

<b>Original Adoption:</b>	3/8/2016
<b>Revised:</b>	July 2019
<b>Board Approved:</b>	8/21/19

<b>Toms River Regional Schools Algebra 1 Curriculum</b>	
<b>Content Area: Mathematics</b>	
<b>Course Title: Algebra 1</b>	<b>Grade Level: High School</b>
Modeling with Linear Equations and Inequalities	50 days
Modeling with Linear Functions, Linear Systems, & Exponential Functions	55 Days
Quadratic Equations, Functions & Polynomial	45 Days
Modeling with Statistics	20 Days

**Introduction**

**Effective mathematics education provides students with a balanced instructional program. In such a program, students become proficient in basic computational skills and procedures, develop conceptual understandings, and become skilled at problem solving. Standards-based mathematics instruction starts with basic material and increases in scope and content as the years progress.**

**The curriculum is aligned to the NJSLS for Mathematics. Activities outlined in this curriculum infuse the Standards for Mathematical Practice. In alignment to the content and practice standards, algebra students will extend their knowledge of mathematics as they learn to represent and compare complex numbers, polynomials, periodic models and inference making.**

**Students use functions to model real world applications and their knowledge of their properties to explain the world around them. They will summarize, represent and interpret data to make inferences and justify conclusions. Students will use numerical, graphical, and algebraic models to solve problems.**

**Unit 1: Modeling with Linear Equations and Inequalities**

**Duration: 50 Days**

**Standards/Learning Targets**

**Focus Standards (Major Standards)**

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.SSE.A.1. Interpret expressions that represent a quantity in terms of its context.

A.SSE.A.1a. Interpret parts of an expression, such as terms, factors, and coefficients.

A.CED.A.1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear functions and quadratic functions, and simple rational and exponential functions.

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.2. Create equations in two or more variables to represent relationships between quantities; Graph equations on coordinate axes with labels and scales.

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). [Focus on linear equations.]

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.\* [Focus on linear equations.]

### Supporting and Additional Standards

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.

N.Q.A.2. Define appropriate quantities for the purpose of descriptive modeling.

N.Q.A.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

S.ID.B.6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

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.6c. Fit a linear function for a scatter plot that suggests a linear association.

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.

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.

The following Standards for Mathematical Practice and select New Jersey Student Learning Standards should be covered throughout the various units of the curriculum.

### Standards for Mathematical Practices

MP.1	Make sense of problems and persevere in solving them	<ul style="list-style-type: none"> <li>● Find meaning in problems</li> <li>● Look for entry points</li> <li>● Analyze, conjecture and plan solution pathways</li> <li>● Monitor and adjust</li> <li>● Verify answers</li> <li>● Ask themselves the question: “Does this make sense?”</li> </ul>
MP.2	Reason abstractly and quantitatively.	<ul style="list-style-type: none"> <li>● Make sense of quantities and their relationships in problems</li> <li>● Learn to contextualize and de-contextualize</li> <li>● Create coherent representations of problems</li> </ul>
MP.3	Construct viable arguments and critique the reasoning of others.	<ul style="list-style-type: none"> <li>● Understand and use information to construct arguments</li> <li>● Make and explore the truth of conjectures</li> <li>● Recognize and use counterexamples</li> <li>● Justify conclusions and respond to arguments of others</li> </ul>
MP.4	Model with Mathematics.	<ul style="list-style-type: none"> <li>● Apply mathematics to problems in everyday life</li> <li>● Make assumptions and approximations</li> <li>● Identify quantities in a practical situation</li> <li>● Interpret results in the context of the situation and reflect on whether the results make sense</li> </ul>
MP.5	Use appropriate tools strategically.	<ul style="list-style-type: none"> <li>● Consider the available tools when solving problems</li> <li>● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools)</li> <li>● Make sound decisions of which of these tools might be helpful</li> </ul>
MP.6	Attend to precision.	<ul style="list-style-type: none"> <li>● Communicate precisely to others</li> </ul>

<p>MP.7 Look for and make use of structure.</p>	<ul style="list-style-type: none"> <li>● Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes</li> <li>● Calculate accurately and efficiently</li> </ul>
<p>MP.8 Look for and express regularity in repeated reasoning.</p>	<ul style="list-style-type: none"> <li>● Discern patterns and structures</li> <li>● Can step back for an overview and shift perspective</li> <li>● See complicated things as single objects or as being composed of several objects</li> </ul>



**Primary Interdisciplinary Connections:** Infused within the unit are connections to the NJSLS for Mathematics, Language Arts Literacy

WHST.11-12.10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

RST.11-12.7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

- **TECHNOLOGY STANDARDS**
- 8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

- A. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations
- F: Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

**21st Century Themes/Careers: Through instruction in life and career skills, all students acquire the knowledge and skills needed to prepare for life as citizens and workers in the 21st century. For further clarification see NJ World Class Standards at [www.NJ.gov/education/aps/cccs/career/](http://www.NJ.gov/education/aps/cccs/career/)**

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.

9.1.8.B.1 Distinguish among cash, check, credit card, and debit card

9.1.8.B.2 Construct a simple personal savings and spending plan based on various sources of income.

