

Ocean Academy Charter High School
Algebra 1 Part B Curriculum Guide
Grade: 9-12



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Ocean Academy Charter High School Algebra 1 Part B Curriculum	
Content Area: Mathematics	
Course Title: Algebra 1 Part B	
Grade Level: 9-12	
Unit Title	Pacing Guide in Days
Unit Plan 3: Quadratic Equations, Functions and Polynomials	50 Days
Unit Plan 4: Modeling with Statistics	40 Days

Ocean Academy Charter High School Unit 3 Overview	
Content Area: Algebra 1 Mathematics	
Unit 3 Title: 3 Quadratic Equations, Functions and Polynomials; Reasoning with Equations and Inequalities/Creating Equations	Duration: 50 Days
Target Course/Grade Level: Algebra 1 Part B ; 9-12	
Introduction/Unit 3 ➤ Perform arithmetic operations on polynomials ➤ Understand the relationship between zeros and factors ➤ Interpret the structure of expressions ➤ Solve equations and inequalities in one variable ➤ Create equations that describe numbers or relationships ➤ Interpret functions that arise in applications in terms of the context ➤ Represent and solve equations and inequalities graphically	

- Build a function that models a relationship between two quantities
- Construct & compare linear, quadratic, & exponential models
- Build new functions from existing functions
- Analyze functions using different representations
- Use properties of rational and irrational numbers

Primary interdisciplinary connections: Infused within the unit are connection to the NJSLs for Mathematics, Language Arts Literacy and Technology. <http://nj.gov/education/cccs/>

Disciplinary Concepts for the Unit

Standard 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.

Standard 9.2 Career Awareness, Exploration, Preparation and Training

This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

Standard 9.4 Life Literacies and Key Skills

This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy.

Standard 8.1 Computer Science

Computer Science outlines a comprehensive set of concepts and skills, such as data and analysis, algorithms and programming, and computing systems.

Standard 8.2 Design Thinking

Technology, outlines the technological design concepts and skills essential for technological and engineering literacy. The framework design includes Engineering Design, Ethics and Culture, and the Effects of Technology on the Natural world among the disciplinary concepts

Amistad Law: N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocide in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35 A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards (N.J.S.A.18A:35-4.36) A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35.

Diversity and Inclusion

C.18A:35-4.36a Curriculum to include instruction on diversity and inclusion.

1. The instruction shall:
 - (1) highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance;
 - (2) examine the impact that unconscious bias and economic disparities have at both an individual level and on society as a whole; and
 - (3) encourage safe, welcoming, and inclusive environments for all students regardless of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs.

Asian Americans and Pacific Islanders (AAPI)

Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLs) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416).

21st Century Themes and Skills

"Twenty-first century themes and skills" means themes such as global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; learning and innovation skills, including creativity and innovation, critical thinking and problem solving, and communication and collaboration; information, media, and technology skills; and life and career skills, including flexibility. Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy."

Disciplinary Concepts for Unit 3.

Career Readiness, Life Literacies, and Key Skills

Critical Thinking

Creativity and Innovation

Computer Science and Design Thinking

Impacts of Computing

Unit 3 Focus Standards (Major Standards) [New Jersey Student Learning Standards-Mathematics](#)

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Content Standards with Statement	BIM Resource	Suggested Mathematical Practices	Critical Knowledge and Skills Objectives
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. <i>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 $(x^2 - y^2)(x^2 + y^2)$.</i>	7.1, 7.2, 7.3 7.5, 7.6, 7.7, 7.8	MP.2 Reason abstractly and quantitatively. MP.7 Look for and make use of structure.	LG1 Add, subtract, and multiply polynomials, relating these to arithmetic operations with integers. Factor to produce equivalent forms of quadratic expressions in one variable. Polynomials form a system analogous to the integers. Polynomials are closed under the operations of addition, subtraction, and multiplication. ➤ add and subtract polynomials. ➤ multiply polynomials. ➤ recognize numerical expressions as a difference of squares and rewrite the expression as the product of sums/differences. ➤ recognize polynomial expressions in one variable as a difference of squares and rewrite the expression as the product of sums/differences.
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,	9.4, 9.5	MP.1 Make sense of problems and persevere in solving them. MP.3 Construct viable arguments and critique the reasoning of others. MP. 5 Use appropriate	LG2 and LG3 Derive the quadratic formula by completing the square and recognize when there are no real solutions. Solve quadratic equations in one variable using a variety of methods (including inspection, taking square roots, factoring, completing the square, and the quadratic formula) and write complex solutions in $a \pm bi$ form. Multiple methods for solving quadratic equations.

