Kingsway Regional School District

Committed to Excellence

Course Name: Advanced Algebra	**Grade Level(s): 8th**
Department: Mathematics	**Credits: 1.0 High School**
BOE Adoption Date: October 2017	**Revision Date(s): October 2018**

ABSTRACT

The fundamental purpose of 8th Grade Algebra I is to formalize and extend the mathematics that students learned through the end of seventh grade. The critical areas, called units, deepen and extend understanding of linear and exponential relationships by contrasting them with each other and by applying linear models to data that exhibit a linear trend. In addition, the units will introduce methods for analyzing and using quadratic functions, including manipulating expressions for them, and solving quadratic equations. Students understand and apply the Pythagorean Theorem, and use quadratic functions to model and solve problems. The Mathematical Practice Standards apply throughout each course and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

This course differs from High School Algebra I in that it contains content from 8th grade. While coherence is retained, in that it logically builds from the Accelerated 7th Grade, the additional content when compared to the high school course demands a faster pace for instruction and learning. The critical areas are as follows:

Critical Area 1: Work with quantities and rates, including simple linear expressions and equations forms the foundation for this unit. Students use units to represent problems algebraically and graphically, and to guide the solution of problems. Student experience with quantity provides a foundation for the study of expressions, equations, and functions. This unit builds on earlier experiences with equations by asking students to analyze and explain the process of solving an equation. Students develop fluency writing, interpreting, and translating between various forms of linear equations and inequalities, and using them to solve problems. They master the solution of linear equations and apply related solution techniques and the laws of exponents to the creation and solution of simple exponential equations.

Critical Area 2: Building on earlier work with linear relationships, students learn function notation and language for describing characteristics of functions, including the concepts of domain and range. They explore many examples of functions, including sequences; they interpret functions given graphically, numerically, symbolically, and verbally, translate between representations, and understand the limitations of various representations. They work with functions given by graphs and tables, keeping in mind that depending upon the context, these representations are likely to be approximate and incomplete. Their work includes functions that can be described or approximated by formulas as well as those that cannot. When functions describe relationships between quantities arising from a context, students reason with the units in which those quantities are measured. Students explore systems of equations and inequalities, and they find and interpret their solutions. Students build on and informally extend their understanding of integral exponents to consider exponential functions. They compare and contrast linear and exponential functions, distinguishing between additive and multiplicative change. They interpret arithmetic sequences as linear functions and geometric sequences as exponential functions.

Critical Area 3: Students use regression techniques to describe relationships between quantities. They use graphical representations and knowledge of the context to make judgments about the appropriateness of linear models. With linear models, they look at residuals to analyze the goodness of fit.

Critical Area 4: In this unit, students build on their knowledge from unit 2, where they extended the laws of exponents to rational exponents. Students apply this new understanding of number and strengthen their ability to see structure in and create quadratic and exponential expressions. They create and solve equations, inequalities, and systems of equations involving quadratic expressions.

Critical Area 5: In preparation for work with quadratic relationships students explore distinctions between rational and irrational numbers. They consider quadratic functions, comparing the key characteristics of quadratic functions to those of linear and exponential functions. They select from among these functions to model phenomena. Students learn to anticipate the graph of a quadratic function by interpreting various forms of quadratic expressions. In particular, they identify the real solutions of a quadratic equation as the zeros of a related quadratic function. Students learn that when quadratic equations do not have real solutions the number system must be extended so that solutions exist, analogous to the way in which extending the whole numbers to the negative numbers allows $x+1 = 0$ to have a solution. Formal work with complex numbers comes in Algebra II. Students expand their experience with functions to include more specialized functions—absolute value, step, and those that are piecewise-defined.

Proficiencies and Pacing:
Course Title: Advanced Algebra
Prerequisite(s): Pre-Algebra

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
Unit 1: Relationships Between Quantities and Reasoning with Equations	9 weeks Sept/Nov	**Subject Area:** **Major:** NJ SLS.N.Q.A.1, NJ SLS.N.Q.A.2, NJ SLS.N.Q.A.3, NJ SLS.A.SSE. A.1, NJ SLS.A.CED. A.1, NJ SLS.A.CED. A.2, NJ SLS.A.CED. A.3, NJ SLS.A.CED. A.4, NJ SLS.A.REI. A.1, NJ SLS.A.REI. B.3 **Mathematical Practices:** NJ SLS.MP.1 NJ SLS.MP.3 NJ SLS.MP.4 NJ SLS.MP.5 NJ SLS.MP.6 NJ SLS.MP.8 **Technology:** NJ SLS 8.1.12.B.2, NJ SLS 8.1.12.F.1, NJ SLS 8.2.12.E.3, NJ SLS 8.2.12.E.4 **Career Practices:** CRP1, CRP2, CRP4, CRP8, CRP11	1. Students will be able to solve multi-step problems that can be represented algebraically with accurate and appropriately defined units, scales, and models (such as graphs, tables, and data displays). (NJ SLS.N.Q.A.1, NJ SLS.N.Q.A.2, NJ SLS.N.Q.A.3) 2. Students will be able to interpret terms, factors, coefficients, and expressions (including complex linear and exponential expressions) in terms of context. (NJ SLS.A.SSE. A.1) 3. Students will be able to solve equations and inequalities in one variable and justify each step in the process and the solution. (NJ SLS.A.CED. A.4, NJ SLS.A.REI. B.3) 4. Students will be able to create linear equations and inequalities in one variable and use them to solve problems and justify each step in the process and the solutions. (NJ SLS.A.CED.A.1, NJ SLS.A.REI.A.1, NJ SLS.A.REI.B.3) 5. Students will be able to create linear equations in two variables to represent relationships between quantities; graph equations on the coordinate plane with labels and scales. (NJ SLS.A.CED.A.2) 6. Students will be able to model and	• Solve linear equations and inequalities in one variable • Solve equations with variables on both sides of the equals sign • Use a formula for one measurement to write a formula for a different measurement • Recognize and graph linear equations • Use slope of a line to describe the line • Describe the graph of an equation in Slope-Intercept form • Describe the graph of an equation in Standard form • Write an equation of a line in Slope-Intercept form • Write an equation of a line in Point-Slope form • Use linear equations in two variables to model real-life problems • Use inequalities to describe real-life statements • Solve inequalities and graph their solution sets • Use the coordinate plane to solve problems involving linear inequalities • Use graphing to solve systems of equations • Use substitution to solve systems of equations

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		Career Awareness: NJ SLS 9.2.12.C.4 **Interdisciplinary:** NJ SLS.W.9-10.1.A NJ SLS.W.9-10.1.C	describe constraints with linear equations, inequalities, and systems of equations and determine if the solution(s) are viable or non-viable. (NJ SLS.A.CED.A.3, NJ SLS.A.REI.A.1)	• Use elimination to solve systems of equations • Graph systems of inequalities
Unit 2: Linear and Exponential Functions	12 weeks Nov/Feb	**Subject Area:** **Major:** NJ SLS.8.EE.C.8.a, NJ SLS.8.EE.C.8.b, NJ SLS.8.EE.C.8.c, NJ SLS.A.REI. D.10, NJ SLS.A.REI. D.11, NJ SLS.A.REI. D.12, NJ SLS.8. F.A.1, NJ SLS.8. F.A.2, NJ SLS.8. F.A.3, NJ SLS.F.IF.A.1, NJ SLS.F.IF.A.2, NJ SLS.F.IF.A.3, NJ SLS.F.IF.B.4, NJ SLS.F.IF.B.5, NJ SLS.F.IF.B.6, NJ SLS.F.BF. A.2 **Supporting:** NJ SLS.8. F.B.4, NJ SLS.8. F.B.5, NJ SLS.F.IF.C.7. a, NJ SLS.F.IF.C.7. e, NJ SLS.F.IF.C.9,	1. Students will be able to solve systems of linear equations in two variables by inspection, algebraically, and/or graphically (estimate solutions) to demonstrate solutions correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. (NJ SLS.8.EE.C.8) 2. Students will be able to graph equations, inequalities, and systems of inequalities in two variables and explain that the solution to an equation is all points along the curve, the solution to a system of linear functions is the point of intersection, and the solution to a system of inequalities is the intersection of the corresponding half-planes. (NJ SLS.A.REI. D.10, NJ SLS.A.REI.D.11, NJ SLS.A.REI.D.12) 3. Students will be able to define linear functions as a rule that assigns one output to each input and determine if data represented as a graph or in a table is a function. (NJ SLS.8.F.A.1)	• Solving systems of linear equations by graphing • Solving systems of linear equations by substitution • Solving systems of linear equations by elimination • Solving special systems of linear equations • Graphing systems of linear inequalities • Identify the domain and range of a function • Determine whether the domain of a function is discrete or continuous • Use linear functions to describe a linear pattern • Use function notation to represent a function • Determine whether a pattern is linear or nonlinear • Use arithmetic sequences to describe patterns • Multiply and divide square roots • Use inductive reasoning to observe patterns and write general rules

