one or more simpler equations. Strategic competence in solving included looking ahead for productive manipulations and anticipating the nature and number solutions. Inequalities can be solved by reasoning about the properties of inequality. Many, but not all, of the properties of equality continue to hold for inequalities and can be useful in solving them.
- Interpreting Functions: Functions presented as expressions can model many important phenomena. Two important families of functions characterized by laws of growth are linear functions, which grow at a constant rate, and exponential functions, which grow at a constant percent rate. Linear functions with a constant term of zero describe proportional relationships.
- The Real Number Systems: In high school, students will be exposed to yet another extension of numbers, when the real numbers are augmented by imaginary numbers to form complex numbers.
- Quantities: Quantities have a real application to real world problems. In real world problems, the answers are usually not numbers but quantities: numbers with units, which involves measurement. In high school, students encounter a wider variety of units in modeling, e.g., acceleration, currency conversions, derived quantities such as person-hours and heating degree days, social science rates such as per-capita income, and rates in everyday life such as points scored per game or batting averages.

Instruction

Standard(s) & Math Practice(s)	**Learning Targets (objective) - Students will…**
All levels: ● 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; 37 intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. ● F-IF.B.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. ● F-IF.B.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. ● F.IF.C.7b: Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. ● F-BF.A.1b: Combine standard function types using arithmetic operations. ● 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 (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. ● F-BF.B.4: Find inverse functions. ● 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. ● S.ID.A.1: Represent data on the real number line (dot plots, histograms, and box plots). ● S.ID.A.2: Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ● S-ID.A.3: Interpret differences in shape,	● Simplify radicals and radical expressions ● Graph square root functions ● Use a variety of ways to organize and represent Data (Ex: Matrix, histogram, Box-&-Whisker plot) ● Permutations & Combinations ● The difference between Theoretical and Experimental Probability

center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). ● S-IC.B.5: Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.	
Advanced: ● A.REI(Reasoning with Equations & Inequalities), F.IF(Interpreting Functions), S-ID(Interpreting Categorical & Quantitative Data), A.APR(Arithmetic with Polynomials and Rational Expressions)	
Math Practice Standards: ● MP.1 Make sense of problems and persevere in solving them. ● MP.2 Reason abstractly and quantitatively. ● MP.3 Construct viable arguments & critique the reasoning of others. ● MP.4 Model with mathematics. ● MP.5 Use appropriate tools strategically. ● MP.6 Attend to precision. ● MP.7 Look for and make use of structure.	

Assessments	
Formative	● Independent problems during lessons ● Lesson quizzes
Summative	● Unit Test
Benchmark	● Star Renaissance Math
Alternative	● Teachers will expose students to higher order thinking problems that are like the NJSLA/NJGPA. These tasks will be used as additional support when covering the material in the unit. Students should receive feedback from the teacher on their performance.

Accommodations and Modifications	
Special Education	● Follow 504/IEP accommodations ● Step by step examples ● Visual demonstration of skill or activity ● Allow for flexible grouping

	• Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Restate, reword, clarify directions • Provide Educational "breaks" as necessary • Utilize visual and audio cues
English Language Learners	• Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions
Students At-Risk of School Failure	• Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions • Chunking content into small segments • Shorten or reduce assignment to focus on one specific skill
Gifted and Talented	• Student Choice • Student centered activities • Enhance skill or activity based on Individual Student Need • Allow for flexible grouping • Problem solving situations
Students with 504 Plans	• Follow 504/IEP accommodations • Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Restate, reword, clarify directions • Provide Educational "breaks" as necessary • Utilize visual and audio cues

Resources and Materials

- McGraw Hill Reveal Algebra 1 textbook and resources, Illustrative Mathematics https://www.illustrativemathematics.org/ , & EngageNY https://www.engageny.org/

Interdisciplinary Connections

- NJSLSA.W2: Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
- NJSLSA.W4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

Climate Change Integration

- A.CED.A.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.

Integration of Technology

- 8.1.5.A.1: Select and use the appropriate digital tools and resources to accomplish various tasks including solving problems.
- 8.1.5.A.3: Use graphic organizers to organize information about problems or issues.
- 8.2.2.C.1: Brainstorm ideas on how to solve a problem or build a product.
- 8.2.5.C.4: Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.
- 8.2.8.C.4: Identify the steps in the design process that would be used to solve designated consequences of other technologies and present your findings.
- 8.2.2.D.1: Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade –offs to be considered.
- 8.2.5.D.3: Follow step by step directions to assemble a product or solve a problem.
- 8.2.2.E.1: List and demonstrate the steps to an everyday task.

Career Education- NJSLS 9

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Unit Overview

Content Area: Algebra II

Unit Title: Unit 1 – Linear Functions and Systems

Grade Level: 9-12   **Timeline:** CP: 25-30 Days, Adv.: 22-25 Days, Honors: 20 Days

Unit Summary:

- Expressions: An expression is a record of a computation with numbers, symbols that represent numbers, arithmetic operations, exponentiation, and, at more advanced levels, the operation of evaluating a function. Reading an expression with comprehension involves analysis of its underlying structure. This may suggest a different but equivalent way of writing the expression that exhibits some different aspect of its meaning.

- Equations & Inequalities plus Creating Equations: An equation is a statement of equality between two expressions. An equation can often be solved by successively deducing from it one or more simpler equations. Strategic competence in solving included looking ahead for productive manipulations and anticipating the nature and number solutions. Inequalities can be solved by reasoning about the properties of inequality. Many, but not all, of the properties of equality continue to hold for inequalities and can be useful in solving them.

- Building Functions, Interpreting Functions and Linear & Exponential Models: Functions presented as expressions can model many important phenomena. Two important families of functions characterized by laws of growth are linear functions, which grow at a constant rate, and exponential functions, which grow at a constant percent rate. Linear functions with a constant term of zero describe proportional relationships.

- Interpreting Functions: Functions presented as expressions can model many important phenomena. Two important families of functions characterized by laws of growth are linear functions, which grow at a constant rate, and exponential functions, which grow at a constant percent rate. Linear functions with a constant term of zero describe proportional relationships.

- The Real Number Systems: In high school, students will be exposed to yet another extension of numbers, when the real numbers are augmented by imaginary numbers to form complex numbers.

- Quantities: Quantities have a real application to real world problems. In real world problems, the answers are usually not numbers but quantities: numbers with units, which involves measurement. In high school, students encounter a wider variety of modeling, e.g., acceleration, currency conversions, derived

quantities such as person-hours and heating degree days, social science rates such as per-capita income, and rates in everyday life such as points scored per game or batting averages.

Instruction	
Standard(s) & Math Practice(s)	**Learning Targets (objective) - Students will...**
All Levels: • A.CED.A.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. • F.BF.A.1: Write a function that describes a relationship between two quantities.* • 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. • F.IF.B.4: For a functions 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.* * • F.LE.A.2: Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description, or two input-output pairs (include reading these from a table).	• Write the domain and range of functions using set-builder and interval notations. • Identify key features of a graph of a function, including x- intercepts, y-intercepts, positive and negative intervals, and areas where the function is increasing or decreasing. • Calculate and interpret the average rate of change of a function over a specified interval. • Apply transformations to graph functions and write equations. • Graph and interpret piecewise-defined functions. • Interpret arithmetic sequences and series. • Use graphs and tables to approximate solutions to algebraic equations and inequalities. • Use a variety of tools to solve systems of linear equations and inequalities. • Solve Systems of Equations using Matrices

- REI.D.11: Explain why the x-coordinates of the equation y=f(x) and y=g(x) intersects 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 fox) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.*

Advanced/Honors:

- 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 content. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*
- 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 (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.
- F.IF.A.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)=f91)=1, f(n+1)=f(n)+ F9n-1) for n≥1.
- F.IF.B.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.** ● F.IF.C.7.b: Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. ● REI.C.6: Solve systems of linear equations algebraically (include using the elimination method) and graphically, focusing on pairs of linear equations in two variables. Math Practice Standards: ● MP.1 Make sense of problems and persevere in solving them. ● MP.2 Reason abstractly and quantitatively. ● MP.3 Construct viable arguments & critique the reasoning of others. ● MP.4 Model with mathematics. ● MP.5 Use appropriate tools strategically. ● MP.6 Attend to precision. ● MP.7 Look for and make use of structure.	

Assessments	
Formative	● Independent problems during lessons ● Lesson Quizzes
Summative	● Unit Test
Benchmark	● STAR Renaissance Math
Alternative	● Teachers will expose students to higher order thinking problems that are like the NJSLA/NJGPA. These tasks will be used as additional support when covering the material in the unit. Students should receive feedback from the teacher on their performance.

