Unit 9: Quadratics-Graphing

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

UNIT RATIONALE

This unit focuses on graphing quadratics. Students will discover key features of graphing quadratic equations, and how the shape of quadratics are formed in real world examples. Students will build rollercoasters and learn about how the structure and shape of each part of the roller coaster is key for a successful and safe trip.

ESSENTIAL QUESTIONS

Which form is the best for finding specific key features of quadratics?

What are the essential parts for graphing a quadratic equation?

How can we find the x and y intercepts from each quadratic form?

STANDARDS

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.F-IF.C.7a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
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.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

WRK.9.2.12.CAP.3	Investigate how continuing education contributes to one's career and personal growth.
WRK.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.
WRK.9.2.12.CAP.5	Assess and modify a personal plan to support current interests and post-secondary plans.
WRK.9.2.12.CAP.6	Identify transferable skills in career choices and design alternative career plans based on those skills.
WRK.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.
TECH.9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.
TECH.9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).
TECH.9.4.12.IML.1	Compare search browsers and recognize features that allow for filtering of information.
TECH.9.4.12.IML.3	Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).
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).
TECH.9.4.12.IML.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).

NEW JERSEY STUDENT LEARNING STANDARDS: COMPUTER SCIENCE AND DESIGN THINKING

CS.9-12.8.1.12.AP.4	Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue.
CS.9-12.8.1.12.AP.7	Collaboratively design and develop programs and artifacts for broad audiences by incorporating feedback from users.
CS.9-12.8.1.12.AP.8	Evaluate and refine computational artifacts to make them more usable and accessible.
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.2	Describe the trade-offs in how and where data is organized and stored.
CS.9-12.8.1.12.IC.2	Test and refine computational artifacts to reduce bias and equity deficits.
CS.9-12.8.2.12.EC.2	Assess the positive and negative impacts of emerging technologies on developing countries and evaluate how individuals, non-profit organizations, and governments have responded.
CS.9-12.8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.
CS.9-12.8.2.12.ED.2	Create scaled engineering drawings for a new product or system and make modification to increase optimization based on feedback.
CS.9-12.8.2.12.NT.1	Explain how different groups can contribute to the overall design of a product.
CS.9-12.8.2.12.NT.2	Redesign an existing product to improve form or function.

PRE-ASSESSMENTS

Non-curricular tasks to identify students' readiness levels with problem solving.

Rubric Based Reassessments and Algebra 1 assignments.

INSTRUCTIONAL PLAN

MODULE 1

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 are no formative assessments for the introduction to each topic.
Activities and Resources	Interactive Notebook Pages Listed
Suggested Modifications	Fill out pages for absent students.

Factored_FormINT.docx

StandardformINT.docx
VertexFormINT.docx
VertexFormINT.pdf
StandardformINT.pdf
Factored_FormINT.pdf
CharacteristicsofParabolasFoldableforAlgebra1-1.pdf

MODULE 2

Student Learning Intentions (SLI) WALT: (We are learning to…)	Students are learning how to build roller coasters based on quadratic functions.
Student Learning Strategies	Roller coaster videos. Newton law of motions videos and worksheets Practice paper to build with. Trial and Error.
Success Criteria	I can successfully build a roller coaster that will h a marble for 30 seconds along the ride.
Formative Assessment (drives instructional decisions)	There will be a competition at the end where eac group has 3 tries to have a marble go through the roller coaster successfully for 30 seconds
Activities and Resources	Powerpoint and worksheets below
Suggested Modifications	Make sure students work in groups. There is not enough paper for students to make it by themsel Have students bring in their own tape. Help students build specific structures.

Day_by_Day_instructions.docx

Handout_on_three_laws_of_motion_video.docx
Planning_-_Video_watching_handout.docx
FN3FUC0HSBWQNS0.pdf
Newton_s_laws_of_motion_video_links.docx
paper-roller-coaster-template-kit-2022-07-11.pdf
Rubric.docx
Rubric.pdf
FF9FKTOHSBWQNRZ.pdf
Paper-Roller-Coasters-.pdf
Rollercoaster Stem Project

REFLECTIONS

Interactive notebooks should each be a marking period grade. It'll hold kids more accountable.

I used File folders instead of Cardstock for the roller coaster project. You need a ton of either. I made the project for the month of May since students will also be working on reviewing for their NJSLA tests in their academic classes.

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

LA.K-12.NJSLSA.R3	Analyze how and why individuals, events, and ideas develop and interact over the course of a text.
LA.K-12.NJSLSA.R5	Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.
LA.K-12.NJSLSA.W5	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
LA.K-12.NJSLSA.W6	Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.
LA.K-12.NJSLSA.W7	Conduct short as well as more sustained research projects, utilizing an inquiry-based research process, based on focused questions, demonstrating understanding of the subject under investigation.
LA.W.9-10.1.E	Provide a concluding paragraph or section that supports the argument presented.
LA.W.9-10.2.A	Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
LA.W.9-10.2.B	Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.
LA.W.9-10.2.C	Use appropriate and varied transitions to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.