### Evidence of Student Learning

#### Performance Tasks/Use of Technology:

[www.mathxforschool.com](http://www.mathxforschool.com)

[www.khanacademy.com](http://www.khanacademy.com)

[www.desmos.com](http://www.desmos.com)

[www.kahoot.com](http://www.kahoot.com)

[www.quizizz.com](http://www.quizizz.com)

#### Other Assessments

##### Formative

- Observation
- Homework
- Class Participation
- Whiteboards/communicators
- Think-Pair-Share
- Do-Now
- Notebook Checks
- Writing Prompts
- Exit Tickets

	<ul style="list-style-type: none"> <li>● Classroom Games</li> <li>● Self-assessment</li> </ul> <p><b>Summative</b></p> <ul style="list-style-type: none"> <li>● Chapter/Unit Test</li> <li>● Quizzes</li> <li>● Presentations</li> <li>● Unit Projects</li> </ul> <p><b>Benchmark</b></p> <ul style="list-style-type: none"> <li>● State Standardized Assessments</li> <li>● Quarterly Benchmark Assessment</li> </ul> <p><b>Alternative</b></p> <ul style="list-style-type: none"> <li>● Portfolio Project</li> <li>● Modified assignments</li> </ul>
<b>Knowledge and Skills</b>	
<b>Content</b>	<b>Skills</b>
<p><i>Students will know...</i></p> <ul style="list-style-type: none"> <li>● Literal equations can be rearranged using the properties of equality</li> <li>● Equations and inequalities describe relationships.</li> <li>● Equations can represent real-world and mathematical problems.</li> <li>● Equations represent quantitative relationships.</li> <li>● Scatter plots represent the relationship between two variables.</li> </ul>	<p><i>Students will be able to..</i></p> <ul style="list-style-type: none"> <li>● solve linear equations with coefficients represented by letters in one variable.</li> <li>● use the properties of equality to justify steps in solving linear equations.</li> <li>● solve linear inequalities in one variable.</li> <li>● rearrange linear formulas and literal equations, isolating a specific variable.</li> <li>● identify different parts of an expression, including terms,</li> </ul>

- Scatter plots can be used to determine the nature of the association between the variables.
- Linear models may be developed by fitting a linear function to approximately linear data.
- The correlation coefficient represents the strength of a linear association.
- $y = f(x)$ ,  $y=g(x)$  represent a system of equations.
- Systems of equations can be solved graphically

factors and constants.

- explain the meaning of parts of an expression in context.
- identify and describe relationships between quantities in word problems.
- create linear equations in one variable.
- create linear inequalities in one variable.
- use equations and inequalities to solve real world problems.
- explain each step in the solution process.
- create linear equations in two variables, including those from a context.
- select appropriate scales for constructing a graph.
- interpret the origin in graphs.
- graph equations on coordinate axes, including labels and scales.
- identify and describe the solutions in the graph of an equation.
- distinguish linear models representing approximately linear data from linear. equations representing “perfectly” linear relationships.
- create a scatter plot and sketch a line of best fit.
- fit a linear function to data using technology.
- solve problems using prediction equations.
- interpret the slope and the intercepts of the linear model in context.
- determine the correlation coefficient for the linear model using technology.
- determine the direction and strength of the linear association between two variables.
- explain the relationship between the x-coordinate of a point of intersection and the solution to the equation  $f(x) = g(x)$  for linear equations  $y = f(x)$  and  $y = g(x)$ .
- find approximate solutions to the system by making a

	table of values, graphing, and finding successive approximations.
<b>Instructional Plan</b>	
<b>Suggested Activities</b>	<b>Resources</b>
<a href="#">N.O.A.1 Runners' World</a> <a href="#">N.O.A.2 Giving Raises</a> <a href="#">N.O.A.3 Calories in a Sports Drink</a> <a href="#">A.REI.B.3, A.REI.A.1 Reasoning with linear inequalities</a> <a href="#">A.CED.A.4 Equations and Formulas</a> <a href="#">A.SSE.A.1 Kitchen Floor Tiles</a> <a href="#">A.CED.A.1 Planes and wheat</a> <a href="#">A-CED.A.1 Paying the rent</a> <a href="#">A.REI.A.1 Zero Product Property 1</a> <a href="#">A.CED.A.2 Clea on an Escalator</a> <a href="#">S.ID.B.6,S.ID.C.7-9 Coffee and Crime</a>	<ul style="list-style-type: none"> <li>● Graphing Calculator</li> <li>● Microsoft Excel/PowerPoint</li> <li>● Teacher-made tests, worksheets, warm-ups, and quizzes</li> <li>● Computer software to support unit</li> <li>● Smart board</li> <li>● Document camera</li> </ul>
<b>MODIFICATIONS</b>	
<p><i>English Language Learners</i></p> <ul style="list-style-type: none"> <li>● Provide clear and specific directions</li> <li>● Allow for alternate forms of responses- drawing or speaking instead of writing to demonstrate knowledge when you are not specifically assessing writing</li> <li>● Provide class notes ahead of time to allow students to preview material and increase comprehension</li> <li>● Provide extended time</li> <li>● Simplify written and verbal instructions</li> <li>● Allow the use of an online dictionary to look up the definition and hear the pronunciation of unknown words</li> </ul> <p><i>Special Education</i></p> <ul style="list-style-type: none"> <li>● Utilize graphic organizers to help provide a purpose for reading and increase comprehension</li> </ul>	