Accommodations and Modifications	
Special Education	- Follow 504/IEP accommodations - Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Restate, reword, clarify directions - Provide Educational "breaks" as necessary - Utilize visual and audio cues
English Language Learners	- Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Utilize visual and audio cues - Highlight, define, or demonstrate important vocabulary - Restate, reword, clarify directions
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Gifted and Talented	- Student Choice - Student centered activities - Enhance skill or activity based on Individual Student Need - Allow for flexible grouping - Problem solving situations
Students with 504 Plans	- Follow 504/IEP accommodations - Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities

	● Learning Stations ● Small group & large group discussions ● Problem solving situations ● Restate, reword, clarify directions ● Provide Educational "breaks" as necessary ● Utilize visual and audio cues

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● NJSLSA.W4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

Climate Change Integration

● A.CED.A.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.
● F.IF.B.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.*

Integration of Technology

● 8.1.5.A.1: Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
● 8.1.5.A.3: Use graphic organizers to organize information about problem or issue.
● 8.2.2.C.1: Brainstorm ideas on how to solve a problem or build a product.
● 8.2.5.C.4: Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.
● 8.2.8.C.4: Identify the steps in the design process that would be used to solve a designated consequences of other technologies and present your findings.

- 8.2.2.D.1: Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade –offs to be considered.
- 8.2.5.D.3: Follow step by step directions to assemble a product or solve a problem.
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Unit Overview

Content Area: Algebra II

Unit Title: Unit 2 – Quadratic Equations, Quadratic Functions, and Polynomial Functions

Grade Level: 9-12   **Timeline:** CP: 43-52 Days, Adv.: 38-43 Days, Honors: 38 Days

Unit Summary:

- Expressions: An expression is a record of a computation with numbers, symbols that represent numbers, arithmetic operations, exponentiation, and, at more advanced levels, the operation of evaluating a function. Reading an expression with comprehension involves analysis of its underlying structure. This may suggest a different but equivalent way of writing the expression that exhibits some different aspect of its meaning.

- Equations & Inequalities plus Creating Equations: An equation is a statement of equality between two expressions. An equation can often be solved by successively deducing from it one or more simpler equations. Strategic competence in solving included looking ahead for productive manipulations and anticipating the nature and number solutions. Inequalities can be solved by reasoning about the properties of inequality. Many, but not all, of the properties of equality continue to hold for inequalities and can be useful in solving them.

- Building Functions, Interpreting Functions and Linear & Exponential Models: Functions presented as expressions can model many important phenomena. Two important families of functions characterized by laws of growth are linear functions, which grow at a constant rate, and exponential functions, which grow at a constant percent rate. Linear functions with a constant term of zero describe proportional relationships.

- Interpreting Functions: Functions presented as expressions can model many important phenomena. Two important families of functions characterized by laws of growth are linear functions, which grow at a constant rate, and exponential functions, which grow at a constant percent rate. Linear functions with a constant term of zero describe proportional relationships.

- The Real Number Systems: In high school, students will be exposed to yet another extension of numbers, when the real numbers are augmented by imaginary numbers to form complex numbers.

- Quantities: Quantities have a real application to real world problems. In real world problems, the answers are usually not numbers but quantities: numbers with units, which involves measurement. In high school, students encounter a wider variety of modeling, e.g., acceleration, currency conversions, derived quantities such as person-hours and heating degree days, social science rates such as per-capita income, and rates in everyday life such as points scored per game or batting averages.

Instruction	
Standard(s) & Math Practice(s)	**Learning Targets (objective) - Students will...**
All Levels: • F.BF.A.1: Write a function that describes a relationship between two quantities.* • 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 (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.	• Create, graph, and interpret quadratic functions. • Use Standard Form to create a quadratic function. • Add, subtract, and multiply complex numbers. • Use completing the square to transform a quadratic function. • Use the Quadratic Formula to solve quadratic equations that have complex solutions. • Graph, predict, and sketch polynomial functions. • Add, subtract, multiply, and divide

- F.IF.B.4: For a functions 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. *
- F.IF.B.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.*
- F.IF.C.7: Graph a function expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*
- F.IF.C.8: Write a functions defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
- F.IF.C.9: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal description) For example, given a graph of one quadratic function and an algebraic expression as another, say which has the larger maximum.
- A.SSE.A.2: Use the structure of an expression to identify ways to rewrite it. *For example, see x4-y4 as (x2)2-(y2)2, thus recognizing it as a difference of squares that can be factored as (x2-y2)(x2+y2).*
- A.SSE.B.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the

- polynomials.
- Prove polynomial identities.
- Extend polynomial theorems and identities to find real and complex number solutions.

- quantity represented by the Expression.
- A.APR.A.1: Understand that polynomials form a system analogous to the integers, namely, they are closed under the operation of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
- A.APR.B.2: Know and apply the Remainder Theorem: *For a polynomials p(x) and a number a, the reminder 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 when suitable factorization are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
- 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.
- 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), where a(x), b(x), q(x), and r(x) are polynomials with the degrees of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.
- A.REI.C.7: Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. *For example, find the point of intersection between the line y+-3x and the circle x2+y2=3.*
- A.REI.D.11: Explain why the x-coordinates of the equation y=f(x)

and y=g(x) intersects 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 fox) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.*

- N.CN.C.8: (+) Extend polynomial identities to the complex numbers. For example, rewrite x2+4 as (x+2i)(x-2i).
- N.CN.C.9: Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.
- 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.

Advanced/Honors:

- A.APR.C.4: Prove polynomials identify and use them to describe numerical relationships. *For example. The difference of two squares; the sum of difference of two cubes; the polynomials identity (x2+y2)2 +(x2-y2)2 + (2xy)2 can be used to Pythagorean triples.*
- A.REI.B.4: Solve quadratics equations by inspection (e.g., for x2= 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.
- N.CN.A.1: Know there is a complex number i such that $i2=-1$, and every complex number has the form $a+bi$ with a and b real.
- N.CN.A.2: Use the relation $i2=-1$ and the commutative, associative, and

distribute properties to add, subtract, and multiply complex numbers. ● N.CN.A.3: Find the conjugate of a complex number; use conjugate to find moduli and quotients of complex numbers. ● N.CN.C.7: Solve quadratic equations with real coefficients that have complex solutions. Math Practice Standards: ● MP.1 Make sense of problems and persevere in solving them. ● MP.2 Reason abstractly and quantitatively. ● MP.3 Construct viable arguments & critique the reasoning of others. ● MP.4 Model with mathematics. ● MP.5 Use appropriate tools strategically. ● MP.6 Attend to precision. ● MP.7 Look for and make use of structure. ● MP.8 Look for and express regularity in repeating reasoning.	

Assessments	
Formative	● Independent problems during lessons ● Lesson Quizzes
Summative	● Unit Test
Benchmark	● STAR Renaissance Math
Alternative	● Teachers will expose students to higher order thinking problems that are like the NJSLA/NJGPA. These tasks will be used as additional support when covering the material in the unit. Students should receive feedback from the teacher on their performance.

Accommodations and Modifications	
Special Education	- Follow 504/IEP accommodations - Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Restate, reword, clarify directions - Provide Educational "breaks" as necessary - Utilize visual and audio cues
English Language Learners	- Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Utilize visual and audio cues - Highlight, define, or demonstrate important vocabulary - Restate, reword, clarify directions
Students At-Risk of School Failure	- Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Utilize visual and audio cues - Highlight, define, or demonstrate important vocabulary - Restate, reword, clarify directions - Chunking content into small segments - Shorten or reduce assignment to focus on one specific skill
Gifted and Talented	- Student Choice - Student centered activities - Enhance skill or activity based on Individual Student Need - Allow for flexible grouping - Problem solving situations
Students with 504 Plans	- Follow 504/IEP accommodations - Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions

	● Problem solving situations ● Restate, reword, clarify directions ● Provide Educational "breaks" as necessary ● Utilize visual and audio cues

Resources and Materials
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Interdisciplinary Connections
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Climate Change Integration
● F.IF.B.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.*

Integration of Technology
● 8.1.5.A.1: Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems. ● 8.1.5.A.3: Use graphic organizers to organize information about problem or issue. ● 8.2.2.C.1: Brainstorm ideas on how to solve a problem or build a product. ● 8.2.5.C.4: Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models. ● 8.2.8.C.4: Identify the steps in the design process that would be used to solve a designated consequences of other technologies and present your findings. ● 8.2.2.D.1: Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade –offs to be considered. ● 8.2.5.D.3: Follow step by step directions to assemble a product or solve a problem. ● 8.2.2.E.1: List and demonstrate the steps to an everyday task.

Career Education- NJSLS 9

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Unit Overview

Content Area: Algebra II

Unit Title: Unit 3 – Radical Functions, Rational Exponents, Exponential & Logarithmic Functions

Grade Level: 9-12   **Timeline:** CP: 60-69 Days, Adv.: 47-56 Days, Honors: 42-45 Days

Unit Summary:

- Expressions: An expression is a record of a computation with numbers, symbols that represent numbers, arithmetic operations, exponentiation, and, at more advanced levels, the operation of evaluating a function. Reading an expression with comprehension involves analysis of its underlying structure. This may suggest a different but equivalent way of writing the expression that exhibits some different aspect of its meaning.