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		NJ SLS.F.BF.A.1.a, NJ SLS.F.BF.A.1.b, NJ SLS.F.LE.A.3, NJ SLS.F.LE.B.5 **Additional:** NJ SLS.N.RN.A.1, NJ SLS.N.RN.A.2, NJ SLS.A.REI.C.5, NJ SLS.A.REI.C.6, NJ SLS.F.BF.B.3, NJ SLS.F.LE.A.1.a, NJ SLS.F.LE.A.1.b, NJ SLS.F.LE.A.1.c, NJ SLS.F.LE.A.2 **Mathematical Practices:** NJ SLS.MP.1 NJ SLS.MP.3 NJ SLS.MP.6 NJ SLS.MP.7 NJ SLS.MP.8 **Technology:** NJ SLS 8.1.12.B.2, NJ SLS 8.1.12.F.1, NJ SLS 8.1.12.A.2, NJ SLS 8.2.12.E.3, NJ SLS 8.2.12.E.4 **Career Practices:** CRP1, CRP2, CRP3,	4. Compare two functions each represented in a different way (numerically, verbally, graphically, and algebraically) and draw conclusions about their properties (rate of change and intercepts). (NJ SLS.8.F.A.2) 5. Utilize equations, graphs, and tables to classify functions as linear or non-linear, recognizing that y = mx + b is linear with a constant rate of change. (NJ SLS.8.F.A.3) 6. Students will be able to explain and interpret the definition of functions including domain and range and how they are related; correctly use function notation in a context and evaluate functions for inputs and their corresponding outputs. (NJ SLS.F.IF.A.1, NJ SLS.F.IF.A.2) 7. Students will be able to write both recursive and explicit equations of arithmetic sequences. (NJ SLS.F.IF.A.3, NJ SLS.F.BF.B.2)	involving properties of exponents • Write and evaluate an n^{th} root of a number • Identify and describe the characteristics of an exponential function • Identify, describe, and graph exponential growth • Identify, describe, and graph exponential decay • Use geometric sequences to describe patterns

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		CRP4, CRP8 **Career Awareness:** NJ SLS 9.2.12.C.4 **Interdisciplinary:** NJ SLS.W.9-10.1.A NJ SLS.W.9-10.1.C		
Unit 3: Expressions and Equations	6 weeks Feb/March	**Subject Area:** **Major:** NJ SLS.A.APR.A.1, NJ SLS.A.CED.A.1, NJ SLS.A.CED.A.2, NJ SLS.A.CED.A.4, NJ SLS.A.REI.B.4.a, NJ SLS.A.REI.B.4.b **Supporting:** NJ SLS.A.REI.C.7, NJ SLS.A.SSE.B.3.a, NJ SLS.A.SSE.B.3.b, NJ SLS.A.SSE.B.3.c **Mathematical Practices:** NJ SLS.MP.1 **Technology:** NJ SLS 8.1.12.B.2, NJ SLS 8.1.12.F.1, NJ SLS 8.1.12.A.2, NJ SLS 8.2.12.E.3,	1. Students will be able to perform addition, subtraction, and multiplication with polynomials and relate it to arithmetic operations with integers. (NJ SLS.A.APR.A.1) 2. Students will be able to create equations and inequalities in one variable and use them to solve problems. Including equations arising from linear and quadratic functions, simple rational and exponential functions and highlight a quantity of interest in a formula. (NJ SLS.A.CED.A.1, NJ SLS.A.CED.A.4) 3. Students will be able to create linear and quadratic equations that represent a relationship between two or more variables and graph equations on the coordinate plane with labels and scales. (NJ SLS.A.CED.A.2) 4. Students will be able to derive the quadratic formula by completing the square and solve equations in one variable	• Model and classify polynomials • Add and subtract polynomials • Multiply two binomials • Identify and use patterns to multiply the special products $(a + b)(a – b)$, $(a + b)^2$, and $(a – b)^2$ • Solving polynomial equations written in factored form • Factor the GCF of a polynomial • Factor trinomials of the form x^2+bx+c into products of two binomials • Factor trinomials of the form ax^2+bx+c into products of two binomials • Recognize and factor special products • Factor by grouping • Identify the characteristics of the graph of the quadratic function $y = ax^2$ • Identify the characteristics of a parabola • Graphing parabolas of the form $y = ax^2 + c$

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		NJ SLS 8.2.12.E.4 **Career Practices:** CRP1, CRP2, CRP3, CRP4, CRP8 **Career Awareness:** NJ SLS 9.2.12.C.4 **Interdisciplinary:** NJ SLS.W.9-10.1.A NJ SLS.W.9-10.1.C	using a variety of methods (i.e. factoring, completing the square, and the quadratic formula). (NJ SLS.A.REI.B.4) 5. Students will engage in March Money Madness (see lesson plan in Callisto/Open Area/#1DragonFamily)	• Graphing parabolas of the form $y = ax^2 + bx + c$ • Graphing parabolas of the form $y = a(x – h)^2 + k$ Compare the growth rate of linear, exponential, and quadratic functions
Unit 4: Quadratic Functions and Modeling	8 weeks April/May	**Subject Area:** **Major:** NJ SLS.A.SSE.A.1.a, NJ SLS.A.SSE.A.1.b, NJ SLS.A.SSE.A.2, NJ SLS.8.G.B.6, NJ SLS.8.G.B.7, NJ SLS.8.G.B.8, NJ SLS.F.IF.B.4, NJ SLS.F.IF.B.5, NJ SLS.F.IF.B.6 **Additional:** NJ SLS.N.RN.B.3 **Mathematical Practices:** NJ SLS.MP.1 NJ SLS.MP.2	1. Students will be able to interpret parts of expressions in terms of context including those that represent square and cube roots; use the structure of an expression to identify ways to write it. (NJ SLS.A.SSE.A.1, NJ SLS.A.SSE.A.2) 2. Students will be able to explain a proof of the Pythagorean Theorem and its converse. They will also be able to utilize the Pythagorean Theorem to determine unknown side lengths of right triangles in two and three dimensions to solve real world and mathematical problems including being able to determine the distance between two points in the coordinate plane. (NJ SLS.8.G.B.6, NJ SLS.8.G.B.7, NJ SLS.8.G.B.8) 3. Sketch the graph of a function that models a relationship between two	• Graph square root functions • Describe the domain and range of the function • Rationalize the denominator • Solve square root equations • Prove the Pythagorean Theorem and its converse • Use the Pythagorean Theorem to find the unknown side of a right triangle • Use the Pythagorean Theorem to determine whether a given triangle is a right triangle • Use the Pythagorean Theorem to derive the distance formula

