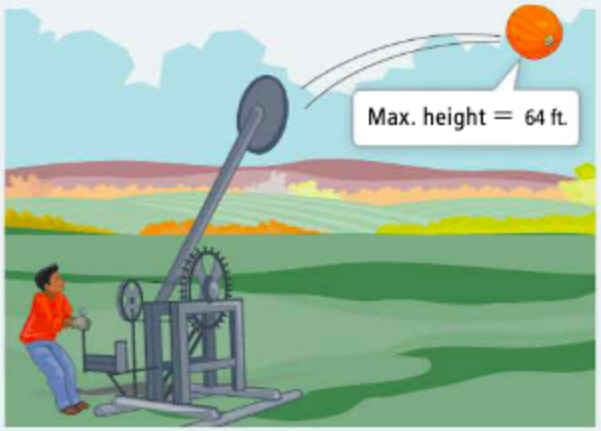
Marking Period	Unit Title	Recommended Instructional Days
1	**Quadratic Functions and Equations**	**30 - 35 days**

Domain:		
NJSLS Strand: **N-CN.1** Know there is a complex number *i* such that $i^2 = -1$, and every complex number has the form a + b*i* with a and b real. **N-CN .2**. Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. **N-CN .7**. *Solve quadratic equations with real coefficients that have complex solutions.* **A-SSE.2**. Use the structure of an expression to identify ways to rewrite it. **A-SSE.3a**. Factor a quadratic expression to reveal the zeros of the function it defines. **A-SSE.3b.** Complete the square in a quadratic	***Progress Indicator:*** ***Tests ● Quizzes ● Practice problems for homework ● Online textbook ● Worksheets ● IXL ● Leveled assessments***	**Recommended Activities, Investigations, Interdisciplinary Connections, and/or Student Experiences to Explore NJSLS-CLKS within Unit** **<u>Essential Question/s:</u>** **How do you use quadratic functions to model situations and solve problems?** **<u>Activity Description</u>:** Vertex form of a quadratic function Standard form of a quadratic function Factored form of a quadratic function Complex numbers and operations Completing the square The quadratic formula **<u>Interdisciplinary Connections:</u>** **TOPIC 2 PROJECT enVision STEM** **Content: Design a ballpark** **NJSLS#: HS.PS2-1, HS.PS2-2** **<u>Example Tasks:</u>** **At the end of each topic please review the Assessment Practice and Performance Tasks questions.**

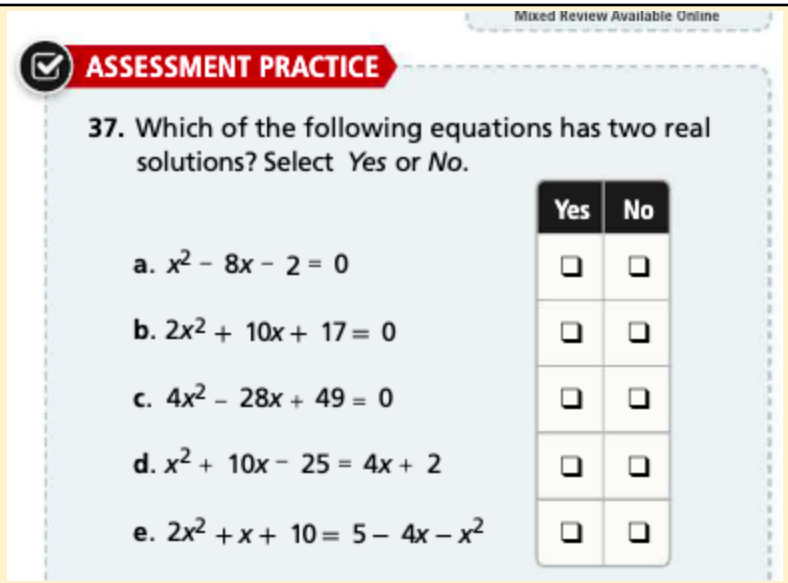
expression to reveal the maximum or minimum value of the function it defines. **A-CED.1**.Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.* **A-CED.2.** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **A-CED.3.**Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*		**38.** **Performance Task** The Bluebird Bakery sells more cookies when it lowers its prices, but this also changes profits.  The profit function for the cookies is $f(x) = -500(x - 0.45)^2 + 400$. This function represents the profit earned when the price of a cookie is x dollars. The bakery wants to maximize their profits. **Part A** What is the domain of the function? **Part B** Find the daily profits for selling cookies for \$0.40 each and for \$0.75 each. **Part C** What price should the bakery charge to maximize their profits from selling cookies? **Part D** What is the maximum profit?

A-REI.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-REI.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 ± bi for real numbers a and b. **A-REI.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 solutions approximately; e.g., using technology to graph		**38. Performance Task** The Bluebird Bakery sells more cookies when it lowers its prices, but this also changes profits.  The profit function for the cookies is $f(x) = -500(x - 0.45)^2 + 400$. This function represents the profit earned when the price of a cookie is x dollars. The bakery wants to maximize their profits. **Part A** What is the domain of the function? **Part B** Find the daily profits for selling cookies for $0.40 each and for $0.75 each. **Part C** What price should the bakery charge to maximize their profits from selling cookies? **Part D** What is the maximum profit?