- Equations & Inequalities plus Creating Equations: An equation is a statement of equality between two expressions. An equation can often be solved by successively deducing from it one or more simpler equations. Strategic competence in solving included looking ahead for productive manipulations and anticipating the nature and number solutions. Inequalities can be solved by reasoning about the properties of inequality. Many, but not all, of the properties of equality continue to hold for inequalities and can be useful in solving them.

- Building Functions, Interpreting Functions and Linear & Exponential Models: Functions presented as expressions can model many important phenomena. Two important families of functions characterized by laws of growth are linear functions, which grow at a constant rate, and exponential functions, which grow at a constant percent rate. Linear functions with a constant term of zero describe proportional relationships.

- Interpreting Functions: Functions presented as expressions can model many important phenomena. Two important families of functions characterized by laws of growth are linear functions, which grow at a constant rate, and

exponential functions, which grow at a constant percent rate. Linear functions with a constant term of zero describe proportional relationships.

- The Real Number Systems: In high school, students will be exposed to yet another extension of numbers, when the real numbers are augmented by imaginary numbers to form complex numbers.

- Quantities: Quantities have a real application to real world problems. In real world problems, the answers are usually not numbers but quantities: numbers with units, which involves measurement. In high school, students encounter a wider variety of modeling, e.g., acceleration, currency conversions, derived quantities such as person-hours and heating degree days, social science rates such as per-capita income, and rates in everyday life such as points scored per game or batting averages.

Instruction	
Standard(s) & Math Practice(s)	**Learning Targets (objective) - Students will…**
All Levels: ● A.SSE.A.2: Use the structure of an expression to identify ways to rewrite it. *For example, see x4-y4 as (x2)2-(y2)2, thus recognizing it as a difference of squares that can be factored as (x2-y2)(x2+y2).* ● A.SSE.A.1a: Interpret parts of an expression, such as terms, factors, and coefficients. ● A.SSE.A.1b: 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.* ● A.SSE.B.3.C: Use the properties of exponents to transform expressions for exponential functions. For the expressions 1.15t can be written as (1.151/12)=1.01212t to reveal the appropriate equivalent monthly interest rate if the annual rate is 15%. ● A.REI.A.1: Explain each step in solving a simple equation as following	● Use inverse variations to write and graph reciprocal functions. ● Graph rational functions by identifying asymptotes and end behavior. ● Rewrite simple rational expressions in different forms using long division. ● Add, Subtract, Multiply, and Divide rational expression. ● Solve rational equations in one variable. ● Identify extraneous solutions to rational equations and give examples of how they arise. ● Find all real nth roots of a number. ● Evaluate expressions with rational exponents. ● Use the properties of exponents and radicals to identify ways to rewrite radical expressions. ● Interpret radical expressions. ● Graph radical functions. ● Solve radical equations with one

- 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.
- A.REI.A.2: Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
- A.REI.D.11: Explain why the x-coordinates of the equation y=f(x) and y=g(x) intersects 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 fox) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.*
- A.CED.A.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.
- 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.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.*
- N.RN.A1: 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 51/3 to be the

- variable.
- Solve radical inequalities and apply the solutions within a real-world context.
- Combine functions by adding, subtracting, multiplying, and dividing and identify the domain result.
- Graph transformations of exponential function.
- Rewrite exponential functions to identify rates.
- Construct exponential models.
- Understand inverse relationships between exponents and logarithms.
- Graph logarithmic functions.
- Write equations that are inverses of exponential and logarithmic functions.
- Solve exponential and logarithmic equations.
- Construct a geometric sequence given a graph, table, or description of a relationship.
- Translate between geometric sequences written in recursive and explicit forms.

- cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.
- N.RN.A.2: Rewrite expressions involving radicals and rational exponents using the properties of exponents.
- F.BF.A.1b: 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 function to the model.*
- *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 (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.*
- F.BF.A.1c: (+) Compare 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.*
- F.IF.A.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)=f91)=1, f(n+1)=f(n)+ F9n-1) for n≥1.
- F.IF.B.4: For a functions 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.* *

- F.IF.B.5: Relate the domain of a function to its graph and, where applicable, to the quantitative relationship 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.**
- F.IF.B.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.*
- F.IF.C.7d: (+) Graph rational functions; identify zeros and asymptotes when suitable factorizations are available, showing end behavior.
- F.IF.C.7e: Graph exponential and logarithmic functions, showing intercepts and end behavior.
- F.IF.C.8: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
- F.IF.C.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.
- 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 (includes reading from a table).
- F.LE.B.5: Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.*
- A.APR.D.6: Rewrite simple rational expressions in different forms; write $a(x)b(x)$ in the form $q(x)+r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degrees of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.
- A.APR.D.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.

Advanced/Honors:

- A.SSE.B.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.
- 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. *For example, f(x)=2x3 or f(x)=9x+1)/(x-1) for x≠1.*
- F.BF.B.4c: (+) Read values of an inverse function from a graph or table, given that the function has an inverse.
- F.IF.C.7b: Graph square root, cube

root, and piecewise-defined functions, including step functions and absolute value functions.

- F.LE.A.4: Understand the inverse relationship between exponents and logarithms. For exponential models, express as a logarithm the solution to $abct=d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.

Math Practice Standards:

- MP.1 Make sense of problems and persevere in solving them.
- MP.2 Reason abstractly and quantitatively.
- MP.3 Construct viable arguments & critique the reasoning of others.
- MP.4 Model with mathematics.
- MP.5 Use appropriate tools strategically.
- MP.6 Attend to precision.
- MP.7 Look for and make use of structure.
- MP.8 Look for and express regularity in repeating reasoning.

Assessments	
Formative	- Independent problems during lessons - Lesson Quizzes
Summative	Unit Test
Benchmark	STAR Renaissance Math
Alternative	Teachers will expose students to higher order thinking problems that are like the NJSLA/NJGPA. These tasks will be used as additional support when covering the material in the unit. Students should receive feedback from the teacher on their performance.

Accommodations and Modifications	
Special Education	- Follow 504/IEP accommodations - Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Restate, reword, clarify directions - Provide Educational "breaks" as necessary - Utilize visual and audio cues
English Language Learners	- Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Utilize visual and audio cues - Highlight, define, or demonstrate important vocabulary - Restate, reword, clarify directions
Students At-Risk of School Failure	- Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Utilize visual and audio cues - Highlight, define, or demonstrate important vocabulary - Restate, reword, clarify directions - Chunking content into small segments - Shorten or reduce assignment to focus on one specific skill
Gifted and Talented	- Student Choice - Student centered activities - Enhance skill or activity based on Individual Student Need - Allow for flexible grouping - Problem solving situations
Students with 504 Plans	- Follow 504/IEP accommodations - Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions

	● Problem solving situations ● Restate, reword, clarify directions ● Provide Educational "breaks" as necessary ● Utilize visual and audio cues
Resources and Materials	
● McGraw Hill Reveal Algebra 1 textbook and resources, Illustrative Mathematics https://www.illustrativemathematics.org/ , & EngageNY https://www.engageny.org/	

Interdisciplinary Connections

- NJSLSA.W2: Write information/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
- NJSLSA.W4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

Climate Change Integration

- A.CED.A.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.
- A.CED.A.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.*

Integration of Technology

- 8.1.5.A.1: Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
- 8.1.5.A.3: Use graphic organizers to organize information about problem or issue.
- 8.2.2.C.1: Brainstorm ideas on how to solve a problem or build a product.
- 8.2.5.C.4: Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.
- 8.2.8.C.4: Identify the steps in the design process that would be used to solve a designated consequences of other technologies and present your findings.
- 8.2.2.D.1: Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade –offs to be considered.
- 8.2.5.D.3: Follow step by step directions to assemble a product or solve a problem.
- 8.2.2.E.1: List and demonstrate the steps to an everyday task.

Career Education- NJSLS 9
9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.   9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.   9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.

Unit Overview
Content Area: Algebra II
Unit Title: Unit 4 – Probability, Data Analysis, and Statistics
Grade Level: 9-12   **Timeline:** CP: 18-20 Days, Adv.: 18-20 Days, Honors: 28-30 Days
Unit Summary: Statistics and Probability: Decisions or predictions are often based on data- numbers in content. These decisions or predictions would be easy if the data always sent a clear message, but the message is often obscured by variability. Statistics provided tools for describing variability in data and for making informed decisions that take it into account.