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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 .	7.4, 7.5, 7.6, 7.7, 7.8, 9.3, 9.4, 9.5	tools strategically. MP.7 Look for and make use of structure.	Transforming a quadratic equation into the form $(x - p)^2 = q$ yields an equation having the same solutions. ➤ 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).
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.	1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 6.5, 7.5, 7.6, 7.7, 7.8, 9.3, 9.4, 9.5, 9.6, 10.3	MP 2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.7 Look for and make use of structure.	LG4 Create quadratic equations in one variable and use them to solve problems. ➤ create quadratic equations in one variable. ➤ use quadratic equations to solve real world problems.

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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. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i> F.IF.B.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. <i>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</i>	3.3, 3.5, 6.3, 8.4, 8.5, 9.2, 10.1, 10.2 3.2, 3.4	MP.4 Model with mathematics. MP.6 Attend to precision.	LG5 Interpret key features of quadratic functions from graphs and tables. Given a verbal description of the relationship, sketch the graph of a quadratic function, showing key features and relating the domain of the function to its graph. ➤ 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 description of the relationship between the quantities. ➤ identify intercepts and intervals where function is increasing/decreasing ➤ determine the practical domain of a function.
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	7.5, 7.6, 7.7, 7.8, 8.5 9.4	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics.	LG6 Alternate, equivalent forms of a quadratic expression may reveal specific attributes of the function that it defines. ➤ 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.

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maximum or minimum value of the function it defines.		MP.7 Look for and make use of structure.	
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.	4.1, 4.2, 4.4, 4.6, 6.3, 6.4, 6.7, 8.4, 8.5, 8.6	MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics.	LG7 ➤ given a context, write explicit expressions, a recursive process or steps for calculation for quadratic relationships.
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. <i>*[emphasize quadratic functions]</i> 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).	(a)3.2, 3.3, 3.4, 3.5, 3.6, 8.1, 8.2, 8.3, 9.2 (a)8.5, 9.4 3.3, 4.2, 6.3, 8.3, 10.1, 10.2	MP.1 Make sense of problems and persevere in solving them. MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.8 Look for and express regularity in repeated reasoning.	LG8 ➤ 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.

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For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.			
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.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.	6.4, 8.6, 10.1, 10.2 8.6	MP.1 Make sense of problems and persevere in solving them. MP. 4 Model with mathematics. MP. 5 Use appropriate tools strategically. MP. 7 Look for and make use of structure	LG9 A quantity increasing exponentially eventually exceeds a quantity increasing quadratically. ➤ 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.
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.	3.6, 3.7, 6.3, 8.1, 8.2, 8.4	MP. 3 Construct viable arguments and critique the reasoning of others. MP. 5 Use appropriate tools strategically. MP. 7 Look for and make use of structure.	LG10 Characteristics of even and odd functions in graphs and algebraic expressions Vertical and horizontal shifts ➤ 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).

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			➤ 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.
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.*	5.5, 6.5, 8.6, 9.2, 9.6, 10.3	MP.1 Make sense of problems and persevere in solving them. MP.5 Use appropriate tools strategically.	LG11 ➤ 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.
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]	7.4, 7.5, 7.6, 7.7, 7.8, 8.5, 9.2	MP.7 Look for and make use of structure.	LG12 General shape(s) and end behavior of cubic functions ➤ 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.

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N.RN.A.3 SIMPLIFY RADICALS, INCLUDING ALGEBRAIC RADICALS (E.G. SIMPLIFY).	9.1	MP.3 Construct viable arguments and critique the reasoning of others. MP.6 Attend to precision.	LG13 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. ➤ 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.
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Unit 3 Interdisciplinary Standards [NJSLs ELA](#)

New Jersey Student Learning Standards: Interdisciplinary Connections

RI.CR.9-10.1. Cite a range and thorough textual evidence and make clear and relevant connections, to strongly support an analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text.

RI.MF.9-10.6. Analyze, integrate, and evaluate multiple interpretations (e.g., charts, graphs, diagrams, videos) of a single text or text/s presented in different formats (visually, quantitatively) as well as in words in order to address a question or solve a problem.

L.VL.9-10.3. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9-10 reading and content, including technical meanings, choosing flexibly from a range of strategies.

- A. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.
- B. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy).
- C. Analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).
- D. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology.
- E. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

RI.CT.9-10.8. Analyze and reflect on (e.g., practical knowledge, historical/cultural context, and background knowledge) seminal and informational text of historical and scientific significance,

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including how they relate in terms of themes and significant concepts.

RI.AA.9-10.7. Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning.

RI.IT.9-10.3. Analyze how an author unfolds ideas throughout the text, including the order in which the points are made, how they are introduced and developed, and the connections that are drawn between them.

