(Alg 1) Unit 8: Graphing Quadratic Equations

Content Area: **Math**
Course(s): **Math**
Time Period: **March**
Length: **3 weeks**
Status: **Published**

Unit Overview

In this unit, students will learn about the following topics:

- Graph quadratic equations of the form:

  - f(x)=ax^2
  - f(x)=ax^2+c
  - f(x)=ax^2+bx+c
  - f(x)=a(x-h)^2+k

- Using intercept form [f(x)=(x-p)(x-q)]

- Comparing linear, exponential, & quadratic functions

Enduring Understandings

SWBAT:

- Graph quadratic equations in the form f(x)=ax^2

- Describe the domain and range of quadratic functions

- Model real-world problems with quadratic equations

- Graph quadratic equations in the form f(x)=ax^2+c

- Graph quadratic equations in the form f(x)=ax^2+bx+c

- Find the axis of symmetry of a quadratic equation

- Locate the vertex of a quadratic equation

- Graph quadratic equations of the form f(x)=a(x-h)^2+k

- Use transformations to graph a quadratic equation in vertex form

- Compare linear, exponential, and quadratic functions given graphs, tables, or equations

Essential Questions

How can we:

- graph quadratics of the form f(x)=ax^2?
- label key characteristics of graphs of quadratic functions?
- find the domain and range of quadratic functions?
- solve real-world problems that can be modeled by quadratic functions?
- graph quadratics of the form f(x)=ax^2+c?
- transform quadratics from the parent function to obtain a new graph?
- graph quadratics of the form ax^2+bx+c?
- find the axis of symmetry of a quadratic function algebraically and pictorially?
- find the vertex of a quadratic function algebraically and pictorially?
- graph quadratics of the form f(x)=a(x-h)^2+k?
- write quadratic equations in vertex form, intercept form, and standard form?
- use intercept form and the zero product property to graph a quadratic function?
- find the zeros, x-intercepts, or roots of a quadratic function?
- use tables, graphs, or equations to compare linear, exponential, and quadratic functions?

Instructional Strategies & Learning Activities

- Guided Practice
- Daily Do Now
- Extra Practice & Puzzle Time (Resources)
- Scavenger Hunts
- Coloring Activities
- Task Cards (Around the World)
- Maze Activities
- Quizizz Online Assignments
- Kahoot! Online Games
- GimKit Online Games

Integration of 21st Century Themes and Skills

9.1.K12.P.4	Demonstrate creativity and innovation.
P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
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9.1.K12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
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9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to

	determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1).
9.4.8.CT.3	Compare past problem-solving solutions to local, national, or global issues and analyze the factors that led to a positive or negative outcome.
9.1.8.CP.1	Compare prices for the same goods or services.
9.4.8.IML.4	Ask insightful questions to organize different types of data and create meaningful visualizations.
9.4.8.TL.3	Select appropriate tools to organize and present information digitally.
CRP.K-12.CRP1.1	Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.
CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

Technology & Design Integration

8.1.8.DA.5	Test, analyze, and refine computational models.
8.1.8.AP.2	Create clearly named variables that represent different data types and perform operations on their values.
8.1.8.AP.6	Refine a solution that meets users' needs by incorporating feedback from team members and users.
TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
TECH.8.1.8.E.CS1	Plan strategies to guide inquiry.
TECH.8.1.8.E.CS4	Process data and report results.
TECH.8.1.8.F	Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
TECH.8.1.8.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.
TECH.8.2.8.D.CS1	Apply the design process.

Interdisciplinary Connections

L.KL.8.2.A	Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases.
L.KL.8.2.B	Gather vocabulary knowledge when selecting a word or phrase important to comprehension or expression.
L.VL.8.3.A	Use context (e.g., the overall meaning of a sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.
L.VL.8.3.B	Analyze the impact of specific word choices on meaning and tone.
L.VL.8.3.C	Use common, grade-appropriate Greek or Latin affixes and roots as clues to the meaning of a word (e.g., precede, recede, secede).
L.VL.8.3.D	Consult 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 or its part of speech.
VPA.1.1.8.D.1	Describe the intellectual and emotional significance conveyed by the application of the elements of art and principles of design in different historical eras and cultures.

Differentiation

Definitions of Differentiation Components:

- Content – the specific information that is to be taught in the lesson/unit/course of instruction.
- Process – how the student will acquire the content information.
- Product – how the student will demonstrate understanding of the content.
- Learning Environment – the environment where learning is taking place including physical location and/or student grouping

Differentiation occurring in this unit:

- High-achieving students will assist low-achieving students in mixed ability groupings for games and activities.
- High-achieving students can complete sudoku puzzles and logic puzzles as extension activities.
- Limit number/difficulty of problems for low-achieving students to demonstrate mastery.
- Narrow down problem choice to core concepts for low-achieving students.
- Leveled group-based activities, determined by formative assessment.

Modifications & Accommodations

- High-achieving students will assist low-achieving students in mixed ability groupings for games and activities.
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Benchmark Assessments

Schoolwide Benchmark assessments:

- Linkit Benchmarks (Form A in September, Form B in January, Form C in June): Linked to NJSLA standards

Additional Benchmarks used in this unit:

- IXL Diagnostic + continued practice during IXL periods

Formative Assessments

Formative Assessments used in this unit:

- Kahoot! Games
- Quizizz Games
- Homework
- Q & A
- Scavenger Hunts
- Coloring Activities
- Task Cards
- Partner Activities

Summative Assessments

Summative assessments for this unit:

- Chapter Test
- Quizzes

Instructional Materials

1. Big Ideas Math: Math & You 6th Grade Textbook
2. Quizizz
3. Kahoot!
4. Scavenger Hunts
5. Task Cards
6. Coloring Activities
7. GimKit

Standards

F.BF.A.1.a	Determine an explicit expression, a recursive process, or steps for calculation from a context.
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.
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.
A.CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
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.
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.IF.C.7.a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
F.IF.C.8.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.
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.SSE.B.3.a	Factor a quadratic expression to reveal the zeros of the function it defines.
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.