- Assign peer tutor
- Provide clear and specific directions
- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions

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- Utilize graphic organizers to help provide a purpose for reading and increase comprehension
- Assign peer tutor
- Provide clear and specific directions
- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions

*Gifted and Talented*

- Extension activities
- Opportunities for Critical Thinking
- Problem Solving/Design Challenges
- Technology Integration
- Student Choice Activities
- Student Driven Activities
- Group Projects
- Tiered Activities

*Students at Risk of School Failure*

- Extended Time
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning

- Tiered Activities
- Manipulatives
- Modified Assignments
- Preferential Seating
- Visual Cues/Modeling
- Technology Integration
- Assistive Technology

**Core Instructional and Supplemental Materials**

- Algebra 1 Text
- [www.Kutasoftware.com](http://www.Kutasoftware.com)
- Algebra with Pizzazz
- Text support material

**Teacher Notes:**

**Unit 2: Modeling with Linear Functions, Linear Functions, Linear Systems & Exponential Functions**

**Duration:** 55 Days

**Standards/Learning Targets**

**Focus Standards (Major Standards)**

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. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.

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.

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  $y = f(x)$ .

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.

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. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.

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.

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.

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. For example, the Fibonacci sequence is defined recursively by  $f(0) = f(1) = 1$ ,  $f(n+1) = f(n) + f(n-1)$  for  $n \geq 1$ .

A.SSE.A.1. Interpret expressions that represent a quantity in terms of its context

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  $P$ .

\*[Algebra 1 limitation: exponential expressions with integer 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. \*[Focus on 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

### Supporting and Additional Standards

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.

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.

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.1b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.

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).

\*[Algebra 1 limitation: exponential expressions with integer exponents]

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.BF.A.1. Write a function that describes a relationship between two quantities.

1a. Determine an explicit expression, a recursive process, or steps for calculation from a context.

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.SSE.B.3c. Use the properties of exponents to transform expressions for exponential functions. For example the expression  $1.15^t$  can be rewritten as  $(1.15^{1/12})^{12t} \approx 1.012^{12t}$  to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.

\*[Algebra 1: limit to exponential expressions with integer exponents]

F.LE.B.5. Interpret the parameters in a linear or exponential function 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). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum. \*[Limit to linear and exponential]

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 functions 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.

The following Standards for Mathematical Practice and select New Jersey Student Learning Standards should be covered throughout the various units of the curriculum.

### **Standards for Mathematical Practices**

- |      |  |  |
|------|--|--|
| MP.1 | Make sense of problems and persevere in solving them             | <ul style="list-style-type: none"><li>● Find meaning in problems</li><li>● Look for entry points</li><li>● Analyze, conjecture and plan solution pathways</li><li>● Monitor and adjust</li><li>● Verify answers</li><li>● Ask themselves the question: “Does this make sense?”</li></ul> |
| MP.2 | Reason abstractly and quantitatively.                            | <ul style="list-style-type: none"><li>● Make sense of quantities and their relationships in problems</li><li>● Learn to contextualize and de-contextualize</li><li>● Create coherent representations of problems</li></ul>   |
| MP.3 | Construct viable arguments and critique the reasoning of others. | <ul style="list-style-type: none"><li>● Understand and use information to construct arguments</li><li>● Make and explore the truth of conjectures</li><li>● Recognize and use counterexamples</li><li>● Justify conclusions and respond to arguments of others</li></ul>                 |
| MP.4 | Model with Mathematics.  | <ul style="list-style-type: none"><li>● Apply mathematics to problems in everyday life</li><li>● Make assumptions and approximations</li></ul>   |

		<ul style="list-style-type: none"> <li>● Identify quantities in a practical situation</li> <li>● Interpret results in the context of the situation and reflect on whether the results make sense</li> </ul>
MP.5	Use appropriate tools strategically.	<ul style="list-style-type: none"> <li>● Consider the available tools when solving problems</li> <li>● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools)</li> <li>● Make sound decisions of which of these tools might be helpful</li> </ul>
MP.6	Attend to precision.	<ul style="list-style-type: none"> <li>● Communicate precisely to others</li> <li>● Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes</li> <li>● Calculate accurately and efficiently</li> </ul>
MP.7	Look for and make use of structure.	<ul style="list-style-type: none"> <li>● Discern patterns and structures</li> <li>● Can step back for an overview and shift perspective</li> <li>● See complicated things as single objects or as being composed of several objects</li> </ul>
MP.8	Look for and express regularity in repeated reasoning.	<ul style="list-style-type: none"> <li>● Notice if calculations are repeated and look both for general methods and shortcuts</li> <li>● In solving problems, maintain oversight of the process while attending to detail</li> <li>● Evaluate the reasonableness of their immediate results is certain patterns and structures</li> </ul>

**Primary Interdisciplinary Connections:** Infused within the unit are connections to the NJSLS for Mathematics, Language Arts Literacy

WHST.11-12.10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

RST.11-12.7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

● **TECHNOLOGY STANDARDS and APPLY explicit standards as appropriate.**

- 8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
- A. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations
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**MUST LIST STANDARDS OUT SPECIFICALLY AND ADD THE CAREER READY PRACTICES THAT ARE RELEVANT**

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.