Unit 3 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills

Core Ideas	Performance Expectations (Identified with Standard Number and statement)
The design of this version of the NJSLS-Career Readiness, Life Literacies, and Key Skills is intended to: ➤ There are strategies to improve one's professional value and marketability ➤ foster greater coherence and appropriate progressions across grade bands; ➤ establish meaningful connections among the major areas of study; ➤ Career planning requires purposeful planning based on research, self-knowledge, and informed choices. ➤ An individual's income and benefit needs and financial plan can change over time. ➤ Securing an income involve an understanding of the costs and time in preparing for a career field, interview and negotiation skills, job searches, resume development, prior	9.2.12.CAP.1: Analyze unemployment rates for workers with different levels of education and how the economic, social, and political conditions of a time period are affected by a recession. 9.2.12.CAP.4: Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment. 9.2.12.CAP.7: Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest 9.2.12.CAP.10: Identify strategies for reducing overall costs of postsecondary education (e.g., tuition assistance, loans, grants, scholarships, and student loans). 9.2.12.CAP.13: Analyze how the economic, social, and political conditions of a time period can affect the labor market. 9.2.12.CAP.14: Analyze and critique various sources of income and available resources (e.g., financial assets, property, and transfer payments) and how they may substitute for earned income. 9.2.12.CAP.21: Explain low-cost and low-risk ways to start a business. 9.2.12.CAP.22: Compare risk and reward potential and use the comparison to decide whether starting a business is feasible.

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experience, and vesting and retirement plans. ➤ There are ways to assess a business's feasibility and risk and to align it with an individual's financial goals.	
Unit 3 New Jersey Student Learning Standards: <u>Computer Science and Design Thinking</u>	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
The design of this version of the NJSLS - Computer Science and Design Thinking is intended to: ➤ Successful troubleshooting of complex problems involves multiple approaches including research, analysis, reflection, interaction with peers, and drawing on past experiences. ➤ Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task. ➤ Promote the development of curricula and learning experiences that reflect the vision and mission of computer science and design thinking as stated in the beginning of this document; ➤ Foster greater coherence and appropriate	9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.). 9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data. 9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments. 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6). 8.1.12.CS.4: Develop guidelines that convey systematic troubleshooting strategies that others can use to identify and fix errors 8.1.12.IC.1: Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices 8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change. 8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.1.12.DA.6: Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process. 8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.

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progressions across grade bands; ➤ Prioritize the important ideas and core processes that are central to computing and have lasting value beyond the classroom ➤ Reflect the habits of mind central to technology that lead to post-secondary success. ➤ Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people. ➤ Large data sets can be transformed, generalized, simplified, and presented in different ways to influence how individuals interpret and understand the underlying information. ➤ Engineering design is a complex process in which creativity, content knowledge, research, and analysis are used to address local and global problems. Decisions on trade-offs involve systematic comparisons of all costs and benefits, and final steps that may involve redesigning for optimization ➤ Engineers use science, mathematics, and other disciplines to	8.2.12.ED.3: Evaluate several models of the same type of product and make recommendations for a new design based on a cost benefit analysis. 8.2.12.NT.1: Explain how different groups can contribute to the overall design of a product. 8.2.12.NT.2: Redesign an existing product to improve form or function.
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improve technology. Increased collaboration among engineers, scientists, and mathematicians can improve their work and designs. Technology, product, or system redesign can be more difficult than the original design.	
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New Jersey Student Learning Standards: [Climate Change Mandate](#)

Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Individuals select digital tools and design automated processes to collect, transform, generalize, simplify and present large data sets in different ways to influence how other people interpret and understand the underlying information.	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.

Knowledge and Skills

Unit Learning Targets / Objectives:

Students will be able to...

- Represent real-world scenarios using quadratic functions.
- Analyze and explain the connection between algebraic equations and their graphical representations.
- Solve quadratic equations using various methods, including:
 - Taking square roots
 - Factoring
 - Completing the square
 - Applying the quadratic formula

- Determine the number of real solutions to a quadratic equation.
 - Interpret solutions to quadratic equations within the context of a scenario.
 - Analyze the meaning of the vertex and roots of a quadratic function in a given context.
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Unit 3 Enduring Understandings

Students will know that...

Structure and Graphs of Quadratic Functions

- The graph of a quadratic function is a parabola, symmetric about a vertical line through its vertex.
- The vertex represents either the maximum or minimum value of the function, depending on whether the parabola opens upward or downward.
- Quadratic functions can have two, one, or no real x-intercepts.
- Common forms of a quadratic function include:
 - **Standard form:** $f(x)=ax^2+bx+c$ $f(x) = ax^2 + bx + c$
 - **Factored form:** $f(x)=a(x-r)(x-s)$ $f(x) = a(x - r)(x - s)$
 - **Vertex form:** $f(x)=a(x-h)^2+k$ $f(x) = a(x - h)^2 + k$
- A quadratic function can be converted from standard to vertex form by completing the square.
- Standard and factored forms are connected through the distributive property.
- The vertex of a function in standard form is located at $x=-\frac{b}{2a}$, and the y-value can be found by substituting this x into the function.
- In factored form, the x-intercepts are the values r and s; in vertex form, the vertex is at (h,k).
- A quadratic in the form $f(x)=a(x-r)^2$ has one x-intercept at (r,0) and the vertex at the same point.

