Content Area: Mathematics (NJSLS-M)
ALGEBRA 1

Dev. Date:
2021

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Marking Period	Unit Title	Recommended Instructional Days
TBD	**Algebra 1 – Quadratic Modeling – Unit 3 - Module A**	**20-25 days**

Conceptual Category: ALGEBRA
Domain: Arithmetic with Polynomials and Rational Expressions, Seeing Structure in Expressions

NJ Student Learning Standards
(Taught and Assessed):

- **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.SSE.B.3** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

Progress Indicators:

● ***Tests*** ● ***Quizzes*** ● ***Homework and Classwork*** ● ***Online Activities*** ● ***Projects***

Recommended Activities, Investigations, Interdisciplinary Connections, and/or Student Experiences to Explore NJSLS-CLKS within Unit

Essential Question(s):

1. What are polynomial expressions, and how do you simplify them?
2. How do you add and subtract polynomials?
3. How can you multiply polynomials by monomials?
4. How do you interpret algebraic expressions in terms of their context?
5. How can you use completing the square to solve a quadratic equation?
6. How can you use factoring to solve quadratic equations in standard form for which a = 1?
7. How can you use factoring to solve quadratic equations in standard form for which a ≠ 1?
8. How can you use special products to aid in solving quadratic equations by factoring?

Activity Description(s):

See example tasks below:

- Understanding Polynomial Expressions
- Adding Polynomial Expressions
- Subtracting Polynomial Expressions
- Multiplying Polynomial Expressions by Monomials
- Modeling with Expressions
- Solving Equations by Factoring
- Solving Equations by Completing the Square
- Solving Equations by Factoring $ax^2 + bx + c$
- Using Special Factors to Solve Equations

a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. **Key**: ■ Major Cluster □ Supporting Cluster ◎ Additional Cluster		**Task 1 (A.SSE.A.2)** Find a value for a, a value for K, and a value for n so that $(3x+2)(2x-5)=ax^2+kx+n$. **Answer:** No matter what the value of x, the distributive property of multiplication over addition tells us that : $(3x+2)(2x-5)= (3x+2)(2x)+(3x+2)(-5)$ $= 6x^2+4x-15x-10 = 6x^2-11x-1$ So, if a=6, k=−11, and n=−10, then the expression on the left has the same value as the expression on the right for all values of x; that is, the two expressions are equivalent. **Source:** http://tasks.illustrativemathematics.org/content-standards/HSA/SSE/A/2/tasks/87 **Task 2 (A.APR.A.1)** A skyrocket is launched from a 6-foot-high platform with an initial speed of 200 feet per second. The polynomial $-16t^2 + 200t + 6$ gives the height in feet that the skyrocket will rise in t seconds. What is the height of the rocket 5 seconds after it is launched? Answer: The rocket will rise to a height of 606 feet after 5 seconds. **Source:** HMH https://my.hrw.com/dashboard/home.

Task 3 (A.SSE.B.3)

a.

Graph these equations on your graphing calculator at the same time. What happens? Why?

$$y_1 = (x-3)(x+1)$$
$$y_2 = x^2-2x-3$$
$$y_3 = (x-1)^2-4$$
$$y_4 = x^2-2x+1$$

b.

Below are the first three equations from the previous problem.

$$y_1 = (x-3)(x+1)$$
$$y_2 = x^2-2x-3$$
$$y_3 = (x-1)^2-4$$

These three equations all describe the same function. What are the coordinates of the following points on the graph of the function? From which equation is each point most easily determined? Explain.

i.

vertex: _____

ii.

y-intercept: _____

iii.

x-intercept(s): _____

Answer:

a. When you graph these four equations, only two different parabolas are shown. This is because the first three equations are equivalent, and so all produce the same graph. The fourth function produces a different graph.

b.

i.
The vertex is $(1, -4)$ which is most visible in y_3 since the vertex occurs at the point where the squared portion is zero.

ii.
The y-intercept is $(0, -3)$, which is visible as the constant in y_2 since the other terms are 0 when you plug in $x = 0$.

iii.
The x-intercepts are $(3, 0)$ and $(-1, 0)$, which are most visible in y_1 since you can find the roots of the polynomial using the zerofactor property and thus the intercepts correspond to the zeros of each factor.