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		NJ SLS.MP.3 NJ SLS.MP.4 NJ SLS.MP.5 NJ SLS.MP.6 NJ SLS.MP.7 NJ SLS.MP.8 **Technology:** NJ SLS 8.1.12.B.2, NJ SLS 8.1.12.F.1, NJ SLS 8.2.12.E.3, NJ SLS 8.2.12.E.4 **Career Practices:** CRP2, CRP4, CRP6, CRP8 **Career Awareness:** NJ SLS 9.2.12.C.4 **Interdisciplinary:** NJ SLS.W.9-10.1.A NJ SLS.W.9-10.1.C NJ SLS-S.HS-PS2-1 NJ SLS-S.HS-PS2-2 NJ SLS-S.HS-PS2-4	quantities (expressed symbolically or from a verbal description) showing key features (including intercepts, minimums/maximums, domain, and rate of change) by hand in simple cases and using technology in more complicated cases and relate the domain of the function to its graph. (NJ SLS.F.IF.B.4, NJ SLS.F.IF.B.5) 4. Calculate (over a specified period if presented symbolically or as a table) or estimate (if presented graphically) and interpret the average rate of change of a function. (NJ SLS.F.IF.B.6)	
Unit 5: Descriptive Statistics	2 - 3 weeks June	**Subject Area:** **Major:** NJ SLS.S.ID.C.7, NJ SLS.S.ID.C.8, NJ SLS.S.ID.C.9	1. Students will be able to interpret the slope (rate of change) and intercept (constant term) of a linear model in the context of the data, compute (using technology) and interpret the correlations of a linear fit, and distinguish between	• Use measures of central tendency to distribute an amount evenly among a group of people • Measure the dispersion of a data set • Use a box-and-whisker plot to describe a data set

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		Supporting: NJ SLS.8.SP.A.1, NJ SLS.8.SP.A.2, NJ SLS.8.SP.A.3, NJ SLS.8.SP.A.4, NJ SLS.S.ID.B.5, NJ SLS.S.ID.B.6.a, NJ SLS.S.ID.B.6.b, NJ SLS.S.ID.B.6.c **Additional:** NJ SLS.S.ID.A.1, NJ SLS.S.ID.A.2, NJ SLS.S.ID.A.3 **Mathematical Practices:** NJ SLS.MP.1 NJ SLS.MP.2 NJ SLS.MP.3 NJ SLS.MP.4 NJ SLS.MP.5 NJ SLS.MP.6 **Technology:** NJ SLS 8.1.12.B.2, NJ SLS 8.1.12.F.1, NJ SLS 8.2.12.E.3, NJ SLS 8.2.12.E.4 **Career Practices:** CRP2, CRP3, CRP4, CRP8 **Career Awareness:**	correlations and causation. (NJ SLS.S.ID.C.7, NJ SLS.S.ID.C.8, NJ SLS.S.ID.C.9)	• Use a histogram to characterize the basic shape of a distribution • Use data to predict an event • Analyzing lines of fit • Organizing and interpreting data in a two-way table • Choosing a data display to help make decisions

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		NJ SLS 9.2.12.C.3 NJ SLS 9.2.12.C.4 **Interdisciplinary:** NJ SLS.W.9-10.1.A NJ SLS.W.9-10.1.C NJ SLS.W.9-10.7 NJ SLS-S.HS-LS3-3		

Unit: 1 – Relationships Between Quantities and Reasoning with Equations	Recommended Duration: [9 weeks– September-November]

Unit Description: Students work with quantities and rates, including simple linear expressions and equations to form the foundation for this unit. Students use units to represent problems algebraically and graphically. This unit builds on earlier experiences with equations by asking students to analyze and explain the process of solving an equation. Students develop fluency writing, interpreting, and translating between various forms of linear equations and inequalities, and using them to solve problems. They will master the solution of linear equations and apply related solution techniques and the laws of exponents to the creation and solution of simple exponential equations.

Essential Questions:	Enduring Understandings:
• How do we represent unknown quantities? • What are the properties for solving an equation/inequality? • How is the process of solving an equation similar and different from solving an inequality? • How you would determine a reasonable domain and range in the context of a real world problem?	• All higher-level mathematics and physical sciences are based upon the relationship between quantities and reasoning with these quantities. • Solving equations is based upon using inverse operations to isolate a variable.

Relevant Standards:	Learning Goals:	Learning Objectives:
Content Standards: **Primary(Power):** **NJLSLS.N.Q.A.1** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.	1. Students will be able to solve multi-step problems that can be represented algebraically with accurate and appropriately defined units, scales, and models (such as graphs, tables, and data displays). (NJ SLS.N.Q.A.1, NJ SLS.N.Q.A.2, NJ SLS.N.Q.A.3) (4 weeks) 2. Students will be able to interpret terms, factors,	• Students will be able to solve linear equations and inequalities in one variable. • Students will be able to solve equations with variables on both sides of the equals sign.

Relevant Standards:	Learning Goals:	Learning Objectives:
NJLSLS.N.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. **NJLSLS.N.Q.A.3** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **NJLSLS.A.SSE.A.1** Interpret expressions that represent a quantity in terms of its context.★ a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P.* **NJLSLS.A.CED.A.1** Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear functions.* **NJLSLS.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. **NJLSLS.A.CED.A.3** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*	coefficients, and expressions (including complex linear and exponential expressions) in terms of context. (NJ SLS.A.SSE. A.1) (1 week) 3. Students will be able to solve equations and inequalities in one variable and justify each step in the process and the solution. (NJ SLS.A.CED. A.4, NJ SLS.A.REI.B.3) (4 weeks) 4. Students will be able to create linear equations and inequalities in one variable and use them to solve problems and justify each step in the process and the solutions. (NJ SLS.A.CED.A.1, NJ SLS.A.REI.A.1, NJ SLS.A.REI.B.3) (2 weeks) 5. Students will be able to create linear equations in two variables to represent relationships between quantities; graph equations on the coordinate plane with labels and scales. (NJ SLS.A.CED.A.2) (2 weeks) 6. Students will be able to model and describe constraints with linear equations, inequalities, and systems of equations and determine if the solution(s) are viable or non-viable. (NJ SLS.A.CED.A.3, NJ SLS.A.REI.A.1) (3 weeks)	• Students will be able to use a formula for one measurement to write a formula for a different measurement. • Students will be able to recognize and graph linear equations. • Students will be able to use slope of a line to describe the line. • Students will be able to describe the graph of an equation in Slope-Intercept form. • Students will be able to describe the graph of an equation in Standard form. • Students will be able to write an equation of a line in Slope-Intercept form. • Students will be able to write an equation of a line in Point-Slope form • Students will be able to use linear equations in two variables to model real-life problems. • Students will be able to use inequalities to describe real-life statements. • Students will be able to solve inequalities

Relevant Standards:	Learning Goals:	Learning Objectives:
NJLSLS.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.* **NJLSLS.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. **NJLSLS.A.REI.B.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **Secondary(Supportive):** <u>Standards for Mathematical Practice:</u> **NJ SLS.MP.1** Make sense of problems and persevere in solving them. **NJ SLS.MP.3** Construct viable arguments and critique the reasoning of others. **NJ SLS.MP.4** Model with mathematics. **NJ SLS.MP.5** Use appropriate tools strategically. **NJ SLS.MP.6** Attend to precision. **NJ SLS.MP.8** Look for and express regularity in		and graph their solution sets. • Students will be able to use the coordinate plane to solve problems involving linear inequalities. • Students will be able to use graphing to solve systems of equations. • Students will be able to use substitution to solve systems of equations. • Students will be able to use elimination to solve systems of equations. • Students will be able to graph systems of inequalities.

Relevant Standards:	Learning Goals:	Learning Objectives:
repeated reasoning.		

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Pre-Assessment , Teacher Observation, Class Participation, Warm Ups, Homework, Exit Slips, Status Checks, Popsicle Sticks, Thumbs Up/Thumbs Down, Stomp on Three, Student Progress Charts & Reflections	Unit tests, Extended constructed response questions, Quizzes, Graded Homework, Summative Assessment 1	Students compare college prices using equations, graphs, tables, substitution, and elimination.	Section quizzes, Unit tests, Pre-Assessment, and the Summative Assessment 1

Instructional Strategies:
Chunking Content into Digestible Bites, Recording and Representing Knowledge, Reviewing Content, Using Homework, Examining Similarities and Differences, Examining Errors in Reasoning, Practicing Skills, Strategies and Processes, Engaging Students in Cognitively Complex Tasks Involving Hypothesis Generation and Testing

Possible Instructional Strategy Modifications /Accommodations:			
Special Education Students	English Language Learners (ELL)	At-Risk Learner	Advanced Learner
• Assign preferential seating. • Provide outlines or study guides. • Daily assignment list.	• Key words in native language (if available). • Provide concrete examples of each type of graph. • Provide outlines or study guides with visual representations • Daily assignment list.	• Encourage SMART attendance. • Provide online textbook access if available. • Provide websites for additional examples. • Utilize flash cards available for graphs of each special function • Daily assignment list	**Advanced Learners** • Independent study that requires them to create questions. • Mini extended lessons on real-life examples.