Modeling with Quadratics

- Any three non-collinear points determine a unique quadratic function.
- If two x-values produce the same output, the vertex lies midway between them.
- The x-intercepts, along with one additional point, can help determine the algebraic rule for a quadratic function.
- A quadratic function can also be defined using its vertex and another point.

Solving Quadratic Equations

- Solving $ax^2+bx+c=d$ graphically involves finding the intersection of the parabola $y=ax^2+bx+c$ and the horizontal line $y=d$.
- The roots of $ax^2+bx+c=0$ correspond to the x-intercepts of the graph.
- The square root of a positive number has two real solutions, one positive and one negative; the principal square root is the non-negative value.
- Negative numbers do not have real square roots.
- Factoring is one method to find the roots of a quadratic equation, and multiple valid factorizations may exist.
- Completing the square transforms a quadratic equation into a solvable form, though solutions may not always be real.
- All quadratic equations can be expressed in the form $ax^2+bx+c=0$, which is solvable using the quadratic formula.
- The quadratic formula derives from completing the square and always provides a solution, though it may be irrational or complex.
- The x-values from the formula represent horizontal distances from the vertex.
- A quadratic equation with rational solutions can be factored into linear factors with integer coefficients.
- The **discriminant** $D=b^2-4ac$ determines the number and type of solutions:
 - Two real solutions if $D>0$

- One real solution if $D=0$
- No real solutions if $D<0$

Contextual Applications

- Quadratic functions effectively model scenarios with curved or parabolic shapes (e.g., projectile motion, satellite dishes, solar collectors).
- Scenarios involving products of linear expressions, such as area or profit, often lead to quadratic models.
- Quadratic equations derived from real-life contexts can be solved algebraically but must be interpreted within the original context.
- The units of the solution should match those in the contextual problem.
- The vertex may represent a maximum or minimum output depending on the context, and its x-value indicates the input that produces it.
- The roots often represent critical input values, such as starting or ending points in a real-world situation.

Unit 3 Essential Questions

- What criteria are used to classify a polynomial?
- What are the rules for adding, subtracting, and multiplying polynomials?
- In what ways do the properties of real numbers apply to polynomial operations?
- What steps are involved in graphing a quadratic function?
- How can the vertex, axis of symmetry, y-intercept, and zeros of a quadratic function be identified and interpreted?
- Which method is most effective for solving a quadratic equation in a given situation?

- What information about the graph of a quadratic function can be inferred from its solutions?

Unit 3: Instructional Plan

In this unit, students will explore quadratic relationships by connecting the domain of quadratic functions to their graphs. They will learn to sketch quadratic graphs and identify key features such as zeros, extreme values, and symmetry, interpreting these features through both graphs and tables. By understanding how these properties appear in different representations, students will deepen their ability to analyze quadratic functions.

A major focus will be on using techniques like factoring and completing the square to rewrite quadratic expressions into equivalent forms. This process will help students uncover key properties of quadratic functions, including their zeros, extreme values, and symmetry. Students will gain insight into how different forms of quadratic equations relate to these important graph features, providing a deeper understanding of their behavior.

As students continue, they will work on creating quadratic equations to model real-world situations, solving these equations using various methods. They will start by solving simple equations through inspection (such as solving $x^2 = 25$), move on to taking square roots when applicable, and apply completing the square and the quadratic formula to solve more complex problems. In cases where factoring is possible, students will also use this method to find solutions.

Throughout the unit, students will graph quadratic functions and compare the properties of quadratic functions expressed in different forms. This will help them recognize how transformations, such as shifts, stretches, and reflections, affect the graph. They will apply the same reasoning used for linear functions to understand the changes in the graph's shape and position when the equation is transformed.

By the end of the unit, students will have a solid understanding of quadratic functions and how to model, solve, and interpret them. They will be comfortable with multiple methods of solving quadratic equations, graphing quadratic functions, and analyzing transformations, setting them up for future algebraic challenges.

Resources & Text	Suggested Activities
➤ EnVision Platform ➤ EnVision Textbook ➤ Calculator ➤ Graphing Paper	➤ IXL ➤ KhanAcademy ➤ DESMOS ➤ Nearpod ➤ Edpuzzle ➤ Kahoot ➤ Quizizz

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- Blooket
- Kuta Software

Unit 3 Evidence of Student Learning

Formative Assessments:

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

Summative Assessments

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

Benchmark Assessments:

- State Standardized Assessments
- Quarterly Benchmark Assessment

Alternative Assessments

- Portfolio Project
- Modified assignments

Performance Tasks: (When appropriate) This type of task demonstrates students transfer of learning and application to a performance task. Think about what you want the students to be able to do at the end of the unit.