Instruction	
Standard(s) & Math Practice(s)	**Learning Targets (objective) - Students will...**
Advanced/Honors: - S.IC.B.5: Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. - S.IC.B.4: Use data from a sample survey to estimate a population mean or proportion; develop a margin of	- Use combinations and permutations accurately. - Find experimental and theoretical probability of events. - Use tables to find the probability of an event. - Find the probability of multiple events.

error through the use of simulation models for random sampling. ● S.IC.B.3: Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. ● S.IC.A.1: Understand statistics as a process for making inferences about population parameters based on a random sample from that population. ● S.IC.B.6: Evaluate reports based on data (e.g. interrogate study design, data sources, randomization, the way the data are analyzed and displayed, inferences drawn and methods used; identify and explain misleading uses of data; recognize when arguments based on data are flawed). ● S.CP.A.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"). ● 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, and use this characterization to determine if they are independent. ● S.CP.A.3: Understand the conditional probability of *A* given *B* as *P*(*A* 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*. ● S.CP.A.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.*

- S.CP.A.5: Recognize and explain the NEW 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.*
- 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 answer in terms of the model.
- S.CP.B.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.
- S.CP.B.8: (+) Apply the general Multiplication Rule in a uniform probability model, P9A and B)= P(A)P(BIA)= P(B)p(AIB), and intercept the answer in terms of the model.
- S.CP.B.9: Use permutations and combinations to compute probabilities of compound events and solve problems.
- S.IC.A.2: Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result*

of 5 tails in a row cause you to question the model? ● S.MD.B.6: (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator). ● S.MD.B.7: (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game). ● 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. Math Practice Standards: ● MP.1 Make sense of problems and persevere in solving them. ● MP.2 Reason abstractly and quantitatively. ● MP.3 Construct viable arguments & critique the reasoning of others. ● MP.4 Model with mathematics. ● MP.5 Use appropriate tools strategically. ● MP.6 Attend to precision. ● MP.7 Look for and make use of structure. ● MP.8 Look for and express regularity in repeating reasoning.	

Assessments	
Formative	● Independent problems during lessons ● Lesson Quizzes
Summative	● Unit Test

Benchmark	● STAR Renaissance Math
Alternative	● Teachers will expose students to higher order thinking problems that are like the NJSLA/NJGPA. These tasks will be used as additional support when covering the material in the unit. Students should receive feedback from the teacher on their performance.

Accommodations and Modifications	
Special Education	● Follow 504/IEP accommodations ● Step by step examples ● Visual demonstration of skill or activity ● Allow for flexible grouping ● Student centered activities ● Learning Stations ● Small group & large group discussions ● Problem solving situations ● Restate, reword, clarify directions ● Provide Educational "breaks" as necessary ● Utilize visual and audio cues
English Language Learners	● Step by step examples ● Visual demonstration of skill or activity ● Allow for flexible grouping ● Student centered activities ● Learning Stations ● Small group & large group discussions ● Problem solving situations ● Utilize visual and audio cues ● Highlight, define, or demonstrate important vocabulary ● Restate, reword, clarify directions
Students At-Risk of School Failure	● Step by step examples ● Visual demonstration of skill or activity ● Allow for flexible grouping ● Student centered activities ● Learning Stations ● Small group & large group discussions ● Problem solving situations ● Utilize visual and audio cues ● Highlight, define, or demonstrate important vocabulary ● Restate, reword, clarify directions ● Chunking content into small segments ● Shorten or reduce assignment to focus on one specific skill
Gifted and Talented	● Student Choice ● Student centered activities

	● Enhance skill or activity based on Individual Student Need ● Allow for flexible grouping ● Problem solving situations
Students with 504 Plans	● Follow 504/IEP accommodations ● Step by step examples ● Visual demonstration of skill or activity ● Allow for flexible grouping ● Student centered activities ● Learning Stations ● Small group & large group discussions ● Problem solving situations ● Restate, reword, clarify directions ● Provide Educational "breaks" as necessary ● Utilize visual and audio cues

Resources and Materials

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Interdisciplinary Connections

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● NJSLSA.W4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

Integration of Technology

● 8.1.5.A.1: Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
● 8.1.5.A.3: Use graphic organizers to organize information about problem or issue.
● 8.2.2.C.1: Brainstorm ideas on how to solve a problem or build a product.
● 8.2.5.C.4: Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.
● 8.2.8.C.4: Identify the steps in the design process that would be used to solve a designated consequences of other technologies and present your findings.
● 8.2.2.D.1: Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade –offs to be considered.
● 8.2.5.D.3: Follow step by step directions to assemble a product or solve a problem.
● 8.2.2.E.1: List and demonstrate the steps to an everyday task.

Career Education- NJSLS 9
9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.   9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.   9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.

Unit Overview
Content Area: Geometry
Unit Title: Unit 1 – Foundations of Geometry
Grade Level: 9/10 **Timeline:** College Prep: 32-34 days, Advanced: 27-29 days, Honors: 22-24 days
Unit Summary: During high school, students begin to formalize their geometry experiences from elementary and middle school, using more precise definitions and developing careful proofs. Later in college some students develop Euclidean and other geometries carefully from a small set of axioms.

Instruction	
Standard(s) & Math Practice(s)	**Learning Targets (objective) - Students will...**
All levels: - G-CO.A.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance around a circular arc. - G-CO.C.9 Prove theorems about lines and angles. - G-MG.A.3 Apply geometric methods	- Experiment with transformations in the plane - Prove geometric theorems - Make geometric constructions - Use coordinates to prove simple geometric theorems algebraically - Apply geometric concepts in modeling situations

to solve design problems
- G-GPE.B.5 Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems
- G-MG.A.1 Use geometric shapes, their measures, and their properties to describe objects

Advanced/Honors:

- G-GPE.B.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
- G-CO.D.12 Make formal geometric constructions with a variety of tools and methods

Math Practices:

MP1 Make sense of problems and persevere in solving them.

MP2 Reason abstractly and quantitatively.

MP3 Construct viable arguments and critique the reasoning of others.

MP4 Model with mathematics.

MP5 Use appropriate tools strategically.

MP6 Attend to precision.

MP7 Look for and make use of structure.

Assessments	
Formative	• Independent problems during lessons • Lesson Quizzes
Summative	∉ Unit Test
Benchmark	• STAR Renaissance Math

Alternative	Teachers will expose students to higher order thinking problems that are like the NJSLA/NJGPA. These tasks will be used as additional support when covering the material in the unit. Students should receive feedback from the teacher on their performance. **Domain: G-CO** Congruence G.CO.A.1 G.CO.C.9 G.CO.C.10 G.CO.C.11 G.CO.D.12 **Domain: G-GPE** Expressing Geometric Properties with Equations G.GPE.5 G.GPE.6 **Domain: G-MG** Modeling with Geometry G.MG.A.1 G.MG.A.3

Accommodations and Modifications	
Special Education	● Follow 504/IEP accommodations ● Step by step examples ● Visual demonstration of skill or activity ● Allow for flexible grouping ● Student centered activities ● Learning Stations ● Small group & large group discussions ● Problem solving situations ● Restate, reword, clarify directions ● Provide Educational "breaks" as necessary ● Utilize visual and audio cues
English Language Learners	● Step by step examples ● Visual demonstration of skill or activity ● Allow for flexible grouping ● Student centered activities ● Learning Stations

	● Small group & large group discussions ● Problem solving situations ● Utilize visual and audio cues ● Highlight, define, or demonstrate important vocabulary ● Restate, reword, clarify directions
Students At-Risk of School Failure	● Step by step examples ● Visual demonstration of skill or activity ● Allow for flexible grouping ● Student centered activities ● Learning Stations ● Small group & large group discussions ● Problem solving situations ● Utilize visual and audio cues ● Highlight, define, or demonstrate important vocabulary ● Restate, reword, clarify directions ● Chunking content into small segments ● Shorten or reduce assignment to focus on one specific skill
Gifted and Talented	● Student Choice ● Student centered activities ● Enhance skill or activity based on Individual Student Need ● Allow for flexible grouping ● Problem solving situations
Students with 504 Plans	● Follow 504/IEP accommodations ● Step by step examples ● Visual demonstration of skill or activity ● Allow for flexible grouping ● Student centered activities ● Learning Stations ● Small group & large group discussions ● Problem solving situations ● Restate, reword, clarify directions ● Provide Educational "breaks" as necessary ● Utilize visual and audio cues

Resources and Materials

McGraw Hill Reveal Geometry textbook and resources, Illustrative Mathematics

https://www.illustrativemathematics.org/ , & EngageNY https://www.engageny.org/

Interdisciplinary Connections

- **NJSLSA.R8** Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning and the relevance and sufficiency of the evidence.
- **RST.9-10.5** Analyze the relationships among concepts in a text, including relationships among key terms.

Climate Change Integration
● G-MG.A.3 Apply geometric methods to solve design problems ● G-MG.A.1 Use geometric shapes, their measures, and their properties to describe objects

Integration of Technology
● **8.1.12.DA.1:** Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change. ● **8.1.12.DA.5:** Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

Career Eduation – NJSLS 9
● **9.4.12.CI.1:** Demonstrate the ability to reflect, analyze, and use creative skills and ideas. ● **9.4.12.CT.1:** Identify problem-solving strategies used in the development of an innovative product or practice. ● **9.4.12.IML.3:** Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.

Unit Overview
Content Area: Geometry
Unit Title: Unit 2 – Transformations, Congruence, Similarity
Grade Level: 9/10 **Timeline:** College Prep: 54-56 days, Advanced: 41-43 days Honors: 28-30 days
Unit Summary: ● The concepts of congruence, similarity, and symmetry can be understood from the perspective of geometric transformation. Fundamentals are the rigid motions: translations, rotations, reflections, and combination of these, all of which are here assumed to preserve

distance and angles (and therefore shapes generally).
- Similarity transformation defines similarity in the same way that rigid motions define congruence, thereby formalizing the similarity ideas of "same shape" and "scale factor" developed in the middle grades. These transformations lead to the criterion for triangle similarity that two pairs of corresponding angles are congruent.