Unit Vocabulary:
Essential: Literal equation **Non-Essential:** Expression, Equation, Inequality, Linear, Non-linear, Constant, Exponent, Term, Factor, Coefficient

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
Technology: NJ SLS 8.1.12.B.2: Apply previous content knowledge by creating and piloting a digital learning game or tutorial. NJ SLS 8.1.12.F.1: Use geographic mapping tools to plan and solve problems. NJ SLS 8.2.12.E.3: Using a simple, visual programming language, create a program using loops, events and procedures to generate specific output.	**S** – Use mathematical videos on Edpuzzle or Khan Academy to review the pre-algebra skills. **A** – Create an online worksheet or formative assessment on Google Forms or Edulastic. **M** – Have a discussion board on Google classroom from a shared video that relates to the mathematical reasoning behind solving equations. Students must	_X_ Global Awareness – Population growth versus the amount of resources needed. _X_ Financial – amount of chores done around the house in relation to amount of allowance paid at the end of the work.	_X_ Life and Career Skills - performing tasks with an extrinsic reward attached (working for a pay check – doing chores for an allowance) _X_ Communication & Collaboration students working in groups and using Google classroom to collaborate on and peer review projects.

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
NJ SLS 8.2.12.E.4: Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements). **Career Practices:** CRP1. Act as a responsible and contributing citizen and employee CRP2: Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively and with reason. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity. **Career Awareness:** NJ SLS 9.2.12.C.4: Analyze how economic conditions and societal changes influence employment trends and future education. **Interdisciplinary:** NJ SLS.W.9-10.1.A: Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient	post one discussion and comment on two other students discussions. **R** – Students create their own tutorial using online video technology to share with their peers on Edmodo or Google classroom.		

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
evidence. NJ SLS.W.9-10.1.C: Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.			

Resources:
Texts/Materials: Big Ideas Math Algebra I and Big Ideas workbook and online resources, PMI resources, Articles

Unit: 2 Linear and Exponential Functions	Recommended Duration: 12 Weeks– November-February

Unit Description:
Building on earlier work with linear relationships, students learn function notation and language for describing characteristics of functions, including the concepts of domain and range. They explore many examples of functions, including sequences; they interpret functions given graphically, numerically, symbolically, and verbally, translate between representations, and understand the limitations of various representations. They work with functions given by graphs and tables, keeping in mind that depending upon the context, these representations are likely to be approximate and incomplete. Their work includes functions that can be described or approximated by formulas as well as those that cannot. When functions describe relationships between quantities arising from a context, students reason with the units in which those quantities are measured. Students explore systems of equations and inequalities, and they find and interpret their solutions. Students build on and informally extend their understanding of integral exponents to consider exponential functions. They compare and contrast linear and exponential functions, distinguishing between additive and multiplicative change. They interpret arithmetic sequences as linear functions and geometric sequences as exponential functions.

Essential Questions:	Enduring Understandings:
• What is function notation and how can it be used and interpreted? • What are functions and how can they be defined? • What are sequences and how are their domains defined? • How can you represent a function and what are the key features of each representation? • What are various representations of a function and how can they be interpreted? • How do you identify and explain the key features of a function in relation to the context? • How do you compare functions and their properties including maxima, minima, domain, range, intercepts, symmetry, end behavior and average rate of change?	• Functions have exactly one output for each input. • Functions can be defined explicitly or recursively. • Function notation is used to evaluate and interpret inputs and outputs of functions. • Sequences are functions with a domain as a subset of the integer. • A function has key features that can be represented and interpreted from a graph, table or quantitative relationship • Functions can be used as models and can be represented as equations, tables, graphs, and words. • Given a particular representation (such as an equation) of a function, other representations (such as graphs or tables) can be generated and explored.

Essential Questions:	Enduring Understandings:
• What are transformations and how can they be used symbolically and graphically? • How can systems of linear equations or inequalities be used to model real world situations? • How can the solution(s) of a system be represented and interpreted? • What processes may be used to solve a system of equations or inequalities?	• Functions exhibit special properties that can be identified and used to compare functions or to determine solutions to real world experiences. • Transformations allow for quick manipulations and graphing of functions. • Average rate of change can be calculated, estimated and/or interpreted from multiple representations of a function. • A system of equations can have no, one, or infinitely many solutions. • Solutions of systems of equations are ordered pairs that satisfy all equations. • Solutions of systems of inequalities are ordered pairs that satisfy all inequalities, often represented by a region. • Exact or approximate solutions can be found using tables, graphs, and/or algebraic manipulations.

Relevant Standards:	Learning Goals:	Learning Objectives:
Content Standards: **Primary(Power):** **NJ SLS.8.EE.C.8** Analyze and solve pairs of simultaneous linear equations. a) Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.	1. Students will be able to solve systems of linear equations in two variables by inspection, algebraically, and/or graphically (estimate solutions) to demonstrate solutions correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. (NJ SLS.8.EE.C.8) (6 weeks) 2. Students will be able to graph equations,	• Solving systems of linear equations by graphing • Solving systems of linear equations by substitution • Solving systems of linear equations by elimination

Relevant Standards:	Learning Goals:	Learning Objectives:
b) Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6. c) Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair. **NJ SLS.A.REI.D.10** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). **NJ SLS.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.★ **NJ SLS.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, and systems of inequalities in two variables and explain that the solution to an equation is all points along the curve, the solution to a system of linear functions is the point of intersection, and the solution to a system of inequalities is the intersection of the corresponding half-planes. (NJ SLS.A.REI.D.10, NJ SLS.A.REI.D.11, NJ SLS.A.REI.D.12) (2 weeks) 3. Students will be able to define linear functions as a rule that assigns one output to each input and determine if data represented as a graph or in a table is a function. (NJ SLS.8.F.A.1) (1 week) 4. Compare two functions each represented in a different way (numerically, verbally, graphically, and algebraically) and draw conclusions about their properties (rate of change and intercepts). (NJ SLS.8.F.A.2) (2 weeks) 5. Utilize equations, graphs, and tables to classify functions as linear or non-linear, recognizing that y = mx + b is linear with a constant rate of change. (NJ SLS.8.F.A.3) (2 weeks) 6. Students will be able to explain and interpret the definition of functions including domain and range and how they are related; correctly use function notation in a context and evaluate functions for inputs and their corresponding outputs. (NJ SLS.F.IF.A.1, NJ SLS.F.IF.A.2) (1 week) 7. Students will be able to write both recursive	• Solving special systems of linear equations • Graphing systems of linear inequalities • Identify the domain and range of a function • Determine whether the domain of a function is discrete or continuous • Use linear functions to describe a linear pattern • Use function notation to represent a function • Determine whether a pattern is linear or nonlinear • Use arithmetic sequences to describe patterns • Multiply and divide square roots • Use inductive reasoning to observe patterns and write general rules involving properties of exponents • Write and evaluate an n^{th} root of a number • Identify and describe the characteristics of an exponential function

Relevant Standards:	Learning Goals:	Learning Objectives:
inequalities in two variables as the intersection of the corresponding half-planes. **NJ SLS.8.F.A.1** Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. **NJ SLS.8.F.A.2** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.* **NJ SLS.8.F.A.3** Interpret the equation y=mx +b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side lengths is not linear because its graph contains the points (1, 1), (2, 4), and (3, 9) which are not on a straight line.* **NJ SLS.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)*. **NJ SLS.F.IF.A.2** Use function notation, evaluate	and explicit equations of arithmetic sequences. (NJ SLS.F.IF.A.3, NJ SLS.F.BF.B.2) (1 week)	• Identify, describe, and graph exponential growth • Identify, describe, and graph exponential decay • Use geometric sequences to describe patterns

Relevant Standards:	Learning Goals:	Learning Objectives:
functions for inputs in their domains, and interpret statements that use function notation in terms of a context. **NJ SLS.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) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.* **NJ SLS.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.*★ **NJ SLS.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.*★ **NJ SLS.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.★		