Differentiation & Inclusive Support Strategies:

Multilingual Learners:

- Provide guided reading and writing in small groups
- Use visuals, labeled classroom materials, and cognates
- Pre-teach academic vocabulary using sentence and speaking frames

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- Integrate WIDA Can Do Descriptors into lesson scaffolding
- Use screen readers, audio tools, and visual glossaries
- Offer extended time and oral/dictated responses
- Integrate culturally relevant texts and technology tools

Students with IEPs or 504 Plans:

- Follow all IEP/504 accommodations and modifications
- Use audio books, large print, or Braille/digital formats
- Provide peer tutoring, scribes, and augmentative communication tools
- Allow oral responses and extended time
- Offer modified assignments, assessments, and guided notes
- Utilize leveled texts and differentiated materials
- Use flexible seating and small group instruction

Students At Risk of Academic Failure:

- Scaffold instruction using visuals, chants, and songs
- Offer modified tasks and flexible grouping
- Use technology to support organization and engagement
- Provide structured routines and clear expectations
- Assign peer mentors and provide goal-setting checklists
- Include culturally relevant content to boost connection
- Embed mini-lessons and tiered intervention strategies

Gifted and Talented Learners:

- Provide open-ended and inquiry-based tasks
- Incorporate Bloom's Taxonomy (analyzing, evaluating, creating)
- Offer choices in content, process, and product
- Use advanced reading lists and tiered assignments

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- Encourage discovery and student-designed projects
- Offer enrichment centers and flexible grouping
- Facilitate problem-solving simulations and debriefing

Diversity and Inclusion:

- Celebrate cultural identity through inclusive texts
- Provide alternative formats for assignments and assessments
- Collaborate with ESL staff and use closed captions when available
- Offer wait time and avoid idioms or slang
- Create a nurturing classroom with visual routines and structured expectations
- Encourage family engagement and home language maintenance
- Use word walls and accessible academic vocabulary tools

Unit 3: Supplemental Resources

For further clarification refer to NJ Class Standard Introductions at www.njcccs.org.

Instructional Materials

- enVision Textbook
- enVision Platform
- Graph Paper
- Calculator
- Manipulatives
- Microsoft Excel/PowerPoint
- Teacher-made tests, worksheets, warm-ups, and quizzes
- Computer software to support unit

Supplemental Materials

- IXL
- Khan Academy
- Desmos
- Cool Math
- Nearpod
- Edpuzzle
- Kahoot
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- Blooket
- Kuta Software
- Illustrative Math Activities
 - N.Q.A.1 Runners' World
 - N.Q.A.2 Giving Raises
 - N.Q.A.3 Calories in a Sports Drink
 - A.REI.B.3, A.REI.A.1 Reasoning with linear inequalities
 - A.CED.A.4 Equations and Formulas
 - A.SSE.A.1 Kitchen Floor Tiles
 - A.CED.A.1 Planes and wheat
 - A-CED.A.1 Paying the rent
 - A.REI.A.1 Zero Product Property 1
 - A.CED.A.2 Clear on an Escalator
 - S.ID.B.6,S.ID.C.7-9 Coffee and Crime

Intervention Materials

- Anchor activities
- Flexible grouping
- Varied computer programs
- Mini workshops to re-teach or extend skills
- Think-Pair-Share
- Games to practice mastery of information and skill
- Multiple levels of questions
- Tiered assignment/ product
- Stations/ Learning Centers
- Organizers
- Alternative Assessments

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Unit 4 Overview

Content Area: Algebra 1 Part B Mathematics

Unit 4 Title: Modeling with Statistics

Duration: 40 Days

Target Course/Grade Level: 9-12

Unit 4 Focus:

- Summarize, represent, and interpret data on a single count or measurement variable
- Summarize, represent, and interpret data on two categorical and quantitative variables
- Interpret functions that arise in applications in terms of the context

Primary interdisciplinary connections: Infused within the unit are connections to the NJSLS for Mathematics, Language Arts Literacy and Technology. <http://nj.gov/education/cccs/>

Disciplinary Concepts for the Unit

Standard 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.

Standard 9.2 Career Awareness, Exploration, Preparation and Training

This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

Standard 9.4 Life Literacies and Key Skills

This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy.

Standard 8.1 Computer Science

Computer Science outlines a comprehensive set of concepts and skills, such as data and analysis, algorithms and programming, and computing systems.

Standard 8.2 Design Thinking

Technology, outlines the technological design concepts and skills essential for technological and engineering literacy. The framework design includes Engineering Design, Ethics and Culture, and the Effects of Technology on the Natural world among the disciplinary concepts

Amistad Law: N.J.S.A. 18A:52:16A-88 Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocide in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35 A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards (N.J.S.A.18A:35-4.36) A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35.

