

# MP3a-Quadratic Expressions and Equations

Content Area: **Math**  
Course(s): **Math 8 Algebra 1 Honors**  
Time Period: **Marking Period 3**  
Length: **MP3**  
Status: **Published**

## Essential Questions

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- When could a nonlinear function be used to model a real-world situation?

## Big Ideas

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- Interpret the structure of expressions.
- Write expressions in equivalent forms to solve problems.
- Perform arithmetic operations on polynomials.
- Understand solving equations as a process of reasoning and explain the reasoning.
- Solve equations and inequalities in one variable.

## Technology Integration

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- 8.1.8.A.5 Create a database query, sort and create a report and describe the process, and explain the report results.
- 8.1.8.A.3 Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
- 8.1.8.C.1 Collaborate to develop and publish work that provides perspectives on a global problem for discussions with learners from other countries.

Activity:

Students complete the interactive lab activity, “Quadratic Functions- [Desmos- Will it Hit the Hoop?](#)” independently during station rotation. The lab challenges students to take knowledge of how a basketball is shot and transfer it to the terms in a quadratic formula. At the end, students are able to view other responses from classmates, and hold a classroom discussion on the methods and strategies used to successfully complete the lab through a shared Google Doc.

## Diversity Integration

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Objective: Create a parabola that matches arches found in architecture from around the world.

Description of Activity: Students will research architecture from around the world and choose an arch to recreate. They will insert the picture into Desmos and create a parabola that matches the arch using quadratic equations. They will provide how each value affects the parent function and compare scales on grid to real life size.

## **Enduring Understandings**

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### **Seeing Structure in Expressions**

A.SSE.1a [M] Interpret parts of an expression, such as terms, factors, and coefficients.

A.SSE.2 [M] 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.3a Factor a quadratic expression to reveal the zeros of the function it defines.

### **Arithmetic with Polynomials & Rational Expressions**

A.APR.1 [M] 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

### **Reasoning with Equations & Inequalities**

A.REI.1 Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

A.REI.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  $b$ .

## **Mathematical Practices Focus**

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1. Make sense of problems and persevere in solving them. Lessons 0-1, 1-8, 2-4, 3-4, 4-5, 5-4, 6-4, 7-5, 8-8, 9-3, 10-5, 11-1, 12-4

2. Reason abstractly and quantitatively. Lessons 1-3, 2-1, 3-3, 4-1, 5-1, 6-5, 7-2, 8-5, 9-1, 10-3, 11-8, 12-2

3. Construct viable arguments and critique the reasoning of others. Lessons 1-3, 2-5, 3-5, 4-2, 5-5, 6-1, 7-4, 8-1, 9-2, 10-4, 11-2, 12-1

4. Model with mathematics. Lessons 1-1, 2-9, 3-2, 4-5, 5-1, 6-5, 7-6, 8-7, 9-7, 10-4, 11-7, 12-5

5. Use appropriate tools strategically. Lessons 1-7, 2-4, 3-2, 4-4, 5-6, 6-1, 7-5, 8-2, 9-6, 10-6, 11-8, 12-3
6. Attend to precision. Lessons 1-3, 2-8, 3-4, 4-2, 5-2, 6-6, 7-4, 8-9, 9-5, 10-1, 11-6, 12-2
7. Look for and make use of structure. Lessons 1-2, 2-5, 3-6, 4-1, 5-5, 6-3, 7-7, 8-6, 9-6, 10-2, 11-2, 12-8
8. Look for and express regularity in repeated reasoning. Lessons 1-4, 2-7, 3-1, 4-1, 5-4, 6-1, 7-1, 8-4, 9-3, 10-2, 11-5, 12-6