Instruction	
Standard(s) & Math Practice(s)	**Learning Targets (objective) - Students will...**
All levels: • **G-SRT.B.5** Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. • **G-CO.C.10** Prove theorems about triangles. • **G-GPE.B.5** Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems • **G-CO.A.2** Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not • **G-CO.A.4** Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. • **G-CO.B.6** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion	• Experiment with transformations in the plane • Understand congruence in terms of rigid motions • Prove geometric theorems • Prove theorems involving similarity • Understand similarity in terms of similarity transformations • Understand and apply theorems about circles • Use coordinates to prove simple geometric theorems algebraically

- on a given figure; given two figures, use definition of congruence in terms of rigid motions to decide if they are congruent.
- **G-CO.A.5** Given a geometric figure and a rotation, reflection, or translation, draws the transformed figure. Specify a sequence of transformations that will carry a given figure onto another.
- **G-CO.B.7** Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent

- **G-CO.B.8** Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.
- **G-SRT.A.1** Verify experimentally the properties of dilation given by a center and a scale factor: a dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged; the dilation of a line segment is longer or shorter in the ratio given by a scale factor
- **G-SRT.A.2** Given two figures use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the

meaning of similarity for triangles as the equality of all corresponding pair of angles and the proportionality of a corresponding pairs of sides. • **G-SRT.A.3** Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. • **G-SRT.B.4** Prove theorems about triangles • **G-C.A.1** Prove that all circles are similar **Advanced/Honors:** • **G-CO.A.3** Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself Math Practices: **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP4** Model with mathematics. **MP6** Attend to precision. **MP7** Look for and make use of structure.	

Assessments	
Formative	• Independent problems during lessons • Lesson Quizzes
Summative	∉ Unit Test

Benchmark	● STAR Renaissance Math
Alternative	Teachers will expose students to higher order thinking problems that are like the NJSLA/NJGPA. These tasks will be used as additional support when covering the material in the unit. Students should receive feedback from the teacher on their performance. **Domain: G-SRT** Similarity, Right Triangles, and Trigonometry G-SRT.A.1 G-SRT.A.2 G-SRT.A.3 G-SRT.B.4 G-SRT.B.5 **Domain: GCO** Congruence G.CO.A.2 G.CO.A.3 G.CO.A.4 G.CO.A.5 G.CO.B.6 G.CO.B.7 G.CO.B.8 **Domain: G-C** Circles G-C.A.1 G-C.A.3

Accommodations and Modifications	
Special Education	- Follow 504/IEP accommodations - Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Restate, reword, clarify directions - Provide Educational "breaks" as necessary - Utilize visual and audio cues
English Language Learners	- Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Utilize visual and audio cues - Highlight, define, or demonstrate important vocabulary - Restate, reword, clarify directions
Students At-Risk of School Failure	- Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Utilize visual and audio cues - Highlight, define, or demonstrate important vocabulary - Restate, reword, clarify directions - Chunking content into small segments - Shorten or reduce assignment to focus on one specific skill
Gifted and Talented	- Student Choice - Student centered activities - Enhance skill or activity based on Individual Student Need - Allow for flexible grouping - Problem solving situations
Students with 504 Plans	- Follow 504/IEP accommodations - Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions

	- Problem solving situations - Restate, reword, clarify directions - Provide Educational "breaks" as necessary - Utilize visual and audio cues

Resources and Materials

McGraw Hill Reveal Geometry textbook and resources, Illustrative Mathematics

https://www.illustrativemathematics.org/ , & EngageNY https://www.engageny.org/

Interdisciplinary Connections

- **RST.9-10.3** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks,
- attending to special cases or exceptions defined in the text.
- **RST.9-10.5** Analyze the relationships among concepts in a text, including relationships among key terms.

Integration of Technology

- **8.1.12.DA.1:** Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
- **8.1.12.DA.5:** Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

Career Eduation – NJSLS 9

- **9.4.12.CI.1:** Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
- **9.4.12.CT.1:** Identify problem-solving strategies used in the development of an innovative product or practice.
- **9.4.12.IML.3:** Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.

Unit Overview
Content Area: Geometry
Unit Title: Unit 3 – Right Triangles, Area, Volume
Grade Level: 9/10 **Timeline:** College Prep: 44-46 days, Advanced: 34-36 days, Honors: 28-30 days
Unit Summary: ● The definitions of sine, cosine, and tangent for acute angles are founded on right triangles and similarity, and, with the Pythagorean Theorem, are fundamental in many real-world and theoretical situations. The Pythagorean Theorem is generalized to non-right triangles by the Law of Cosines. Together, the Law of Sines and Cosines embody the triangle congruence criteria for the cases where three pieces of information suffice to completely solve a triangle.

Instruction	
Standard(s) & Math Practice(s)	**Learning Targets (objective) - Students will...**
All levels: **G-SRT.B.4** Prove theorems about triangles **G-SRT.C.8** Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems **G-SRT.C.6** Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles **G-SRT.C.7** Explain and use the relationship between the sine and cosine of complementary angles **G-GMD.A.1** Give an informal argument for the formulas for the	All Levels ● Prove theorems involving similarity ● Define trigonometric ratios and solve problems involving right triangles ● Explain volume formulas as use them to solve problems ● Apply geometric concepts in modeling situations Advanced/Honors ● Apply trigonometry to general triangles ● Visualize relationships between two-dimensional and three-dimensional objects

circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone

G-GMD.A.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems

G-MG.A.1 Use geometric shapes, their measures, and their properties to describe objects

G-MG.A.2 Apply concepts of density based on area and volume in modeling situations

Advanced/Honors:

G-SRT.D.10 Prove the Law of Sines and Cosines and use them to solve problems

G-SRT.D.11 Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles

G-GMD.B.4 Use coordinates to prove simple geometric theorems algebraically

G-GMD.A.2 Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures

Math Practices:

MP1 Make sense of problems and persevere in solving them.

MP3 Construct viable arguments and critique the reasoning of others.

MP4 Model with mathematics.

MP5 Use appropriate tools strategically.

MP6 Attend to precision.

MP7 Look for and make use of structure.

MP8 Look for and express regularity in repeated reasoning.

Assessments	
Formative	- Independent problems during lessons - Lesson Quizzes
Summative	∉ Unit Test
Benchmark	STAR Renaissance Math
Alternative	Teachers will expose students to higher order thinking problems that are like the NJSLA/NJGPA. These tasks will be used as additional support when covering the material in the unit. Students should receive feedback from the teacher on their performance. **Domain: G-SRT** Similarity, Right Triangles, and Trigonometry G-SRT.B.4 G-SRT.C.6 G-SRT.C.7 G-SRT.C.8 **Domain: G-GMD** Geometric Measurement and Dimension G-GMD.A.1 G-GMD.A.2 G-GMD.A.3 G-GMD.B.4 **Domain: G-MG** Modeling with Geometry G-MG.A.1 G-MG.A.2

Accommodations and Modifications	
Special Education	• Follow 504/IEP accommodations • Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Restate, reword, clarify directions • Provide Educational "breaks" as necessary • Utilize visual and audio cues
English Language Learners	• Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions
Students At-Risk of School Failure	• Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions • Chunking content into small segments • Shorten or reduce assignment to focus on one specific skill
Gifted and Talented	• Student Choice • Student centered activities • Enhance skill or activity based on Individual Student Need • Allow for flexible grouping • Problem solving situations
Students with 504 Plans	• Follow 504/IEP accommodations • Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions

	● Problem solving situations ● Restate, reword, clarify directions ● Provide Educational "breaks" as necessary ● Utilize visual and audio cues

Resources and Materials

McGraw Hill Reveal Geometry textbook and resources, Illustrative Mathematics
https://www.illustrativemathematics.org/ , & EngageNY https://www.engageny.org/

Interdisciplinary Connections

- **RST.9-10.3** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
- **RST.9-10.5** Analyze the relationships among concepts in a text, including relationships among key terms.

Climate Change Integration

- G-MG.A.3 Apply geometric methods to solve design problems
- G-MG.A.1 Use geometric shapes, their measures, and their properties to describe objects

Integration of Technology

- **8.1.12.DA.1:** Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
- **8.1.12.DA.5:** Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

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- **9.4.12.CI.1:** Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
- **9.4.12.CT.1:** Identify problem-solving strategies used in the development of an innovative product or practice.
- **9.4.12.IML.3:** Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.

Unit Overview
Content Area: Geometry
Unit Title: Unit 4- Polygons and Circles
Grade Level: 9/10 **Timeline:** College Prep: 34-36 days, Advanced: 25-27 days, Honors: 28-30 days
Unit Summary: ● Analytic geometry connects algebra and geometry, resulting in powerful methods of analysis and problem solving. Just as the number line associates numbers with locations in one dimension. A pair of perpendicular axes associates pairs of numbers with locations in two dimensions. This correspondence between numerical coordinates and geometric points allows methods from algebra to be applied to geometry and vice versa.