Diversity and Inclusion

C.18A:35-4.36a Curriculum to include instruction on diversity and inclusion.

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1. The instruction shall:
 - (1) highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance;
 - (2) examine the impact that unconscious bias and economic disparities have at both an individual level and on society as a whole; and
 - (3) encourage safe, welcoming, and inclusive environments for all students regardless of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs.

Asian Americans and Pacific Islanders (AAPI)

Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLS) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416).

21st Century Themes and Skills

“Twenty-first century themes and skills” means themes such as global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; learning and innovation skills, including creativity and innovation, critical thinking and problem solving, and communication and collaboration; information, media, and technology skills; and life and career skills, including flexibility. Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.”

Disciplinary Concepts for Unit 4 .

Career Readiness, Life Literacies, and Key Skills

Critical Thinking

Creativity and Innovation

Computer Science and Design Thinking

Impacts of Computing

Unit 4 Focus Standards (Major Standards) [New Jersey Student Learning Standards-Mathematics](#)

Content Standards with Statement	BIM Resource	Suggested Mathematical Practices	Critical Knowledge and Skills Objectives
S.ID.A.1. Represent data with plots on the real number line (dot plots, histograms, and box plots).	11.2, 11.3, 11.5	MP.1 Make sense of problems and persevere in solving them.	LG 1 Represent data with plots (dot plots, histograms, and box plots) on the real number line.

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		MP 2 Reason abstractly and quantitatively. MP. 4 Model with mathematics. MP. 5 Use appropriate tools strategically. MP.6 Attend to precision.	➤ represent data with dot plots on the real number line. ➤ represent data with histograms on the real number line. ➤ represent data with box plots on the real number line.
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).	11.3 11.1, 11.2, 11.3	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP. 4 Model with mathematics. MP. 5 Use appropriate tools strategically. MP.6 Attend to precision.	LG2 Compare center and spread of two or more data sets, interpreting differences in shape, center, and spread in the context of the data, taking into account the effects of outliers. Appropriate use of a statistic depends on the shape of the data distribution. Standard deviation ➤ represent two or more data sets with plots and use appropriate statistics to compare their center and spread. ➤ interpret differences in shape, center, and spread in context. ➤ explain possible effects of extreme data points (outliers) when summarizing data and interpreting shape, center and spread.

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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.	11.4	MP.1 Make sense of problems and persevere in solving them. MP. 5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	LG3 Summarize and interpret categorical data for two categories in two-way frequency tables; explain possible associations and trends in the data. Categorical variables represent types of data which may be divided into groups. ➤ construct two-way frequency tables for categorical data. ➤ interpret joint, marginal and conditional relative frequencies in context. ➤ explain possible associations between categorical data in two-way tables. ➤ identify and describe 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.	(a)4.4, 4.5 (b) 4.5	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP. 4 Model with mathematics. MP. 5 Use appropriate	LG4 Fit functions to data using technology, plot residuals and informally assess the fit of linear and non-linear functions by analyzing residuals. ➤ fit a function to data using technology. ➤ solve problems using functions fitted to data (prediction equations). ➤ interpret the intercepts of models in context.

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S.ID.B.6b. Informally assess the fit of a function by plotting and analyzing residuals, including with the use of technology.		tools strategically. MP.6 Attend to precision.	➤ plot residuals of linear and nonlinear functions. ➤ analyze residuals in order to informally evaluate the fit of linear and nonlinear 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. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i> F.IF.B.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. <i>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</i>	3.3, 3.5, 6.3, 8.4, 8.5, 9.2, 10.1, 10.2 3.2, 3.4	MP. 4 Model with mathematics. MP. 6 Attend to precision.	LG5 Interpret key features of functions from graphs and tables. Given a verbal description of the relationship, sketch the graph of a function, showing key features and relating the domain of the function to its graph. ➤ interpret 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 .

Unit 4 Interdisciplinary Standards [NJSLS ELA](#)

New Jersey Student Learning Standards: Interdisciplinary Connections

RI.CR.9-10.1. Cite a range and thorough textual evidence and make clear and relevant connections, to strongly support an analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text.

RI.MF.9-10.6. Analyze, integrate, and evaluate multiple interpretations (e.g., charts, graphs, diagrams, videos) of a single text or text/s presented in different formats (visually, quantitatively) as well as in words in order to address a question or solve a problem.

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L.VL.9-10.3. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9-10 reading and content, including technical meanings, choosing flexibly from a range of strategies.

- A. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.
- B. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy).
- C. Analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).
- D. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology.
- E. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

RI.CT.9-10.8. Analyze and reflect on (e.g., practical knowledge, historical/cultural context, and background knowledge) seminal and informational text of historical and scientific significance, including how they relate in terms of themes and significant concepts.