9.1.8.B.1 Distinguish among cash, check, credit card, and debit card

9.1.8.B.2 Construct a simple personal savings and spending plan based on various sources of income.

## Evidence of Student Learning

### Performance Tasks/Use of Technology:

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[www.desmos.com](http://www.desmos.com)

[www.kahoot.com](http://www.kahoot.com)

[www.quizizz.com](http://www.quizizz.com)

### Other Assessments

#### Formative

- Observation
- Homework
- Class Participation
- Whiteboards/communicators
- Think-Pair-Share
- Do-Now
- Notebook Checks
- Writing Prompts
- Exit Tickets
- Classroom Games
- Self-assessment

#### Summative

- Chapter/Unit Test
- Quizzes
- Presentations
- Unit Projects

#### Benchmark

- State Standardized Assessments
- Quarterly Benchmark Assessment

#### Alternative

- Portfolio Project
- Modified assignments

Knowledge and Skills	
Content	Skills
<p><i>Students will know...</i></p> <ul style="list-style-type: none"> <li>● Identify and define variables representing essential features for the model.</li> <li>● model real world situations by creating a system of linear equations.</li> <li>● solve systems of linear equations using the elimination or substitution method.</li> <li>● solve systems of linear equations by graphing.</li>   <li>● interpret the solution(s) in context.</li> <li>● model real world situations by creating a system of linear inequalities given a context.</li> <li>● interpret the solution(s) in context</li> <li>● identify and describe situations in which one quantity changes at a constant rate.</li> <li>● identify and describe situations in which a quantity grows or decays by a constant percent.</li> <li>● show that linear functions grow by equal differences over equal intervals.</li> <li>● show that exponential functions grow by equal factors over equal intervals.</li> <li>● create arithmetic and geometric sequences from verbal descriptions.</li> <li>● create arithmetic sequences from linear functions.</li> <li>● create geometric sequences from exponential functions.</li> </ul>	<p><i>Students will be able to..</i></p> <ul style="list-style-type: none"> <li>● Systems of equations can be solved exactly (algebraically) and approximately (graphically)</li> <li>● <math>F(x)</math> is an element in the range and <math>x</math> is an element in the domain.</li> <li>● use the definition of a function to determine whether a relationship is a function.</li> <li>● use function notation once a relation is determined to be a function.</li> <li>● evaluate functions for given inputs in the domain.</li> <li>● explain statements involving function notation in the context of the problem</li> <li>● Linear functions grow by equal differences over equal intervals.</li> <li>● Exponential functions grow by equal factors over equal intervals.</li> <li>● Sequences are functions, sometimes defined and represented recursively.</li> <li>● Sequences are functions whose domain is a subset of integers.</li> <li>● Rate of change of non-linear functions varies.</li> <li>● Piecewise-defined functions may contain discontinuities.</li> <li>● Absolute value functions are piecewise functions.</li> </ul>

- identify recursively defined sequences as functions.
- create linear and exponential functions given
  - a graph;
  - a description of a relationship;
  - a table of values.
- given a context, write an explicit expressions, a recursive process or steps for calculation for linear and exponential relationships.
- interpret parts of linear and exponential functions in context.
- use the properties of exponents to simplify or expand exponential expressions, recognizing these are equivalent forms.
- given a verbal description of a relationship, sketch linear and exponential functions.
- identify intercepts and intervals where the function is positive/negative.
- interpret parameters in context.
- determine the *practical* domain of a function.
- Compare key features of two linear functions represented in different ways.
- compare key features of two exponential functions represented in different ways.
- calculate the rate of change from a table of values or from a function presented symbolically.
- estimate the rate of change from a graph.
- graph linear, square root, cube root, and piecewise-defined functions.

- graph more complicated cases of functions using technology.
- identify and describe key features of the graphs of square root, cube root, and piecewise-defined functions .

### Instructional Plan

#### Suggested Activities

[A.REI.C.6 Cash Box](#)  
[A.CED.A.3 Dimes and Quarters](#)  
[A.REI.C.5 Solving Two EA.REI.D.12](#)  
[Fishing Adventures 3quations in Two Unknowns](#)  
[F.IF.A.1 The Parking Lot](#)  
[F.IF.A.2 Yam in the Oven](#)  
[F.LE.A.1 Finding Linear and Exponential Models](#)  
[F.LE.A.2 Interesting Interest Rates](#)  
[F.BF.A.1a Skeleton Tower](#)  
[A.SSE.A.1 Mixing Candies](#)  
[F.IF.B.4 Warming and Cooling](#)  
[F.IF.B.4, F.IF.B.5 Average Cost](#)  
[F.LE.B.5 US Population 1982-1988](#)  
[F.IF.B.6 Temperature Change](#)  
[F.IF.C.7b Bank Account Balance](#)

#### Resources

- Graphing Calculator
- Microsoft Excel/PowerPoint
- Teacher-made tests, worksheets, warm-ups, and quizzes
- Computer software to support unit
- Smart board
- Document camera

### MODIFICATIONS

#### *English Language Learners*

- Provide clear and specific directions
- Allow for alternate forms of responses- drawing or speaking instead of writing to demonstrate knowledge when you are not specifically assessing writing
- Provide class notes ahead of time to allow students to preview material and increase comprehension