Instruction	
Standard(s) & Math Practice(s)	**Learning Targets (objective) - Students will...**
All levels: **G-CO.C.9** Prove theorems about lines and angles **G-CO.C.10** Prove theorems about triangles **G-CO.C.11** Prove theorems about parallelograms **G-C.A.3** Construct the inscribed and circumscribed circles of a triangles, and prove properties of angles for a quadrilateral inscribed in a circle **G-SRT.B.5** Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures **G-GPE.B.7** Use coordinates to compute perimeters of polygons and areas of triangles and rectangles	All levels ● prove geometric theorems ● prove theorems involving similarity ● understand and apply theorems about circles ● experiment with transformations in the plane Advanced/Honors ● find arc lengths and areas of sectors of circles Honors only ● use coordinates to prove simple geometric theorems algebraically ● translate between the geometric descriptions and the equation for a conic section ●

Advanced/Honors:

G-CO.A.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc

G-GPE.A.1 Derive the equation of a circle of given center and radius using Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation

G-C.A.2 Identify and describe relationships among inscribed angles, radii, and chords

G-C.B.5 Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector

G-GPE.B.4 Use coordinates to prove simple geometric theorems algebraically

G-GPE.A.2 Derive the equation of a parabola given a focus and directrix

Assessments	
Formative	● Independent problems during lessons ● Lesson Quizzes
Summative	∉ Unit Test
Benchmark	● STAR Renaissance Math

Alternative	Teachers will expose students to higher order thinking problems that are like the NJSLA/NJGPA. These tasks will be used as additional support when covering the material in the unit. Students should receive feedback from the teacher on their performance. **Domain: G-CO** Congruence G-CO.A.1 G-CO.C.9 G-CO.C.10 **Domain: G-C** Circles G-C.A.3 **Domain: G-SRT** Similarity, Right Triangles, and Trigonometry G-SRT.B.5 **Domain: G-GPE** Expressing Geometric Properties with Equation G-GPE.A.1 G-GPE.A.2 G-GPE.B.4 G-GPE.B.7
Accommodations and Modifications	
Special Education	● Follow 504/IEP accommodations ● Step by step examples ● Visual demonstration of skill or activity ● Allow for flexible grouping ● Student centered activities ● Learning Stations ● Small group & large group discussions ● Problem solving situations ● Restate, reword, clarify directions ● Provide Educational "breaks" as necessary ● Utilize visual and audio cues
English Language Learners	● Step by step examples ● Visual demonstration of skill or activity

	● Allow for flexible grouping ● Student centered activities ● Learning Stations ● Small group & large group discussions ● Problem solving situations ● Utilize visual and audio cues ● Highlight, define, or demonstrate important vocabulary ● Restate, reword, clarify directions
Students At-Risk of School Failure	● Step by step examples ● Visual demonstration of skill or activity ● Allow for flexible grouping ● Student centered activities ● Learning Stations ● Small group & large group discussions ● Problem solving situations ● Utilize visual and audio cues ● Highlight, define, or demonstrate important vocabulary ● Restate, reword, clarify directions ● Chunking content into small segments ● Shorten or reduce assignment to focus on one specific skill
Gifted and Talented	● Student Choice ● Student centered activities ● Enhance skill or activity based on Individual Student Need ● Allow for flexible grouping ● Problem solving situations
Students with 504 Plans	● Follow 504/IEP accommodations ● Step by step examples ● Visual demonstration of skill or activity ● Allow for flexible grouping ● Student centered activities ● Learning Stations ● Small group & large group discussions ● Problem solving situations ● Restate, reword, clarify directions ● Provide Educational "breaks" as necessary ● Utilize visual and audio cues ●

Resources and Materials
McGraw Hill Reveal Geometry textbook and resources, Illustrative Mathematics https://www.illustrativemathematics.org/ , & EngageNY https://www.engageny.org/

Interdisciplinary Connections

- **RST.9-10.3** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
- **RST.9-10.5** Analyze the relationships among concepts in a text, including relationships among key terms.

Integration of Technology

- **8.1.12.DA.1:** Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
- **8.1.12.DA.5:** Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

Career Eduation – NJSLS 9

- **9.4.12.CI.1:** Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
- **9.4.12.CT.1:** Identify problem-solving strategies used in the development of an innovative product or practice.
- **9.4.12.IML.3:** Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.

Unit Overview

Content Area: Statistics

Unit Title: Unit 1 – Introduction to Statistics

Grade Level: 11/12
Timeline: 15 days

Unit Summary:
(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.
(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.
(3) Investigate, research, and synthesize various information from a variety of media sources.

Goal 1: The student will be able to use basis of language of statistics while collecting data and classifying the various data types.

Student Learning Outcome: Student will describe data with descriptive statistics.

Instruction	
Standard(s) & Math Practice(s)	**Learning Targets (objective) - Students will...**
- S-IC.A.1-2 - S-ID.B.3, 5 - S-IC B-4 Math Practices: **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP4** Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure.	- classify and collect data - distinguish between descriptive and inferential statistics - distinguish between quantitative and qualitative data - know considerations when collecting data, including technique and ethical concerns - design a statistical study - design a sample with and without bias using various sampling techniques

Assessments	
Formative	- Independent problems during lessons - Lesson Quizzes
Summative	Unit Test
Benchmark	STAR Renaissance Math
Alternative	ACCC Math 220 – Lab #2 Case Study Rating Television Shows Real Statistics – Real Decisions project

Accommodations and Modifications	
Special Education	- Follow 504/IEP accommodations - Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Restate, reword, clarify directions - Provide Educational "breaks" as necessary - Utilize visual and audio cues

English Language Learners	• Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions
Students At-Risk of School Failure	• Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions • Chunking content into small segments • Shorten or reduce assignment to focus on one specific skill
Gifted and Talented	• Student Choice • Student centered activities • Enhance skill or activity based on Individual Student Need • Allow for flexible grouping • Problem solving situations
Students with 504 Plans	• Follow 504/IEP accommodations • Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Restate, reword, clarify directions • Provide Educational "breaks" as necessary • Utilize visual and audio cues

Resources and Materials

BFW Publishers "The Practice of Statistics" 5th edition; AP classroom

"Elementary Statistics" 6th edition

Interdisciplinary Connections
• **NJSLSA.R8** Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning and the relevance and sufficiency of the evidence.   • **RST.9-10.5** Analyze the relationships among concepts in a text, including relationships among key terms.

Integration of Technology
• 8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

Career Education – NJSLS 9
• 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.   • 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving

Unit Overview
Content Area: Statistics
Unit Title: Unit 2 - Descriptive Statistics
Grade Level: 11/12   **Timeline:** 15 days
Unit Summary: (1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.   (2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.   (3) Investigate, research, and synthesize various information from a variety of media sources.   Goal 2: The student will be able to organization and description of data sets to make data easier to understand by describing trends, averages, and variations   Student Learning Outcome: Student will build frequency distributions and present statistical results graphically; Student will describe data with descriptive statistics

Instruction	
Standard(s) & Math Practice(s)	**Learning Targets (objective) - Students will...**

• S-ID.A.1-4 • S-ID.B.5-6 Math Practices: **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP4** Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure.	• organize and describe data sets • graph and interpret quantitative data sets using histograms, stem and dot plots, pie charts, scatter plots and time series charts • describe data with measures of central tendency, variation, and/or position • interpret numerical descriptions of data sets • find variance and standard deviation od a population and sample • use coefficient of variation to compare variation in different data sets • use quartiles to describe data sets • interpret other fractals such as percentiles and how to find percentiles • find and interpret the standard score?

Assessments	
Formative	• Independent problems during lessons • Lesson Quizzes
Summative	• Unit Test
Benchmark	• STAR Renaissance Math
Alternative	ACCC Math 220 – Lab #1 Case Study Business Size Real Statistics – Real Decisions project

Accommodations and Modifications	
Special Education	• Follow 504/IEP accommodations • Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Restate, reword, clarify directions • Provide Educational "breaks" as necessary • Utilize visual and audio cues
English Language Learners	• Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues

	• Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions
Students At-Risk of School Failure	• Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions • Chunking content into small segments • Shorten or reduce assignment to focus on one specific skill
Gifted and Talented	• Student Choice • Student centered activities • Enhance skill or activity based on Individual Student Need • Allow for flexible grouping • Problem solving situations
Students with 504 Plans	• Follow 504/IEP accommodations • Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Restate, reword, clarify directions • Provide Educational "breaks" as necessary • Utilize visual and audio cues

Resources and Materials

BFW Publishers "The Practice of Statistics" 5th edition; AP classroom

"Elementary Statistics" 6th edition

Interdisciplinary Connections
• **NJSLSA.R8** Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning and the relevance and sufficiency of the evidence. • **RST.9-10.5** Analyze the relationships among concepts in a text, including relationships among key terms.
Climate Change
• S-ID.A.1: Represent data with plots on the real number line (dot plots, histograms, and box plots)

Integration of Technology
• 8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

Career Education – NJSLS 9
• 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.
• 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving

Unit Overview

Content Area: Statistics

Unit Title: Unit 3 - Probability

Grade Level: 11/12
Timeline: 15 days

Unit Summary:
(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.
(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.
(3) Investigate, research, and synthesize various information from a variety of media sources.

