## Unit Goals – Stage 1

<table>
<thead>
<tr>
<th>Number of Days:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MS</td>
<td>44 days</td>
</tr>
<tr>
<td></td>
<td>2/27/17 – 5/5/17</td>
</tr>
<tr>
<td>HS</td>
<td>44 days</td>
</tr>
<tr>
<td></td>
<td>3/6/17 – 5/12/17</td>
</tr>
</tbody>
</table>

### Unit Description:
Students learn that polynomials form a system analogous to integers upon which the students will learn to perform basic operations. Students will consider quadratic functions, comparing the key characteristics of quadratic functions to those of linear and exponential functions. Students learn to anticipate the graph of a quadratic function by interpreting the structure of various forms of quadratic expressions. In particular, they identify the real solutions of a quadratic equation as the zeros of a related quadratic function.

### Materials:
- algebra tiles*, Algebra Tiles Workbook, calculators, graph paper*, Desmos app/website

(* Paper tool available at LBUSD Curriculum Intranet → Instructional Tools → Middle School → Mathematical Tools)

### Standards for Mathematical Practice

<table>
<thead>
<tr>
<th>Practice</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMP 1</td>
<td>Make sense of problems and persevere in solving them.</td>
</tr>
<tr>
<td>SMP 2</td>
<td>Reason abstractly and quantitatively.</td>
</tr>
<tr>
<td>SMP 3</td>
<td>Construct viable arguments and critique the reasoning of others.</td>
</tr>
<tr>
<td>SMP 4</td>
<td>Model with mathematics.</td>
</tr>
<tr>
<td>SMP 5</td>
<td>Use appropriate tools strategically.</td>
</tr>
<tr>
<td>SMP 6</td>
<td>Attend to precision.</td>
</tr>
<tr>
<td>SMP 7</td>
<td>Look for and make use of structure.</td>
</tr>
<tr>
<td>SMP 8</td>
<td>Look for and express regularity in repeated reasoning.</td>
</tr>
</tbody>
</table>

### Transfer Goals

**Students will be able to independently use their learning to…**

- Make sense of never-before-seen problems and persevere in solving them.
- Construct viable arguments and critique the reasoning of others.

### UNDERSTANDINGS

**Students will understand that…**

- When you add, subtract, or multiply polynomials, the result is another polynomial.
- Factoring polynomials breaks apart more complex expressions into smaller, more easily manipulated terms. Factoring a quadratic expression reveals the zeros of the function it defines.
- Writing quadratic equations in different forms reveals different key features.
- The graphs of all other quadratic functions may be built by performing a series of transformations on the graph \( f(x) = x^2 \).
- A quadratic equation in one variable can be written in the standard form \( ax^2 + bx + c = 0 \), where \( a, b, \) and \( c \) are real numbers and \( a \neq 0 \). The solution is the value(s) of \( x \) that make the equation true. Every quadratic equation written in this form has a related quadratic function in two variables, \( y = ax^2 + bx + c \), that is a parabola when graphed. The \( x \)-intercepts of this function are the solutions to the related quadratic equation.
- Systems consisting of a linear equation and a quadratic equation can be solved graphically and algebraically. The solution to a system is zero, one, or two points that satisfy both equations.

### ESSENTIAL QUESTIONS

**Students will keep considering…**

- Why would you rewrite an expression in an equivalent form?
- How are quadratic equations in one variable and quadratic functions in two variables related?
- How are quadratic functions similar and different from linear functions and exponential functions?
- What kind(s) of solutions could a system of a linear equation and a quadratic equation have?
## Unit Goals – Stage 1

### KNOWLEDGE

**Students will know…**

- The definition of academic vocabulary words, such as *polynomial*, *difference of two squares*, *perfect-square trinomial*, *quadratic function*, *parabola*, *vertex*, *maximum/minimum*, and *discriminant*.
- Quadratic functions have several key features, including zeros, vertex, axis of symmetry, minimum/maximum, and directionality.
- The most basic quadratic function is \( f(x) = x^2 \). Its graph is a parabola that opens upward, has its vertex at the origin, and is symmetric about the y-axis.
- Quadratic equations can be solved using a variety of methods, such as factoring, completing the square, using square roots, and using the quadratic formula.

### SKILLS

**Students will be skilled at and/or be able to…**

- Add, subtract, and multiply polynomials.
- Factor polynomials.
- Graph quadratic functions in different forms (vertex, standard, and factored).
- Recognize key features of quadratic functions in various forms.
- Relate the domain and range of a quadratic function to the relationship it describes.
- Use transformations to build new quadratic functions from the parent function, \( f(x) = x^2 \).
- Compare quadratic functions in different representations, such as graphically, algebraically, numerically in tables, or by verbal descriptions.
- Compare linear, exponential, and quadratic functions.
- Write and solve quadratic equations by factoring, using square roots, completing the square, and using the quadratic formula.
- Apply quadratic functions to physical problems.
- Solve a system of equations containing a linear equation and quadratic equation.
Assessed Grade Level Standards

Standards for Mathematical Practice
SMP 1 Make sense of problems and persevere in solving them.
SMP 2 Reason abstractly and quantitatively.
SMP 3 Construct viable arguments and critique the reasoning of others.
SMP 4 Model with mathematics.
SMP 5 Use appropriate tools strategically.
SMP 6 Attend to precision.
SMP 7 Look for and make use of structure.
SMP 8 Look for and express regularity in repeated reasoning.