- Provide extended time
- Simplify written and verbal instructions
- Allow the use of an online dictionary to look up the definition and hear the pronunciation of unknown words

*Special Education*

- Utilize graphic organizers to help provide a purpose for reading and increase comprehension
- Assign peer tutor
- Provide clear and specific directions
- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions

*504*

- Utilize graphic organizers to help provide a purpose for reading and increase comprehension
- Assign peer tutor
- Provide clear and specific directions
- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions

*Gifted and Talented*

- Extension activities
- Opportunities for Critical Thinking
- Problem Solving/Design Challenges
- Technology Integration
- Student Choice Activities
- Student Driven Activities
- Group Projects
- Tiered Activities

*Students at Risk of School Failure*

- Extended Time

- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives
- Modified Assignments
- Preferential Seating
- Visual Cues/Modeling
- Technology Integration
- Assistive Technology

**Core Instructional and Supplemental Materials**

- Algebra 1 Text
- [www.Kutasoftware.com](http://www.Kutasoftware.com)
- Descriptive Statistics by
- Algebra with Pizzazz
- Text support material

**Teacher Notes:**

**Unit 3: Quadratic Equations, Functions & Polynomials**

**Duration: 45 Days**

**Standards/Learning Targets**

## Focus Standards (Major Standards)

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.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  $(x^2 - y^2)(x^2 + y^2)$ .*

A.REI.B.4. Solve quadratic equations in one variable.

A.REI.B.4a. Use the method of completing the square to transform any quadratic equation in  $x$  into an equation of the form  $(x - p)^2 = q$  that has the same solutions. Derive the quadratic formula from this form.

A.REI.B.4b. Solve quadratic equations by inspection (e.g., for  $x^2 = 49$ ), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as  $a \pm bi$  for real numbers  $a$  and  $b$ .

A.CED.A.1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear functions and quadratic functions, and simple rational and exponential functions.

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.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.

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.\*

### Supporting and Additional Standards

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.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.

F.BF.A.1. Write a function that describes a relationship between two quantities.

F.BF.A.1a: Determine an explicit expression, a recursive process, or steps for calculation from a context.

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 functions and show intercepts, maxima, and minima. \*[emphasize quadratic functions]

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).

For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.

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.

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.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.

\*[Algebra 1: limit to quadratic and cubic functions in which linear and quadratic factors are available]

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.

The following Standards for Mathematical Practice and select New Jersey Student Learning Standards should be covered throughout the various units of the curriculum.

### **Standards for Mathematical Practices**

MP.1      Make sense of problems and persevere in solving      ●      Find meaning in problems

	them	<ul style="list-style-type: none"> <li>● Look for entry points</li> <li>● Analyze, conjecture and plan solution pathways</li> <li>● Monitor and adjust</li> <li>● Verify answers</li> <li>● Ask themselves the question: “Does this make sense?”</li> </ul>
MP.2	Reason abstractly and quantitatively.	<ul style="list-style-type: none"> <li>● Make sense of quantities and their relationships in problems</li> <li>● Learn to contextualize and de-contextualize</li> <li>● Create coherent representations of problems</li> </ul>
MP.3	Construct viable arguments and critique the reasoning of others.	<ul style="list-style-type: none"> <li>● Understand and use information to construct arguments</li> <li>● Make and explore the truth of conjectures</li> <li>● Recognize and use counterexamples</li> <li>● Justify conclusions and respond to arguments of others</li> </ul>
MP.4	Model with Mathematics.	<ul style="list-style-type: none"> <li>● Apply mathematics to problems in everyday life</li> <li>● Make assumptions and approximations</li> <li>● Identify quantities in a practical situation</li> <li>● Interpret results in the context of the situation and reflect on whether the results make sense</li> </ul>
MP.5	Use appropriate tools strategically.	<ul style="list-style-type: none"> <li>● Consider the available tools when solving problems</li> <li>● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools)</li> <li>● Make sound decisions of which of these tools might be helpful</li> </ul>
MP.6	Attend to precision.	<ul style="list-style-type: none"> <li>● Communicate precisely to others</li> <li>● Use clear definitions, state the meaning of symbols and are</li> </ul>

MP.7	Look for and make use of structure.	<p>careful about specifying units of measure and labeling axes</p> <ul style="list-style-type: none"> <li>● Calculate accurately and efficiently</li> <li>● Discern patterns and structures</li> <li>● Can step back for an overview and shift perspective</li> <li>● See complicated things as single objects or as being composed of several objects</li> </ul>
MP.8	Look for and express regularity in repeated reasoning.	<ul style="list-style-type: none"> <li>● Notice if calculations are repeated and look both for general methods and shortcuts</li> <li>● In solving problems, maintain oversight of the process while attending to detail</li> <li>● Evaluate the reasonableness of their immediate results is certain patterns and structures</li> </ul>

**Primary Interdisciplinary Connections:** Infused within the unit are connections to the NJSL for Mathematics, Language Arts Literacy

WHST.11-12.10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

RST.11-12.7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

● **TECHNOLOGY STANDARDS and APPLY explicit standards as appropriate.**

- 8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
- A. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and

operations

- F: Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

**21st Century Themes/Careers: Through instruction in life and career skills, all students acquire the knowledge and skills needed to prepare for life as citizens and workers in the 21st century. For further clarification see NJ World Class Standards at [www.NJ.gov/education/aps/cccs/career/](http://www.NJ.gov/education/aps/cccs/career/)**

**MUST LIST STANDARDS OUT SPECIFICALLY AND ADD THE CAREER READY PRACTICES THAT ARE RELEVANT**

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.