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.* **F-IF.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 in 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.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*		Mixed Review Available Online **ASSESSMENT PRACTICE** **43.** Which of the following are solutions to the equation $-11x = 2x^2 + 15$? Select all that apply. Ⓐ -5 Ⓑ -3 Ⓒ $-\frac{5}{2}$ Ⓓ $\frac{5}{2}$ Ⓔ 3 Ⓕ 5

*takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.** **F-IF.7.** Graph functions expressed symbolically and show key features if the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima. F-IF.8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.		**45. Performance Task** A pumpkin is launched from the ground into the air and lands 4.5 s later. At its peak the pumpkin reached a height of 81 ft.  **Part A** Write a quadratic function that models the height, in feet, of the pumpkin *x* seconds after it is launched. Explain how you found the function. **Part B** A second pumpkin is launched from the ground. After 1 second, it is 64 feet high. The pumpkin lands after 5 seconds. What is the maximum height of the pumpkin? Explain.

F-BF.*1. Write a function that describes a relationship between two quantities.*
F-BF. 3. Identify the effect on the graph of replacing f(x) by f(x) + k, kf(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.*



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ASSESSMENT PRACTICE

37. Which of the following equations has two real solutions? Select *Yes* or *No*.

	Yes	No
a. $x^2 - 8x - 2 = 0$	❑	❑
b. $2x^2 + 10x + 17 = 0$	❑	❑
c. $4x^2 - 28x + 49 = 0$	❑	❑
d. $x^2 + 10x - 25 = 4x + 2$	❑	❑
e. $2x^2 + x + 10 = 5 - 4x - x^2$	❑	❑

Spot Light on:

- Sally Ride: First American woman in space.

Mathematics Practices

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

Social and Emotional Learning: ***Competencies***	**Social and Emotional Learning:** ***Sub-Competencies***	
Self- awareness Social Awareness Self- Management Relationship Skills Responsible Decision-Making	Recognizing the importance of self-confidence in handling daily tasks and challenges. Demonstrate an awareness of the expectations for social interactions in a variety of ways. Demonstrate an understanding of the need for mutual respect when viewpoints differ. Recognize the skills needed to establish and achieve personal and educational goals. Utilize positive communication and social skills to interact effectively with others. Develop, implement, and model effective problem solving and critical thinking skills.	

Assessments (Formative) ***To show evidence of meeting the standard/s, students will successfully engage within:***	**Assessments (Summative)** ***To show evidence of meeting the standard/s, students will successfully complete:***
<u>Formative Assessments:</u> ● Entry and Exit Slips ● Quizzes ● Self Assessments	**<u>Benchmarks:</u>** ● Chapter Tests ● Projects **<u>Summative Assessments:</u>** ● District Assessments ● Midterms ● Standardized Tests
Differentiated Student Access to Content: **Teaching and Learning *Resources/Materials***	

Core Resources	Alternate Core Resources *IEP/504/At-Risk/ESL*	ELL Core Resources	Gifted & Talented Core Resources
• Textbooks websites • Achieve the core • Khan Academy • Desmos	• Skill building worksheets • Math Manipulatives	• Dictionary for native languages • Videos in their native language.	• Leveled Assessments • Enrichment worksheets

Supplemental Resources

Technology:
- **Chromebooks, Graphing Calculators, Online math manipulatives**

Other:
- **Zoom and Google Meets, Google Classroom, Interactive Textbooks**

Differentiated Student Access to Content:
Recommended *Strategies & Techniques*

Core Resources	Alternate Core Resources *IEP/504/At-Risk/ESL*	ELL Core Resources	Gifted & Talented Core
• **Deliver instruction utilizing varied learning styles including audio, visual, and tactile/kinesthetic, provide individual instruction as needed, modify assessments and/or rubrics, repeat**	• **Utilize a multi-sensory (VAKT) approach during instruction, provide alternate presentations of skills by varying the method (repetition, simple explanations, additional examples, modeling, etc.), modify test content and/or format, allow students to retake test for additional credit, provide additional times and preferential seating as needed, review, restate and repeat directions, provide study guides, and/or break**	• **Extend time requirements, preferred seating, positive reinforcement, check often for understanding/review, oral/visual directions/prompts when necessary, supplemental materials including use of an online bilingual dictionary, and modified assessment and/or rubric.**	• **Create an enhanced set of introductory activities, integrate active teaching/learning opportunities, incorporate authentic components, propose interest-based extension activities, and connect student to related**

	assignments into segments of shorter tasks.		

NJSLS CAREER READINESS, LIFE LITERACIES & KEY SKILLS	**Disciplinary Concept: Creativity and Innovation**	
	Core Ideas:	**With a growth mindset, failure is an important part of success**
	Performance Expectation/s:	**9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).**
	Career Readiness, Life Literacies, & Key Skills Practices	
	Act as a responsible and contributing community member and employee. **Attend to financial well-being.** **Consider the environmental, social and economic impacts of decisions.** **Demonstrate creativity and innovation.** **Utilize critical thinking to make sense of problems and persevere in solving them.** **Model integrity, ethical leadership and effective management.** **Plan education and career paths aligned to personal goals.** **Use technology to enhance productivity, increase collaboration and communicate effectively.** **Work productively in teams while using cultural/global competence.**	

New Jersey Legislative Statutes and Administrative Code (place an "X" before each law/statute if/when present within the curriculum map)									
	Amistad Law: *N.J.S.A. 18A 52:16A-88*		Holocaust Law: *N.J.S.A. 18A:35-28*	X	LGBT and Disabilities Law: *N.J.S.A. 18A:35-4.35*		Diversity & Inclusion: *N.J.S.A. 18A:35-4.36a*		Standards in Action: *Climate Change*