Source:
http://tasks.illustrativemathematics.org/content-standards/HSA/SSE/B/3/tasks/388

Interdisciplinary Connections: Science.
Skills **Content:**, Growing cell cultures and substance's effects.
NJSLS#:

A scientist is growing cell cultures and examining the effects of various substances on them as part of his research. The culture in one petri dish increases according to the expression $t^2 + 4t + 4$ for time t in minutes.

		Another increases according to $t^2 + 2t + 4$. He needs to feed all the cells equally, so he needs to know the expression for the total number of cells in both dishes because the food is proportional to the total number of cells. Find the expression. Answer: **$2t^2 + 6t + 8$** **Source:** https://my.hrw.com/dashboard/home **Spotlight on:** *Acknowledge every student's comment or response, even if it's incorrect.*
Mathematics Practices 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning 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:***
Formative Assessments: ● Entry and Exit Slips ● Homework and Classwork ● Quizzes ● Self Assessments	**Benchmarks:** ● Tests ● Projects **Other Summative Assessments:** ● District Assessments ● Midterm and/or Final Exams ● 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 resources • Khan Academy • Desmos • IXL Learning • Understanding ELLs • GeoGebra • Edulastic • Illustrative Math • Achieve the core • NJDOE resources	• Skill building worksheets • Math Manipulatives • Guided notes • Guided Practice • (other alternate core resources)	• Bilingual editions, if available • Dictionary for native languages • Videos in students' native language. • Mathematical Literacy and vocabulary activity • (other ELL resource)	• Leveled Assessments • Enrichment Activities • (other G&T resources)

Supplemental Resources

Technology:

- **Chromebooks, Scientific and Graphing Calculators, Online Math Activities (Desmos, Digital interactive notebooks, Kahoot, Edulastic, Quizlet, Kuta Software, BOOM Cards, EDPUZZLE, Thatquiz.org, QUIZIZZ, BLOOKET, JAMBOARD, Peardecks, Nearpod, Socrative, IXL Diagnostic Arena, Prodigy, etc.)**

Other:

- **Google Meets or Zoom, 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 for varied learning styles (auditory, visual, tactile/kinesthetic, etc) • Provide individual instruction as needed • Modify assessments and/or rubrics as needed.	• Utilize a multi-sensory (VAKT) approach during instruction • Provide alternatives to skill development by varying the methods (repetition, simple explanations, additional examples, modeling, etc.) • Modify test content and/or format • Allow students to retake or correct tests for additional credit • Provide additional time and preferential seating as needed • Review, restate and repeat directions	• Extend allowable time if possible and as needed • Preferred seating • Positive reinforcement • Check often for understanding • Oral/visual directions/prompts when necessary • Supplemental materials (ie. online bilingual dictionary) • Modified assessments and/or rubrics • Other Accommodations and Modifications for ESL (Source:	• Create an enhanced set of introductory activities • Integrate active teaching/learning opportunities • Incorporate authentic components • Propose interest-based extension activities, and/or additional interdisciplinary connections, etc.

	• Provide study guides, and/or break assignments into segments or shorter tasks, etc.	https://studylib.net/doc/6610362/general-accomodations-and-modifications-checklist)	

NJSLS CAREER READINESS, LIFE LITERACIES & KEY SKILLS	**Disciplinary Concept: Digital Citizenship**	
	Core Ideas:	**Cultivating online reputations for employers and academia requires separating private and professional digital identities.**
	Performance Expectation/s:	**9.4.12.DC.6: Select information to post online that positively impacts personal image and future college and career opportunities.**
	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*		LGBT and Disabilities Law: *N.J.S.A. 18A:35-4.35*	x	Diversity & Inclusion: *N.J.S.A. 18A:35-4.36a*		Standards in Action: *Climate Change*