9.1.8.B.1 Distinguish among cash, check, credit card, and debit card

9.1.8.B.2 Construct a simple personal savings and spending plan based on various sources of income.

### Evidence of Student Learning

#### Performance Tasks/Use of Technology:

[www.math1forschool.com](http://www.math1forschool.com)

[www.khanacademy.com](http://www.khanacademy.com)

[www.desmos.com](http://www.desmos.com)

[www.kahoot.com](http://www.kahoot.com)

[www.quizizz.com](http://www.quizizz.com)

#### Other Assessments

##### Formative

- Observation
- Homework
- Class Participation
- Whiteboards/communicators
- Think-Pair-Share
- Do-Now
- Notebook Checks
- Writing Prompts

	<ul style="list-style-type: none"> <li>● Exit Tickets</li> <li>● Classroom Games</li> <li>● Self-assessment</li> </ul> <p><b>Summative</b></p> <ul style="list-style-type: none"> <li>● Chapter/Unit Test</li> <li>● Quizzes</li> <li>● Presentations</li> <li>● Unit Projects</li> </ul> <p><b>Benchmark</b></p> <ul style="list-style-type: none"> <li>● State Standardized Assessments</li> <li>● Quarterly Benchmark Assessment</li> </ul> <p><b>Alternative</b></p> <ul style="list-style-type: none"> <li>● Portfolio Project</li> <li>● Modified assignments</li> </ul>
<b>Knowledge and Skills</b>	
<b>Content</b>	<b>Skills</b>
<p><i>Students will know...</i></p> <ul style="list-style-type: none"> <li>● add and subtract polynomials.</li> <li>● multiply polynomials.</li> <li>● recognize numerical expressions as a difference of squares and rewrite the expression as the product of sums/differences.</li> <li>● recognize polynomial expressions in one variable as a</li> </ul>	<p><i>Students will be able to..</i></p> <ul style="list-style-type: none"> <li>● Polynomials form a system analogous to the integers.</li> <li>● Polynomials are closed under the operations of addition, subtraction, and multiplication.</li> <li>● Multiple methods for solving quadratic equations.</li> <li>● Transforming a quadratic equation into the form <math>(x - p)^2 = q</math> yields an equation having the same solutions.</li> </ul>

difference of squares and rewrite the expression as the product of sums/differences.

- use the method of completing the square to transform a quadratic equation in  $x$  into an equation of the form  $(x - p)^2 = q$ .
- derive the quadratic formula from  $(x - p)^2 = q$ .
- solve a quadratic equations in one variable by inspection.
- solve quadratic equations in one variable by taking square roots.
- solve a quadratic equations in one variable by completing the square.
- solve a quadratic equations in one variable using the quadratic formula.
- solve a quadratic equations in one variable by factoring.
- strategically select, as appropriate to the initial form of the equation, a method for solving a quadratic equation in one variable.
- write complex solutions of the quadratic formula in  $a \pm bi$  form.
- analyze the quadratic formula, recognizing the conditions leading to complex solutions (discriminant).
- create quadratic equations in one variable.
- use quadratic equations to solve real world problems.
- interpret maximum/minimum and intercepts of quadratic functions from graphs and tables in the context of the problem.
- sketch graphs of quadratic functions given a verbal

- Alternate, equivalent forms of a quadratic expression may reveal specific attributes of the function that it defines.
- given a context, write explicit expressions, a recursive process or steps for calculation for quadratic relationships.
- A quantity increasing exponentially eventually exceeds a quantity increasing quadratically.
- Characteristics of even and odd functions in graphs and algebraic expressions
- Vertical and horizontal shifts
- General shape(s) and end behavior of cubic functions
- The sum or product of two rational numbers is rational.
- The sum of a rational number and an irrational number is irrational.
- The product of a nonzero rational number and an irrational number is irrational.

description of the relationship between the quantities.

- identify intercepts and intervals where function is increasing/decreasing
- determine the practical domain of a function.
- factor a quadratic expression for the purpose of revealing the zeros of a function.
- complete the square for the purpose of revealing the maximum or minimum of a function.
- graph quadratic functions expressed symbolically.
- graph more complicated cases of quadratic functions using technology.
- identify and describe key features of the graphs of quadratic functions.
- given two quadratic functions, each represented in a different way, compare the properties of the functions.
- calculate the rate of change of a quadratic function from a table of values or from a function presented symbolically.
- estimate the rate of change from a graph of a quadratic function.
- analyze graphs and tables to compare rates of change of exponential and quadratic functions.
- perform transformations on graphs of linear and quadratic functions.
- 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).
- identify the effect on the graph of combinations of

transformations.

