Unit 8: Quadratics-Solving

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **Full Year**
Status: **Published**

UNIT RATIONALE

- The zeros of a function are the values in which the output is equal to zero, and where its graph crosses the x-axis. The zeros are easily identified when the function is written in factored form.
- Quadratic equations can be solved using many techniques including factoring, completing the square, using the quadratic formula, and taking the square root.
- Quadratic equations will either have 2 real and rational solutions, 2 real and irrational solutions, 1 real and rational solution, or 0 real solutions. This can be determined by the discriminant.
- Quadratic functions are everywhere, in arches, sports, rainbows, etc. Students will use time during this unit to look at how it is presented.

ESSENTIAL QUESTIONS

STANDARDS

- What do the zeros of a quadratic function tell you about its graph?
- When will a quadratic equation give you real solutions? Non-real solutions?
- How do you solve a quadratic equation?
- How can you use quadratic functions to look at real world examples?

NEW JERSEY STUDENT LEARNING STANDARDS: CONTENT AREA

New Jersey (NJSLS) - High School - Mathematics (2020)

MA.A-SSE.B.3a	Factor a quadratic expression to reveal the zeros of the function it defines.
MA.A-SSE.B.3b	Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
MA.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.
MA.F-IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.

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

NEW JERSEY STUDENT LEARNING STANDARDS: CAREER READINESS, LIFE LITERACIES AND KEY SKILLS

TECH.9.4.12.TL.2	Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
TECH.9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.
TECH.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).
TECH.9.4.12.IML.4	Assess and critique the appropriateness and impact of existing data visualizations for an intended audience (e.g., S-ID.B.6b, HS-LS2-4).

NEW JERSEY STUDENT LEARNING STANDARDS: COMPUTER SCIENCE AND DESIGN THINKING

CS.9-12.8.1.12.AP.1	Design algorithms to solve computational problems using a combination of original and existing algorithms.
CS.9-12.8.1.12.AP.9	Collaboratively document and present design decisions in the development of complex programs.
CS.9-12.8.1.12.DA.5	Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
CS.9-12.8.1.12.DA.6	Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.

PRE-ASSESSMENTS

INSTRUCTIONAL PLAN

MODULE 1

Student Learning Intentions (SLI) WALT: (We are learning to…)	We are incorporating March Madness into the Solving Quadratics.
Student Learning Strategies	March Madness Will it hit the hoop?
Success Criteria	We will be able to use the path of a quadratic to determine if a ball will make it into the hoop. We will review old topics to help us prepare to so quadratic equations during March Madness.
Formative Assessment (drives instructional decisions)	Will it hit the hoop Desmos March Madness folder
Activities and Resources	March Madness fodler Will it hit the hoop Desmos
Suggested Modifications	included more from the other sports or real world examples of quadratics.

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Sum-Product-Puzzles-All-5-Sets.pdf
March_Madness_Final_Round__1_.pdf
March_Madness_Final_Round_-_KEY.pdf
line_Marchmadness_-_KEY__1_.pdf
line_Marchmadness.pdf
line_Marchmadness__1_.pdf
line_Marchmadness_-_KEY.pdf
baseballquads.docx
March Madness Stem

MODULE 2

Student Learning Intentions (SLI) WALT: (We are learning to…)	Students will fill out interactive notebook pages to help them in their algebra 1 class.
Student Learning Strategies	Interactive notebook pages common mistakes resource and flip books
Success Criteria	Students can fill out the pages of their interactive

	notebook so they have a resource for their classroom.
Formative Assessment (drives instructional decisions)	There is not formative assessment for the introduction to each topic.
Activities and Resources	Interactive Notebook Pages Listed
Suggested Modifications	Fill out pages for absent students.

Complete_the_SquareINT.docx

Quadratic_FormulaINT.docx
QuadSquareRootINT.docx
Solving_QuadraticsFactoringINT.docx
Complete_the_SquareINT.pdf
Quadratic_FormulaINT.pdf
Solving_QuadraticsFactoringINT.pdf
discriminantINT.docx
discriminantINT.pdf
QuadSquareRootINT.pdf
Solve_QuadraticsGRAPHint.pdf
Solve_QuadraticsGRAPHint.docx

REFLECTIONS

Really enjoyed the march madness project and so did my students. Each class was put into their own brackets and the winner after a bunch of competitions received chikfila. During this time we focused on how basketball relates to quadratic functions and other parts of sports relate as well. I would love to incorporate more when given more time to put the information together.

INTERDISCIPLINARY CONNECTIONS: NEW JERSEY STUDENT LEARNING STANDARDS FOR ELA, SOCIAL STUDIES, SCIENCE AND/OR MATHEMATICS

LA.W.9-10.3.D	Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.
LA.W.9-10.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
LA.W.9-10.6	Use technology, including the Internet, to produce, share, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
LA.W.9-10.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of

	the subject under investigation.
LA.W.9-10.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation (MLA or APA Style Manuals).