RI.AA.9-10.7. Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning.

RI.IT.9-10.3. Analyze how an author unfolds ideas throughout the text, including the order in which the points are made, how they are introduced and developed, and the connections that are drawn between them.

Unit 4 New Jersey Student Learning Standards: [Career Readiness, Life Literacies, and Key Skills](#)

Core Ideas	Performance Expectations (Identified with Standard Number and statement)
The design of this version of the NJSLS-Career Readiness, Life Literacies, and Key Skills is intended to: ➤ There are strategies to improve one's professional value and marketability ➤ Foster greater coherence and appropriate progressions across grade bands; ➤ Establish meaningful connections among the major areas of study; ➤ Career planning requires purposeful	9.2.12.CAP.1: Analyze unemployment rates for workers with different levels of education and how the economic, social, and political conditions of a time period are affected by a recession. 9.2.12.CAP.4: Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment. 9.2.12.CAP.7: Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest 9.2.12.CAP.10: Identify strategies for reducing overall costs of postsecondary education (e.g., tuition assistance, loans, grants, scholarships, and student loans).

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planning based on research, self-knowledge, and informed choices. ➤ An individual's income and benefit needs and financial plan can change over time. ➤ Securing an income involves an understanding of the costs and time in preparing for a career field, interview and negotiation skills, job searches, resume development, prior experience, and vesting and retirement plans. ➤ There are ways to assess a business's feasibility and risk and to align it with an individual's financial goals.	9.2.12.CAP.13: Analyze how the economic, social, and political conditions of a time period can affect the labor market. 9.2.12.CAP.14: Analyze and critique various sources of income and available resources (e.g., financial assets, property, and transfer payments) and how they may substitute for earned income. 9.2.12.CAP.21: Explain low-cost and low-risk ways to start a business. 9.2.12.CAP.22: Compare risk and reward potential and use the comparison to decide whether starting a business is feasible.
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Unit 4 New Jersey Student Learning Standards: [Computer Science and Design Thinking](#)

Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
The design of this version of the NJSLS - Computer Science and Design Thinking is intended to: ➤ Successful troubleshooting of complex problems involves multiple approaches including research, analysis, reflection, interaction with peers, and drawing on past experiences. ➤ Digital tools differ in features, capacities, and styles. Knowledge of different digital	9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.). 9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data. 9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments. 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6). 8.1.12.CS.4: Develop guidelines that convey systematic troubleshooting strategies that others can use to identify and fix errors

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tools is helpful in selecting the best tool for a given task. ➤ Promote the development of curricula and learning experiences that reflect the vision and mission of computer science and design thinking as stated in the beginning of this document; ➤ Foster greater coherence and appropriate progressions across grade bands; ➤ Prioritize the important ideas and core processes that are central to computing and have lasting value beyond the classroom ➤ Reflect the habits of mind central to technology that lead to post-secondary success. ➤ Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people. ➤ Large data sets can be transformed, generalized, simplified, and presented in different ways to influence how individuals interpret and understand the underlying information.	8.1.12.IC.1: Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices 8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change. 8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.1.12.DA.6: Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process. 8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process. 8.2.12.ED.3: Evaluate several models of the same type of product and make recommendations for a new design based on a cost benefit analysis. 8.2.12.NT.1: Explain how different groups can contribute to the overall design of a product. 8.2.12.NT.2: Redesign an existing product to improve form or function.
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➤ Engineering design is a complex process in which creativity, content knowledge, research, and analysis are used to address local and global problems. Decisions on trade-offs involve systematic comparisons of all costs and benefits, and final steps that may involve redesigning for optimization ➤ Engineers use science, mathematics, and other disciplines to improve technology. Increased collaboration among engineers, scientists, and mathematicians can improve their work and designs. Technology, product, or system redesign can be more difficult than the original design.	
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New Jersey Student Learning Standards: Climate Change Mandate	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Individuals select digital tools and design automated processes to collect, transform, generalize, simplify and present large data sets in different ways to influence how other people interpret and understand the underlying information.	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.

Unit 4 Knowledge and Skills
Unit 4: Learning Targets / Objectives

Students will be able to...

- Counting methods can be used to determine possible outcomes as well as the likelihood of an event occurring.
- Measures of central tendency can be used to quantify sets of data.
- Data displays are organizational tools to assist in analysis of real world information
- Given a probability situation, the student can use a permutation or combination to predict the probability of an outcome.
- Given a set of data, the student can apply statistical measures of center to solve problems.
- Given a set of data, the student can select and construct an appropriate display to represent the data
- The student will find probabilities involving permutations, combinations or compound events, and convert the probabilities to odds.
- The student will analyze data using measures of central tendency, dispersion, variance and standard deviation.