Relevant Standards:	Learning Goals:	Learning Objectives:
NJ SLS.F.BF.A.2 Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations and translate between two forms. **Secondary(Supportive):** **NJ SLS.8.F.B.4** Construct a function to model the linear relationship between two variables and determine the rate of change and initial value of the real world data it represents from either graphs or tabulated values. **NJ SLS.8.F.B.5** Sketch a graph of a function from a qualitative description and give a qualitative description of a graph of a function. **NJ SLS.F.IF.C.7.a, NJ SLS.F.IF.C.7.e** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ a. Graph linear functions. **NJ SLS.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.* **NJ SLS.F.BF.A.1.a, NJ SLS.F.BF.A.1.b** Write a function that describes a relationship between two quantities. ★		

Relevant Standards:	Learning Goals:	Learning Objectives:
a. Determine an explicit expression, a recursive process, or steps for calculation from a context. **NJ SLS.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. **NJ SLS.F.LE.B.5** Interpret the parameters in a linear or exponential function in terms of a context. <u>Standards for Mathematical Practice:</u> **NJ SLS.MP.1** Make sense of problems and persevere in solving them. **NJ SLS.MP.3** Construct viable arguments and critique the reasoning of others. **NJ SLS.MP.5** Use appropriate tools strategically. **NJ SLS.MP.6** Attend to precision. **NJ SLS.MP.7** Look for and make use of structure. **NJ SLS.MP.8** Look for and express regularity in repeated reasoning. **Additional** **NJ SLS.N.RN.A.1** Explain how the definition of the meaning of rational exponents follows from		

Relevant Standards:	Learning Goals:	Learning Objectives:
extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.* **NJ SLS.N.RN.A.2** Rewrite expressions involving radicals and rational exponents using the properties of exponents. **NJ SLS.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 solutions. **NJ SLS.A.REI.C.6** Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. **NJ SLS.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.* **NJ SLS.F.LE.A.1** Distinguish between situations that can be modeled with linear functions and with exponential functions. a) Prove that linear functions grow by equal		

Relevant Standards:	Learning Goals:	Learning Objectives:
differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. b) Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c) Recognize situations in which one quantity grows or decays by a constant percent rate per unit interval relative to another. **NJ SLS.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)		

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Teacher Observation, Class Participation, Warm Ups, Homework, Exit Slips, Status Checks, Popsicle Sticks, Thumbs Up/Thumbs Down, Stomp on Three, Student Progress Charts & Reflections	Unit tests, Extended constructed response questions, Quizzes, Graded Homework, Benchmark test	Students combine 4 different types of functions into a single piecewise function. Students analyze growth and decay equations and real world scenarios.	Section quizzes, Unit tests, and the model curriculum benchmark Unit 2 test

Possible Assessment Modifications /Accommodations:			
Special Education Students	At-Risk Learner	English Language Learners (ELL)	Advanced Learner
• Scale graphs accordingly • Leveled texts (writing and solving a system of equations from real-world scenarios) • Underline/highlight important information in word problems • Define the difference between systems of equations and systems of inequalities	• Provide multiple study guides prior to assessments with teacher's answer key as a reference • Multiple texts (leveled reading for real world application word problems) • Scale graphs accordingly	• Label axes • Underline/highlight import information in real-world application word problems • Define necessary variables • Simplify language • Accept short answers	• Tiered projects • Multiple texts to compare and contrast methods and solution possibilities

Instructional Strategies:
Chunking Content into Digestible Bites, Recording and Representing Knowledge, Reviewing Content, Using Homework, Examining Similarities and Differences, Examining Errors in Reasoning, Practicing Skills, Strategies and Processes, Engaging Students in Cognitively Complex Tasks Involving Hypothesis Generation and Testing

Possible Instructional Strategy Modifications /Accommodations:			
Special Education Student	ELL	At-Risk Learner	Advanced Learner
• Read passages aloud • Allow additional time • Shorten assignments	• Daily assignment lists • Demonstrations of key concepts (substitution/elimination) • Reworded, bulleted questions for word problems that students write equations from	• Provide concrete examples of solving systems of equations using substitution and elimination • Interactive notebooks • Graphic organizers for key objectives in this unit	• Extensions/side-bar studies of solving systems of equations • Tiered homework assignments

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Unit Vocabulary:
Essential: Function, inputs, outputs, domain, range, independent variable, dependent variable, maximum, minimum, symmetry, increasing, decreasing, rate of change, end behavior **Non-Essential:** Representations, Evaluate, x-intercept, y-intercept

Interdisciplinary Connections (Applicable Standards):	**Integration of Technology:**	**21st Century Themes:**	**21st Century Skills:**
Technology: NJ SLS 8.1.12.B.2: Apply previous content knowledge by creating and piloting a digital learning game or tutorial. NJ SLS 8.1.12.F.1: Use geographic mapping tools to plan and solve problems. NJ SLS 8.2.12.E.3: Using a simple, visual programming language, create a program using loops, events and procedures to generate specific output. NJ SLS 8.2.12.E.4: Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements). **Career Practices:** CRP2: Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively and with reason. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.	**S –** Use of Desmos online calculator. Students will take screenshots of their practice and add them to a Google Doc notes. **A –** Use the calculator to graph different functions and make changes in their notes. Use the research tool to find examples that support their work. **R –** Students can share the Desmos calculator link to share their graphs and collaborate and create a project (a tutorial or a video where they can create various graphs). Post for discussion.	_x___ Financial, Economic, Business, & Entrepreneurial Literacy – students will determine how various items will increase or decrease in monetary value over time due to exponential growth and decay __X__ Environmental Literacy – students will use exponential growth/decay to determine the sustainability and growth of bacteria over time in a controlled environment	_X_ Life and Career Skills – students will complete real-world applications involving finances and investments and determine how these factors will contribute to their future situations _X_ Communication & Collaboration – students will clearly communicate and defend their decisions and answers to growth/decay problems __X_ Information Literacy – students will research the current net worth of two different companies and use this information along with a hypothetical situation to determine if the company will gain or lose value over an allotted amount of time

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
Career Awareness: NJ SLS 9.2.12.C.3: Identify transferable career skills and design alternate career plans. NJ SLS 9.2.12.C.4: Analyze how economic conditions and societal changes influence employment trends and future education. NJ SLS 9.2.12.C9: Analyze the correlation between personal and financial behavior and employability **Interdisciplinary:** NJ SLS.W.9-10.1.A: Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. NJ SLS.W.9-10.1.C: Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.			

Resources:
Texts/Materials: Big Ideas Math Algebra I and Big Ideas workbook

Unit: 3 – Expressions and Equations	Recommended Duration: 6 weeks– February/March
Unit Description: In this unit, students build on their knowledge from unit 2. They extend the laws of exponents to rational exponents. Students apply this new understanding of numbers and strengthen structure in and create quadratic and exponential expressions. They create and solve equations, inequalities, and systems of equations involving quadratic expressions.	

Essential Questions:	Enduring Understandings:
• How can a quadratic equation be solved? • What are complex numbers, and why do they exist? • How is the quadratic formula derived? • How do the factors of a quadratic determine the x-intercepts of the graph and vice versa?	• Applied problems using quadratics can be answered by either solving a quadratic equation or re-writing the quadratic in a more useful form (factoring to find the zeros, or completing the square to find the maximum or minimum, for instance). • There are several ways to solve a quadratic equation (square roots, completing the square, quadratic formula, and factoring), and that the most efficient route to solving can often be determined by the initial form of the equation. • The quadratic formula is derived from the process of completing the square. • Complex numbers exist and can arise in the solutions of quadratic equations. • The relationship between the factors of a quadratic and the x-intercepts of the graph of the quadratic. • A quadratic function that does not intersect the x-axis has complex zeros.