Goal 3: The student will be able to determine the probability of an event.

Student Learning Outcome: Student will apply counting techniques to probability and discrete probability distributions

Instruction	
Standard(s) & Math Practice(s)	**Learning Targets (objective) - Students will...**
S-CP.A.1-3 S-CP.B.1 S-CP.B.7-9 S-MD.B.5-7 Math Practices: **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP4** Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure.	• determine sample space • use the Fundamental Counting Principle • you find and apply classical, subjective, and experimental probability • find conditional probability • find and apply Addition and Multiplication Rule for probability • use permutations and combinations

Assessments	
Formative	• Independent problems during lessons • Lesson Quizzes
Summative	• Unit Test
Benchmark	• STAR Renaissance Math
Alternative	ACCC Math 220 – Lab #3 Free Throw Outcome Probability Activity Case Study: United States Congress Real Statistics-Real Decisions

Accommodations and Modifications	
Special Education	• Follow 504/IEP accommodations • Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Restate, reword, clarify directions • Provide Educational "breaks" as necessary • Utilize visual and audio cues
English Language Learners	• Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions
Students At-Risk of School Failure	• Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions • Chunking content into small segments • Shorten or reduce assignment to focus on one specific skill

Gifted and Talented	- Student Choice - Student centered activities - Enhance skill or activity based on Individual Student Need - Allow for flexible grouping - Problem solving situations
Students with 504 Plans	- Follow 504/IEP accommodations - Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Restate, reword, clarify directions - Provide Educational "breaks" as necessary - Utilize visual and audio cues

Resources and Materials

BFW Publishers "The Practice of Statistics" 5th edition; AP classroom

"Elementary Statistics" 6th edition

Interdisciplinary Connections

- **NJSLSA.R8** Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning and the relevance and sufficiency of the evidence.
- **RST.9-10.5** Analyze the relationships among concepts in a text, including relationships among key terms.

Integration of Technology

- 8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

Career Education – NJSLS 9

- 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.
- 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving

Unit Overview
Content Area: Statistics
Unit Title: Unit 4 - Discrete Probability Distributions
Grade Level: 11/12   **Timeline:** 22 days
Unit Summary: (1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.   (2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.   (3) Investigate, research, and synthesize various information from a variety of media sources.   Goal 4: The student will be able to create and use probability distributions.   Student Learning Outcome: Student will construct and employ confidence intervals

Instruction	
Standard(s) & Math Practice(s)	**Learning Targets (objective) - Students will...**
S-MD.A.1-4 Math Practices: **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP4** Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure.	• construct and graph discrete probability distributions • find the mean, variance, and standard deviation of a discrete probability distribution • expected value of a discrete probability distribution • find binomial probabilities using, formulas, table, and technology • construct and graph a binomial distribution • find the mean, variance, and standard deviation of a binomial probability distribution

Assessments	
Formative	• Independent problems during lessons • Lesson Quizzes
Summative	• Unit Test
Benchmark	• STAR Renaissance Math
Alternative	ACCC Math 220 – Lab #4 Case Study Distribution of hit in baseball games Real Statistics – Real Decisions project

Accommodations and Modifications	
Special Education	• Follow 504/IEP accommodations • Step by step examples

	• Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Restate, reword, clarify directions • Provide Educational "breaks" as necessary • Utilize visual and audio cues
English Language Learners	• Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions
Students At-Risk of School Failure	• Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions • Chunking content into small segments • Shorten or reduce assignment to focus on one specific skill
Gifted and Talented	• Student Choice • Student centered activities • Enhance skill or activity based on Individual Student Need • Allow for flexible grouping • Problem solving situations
Students with 504 Plans	• Follow 504/IEP accommodations • Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Restate, reword, clarify directions • Provide Educational "breaks" as necessary • Utilize visual and audio cues

Resources and Materials
BFW Publishers "The Practice of Statistics" 5th edition; AP classroom
"Elementary Statistics" 6th edition

Interdisciplinary Connections

- **NJSLSA.R8** Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning and the relevance and sufficiency of the evidence.
- **RST.9-10.5** Analyze the relationships among concepts in a text, including relationships among key terms.

Integration of Technology

- 8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

Career Education – NJSLS 9

- 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.
- 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving

Unit Overview

Content Area: Statistics

Unit Title: Unit 5 - Normal Probability Distributions

Grade Level: 11/12
Timeline: 23 days

Unit Summary:
(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.
(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.
(3) Investigate, research, and synthesize various information from a variety of media sources.

Goal 5: The student will be able to recognize normal distributions and apply their properties to real-life situations.

Student Learning Outcome: Student will apply the Normal distribution, confidence intervals, sample size, hypothesis testing, analysis of variance, correlation, and regressio nto obtain statistical results with which they will draw conclusions.

Instruction

Standard(s) & Math Practice(s)	Learning Targets (objective) - Students will...

S-ID.A.3-4	• interpret graphs of normal probability distributions
Math Practices: **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP4** Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure.	• find area under the standard normal curve • find probabilities for normal distributions using a table and technology • find z-score and transform it to an x-value • apply normal distribution to find data • find and verify sampling distribution • interpret the Central Limit Theorem • apply the Central Limit Theorem to find the probability of a sample mean

Assessments	
Formative	• Independent problems during lessons • Lesson Quizzes
Summative	• Unit Test
Benchmark	• STAR Renaissance Math
Alternative	ACCC Math 220 – Lab #3 Case Study: Birth Weights in America Real Statistics – Real Decisions project

Accommodations and Modifications	
Special Education	• Follow 504/IEP accommodations • Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Restate, reword, clarify directions • Provide Educational "breaks" as necessary • Utilize visual and audio cues
English Language Learners	• Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions
Students At-Risk of	• Step by step examples

School Failure	• Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions • Chunking content into small segments • Shorten or reduce assignment to focus on one specific skill
Gifted and Talented	• Student Choice • Student centered activities • Enhance skill or activity based on Individual Student Need • Allow for flexible grouping • Problem solving situations
Students with 504 Plans	• Follow 504/IEP accommodations • Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Restate, reword, clarify directions • Provide Educational "breaks" as necessary • Utilize visual and audio cues

Resources and Materials
BFW Publishers "The Practice of Statistics" 5th edition; AP classroom

Interdisciplinary Connections
• **NJSLSA.R8** Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning and the relevance and sufficiency of the evidence. • **RST.9-10.5** Analyze the relationships among concepts in a text, including relationships among key terms.

Integration of Technology
• 8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

Career Education – NJSLS 9
• 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice. • 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving

Unit Overview
Content Area: Statistics
Unit Title: Unit 6 - Confidence Intervals
Grade Level: 11/12   **Timeline:** 15 days
Unit Summary: (1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.   (2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.   (3) Investigate, research, and synthesize various information from a variety of media sources.   Goal 6: The student will be able to make a meaningful estimate by specifying an interval of values on a number line, together with a statement of how confident you are that your interval contains the population parameter.   Student Learning Outcome: Student will construct and employ confidence intervals.

Instruction	
Standard(s) & Math Practice(s)	**Learning Targets (objective) - Students will...**
S-IC.A S-IC.B.3-6 Math Practices: **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP4** Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure.	• know inferential statistics • find point estimate and margin of error • construct and interpret confidence intervals for a population mean when σ is known • determine the minimum sample size required when estimating a population sample size • construct and interpret confidence intervals for a population mean when σ is unknown • construct and interpret confidence intervals for a population proportion • determine the minimum sample size required when estimation a population proportion

Assessments	
Formative	• Independent problems during lessons • Lesson Quizzes
Summative	• Unit Test
Benchmark	• STAR Renaissance Math
Alternative	ACCC Math 220 – Lab #3 Case Study: Marathon Training Real Statistics – Real Decisions project

Accommodations and Modifications	
Special Education	- Follow 504/IEP accommodations - Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Restate, reword, clarify directions - Provide Educational "breaks" as necessary - Utilize visual and audio cues
English Language Learners	- Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Utilize visual and audio cues - Highlight, define, or demonstrate important vocabulary - Restate, reword, clarify directions
Students At-Risk of School Failure	- Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions - Problem solving situations - Utilize visual and audio cues - Highlight, define, or demonstrate important vocabulary - Restate, reword, clarify directions - Chunking content into small segments - Shorten or reduce assignment to focus on one specific skill
Gifted and Talented	- Student Choice - Student centered activities - Enhance skill or activity based on Individual Student Need - Allow for flexible grouping - Problem solving situations
Students with 504 Plans	- Follow 504/IEP accommodations - Step by step examples - Visual demonstration of skill or activity - Allow for flexible grouping - Student centered activities - Learning Stations - Small group & large group discussions

	- Problem solving situations - Restate, reword, clarify directions - Provide Educational "breaks" as necessary - Utilize visual and audio cues

Resources and Materials

BFW Publishers "The Practice of Statistics" 5th edition; AP classroom

"Elementary Statistics" 6th edition

Interdisciplinary Connections

- **NJSLSA.R8** Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning and the relevance and sufficiency of the evidence.
- **RST.9-10.5** Analyze the relationships among concepts in a text, including relationships among key terms.