Unit 4: Enduring Understandings

Students will understand that :

- Counting methods can be used to determine possible outcomes as well as the likelihood of an event occurring.
- Measures of central tendency can be used to quantify sets of data.
- Data displays are organizational tools to assist in analysis of real world information

Unit 4: Essential Questions

- How do I identify realworld sampling techniques?
- How do I interpret and analyze data?
- How do I find the probability of real-world events?
- How can probability be used to make predictions or draw conclusions?
- How are measures of central tendency used to quantify data?
- How can it be determined which data display is the best tool to analyze a set of data?

Unit 4: Instructional Plan

In this unit, students will delve into the world of statistical modeling, a key skill for interpreting data and using evidence to support arguments. As data analytics and data science become increasingly important in many fields, students will explore the techniques used to analyze and make sense of data. Through this unit, students will learn how to translate raw data into meaningful facts, draw conclusions, and use those insights to create and share stories.

Students will develop an understanding of how statistical modeling is used in data analytics to organize, analyze, and manipulate data effectively. They will explore different modeling techniques, gaining a deeper appreciation for how data can be interpreted and presented to support

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decision-making. By the end of the unit, students will be able to analyze data, create models, and use statistical methods to support their conclusions, setting the stage for future study in data science and analytics.

Resources & Text	Suggested Activities
➤ EnVision Platform ➤ EnVision Textbook ➤ Calculator ➤ Graphing Paper	➤ IXL ➤ KhanAcademy ➤ DESMOS ➤ Nearpod ➤ Edpuzzle ➤ Kahoot ➤ Quizizz ➤ Blooket ➤ Kuta Software ➤

Unit 4 Evidence of Student Learning

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Alternative Assessments

- Portfolio Project
- Modified assignments

Performance Tasks: (When appropriate) This type of task demonstrates students transfer of learning and application to a performance task. Think about what you want the students to be able to do at the end of the unit.

Differentiation & Inclusive Support Strategies:

Multilingual Learners:

- Provide guided reading and writing in small groups
- Use visuals, labeled classroom materials, and cognates
- Pre-teach academic vocabulary using sentence and speaking frames
- Integrate WIDA Can Do Descriptors into lesson scaffolding
- Use screen readers, audio tools, and visual glossaries
- Offer extended time and oral/dictated responses
- Integrate culturally relevant texts and technology tools

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- Follow all IEP/504 accommodations and modifications
- Use audio books, large print, or Braille/digital formats
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Students At Risk of Academic Failure:

- Scaffold instruction using visuals, chants, and songs
- Offer modified tasks and flexible grouping
- Use technology to support organization and engagement
- Provide structured routines and clear expectations

- Assign peer mentors and provide goal-setting checklists
- Include culturally relevant content to boost connection
- Embed mini-lessons and tiered intervention strategies

Gifted and Talented Learners:

- Provide open-ended and inquiry-based tasks
- Incorporate Bloom's Taxonomy (analyzing, evaluating, creating)
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- Encourage discovery and student-designed projects
- Offer enrichment centers and flexible grouping
- Facilitate problem-solving simulations and debriefing

Diversity and Inclusion:

- Celebrate cultural identity through inclusive texts
- Provide alternative formats for assignments and assessments
- Collaborate with ESL staff and use closed captions when available
- Offer wait time and avoid idioms or slang
- Create a nurturing classroom with visual routines and structured expectations
- Encourage family engagement and home language maintenance
- Use word walls and accessible academic vocabulary tools

Unit 4: Supplemental Resources

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Instructional Materials

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- enVision Platform
- Graph Paper
- Calculator

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- Manipulatives
- Microsoft Excel/PowerPoint
- Teacher-made tests, worksheets, warm-ups, and quizzes
- Computer software to support unit

Supplemental Materials

- IXL
- Khan Academy
- Desmos
- Cool Math
- Nearpod
- Edpuzzle
- Kahoot
- Quizizz
- Blooket
- Kuta Software
- Illustrative Math Activities
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 - N.Q.A.2 Giving Raises
 - N.Q.A.3 Calories in a Sports Drink
 - A.REI.B.3, A.REI.A.1 Reasoning with linear inequalities
 - A.CED.A.4 Equations and Formulas
 - A.SSE.A.1 Kitchen Floor Tiles
 - A.CED.A.1 Planes and wheat
 - A-CED.A.1 Paying the rent
 - A.REI.A.1 Zero Product Property 1
 - A.CED.A.2 Clear on an Escalator
 - S.ID.B.6,S.ID.C.7-9 Coffee and Crime

Intervention Materials

- Anchor activities
- Flexible grouping
- Varied computer programs
- Mini workshops to re-teach or extend skills
- Think-Pair-Share
- Games to practice mastery of information and skill
- Multiple levels of questions
- Tiered assignment/ product
- Stations/ Learning Centers
- Organizers
- Alternative Assessments