Relevant Standards:	Learning Goals:	Learning Objectives:
Content Standards: **Primary(Power):** **NJ SLS.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. **NJ SLS.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.* **NJ SLS.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. **NJ SLS.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. **NJ SLS.A.REI.B.4** Solve quadratic equations in one variable. a) Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x – p)^2 = q$ that has the same solutions. Derive the quadratic formula	1. Students will be able to perform addition, subtraction, and multiplication with polynomials and relate it to arithmetic operations with integers. (NJ SLS.A.APR.A.1) (3 weeks) 2. Students will be able to create equations and inequalities in one variable and use them to solve problems. Including equations arising from linear and quadratic functions, simple rational and exponential functions and highlight a quantity of interest in a formula. (NJ SLS.A.CED.A.1, NJ SLS.A.CED.A.4) (2 weeks) 3. Students will be able to create linear and quadratic equations that represent a relationship between two or more variables and graph equations on the coordinate plane with labels and scales. (NJ SLS.A.CED.A.2) (2 weeks) 4. Students will be able to derive the quadratic formula by completing the square and solve equations in one variable using a variety of methods (i.e. factoring, completing the square, and the quadratic formula). (NJ SLS.A.REI.B.4) (4 weeks) 5. Students will engage in March Money Madness (see lesson plan in Callisto/Open Area/#1DragonFamily)	• Students will be able to model and classify polynomials • Students will be able to add and subtract polynomials • Students will be able to multiply two binomials • Students will be able to identify and use patterns to multiply the special products $(a + b)(a – b)$, $(a + b)^2$, and $(a – b)^2$ • Students will be able to solving polynomial equations written in factored form • Students will be able to factor the GCF of a polynomial • Students will be able to factor trinomials of the form x^2+bx+c into products of two binomials • Students will be able to factor trinomials of the form ax^2+bx+c into products of two binomials • Students will be able to recognize and factor special products • Students will be able to factor by grouping • Students will be able to identify the characteristics of the graph of the quadratic function $y = ax^2$

Relevant Standards:	Learning Goals:	Learning Objectives:
from this form. b) Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b. **Secondary(Supportive):** **NJ SLS.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 line $y = -3x$ and the circle $x^2+y^2 = 3$. **NJ SLS.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. a) Factor a quadratic expression to reveal the zeros of the function it defines. b) Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. c) Use the properties of exponents to transform		• Students will be able to identify the characteristics of a parabola • Students will be able to graphing parabolas of the form $y = ax^2 + c$ • Students will be able to graphing parabolas of the form $y = ax^2 + bx + c$ • Students will be able to graphing parabolas of the form $y = a(x - h)^2 + k$ • Students will be able to compare the growth rate of linear, exponential, and quadratic functions

Relevant Standards:	Learning Goals:	Learning Objectives:
expressions for exponential functions. For example the expression 1.15^t can be rewritten as $(1.15^{\frac{1}{12}})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%. <u>Standards for Mathematical Practice:</u> **NNJ SLS.MP.1** Make sense of problems and persevere in solving them. **NJ SLS.MP.2** Reason abstractly and quantitatively. **NJ SLS.MP.3** Construct viable arguments and critique the reasoning of others. **NJ SLS.MP.4** Model with mathematics. **NJ SLS.MP.5** Use appropriate tools strategically. **NJ SLS.MP.6** Attend to precision. **NJ SLS.MP.7** Look for and make use of structure. **NJ SLS.MP.8** Look for and express regularity in repeated reasoning.		

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Teacher Observation, Class Participation, Warm Ups, Homework,	Unit tests, Extended constructed response questions, Quizzes,	Students create a mini-lesson on one topic of quadratic functions	Section quizzes, Unit 3 test

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Exit Slips, Status Checks, Popsicle Sticks, Thumbs Up/Thumbs Down, Stomp on Three, Student Progress Charts & Reflections	Graded Homework, Benchmark test		

Possible Assessment Modifications /Accommodations:			
Special Education Students	At-Risk Learner	ENGLISH LANGUAGE LEARNER (ELL)	Advanced Learner
• Reference Sheet with examples of the exponent rules and operations with polynomials • Allow corrections and retakes • Allow choice of synthetic or long division on all assessments • Include specific reminders on test about the exponent rules, types of polynomials, when to add, subtract, or multiply the polynomials, when the students combine like terms instead of using the exponent rules	• Teacher rephrases questions to ensure understanding • Provide calculator to aide with basic math skills • Allow breaks if needed • Provide hints on test alluding to whether students should be considering exponent rules or polynomial operations	• Word bank that includes binomial, monomial, polynomial, exponents, area, perimeter, quadratic, cubic, etc. in native language (if available) • Provide study guide with answer keys in native language • Translations from native language to English • Highlight key directions • teacher rephrases and reads problems if needed	• Choice of test format • Choice menu with real-world applications

Instructional Strategies:
Chunking Content into Digestible Bites, Recording and Representing Knowledge, Reviewing Content, Using Homework, Examining Similarities and Differences, Examining Errors in Reasoning, Practicing Skills, Strategies and Processes, Engaging Students in Cognitively Complex Tasks Involving Hypothesis Generation and Testing

Possible Instructional Strategy Modifications /Accommodations:			
Special Education Student	English Language Learners (ELL)	At-Risk Learner	Advanced Learner
• Learning stations to practice exponent rules and polynomial operations • Provide formula sheet with exponent rules • Graphic organizers for key objectives in this unit	• Give oral prompts/cues • Shorten assignments • Concrete examples of exponent rules • Demonstrations of polynomial operations	• Graphic organizers for key objectives in this unit • Use of mnemonics • Review of directions • Daily assignment lists	• Tiered homework assignments • Independent study/extensions

Unit Vocabulary:
Essential: Geometric sequence, Recursive formula, Explicit formula, Exponential function, Equal factor, Equal interval, Domain, Continuous, Discrete, Complex Number, Discriminant, Factor, Zero, Root, x-intercept **Non-Essential:** Arithmetic sequence, Linear equation, Term, Initial value, Common difference, Constant ratio Maximum, Minimum, Vertex

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
Technology: NJ SLS 8.1.12.B.2: Apply previous content knowledge by creating and piloting a digital learning game or tutorial. NJ SLS 8.1.12.F.1: Use geographic mapping tools to plan and solve problems. NJ SLS 8.2.12.E.3: Using a simple, visual programming language, create a program using loops, events and procedures to generate specific	**S –** Students learn the process of using operations with polynomials and exponent rules using Khan Academy (video and lesson practice). Students will take notes on Google Docs. **A –** Create an online worksheet where the students collaborate to complete it then share it with another group to proof work. Students will research examples to	_X_ Civic Literacy – determine the dimensions for blueprints of houses in a development based on the needs and constraints of the city	_X___ Critical Thinking and Problem Solving – use new and previous knowledge of classroom and real-world scenarios to make an educated decision about the mathematical possibility of given situations _X_ Life and Career Skills – realize that real-world thinking needs to be applied to application problems when determining the validity of a problem

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
output. NJ SLS 8.2.12.E.4: Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements). 8.1.8.A.2: Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability **Career Practices:** CRP1. Act as a responsible and contributing citizen and employee CRP2: Apply appropriate academic and technical skills. CRP3. Attend to personal health and financial well-being. CRP4. Communicate clearly and effectively and with reason. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. **Career Awareness:** NJ SLS 9.2.12.C.4: Analyze how economic conditions and societal changes influence employment trends and future education.	support their answers. **M –** Students collaborate and create their own worksheets, expanding their knowledge further than just rules of what to do. They give their worksheet to another group and complete it. **R –** Students create video tutorials for the class on how to complete operations using polynomials. These can be posted in Google Classroom or Edmodo for students to discuss.		_X_ Communication & Collaboration – discuss and analyze real-world experiences and how they are pertinent to a given mathematical scenario

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
Interdisciplinary: NJ SLS.W.9-10.1.A: Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. NJ SLS.W.9-10.1.C: Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.			

Resources:
Texts/Materials: Big Ideas Math Algebra I and Big Ideas workbook

Unit: 4 – Quadratic Functions and Modeling	Recommended Duration: 8 weeks– April - June
Unit Description: In preparation for work with quadratic relationships students explore distinctions between rational and irrational numbers. They consider quadratic functions. Students learn to anticipate the graph of a quadratic function by interpreting various forms of quadratic functions. In particular, they identify the real solutions of a quadratic equation as the zeros of a related quadratic function. Students learn when quadratic equations do not have real solutions the number system must be extended so that solutions exist.	