Integration of Technology

- 8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

Career Education – NJSLS 9

- 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.
- 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving

Unit Overview

Content Area: Statistics

Unit Title: Unit 7 - Hypothesis Testing

Grade Level: 11/12
Timeline: 15 days

Unit Summary:
(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.
(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.
(3) Investigate, research, and synthesize various information from a variety of media sources.

Goal 7: The student will be able to test a claim about a parameter.

Student Learning Outcome: Student will construct and employ confidence intervals

Student Learning Outcome: Student will apply the Normal distribution, confidence intervals, sample size, hypothesis testing, analysis of variance, correlation, and regression to obtain statistical results with which they will draw conclusions.

Goal 8: The student will be able to test a hypothesis that compares two populations.

Student Learning Outcome: Student will apply the Normal distribution, confidence intervals, sample size, hypothesis testing, analysis of variance, correlation, and regression to obtain statistical results with which they will draw conclusions.

Instruction	
Standard(s) & Math Practice(s)	**Learning Targets (objective) - Students will...**
S-IC.B Math Practices: **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP4** Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure.	- know a hypothesis test - state a hypothesis - know error types and interpret the level of significance - use one-tail or tow-tailed statistical test and find p-value - make and interpret a decision based on the results of a statistical test - find and interpret P-values - use P-values for a z-test for a mean when μ and σ is known - find critical values and rejection regions of a standard normal distribution - use rejection regions for a z-test for a mean μ when σ is known - use z-test to test a population proportion - determine whether two samples are independent or dependent - perform a two-sample z-test for the difference between two means using independent samples $\sigma 1$ and $\sigma 2$ known - know how to complete a hypothesis test for a difference between two variances

Assessments	
Formative	- Independent problems during lessons - Lesson Quizzes
Summative	Unit Test
Benchmark	STAR Renaissance Math
Alternative	ACCC Math 220 – Lab #4 Case Study: Human Body Temperature What's Normal Real Statistics – Real Decisions project

Accommodations and Modifications	
Special Education	• Follow 504/IEP accommodations • Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Restate, reword, clarify directions • Provide Educational "breaks" as necessary • Utilize visual and audio cues
English Language Learners	• Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions
Students At-Risk of School Failure	• Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions • Chunking content into small segments • Shorten or reduce assignment to focus on one specific skill
Gifted and Talented	• Student Choice • Student centered activities • Enhance skill or activity based on Individual Student Need • Allow for flexible grouping • Problem solving situations
Students with 504 Plans	• Follow 504/IEP accommodations • Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions

	• Problem solving situations
	• Restate, reword, clarify directions
	• Provide Educational "breaks" as necessary
	• Utilize visual and audio cues

Resources and Materials

BFW Publishers "The Practice of Statistics" 5th edition; AP classroom

"Elementary Statistics" 6th edition

Interdisciplinary Connections

- **NJSLSA.R8** Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning and the relevance and sufficiency of the evidence.
- **RST.9-10.5** Analyze the relationships among concepts in a text, including relationships among key terms.

Integration of Technology

- 8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

Career Education – NJSLS 9

- 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.
- 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving

Unit Overview

Content Area: Statistics

Unit Title: Unit 8 - Correlation and Regression

Grade Level: 11/12
Timeline: 22 days

Unit Summary:
(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.
(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.
(3) Investigate, research, and synthesize various information from a variety of media sources.

Goal 9: The student will be able to calculate and apply properties of correlation and regression to real-life problems.

Student Learning Outcome: Student will apply the normal distribution, confidence intervals, sample size, hypothesis testing, analysis of variance, correlation, and regression to obtain statistical results with which they will draw conclusions

Instruction	
Standard(s) & Math Practice(s)	**Learning Targets (objective) - Students will...**
S-ID.B.5-6 S-ID.C.7-9 <u>Math Practices:</u> **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP4** Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure.	• know correlation and types of correlation • find correlation coefficient • test a population correlation coefficient ρ using a table • perform a hypothesis test for a population correlation coefficient • determine between correlation and causation • find the equation of a regression line • predict *y*-values using a regression equation • interpret the three types of variation about a regression line • find and interpret the coefficient of determination • find and interpret the standard error of estimate for a regression line • construct and interpret a prediction interval for *y* • use technology to find and interpret correlation and multiple regression • use multiple regression to predict *y*-values

Assessments	
Formative	• Independent problems during lessons • Lesson Quizzes
Summative	• Unit Test
Benchmark	• STAR Renaissance Math
Alternative	ACCC Math 220 – Lab #5 Real Statistics – Real Decisions project

Accommodations and Modifications	
Special Education	• Follow 504/IEP accommodations • Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations

	• Small group & large group discussions • Problem solving situations • Restate, reword, clarify directions • Provide Educational "breaks" as necessary • Utilize visual and audio cues
English Language Learners	• Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions
Students At-Risk of School Failure	• Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions • Chunking content into small segments • Shorten or reduce assignment to focus on one specific skill
Gifted and Talented	• Student Choice • Student centered activities • Enhance skill or activity based on Individual Student Need • Allow for flexible grouping • Problem solving situations
Students with 504 Plans	• Follow 504/IEP accommodations • Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Restate, reword, clarify directions • Provide Educational "breaks" as necessary • Utilize visual and audio cues

Resources and Materials
BFW Publishers "The Practice of Statistics" 5th edition; AP classroom "Elementary Statistics" 6th edition

Interdisciplinary Connections

- **NJSLSA.R8** Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning and the relevance and sufficiency of the evidence.
- **RST.9-10.5** Analyze the relationships among concepts in a text, including relationships among key terms.

Integration of Technology

- 8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

Career Education – NJSLS 9

- 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.
- 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving

Unit Overview

Content Area: Statistics

Unit Title: Unit 9 - Chi-Square

Grade Level: 11/12
Timeline: 23 days

Unit Summary:
(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.
(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.
(3) Investigate, research, and synthesize various information from a variety of media sources.

Goal 10: The student will be able to use ANOVA to determine if there is a significant difference among three or more means.

Student learning outcomes: Student will apply the normal distribution, confidence intervals, sample size, hypothesis testing, analysis of variance, correlation, and regression to obtain statistical results with which they will draw conclusions; Student will use technology to help solve problems, experiment, analysis results, interpret results, and verify conclusions

Instruction

Standard(s) & Math Practice(s)	Learning Targets (objective) - Students will...
aligns with college-level standards not High school level but is an important part of the Statistics course Math Practices: **MP1** Make sense of problems and persevere in	- know a Chi-Square distribution - find critical values for a chi-square test - use the chi-square distribution to test whether a frequency distribution fits an expected distribution

solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP4** Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure.	• use a contingency table • use a chi-square distribution to test whether two variables are independent • interpret *F*-distribution and use *F*-table to find critical values (Honors Statistics only) • perform a two-sample *F*-test to compare two variances (Honors statistics only) • use analysis of variance to test claims involving three or more means (Honors Statistics only)

Assessments	
Formative	• Independent problems during lessons • Lesson Quizzes
Summative	• Unit Test
Benchmark	• STAR Renaissance Math
Alternative	ACCC Math 220 – Lab #6 Real Statistics – Real Decisions project Case Study: Food Safety Survey

Accommodations and Modifications	
Special Education	• Follow 504/IEP accommodations • Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Restate, reword, clarify directions • Provide Educational "breaks" as necessary • Utilize visual and audio cues
English Language Learners	• Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions
Students At-Risk of School Failure	• Step by step examples • Visual demonstration of skill or activity

	• Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Utilize visual and audio cues • Highlight, define, or demonstrate important vocabulary • Restate, reword, clarify directions • Chunking content into small segments • Shorten or reduce assignment to focus on one specific skill
Gifted and Talented	• Student Choice • Student centered activities • Enhance skill or activity based on Individual Student Need • Allow for flexible grouping • Problem solving situations
Students with 504 Plans	• Follow 504/IEP accommodations • Step by step examples • Visual demonstration of skill or activity • Allow for flexible grouping • Student centered activities • Learning Stations • Small group & large group discussions • Problem solving situations • Restate, reword, clarify directions • Provide Educational "breaks" as necessary • Utilize visual and audio cues

Resources and Materials

BFW Publishers "The Practice of Statistics" 5th edition; AP classroom

"Elementary Statistics" 6th edition

Interdisciplinary Connections

- **NJSLSA.R8** Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning and the relevance and sufficiency of the evidence.
- **RST.9-10.5** Analyze the relationships among concepts in a text, including relationships among key terms.

Integration of Technology

- 8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

Career Education – NJSLS 9

- 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.
- 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving