



Marietta City Schools
2025-2026 District Unit Planner

Enhanced Algebra: Concepts & Connections (Grade 8)

Unit title	<i>Unit 4: Modeling and Analyzing Quadratic Functions</i>	MYP year	4	Unit duration (hrs)
				18.75 - 22.5 hrs

Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): *What will students learn?*

GA DoE Standards

Standards

A.MM.1 : Apply mathematics to real-life situations; model real-life phenomena using mathematics

A.MM.1.1 Explain applicable, mathematical problems using a mathematical model.

Fundamentals

- Students should be provided with opportunities to learn mathematics in the framework of real-life problems.
- Mathematically applicable problems are those presented in which the given framework makes sense, realistically and mathematically, and allows for students to make decisions about how to solve the problem (model with mathematics).

A.MM.1.2 Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities domains.

Fundamentals

- Students should be able to use the content learned in this course to create a mathematical model to explain real-life phenomena.

A.MM.1.4 Use various mathematical representations and structures with this information to represent and solve real-life problems.

Strategies and Methods

- Students should be able to fluently navigate between mathematical representations that are presented numerically, algebraically, and graphically.
- For graphical representations, students should be given opportunities to analyze graphs using interactive graphing technologies.

A.MM.1.5 Define appropriate quantities for the purpose of descriptive modeling.

Fundamentals

- Given a situation, framework, or problem, students should be able to determine, identify, and use appropriate quantities for representing the situation.

A.MP.1-8 : Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration and expression. Seek help and apply feedback. Set and monitor goals.

A.PAR.6 : Build quadratic expressions and equations to represent and model real-life phenomena; solve quadratic equations in mathematically applicable situations

A.FGR.7 : Construct and interpret quadratic functions from data points to model and explain real-life phenomena; describe key characteristics of the graph of a quadratic function to explain a mathematically applicable situation for which the graph serves as a model.

Concepts/Skills to support mastery of standards

- A.PAR.6.1:** Interpret quadratic expressions and parts of a quadratic expression that represent a quantity in terms of its context.
- A.PAR.6.2:** Fluently choose and produce an equivalent form of a quadratic expression to reveal and explain properties of the quantity represented by the expression.
- A.PAR.6.3:** Create and solve quadratic equations in one variable and explain the solution in the framework of applicable phenomena.
- A.PAR.6.4:** Represent constraints by quadratic equations and interpret data points as possible or not possible in a modeling framework.
- A.FGR.7.1:** Use function notation to build and evaluate quadratic functions for inputs in their domains and interpret statements that use function notation in terms of a given framework.
- A.FGR.7.2:** Identify the effect on the graph generated by a quadratic function when replacing $f(x)$ with $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs.
- A.FGR.7.3:** Graph and analyze the key characteristics of quadratic functions.
- A.FGR.7.4:** Relate the domain and range of a quadratic function to its graph and, where applicable, to the quantitative relationship it describes.
- A.FGR.7.5:** Rewrite a quadratic function representing a mathematically applicable situation to reveal the maximum or minimum value of the function it defines. Explain what the value describes in context.
- A.FGR.7.6:** Create quadratic functions in two variables to represent relationships between quantities; graph quadratic functions on the coordinate axes with labels and scales.
- A.FGR.7.7:** Estimate, calculate, and interpret the average rate of change of a quadratic function and make comparisons to the average rate of change of linear functions.
- A.FGR.7.8:** Write a function defined by a quadratic expression in different but equivalent forms to reveal and explain different properties of the function.
- A.FGR.7.9:** Compare characteristics of two functions each represented differently.
- MSC.Gifted.S3B-** Students will develop and utilize critical thinking, higher-order thinking, logical thinking, and problem-solving skills in various situations.
- MSC.Gifted.S4B-** Students will recognize and examine the value of other strengths, thoughts, ideas, and feeling during collaboration.

Vocabulary

[K-12 Mathematics Glossary](#)

Vertex	Maximum	Minimum	Axis of Symmetry	Y-intercept	X-intercepts	Roots/Zeros
Parabola	2 Real Solutions	1 Real Solution	No Real Solutions	Origin	Quadratic	Average Rate of Change
Domain	Range	Positive	Negative	Standard Form	Vertex Form	Discriminant
Completing the Square	Concavity	Decreasing	Increasing	Degree	Difference of Two Squares	Function
Horizontal Shift	Vertical Shift	Leading Coefficient	Perfect Square Trinomial	Quadratic Expression	Quadratic Equation	Quadratic Function

Notation

Key concept	Related concept(s)	Global context
Relationships	Representation, Systems, and Models	Scientific and Technical Innovation

Statement of inquiry

Investigating the relationship between quadratic functions and their models through representation and systems using scientific and technical innovations can lead to deeper understanding of their behavior and applications.

Inquiry questions

Factual—

- How do I graph a quadratic equation using a graphing calculator or other technology?
- How do I use the Quadratic Formula to solve a quadratic?
- Where do I locate the x-intercepts on a graph?
- What are the steps in completing the square?

Conceptual—

- What is meant by the phrase “transformation of a quadratic equation”?
- How can you determine that the Quadratic Formula will be the best method to solve a quadratic equation?

Debatable-

- What is the best method to use when solving a Quadratic Equation?

MYP Objectives	Assessment Tasks	
<i>What specific MYP objectives will be addressed during this</i>	Relationship between summative assessment task(s) and statement of inquiry:	<i>List of common formative and summative assessments.</i>

<i>unit?</i>		
<p>Objective A: Knowing and Understanding</p> <p>Objective B: Investigating Patterns</p> <p>Objective C: Communicating</p>	The summative assessment will require that students apply technology to demonstrate mastery of modeling and solving quadratic equations.	<p><u>Formative Assessment(s):</u></p> <p>Unit 4 CFA</p> <p><u>Summative Assessment(s):</u></p> <p>Unit 4 Summative Assessment</p> <p>Unit 4 : Summative Retest</p> <p>MYP Project: MYP C - DOE Seeing Structure in Expressions</p>

Approaches to learning (ATL)

Category: Self Management Skills
Cluster: Affective
Skill Indicator: Demonstrate Persistence and Perseverance

Category: Thinking Skills
Cluster: Critical-thinking
Skill Indicator: Practice observing to recognize problems

Category: Research Skills
Cluster: Information Literacy
Skill Indicator: Understand and use technology systems

Learning Experiences

Objective or Content	Learning Experiences	Personalized Learning and Differentiation
----------------------	----------------------	---

<p>A.PAR.6 : Build quadratic expressions and equations to represent and model real-life phenomena; solve quadratic equations in mathematically applicable situations.</p> <p>A.PAR.6.1: Interpret quadratic expressions and parts of a quadratic expression that represent a quantity in terms of its context.</p> <p>A.PAR.6.3 Create and solve quadratic equations in one variable and explain the solution in the framework of applicable phenomena.</p>	<p><u>DOE Seeing Structure in Expressions</u></p> <p>Description: In this learning plan, students will interpret quadratic expressions and their components within relevant contexts, enhancing their ability to connect mathematical representations with real-life phenomena. Students will also create and solve quadratic equations, applying their problem-solving skills to find meaningful solutions. The plan is designed to foster both conceptual understanding and procedural fluency. Students will investigate the structure and key features of quadratic functions, such as zeros, minimum values, and the relationship between coefficients and graph characteristics.</p> <p><u>Learning Goals:</u></p> <ul style="list-style-type: none"> ● I can use the structure of an expression to rewrite it in different equivalent forms. ● I can find zeros of a quadratic function based on real world context ● I can use structure of a quadratic expression to interpret real world phenomena 	<p>Differentiated Support: Students may be intentionally grouped for shared peer learning. Support will be provided through direct, explicit instruction, small group, visual representations, and manipulatives (hands on and technology)</p> <p><u>Extension:</u> Students will create their own equivalent quadratic functions written in two different forms.</p> <p>Using the quadratic functions created, students will come up with a story problem.</p>
<p>A.FGR.7.1: Use function notation to build and evaluate quadratic functions for inputs in their domains and interpret statements that use function notation in terms of a given framework.</p> <p>A.FGR.7.3: Graph and analyze the key characteristics of quadratic functions.</p> <p>A.FGR.7.4: Relate the domain and range of a quadratic function to its graph and, where applicable, to the quantitative relationship it describes.</p>	<p><u>Graphing Transformations</u></p> <p>Description: In this learning plan, students will explore the transformations of the graph of $f(x)=x^2$. Students will use graphing technology to graph various parabolas and examine the changes from the parent function. Students will form conjectures about how $kf(x)$, $f(kx)$, $f(x)+k$, $-f(x)$, and $f(x+k)$ affect the graph of a quadratic function. They will then apply this new thinking to graph parabolas by hand and to describe a contextual situation.</p> <p><u>Learning Goals:</u></p> <ul style="list-style-type: none"> ● I can graph parabolas by hand and with graphing technology. ● I can investigate, identify, and explain transformations of quadratic functions. 	<p>Differentiated Support: The teacher will ask probing questions, provide visual representations, and use manipulatives to engage students for meaningful learning.</p> <p><u>Extension:</u> Students will create their own quadratic functions and graph parabolas with vertical and horizontal shifts by hand.</p>
Content Resources		
<p>SaVvas Envision Algebra 1 Textbook and Online Platform</p> <p>A.PAR.6.1 - Lesson 7-4, 7-5, 7-6, 7-7</p> <p>A.PAR.6.2 - Lesson 7-4, 7-5, 7-6, 7-7, 9-5</p> <p>A.FGR.7.1 - Lesson 8-1, 8-2, 8-3, 8-4</p> <p>A.FGR.7.2 - Lesson 8-1, 8-2, 8-3, 10-4, 10-5</p>		

A.FGR.7.3 - Lesson 8-1, 8-2, 8-3, Topic 8 - Math Modeling in 3 Acts

A.FGR.7.4 - Lesson 8-1, 8-4

A.FGR.7.5 - Lesson 8-3

A.FGR.7.6 - Lesson 8-4

A.FGR.7.7 - Lesson 8-5

A.FGR.7.8 - Lesson 8-3, 8-4

A.FGR.7.9 - Lesson 8-3, 8-5

GADOE Learning Plans for Unit 4