Essential Questions:	Enduring Understandings:
• How do the arithmetic operations on numbers extend to polynomials? • What do the factors of a quadratic reveal about the function? • What does completing the square reveal about a quadratic function? • What is the graph of a quadratic function? What are its properties?	•Polynomial expressions can be added, subtracted, and multiplied to produce new polynomials. • The factors of a quadratic can be used to reveal the zeros of the quadratic. • The process of completing the square can be used to reveal the vertex of the graph of a quadratic (and consequently the minimum or maximum of the function). • The graph of a quadratic function is a curve called a parabola which will have an interval of increase, an interval of decrease, a minimum or maximum, a y-intercept, and which may or may not have x-intercepts.

Relevant Standards:	Learning Goals:	Learning Objectives:
Content Standards: **Primary(Power):** **NJ SLS.A.SSE.A.2** Use the structure of an expression to identify ways to rewrite it. For example, see x^4-y^4 as $(x^2)^2-(y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2– y^2)(x^2+ y^2)$. **NJ SLS.F.IF.B.4** For a function that models a	1. Students will be able to interpret parts of expressions in terms of context including those that represent square and cube roots; use the structure of an expression to identify ways to write it. (NJ SLS.A.SSE.A.1, NJ SLS.A.SSE.A.2) (2 weeks) 2. Explain a proof of the Pythagorean Theorem and its converse. (NJ SLS.8.G.B.6) They will also be able to utilize the Pythagorean Theorem to	• Graph square root functions • Describe the domain and range of the function • Rationalize the denominator • Solve square root equations • Prove the Pythagorean Theorem and its converse

Relevant Standards:	Learning Goals:	Learning Objectives:
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. **NJ SLS.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. **NJ SLS.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. **NJ SLS.8.G.B.6** Explain a proof of the Pythagorean Theorem and its converse. **NJ SLS.8.G.B.7** Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two or three dimensions. **NJ SLS.8.G.B.8** Apply the Pythagorean Theorem	determine unknown side lengths of right triangles in two and three dimensions to solve real-world and mathematical problems. (NJ SLS.8.G.B.7) Students will also be able to use the Pythagorean Theorem to determine the distance between two points in the coordinate plane. (NJ SLS.8.G.B.8) (1 week) 3. Sketch the graph of a function that models a relationship between two quantities (expressed symbolically or from a verbal description) showing key features (including intercepts, minimums/maximums, domain, and rate of change) by hand in simple cases and using technology in more complicated cases and relate the domain of the function to its graph. (NJ SLS.F.IF.B.4, NJ SLS.F.IF.B.5) (2 weeks) 4. Calculate (over a specified period if presented symbolically or as a table) or estimate (if presented graphically) and interpret the average rate of change of a function. (NJ SLS.F.IF.B.6) (1 week)	• Use the Pythagorean Theorem to find the unknown side of a right triangle • Use the Pythagorean Theorem to determine whether a given triangle is a right triangle • Use the Pythagorean Theorem to derive the distance formula

Relevant Standards:	Learning Goals:	Learning Objectives:
to find the distance between two points in a coordinate system. **NJ SLS.A.SSE.A.1** Interpret expressions that represent a quantity in terms of its context. a) Interpret parts of an expression, such as terms, factors, and coefficients. b) Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret P (1+r)n as the product of P and a factor not depending on P. **Secondary(Supportive):** **NJ SLS.N.RN.B.3** Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational. <u>Standards for Mathematical Practice:</u> **NJ SLS.MP.1** Make sense of problems and persevere in solving them. **NJ SLS.MP.2** Reason abstractly and quantitatively. **NJ SLS.MP.3** Construct viable arguments and critique the reasoning of others.		

Relevant Standards:	Learning Goals:	Learning Objectives:
NJ SLS.MP.4 Model with mathematics. **NJ SLS.MP.5** Use appropriate tools strategically. **NJ SLS.MP.6** Attend to precision.		

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Teacher Observation, Class Participation, Warm Ups, Homework, Exit Slips, Status Checks, Popsicle Sticks, Thumbs Up/Thumbs Down, Stomp on Three, Student Progress Charts & Reflections	Unit tests, Extended constructed response questions, Quizzes, Graded Homework, Benchmark test		Section quizzes, Unit tests, and the model curriculum benchmark Unit 4 test

Possible Assessment Modifications /Accommodations:			
Special Education Students	At-Risk Learner	English Language Learners (ELL)	Advanced Learner
• Allow students the use of the graphing calculator for all assessments • Enhanced directions on homework assignments and assessments • Present projectile motion questions and other word problems using leveled text • Provide students with different forms of quadratic equations	• Provide study guides with teacher notes and tips prior to assessments • Allow the use of graphing calculators on all assessments • Provide leveled texts for projectile motion and word problems • Provide students with different forms of quadratic equations.	• Highlight/underline key words in directions or word problems • Present projectile motion question and other word problems in bullet point form • Shorten homework assignments • Include multiple-choice questions on assessments • Provide students with different forms of quadratic equations with descriptions in native language (if possible)	• Flexible grouping • Extensions/side-bar studies using quadratic functions and factoring

Instructional Strategies:
Chunking Content into Digestible Bites, Recording and Representing Knowledge, Reviewing Content, Using Homework, Examining Similarities and Differences, Examining Errors in Reasoning, Practicing Skills, Strategies and Processes, Engaging Students in Cognitively Complex Tasks Involving Hypothesis Generation and Testing

Possible Instructional Strategy Modifications /Accommodations:			
Special Education Student	English Language Learners (ELL)	At-Risk Learner	Advanced Learner
• Learning stations to differentiate different ways to solve a quadratic (Quadratic Formula, graphing, factoring…) • Read longer passages and word problems aloud	• Graphic organizers for key objectives in this unit • Reword projectile motion and word problems in simplified (or native) language when possible • Provide sentence frames for projectile motion answers • Pre-teach key vocabulary words and provide visual representations when possible • Provide students will filled in teacher notes to use as a guide	• Graphic organizers for key objectives in this unit • Concrete examples of when and how to use the Quadratic Formula • Interactive Notebooks • Multiple texts with leveled reading for projectile motion and word problems	• Flexible grouping • Independent study with one-on-one conferences to offer resources and clarifications

Unit Vocabulary:
Essential: Quadratic, Parabola, Factor (as both a noun and a verb), Zero (of a function) **Non-Essential:** Vertex form, Intercepts, Maximum, Minima, Extreme values, Interval, Polynomial

Interdisciplinary Connections (Applicable Standards):	**Integration of Technology:**	**21st Century Themes:**	**21st Century Skills:**
Technology: NJ SLS 8.1.12.B.2: Apply previous content knowledge by creating and piloting a digital learning game or	**S –** Share notes and create an interactive worksheet by inserting Google Draw examples for students to manipulate (or using	__x__ Global Awareness – discover the impact of outside forces and gravity on objects in projectile motion	_X___ Critical Thinking and Problem Solving- Prove that one quadratic equation can be solved in a variety of ways using a wide range of methods.

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
tutorial. NJ SLS 8.1.12.F.1: Use geographic mapping tools to plan and solve problems. NJ SLS 8.2.12.E.3: Using a simple, visual programming language, create a program using loops, events and procedures to generate specific output. NJ SLS 8.2.12.E.4: Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements). **Career Practices:** CRP2: Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively and with reason. CRP6. Demonstrate creativity and innovation. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. **Career Awareness:** NJ SLS 9.2.12.C.4: Analyze how economic conditions and societal changes influence employment trends and future education. **Interdisciplinary:**	GeoGebra). **A –** Students can view various websites by placing media links in their notes in a Google Doc using the research tool. **M –** Assign a video for the students to view and have them discuss what they saw collaboratively using a Google Doc. They will work in pairs or groups to create a storyboard for making an informational video to teach the topic. **R –** Small groups create an informational video teaching the topic. Students post their videos on Google Classroom or Edmodo for discussion.		_X_ Life and Career Skills – partner assignments allow students to use multiple points of view to identify alternative solutions.

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
NJ SLS.W.9-10.1.A: Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. NJ SLS.W.9-10.1.C: Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. NJ SLS.S.HS-PS2-1: Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. NJ SLS.S.HS-PS2-2: Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. NJ SLS.S.HS-PS2-4: Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.			