- given the graph, find the value of  $k$ .
- illustrate an explanation of the effects on linear and quadratic graphs using technology.
- recognize even and odd functions from their graphs and from algebraic expressions for them.
- approximate the solution( $x$ ) to a system of equations comprised of a linear and a quadratic function by using technology to graph the functions, by making a table of values and/or by finding successive approximations.
- find the zeros of a polynomial (quadratic and cubic).
- test domain intervals to determine where  $f(x)$  is greater than or less than zero.
- use zeros of a function to sketch a graph.
- explain and justify conclusions regarding sums and products of two rational numbers..
- explain and justify conclusions regarding the sum of a rational and irrational number.
- explain and justify conclusions regarding the product of a nonzero rational and irrational number.

### Instructional Plan

**Suggested Activities**

**Resources**

[A.APR.A.1 Powers of 11](#)  
[A.SSE.A.2 Equivalent Expressions](#)  
[A.REI.B.4 Visualizing Completing the Square](#)  
[A.REI.B.4 Braking Distance](#)  
[A.REI.B.4 Two Squares are Equal](#)  
[F.IF.B.4 Words – Tables - Graphs](#)  
[F.IF.B.5 The restaurant](#)  
[A.SSE.B.3 Profit of a company](#)  
[A.SSE.B.3 Rewriting a Quadratic Expression](#)  
[F.IF.C.7a Graphs of Quadratic Functions](#)

- Graphing Calculator
- Microsoft Excel/PowerPoint
- Teacher-made tests, worksheets, warm-ups, and quizzes
- Computer software to support unit
- Smart board
- Document camera

## MODIFICATIONS

### *English Language Learners*

- Provide clear and specific directions
- Allow for alternate forms of responses- drawing or speaking instead of writing to demonstrate knowledge when you are not specifically assessing writing
- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions
- Allow the use of an online dictionary to look up the definition and hear the pronunciation of unknown words

### *Special Education*

- Utilize graphic organizers to help provide a purpose for reading and increase comprehension
- Assign peer tutor
- Provide clear and specific directions
- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions

### *504*

- Utilize graphic organizers to help provide a purpose for reading and increase comprehension
- Assign peer tutor
- Provide clear and specific directions

- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions

*Gifted and Talented*

- Extension activities
- Opportunities for Critical Thinking
- Problem Solving/Design Challenges
- Technology Integration
- Student Choice Activities
- Student Driven Activities
- Group Projects
- Tiered Activities

*Students at Risk of School Failure*

- Extended Time
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives
- Modified Assignments
- Preferential Seating
- Visual Cues/Modeling
- Technology Integration
- Assistive Technology

**Core Instructional and Supplemental Materials**

- Algebra 1 Text
- [www.Kutasoftware.com](http://www.Kutasoftware.com)
- Algebra with Pizzazz
- Text support material

**Teacher Notes:****Unit 4: Modeling with Statistics****Duration:** 20 Days**Standards/Learning Targets****Focus Standards (Major Standards)**

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.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.*

**Supporting and Additional Standards**

S.ID.A.1. Represent data with plots 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, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

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.

S.ID.B.6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

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 assess the fit of a function by plotting and analyzing residuals, including with the use of technology.

The following Standards for Mathematical Practice and select New Jersey Student Learning Standards should be covered throughout the various units of the curriculum.

### **Standards for Mathematical Practices**

MP.1	Make sense of problems and persevere in solving them	<ul style="list-style-type: none"><li>● Find meaning in problems</li><li>● Look for entry points</li><li>● Analyze, conjecture and plan solution pathways</li><li>● Monitor and adjust</li><li>● Verify answers</li><li>● Ask themselves the question: “Does this make sense?”</li></ul>
MP.2	Reason abstractly and quantitatively.	<ul style="list-style-type: none"><li>● Make sense of quantities and their relationships in problems</li><li>● Learn to contextualize and de-contextualize</li><li>● Create coherent representations of problems</li></ul>
MP.3	Construct viable arguments and critique the reasoning of others.	<ul style="list-style-type: none"><li>● Understand and use information to construct arguments</li><li>● Make and explore the truth of conjectures</li><li>● Recognize and use counterexamples</li><li>● Justify conclusions and respond to arguments of others</li></ul>
MP.4	Model with Mathematics.	<ul style="list-style-type: none"><li>● Apply mathematics to problems in everyday life</li></ul>

		<ul style="list-style-type: none"> <li>● Make assumptions and approximations</li> <li>● Identify quantities in a practical situation</li> <li>● Interpret results in the context of the situation and reflect on whether the results make sense</li> </ul>
MP.5	Use appropriate tools strategically.	<ul style="list-style-type: none"> <li>● Consider the available tools when solving problems</li> <li>● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools)</li> <li>● Make sound decisions of which of these tools might be helpful</li> </ul>
MP.6	Attend to precision.	<ul style="list-style-type: none"> <li>● Communicate precisely to others</li> <li>● Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes</li> <li>● Calculate accurately and efficiently</li> </ul>
MP.7	Look for and make use of structure.	<ul style="list-style-type: none"> <li>● Discern patterns and structures</li> <li>● Can step back for an overview and shift perspective</li> <li>● See complicated things as single objects or as being composed of several objects</li> </ul>
MP.8	Look for and express regularity in repeated reasoning.	<ul style="list-style-type: none"> <li>● Notice if calculations are repeated and look both for general methods and shortcuts</li> <li>● In solving problems, maintain oversight of the process while attending to detail</li> <li>● Evaluate the reasonableness of their immediate results is certain patterns and structures</li> </ul>

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- 8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
- A. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations
- F: Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

9.2.8.B.1 Research careers within the 16 Career Clusters and determine attributes of career success.

9.2.8.B.4 Evaluate how traditional and nontraditional careers have evolved regionally, nationally, and globally.

**21st Century Themes/Careers: Through instruction in life and career skills, all students acquire the knowledge and skills needed to prepare for life as citizens and workers in the 21st century. For further clarification see NJ World Class Standards at [www.NJ.gov/education/aps/cccs/career/](http://www.NJ.gov/education/aps/cccs/career/)**

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.

9.1. Personal Financial Literacy - This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.

### Evidence of Student Learning

#### Performance Tasks/Use of Technology:

[www.mathxlforschool.com](http://www.mathxlforschool.com)

[www.khanacademy.com](http://www.khanacademy.com)

[www.desmos.com](http://www.desmos.com)

[www.kahoot.com](http://www.kahoot.com)

[www.quizizz.com](http://www.quizizz.com)

#### Other Assessments

##### Formative

- Observation
- Homework
- Class Participation
- Whiteboards/communicators
- Think-Pair-Share
- Do-Now
- Notebook Checks
- Writing Prompts
- Exit Tickets
- Classroom Games
- Self-assessment

##### Summative

- Chapter/Unit Test
- Quizzes
- Presentations
- Unit Projects

##### Benchmark

	<ul style="list-style-type: none"> <li>● State Standardized Assessments</li> <li>● Quarterly Benchmark Assessment</li> </ul> <p><b>Alternative</b></p> <ul style="list-style-type: none"> <li>● Portfolio Project</li> <li>● Modified assignments</li> </ul>
<b>Knowledge and Skills</b>	
<b>Content</b>	<b>Skills</b>
<p><i>Students will know...</i></p> <ul style="list-style-type: none"> <li>● represent data with dot plots on the real number line.</li> <li>● represent data with histograms on the real number line.</li> <li>● represent data with box plots on the real number line.</li> <li>● represent two or more data sets with plots and use appropriate statistics to compare their center and spread.</li> <li>● interpret differences in shape, center, and spread in context.</li> <li>● explain possible effects of extreme data points (outliers) when summarizing data and interpreting shape, center and spread.</li> <li>● construct two-way frequency tables for categorical data.</li> <li>● interpret joint, marginal and conditional relative frequencies in context.</li> <li>● explain possible associations between categorical data in two-way tables.</li> </ul>	<p><i>Students will be able to..</i></p> <ul style="list-style-type: none"> <li>● Appropriate use of a statistic depends on the shape of the data distribution.</li> <li>● Standard deviation</li> <li>● Categorical variables represent types of data which may be divided into groups.</li> </ul>

- identify and describe trends in the data.
- fit a function to data using technology.
- solve problems using functions fitted to data (prediction equations).
- interpret the intercepts of models in context.
- plot residuals of linear and non-linear functions.
- analyze residuals in order to informally evaluate the fit of linear and non-linear functions.
- nterpret maximum/minimum and intercepts of functions from graphs and tables in the context of the problem.
- sketch graphs of functions given a verbal description of the relationship between the quantities.
- identify intercepts and intervals where function is increasing/decreasing.
- determine the practical domain of a function .

### Instructional Plan

#### Suggested Activities

- [S.ID.A.1-3 Haircut Costs](#)
- [S.ID.A.1-3 Speed Trap](#)
- [S.ID.A.2-3 Measuring Variability in a Data Set](#)
- [S.ID.A.3 Identifying Outliers](#)

#### Resources

- Graphing Calculator
- Microsoft Excel/PowerPoint
- Teacher-made tests, worksheets, warm-ups, and quizzes

[S.ID.B.5 Support for a Longer School Day?](#)  
[S.ID.B.6 Laptop Battery Charge 2](#)  
[F.IF.B.4 The Aquarium](#)  
[F.IF.B.4 Containers](#)  
[F.IF.B.4-5 The Canoe Trip, Variation 2](#)

- Computer software to support unit
- Smart board
- Document camera

## MODIFICATIONS

### *English Language Learners*

- Provide clear and specific directions
- Allow for alternate forms of responses- drawing or speaking instead of writing to demonstrate knowledge when you are not specifically assessing writing
- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions
- Allow the use of an online dictionary to look up the definition and hear the pronunciation of unknown words

### *Special Education*

- Utilize graphic organizers to help provide a purpose for reading and increase comprehension
- Assign peer tutor
- Provide clear and specific directions
- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions

### *504*

- Utilize graphic organizers to help provide a purpose for reading and increase comprehension
- Assign peer tutor
- Provide clear and specific directions
- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions

*Gifted and Talented*

- Extension activities
- Opportunities for Critical Thinking
- Problem Solving/Design Challenges
- Technology Integration
- Student Choice Activities
- Student Driven Activities
- Group Projects
- Tiered Activities

*Students at Risk of School Failure*

- Extended Time
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives
- Modified Assignments
- Preferential Seating
- Visual Cues/Modeling
- Technology Integration
- Assistive Technology

**Core Instructional and Supplemental Materials**

- Algebra 1 Text
- [www.kutasoftware.com](http://www.kutasoftware.com)
- Algebra with Pizzazz

- Text support material

**Teacher Notes:**