Resources:
Texts/Materials: Big Ideas Math Algebra I and Big Ideas workbook

Unit: 5 - Descriptive Statistics	Recommended Duration: 2 - 3 Weeks– June
Unit Description: Students use statistics to compare center and spread of two or more different data sets, including the use of scatter plots, histograms, box plots, and standard deviation. Students will interpret outliers and recognize associations and trends in the data. They use technology to examine data sets and potential models, as well as support the appropriate choice of model. They will be using scatter plots in 2 variables and finding line of best fit. Then they use the line of best fit to be able to determine if the two variables are correlations.	

Essential Questions:	Enduring Understandings:
• How do various representations of data lead to different interpretations of the data? • When and how can extreme data points impact interpretation of data? • Why are multiple sets of data used? • How are center and spread of data sets described and compared? • How is a data set represented in a two-way frequency table summarized? • When is it appropriate to use causation or correlation? • How can technology help to determine whether a linear model is appropriate in a given situation?	• Data can be represented and interpreted in a variety of formats. • Extreme data points (outliers) can skew interpretations of a set of data. • Synthesizing information from multiple sets of data results in evidence-based interpretation. • Center and spread of a data set may be compared in multiple ways. • Data in a two –way frequency table can be summarized using relative frequencies in the context of the data. • A line of best fit can be generated for a set of data to model the relationship between two variables by hand or with technology. • A line of best fit aims to minimize the vertical distances between the data points and the points on the line and may be used to make predictions within the proximity of the data. • Making predictions for values within or near the data set is more reliable than for values far beyond the data set. • Correlation does not imply causation.

Relevant Standards:	Learning Goals:	Learning Objectives:
Content Standards: **Primary(Power):** **NJ SLS.S.ID.C.7** Interpret the slope (rate of change) and intercept (constant term) of a linear model in the context of the data. **NJ SLS.S.ID.C.8** Compute (using technology) and interpret the correlations of a linear fit. **NJ SLS.S.ID.C.9** Distinguish between correlations and causation. **Secondary(Supportive):** **NJ SLS.8.SP.A.1** Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. **NJ SLS.8.SP.A.2** Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. **NJ SLS.8.SP.A.3** Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the	1. Students will be able to interpret the slope (rate of change) and intercept (constant term) of a linear model in the context of the data, compute (using technology) and interpret the correlations of a linear fit, and distinguish between correlations and causation. (NJ SLS.S.ID.C.7, NJ SLS.S.ID.C.8, NJ SLS.S.ID.C.9) (3 weeks)	• Use measures of central tendency to distribute an amount evenly among a group of people • Measure the dispersion of a data set • Use a box-and-whisker plot to describe a data set • Use a histogram to characterize the basic shape of a distribution • Use data to predict an event • Analyzing lines of fit • Organizing and interpreting data in a two-way table • Choosing a data display to help make decisions

Essential Questions:		Enduring Understandings:
slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5cm in mature plant height. **NJ SLS.8.SP.A.4** Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores? **NJ SLS.S.ID.B.5** Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. Summarize, represent, and interpret data one two categorical and quantitative variables. **NJ SLS.S.ID.B.6** Represent data on two quantitative variables on a scatter plot, and		

Essential Questions:		Enduring Understandings:
describe how the variables are related. a) Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Uses given functions or choose a function suggested by the context. Emphasize linear and exponential models. c) Fit a linear function for a scatter plot that suggests a linear association. <u>Standards for Mathematical Practice:</u> **NJ SLS.MP.1** Make sense of problems and persevere in solving them. **NJ SLS.MP.4** Model with mathematics. **NJ SLS.MP.5** Use appropriate tools strategically. **NJ SLS.MP.6** Attend to precision. **NJ SLS.MP.7** Look for and make use of structure. **Additional:** **NJ SLS.S.ID.A.1** Represent data plots on the real number line (dot plots, histograms, and box plots). **NJ SLS.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)		

Essential Questions:	Enduring Understandings:	
of two or more different data sets. **NJ SLS.S.ID.A.3** Interpret difference in shape center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).		

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Teacher Observation, Class Participation, Warm Ups, Homework, Exit Slips, Status Checks, Popsicle Sticks, Thumbs Up/Thumbs Down, Stomp on Three, Student Progress Charts & Reflections	Unit tests, Extended constructed response questions, Quizzes, Graded Homework, Benchmark test	Students create a mini-lesson where they teach and assess their peers	Section quizzes, Unit tests, and the model curriculum benchmark Unit 5 test

Possible Assessment Modifications /Accommodations:			
Special Education Students	At-Risk Learner	English Language Learners (ELL)	Advanced Learner
• Reference Sheet with examples of categorical data and how to graph the data using scatter plots and finding the line of best fit • Simplified test wording • Additional time • Allow use of graphing calculator	• Allow use of graphing calculator • Provide data in table form for scatter plots • Allow retakes when necessary • Choice of test format • Chunk information into similar sections on assessments	• Scale graphs accordingly • Allow use of graphing calculators on all assessments • Present scatter plot data in simplified formats (tables, lists, etc) • Accept shortened responses • Single step directions	• Choice menu with more real-world applications • Create flashcards and test questions pertaining to the unit's material to be used as study materials for classmates

Instructional Strategies:
Chunking Content into Digestible Bites, Recording and Representing Knowledge, Reviewing Content, Using Homework, Examining Similarities and Differences, Examining Errors in Reasoning, Practicing Skills, Strategies and Processes, Engaging Students in Cognitively Complex Tasks Involving Hypothesis Generation and Testing

Possible Instructional Strategy Modifications /Accommodations:			
Special Education Student	English Language Learners (ELL)	At-Risk Learner	Advanced Learner
• Preferential seating • Flexible grouping • Concrete examples of causation versus correlation	• Allow use of graphing calculator • Interactive notebooks • Graphic organizers for key objectives in this unit • Give oral prompts/cues • Reword questions and present information in a simpler context	• Allow use of graphing calculator • Learning stations to reiterate and practice the differences and concepts of correlations versus causations • Allow the use of graphing calculators	• Jigsaw activity for students to reiterate and reteach information to classmates • Independent study • Tiered homework assignments

Unit Vocabulary:
Essential: Joint relative frequency, Marginal relative frequency, Conditional relative frequency, Outlier, Skewed Distribution, Correlation, Coefficient, Two-Way Frequency Table, Standard deviation, Interquartile Range, Line of best fit, Linear regression, Correlation coefficient, Correlation, Causation **Non-Essential:** Association, Trend, Dot plot, Histogram, Box Plot, Scatter Plot, Measure of Center, Normal Distribution, Categorical Data, Accuracy, Scale, Quantity

Interdisciplinary Connections (Applicable Standards):	**Integration of Technology:**	**21st Century Themes:**	**21st Century Skills:**
Technology: NJ SLS 8.1.12.B.2: Apply previous content knowledge by creating and piloting a digital learning game or tutorial. NJ SLS 8.1.12.F.1: Use geographic mapping tools to plan and solve	**S –** Show data and formulas on a Google Doc in their notes. **A –** Students view a Khan Academy lesson and then work the problems with instant feedback. Use research to find examples that support their work.	__x_ Financial, Economic, Business, & Entrepreneurial Literacy – compare and contrast the health benefits/costs of different food chains and determine which would be the best investment __X__ Civic Literacy – students will	_X_ Critical Thinking and Problem Solving – persevere through problems to find solutions presented in an inquiry fashion _X_ Communication & Collaboration - students work in teams to develop solutions to problems.

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
problems. NJ SLS 8.2.12.E.3: Using a simple, visual programming language, create a program using loops, events and procedures to generate specific output. NJ SLS 8.2.12.E.4: Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements). **Career Practices:** CRP2: Apply appropriate academic and technical skills. CRP3. Attend to personal health and financial well-being CRP4. Communicate clearly and effectively and with reason. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. **Career Awareness:** NJ SLS 9.2.12.C.3: Identify transferable career skills and design alternate career plans. NJ SLS 9.2.12.C.4: Analyze how economic conditions and societal changes influence employment trends and future education.	**M –** Use Google spreadsheets to make the distributions (with access to a walk-through video) that can be shared with class for commenting and feedback. **R –** Groups of students create collaborative distributions as a "product" where individual's contributions are evident that can be posted on a class website.	learn to evaluate information on various ecosystems to determine living conditions for the animals with outside influences that have a positive or negative effect on them	

Resources:
Texts/Materials: Big Ideas Math Algebra I and Big Ideas workbook