Standards for Mathematical Content

A-SSE.A Interpret the structure of expressions. [Linear, exponential, and quadratic.]
A-SSE.1 Interpret expressions that represent a quantity in terms of its context.*
  a. Interpret parts of an expression, such as terms, factors, and coefficients.*
  b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret P(1+r)^n as the product of P and a factor not depending on P.*
A-SSE.2 Use the structure of an expression to identify ways to rewrite it.

A-SSE.B Write expressions in equivalent forms to solve problems. [Quadratic and exponential.]
A-SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*
  a. Factor a quadratic expression to reveal the zeros of the function it defines.*
  b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.*

A-APR.A Perform arithmetic operations on polynomials. [Linear and quadratic.]
A-APR.1 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.

A-CED.A Create equations that describe numbers or relationships. [Linear, quadratic, and exponential.]
A-CED.1 Create equations and inequalities in one variable including ones with absolute value and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. CA*
A-CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.*

A-REI.B Solve equations and inequalities in one variable. [Linear inequalities; literal equations that are linear in the variables being solved for; quadratics with real solutions.]
A-REI.4 Solve quadratic equations in one variable.
  a. 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.
  b. 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 + bi for real numbers a and b.

A-REI.C Solve systems of equations. [Linear-linear and linear-quadratic.]
A-REI.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.
### Assessed Grade Level Standards

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>[m]</strong> A-REI.D</td>
<td>Represent and solve equations and inequalities graphically.</td>
<td><strong>A-REI.10</strong> Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).</td>
</tr>
<tr>
<td><strong>[m]</strong> F-IF.B</td>
<td>Interpret functions that arise in applications in terms of the context. [Linear, exponential, and quadratic.]</td>
<td><strong>F-IF.4</strong> 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. <em>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</em> <strong>F-IF.5</strong> Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function $h(n)$ gives the number of person-hours it takes to assemble $n$ engines in a factory, then the positive integers would be an appropriate domain for the function.*</td>
</tr>
<tr>
<td><strong>[s]</strong> F-IF.C</td>
<td>Analyze functions using different representations. [Linear, exponential, quadratic, absolute value, step, piecewise-defined.]</td>
<td><strong>F-IF.7</strong> Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* <strong>F-IF.8</strong> Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Graph linear and quadratic functions and show intercepts, maxima, and minima.* <strong>F-IF.9</strong> Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). <em>For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.</em></td>
</tr>
<tr>
<td><strong>[a]</strong> F-BF.B</td>
<td>Build new functions from existing functions. [Linear, exponential, quadratic, and absolute value.]</td>
<td><strong>F-BF.3</strong> 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. Include recognizing even and odd functions from their graphs and algebraic expressions for them.*</td>
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<tr>
<td><strong>[s]</strong> F-LE.B</td>
<td>Interpret expressions for functions in terms of the situation they model.</td>
<td><strong>F-LE.5</strong> Interpret the parameters in a linear or exponential function in terms of a context.* <strong>F-LE.6</strong> Apply quadratic functions to physical problems, such as the motion of an object under the force of gravity. CA*</td>
</tr>
</tbody>
</table>

**Key:**
- **[m]** major clusters;
- **[s]** supporting clusters;
- **[a]** additional clusters

*Indicates a modeling standard linking mathematics to everyday life, work, and decision-making

CA Indicates a California-only standard
## Evidence of Learning – Stage 2

### Unit Assessment

**Claim 1:** Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.

Concepts and skills that may be assessed in Claim 1:

**A-SSE.A**
- The student uses the structure of an expression to identify ways of rewriting it.

**A-SSE.B**
- The student factors a quadratic expression to reveal the zeros of the function it defines.
- The student completes the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.

**A-APR.A**
- The student adds or subtracts polynomials.
- The student multiplies polynomials.

**A-CED.A**
- The student graphs quadratic equations on coordinate axes with labels and scales to represent the solution to a contextual problem.
- The student creates quadratic equations in two or more variables to represent relationships between quantities.

**A-REI.B**
- The student solves quadratic equations in one variable by taking square roots, completing the square, using the quadratic formula, or by factoring.
- The student recognizes when the quadratic formula gives no real solutions.

**A-REI.C**
- The student solves a simple system containing a linear equation and a quadratic equation in two variables algebraically and graphically.

**A-REI.D**
- The student understands that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

**F-IF.B**
- The student interprets key features of a graph or a table representing a quadratic function modeling a relationship between two quantities.
- The student sketches graphs showing key features given a verbal description of a relationship between two quantities that can be modeled with a quadratic function.
- The student relates the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

**F-IF.C**
- The student graphs quadratic functions expressed symbolically and shows key features of the graph.
### Evidence of Learning – Stage 2

#### Assessment Evidence

- The student compares properties of two functions each represented in a different way (e.g., as equations, functions, tables, graphs, or written descriptions).

**F-BF.B**

- The student identifies the effects of transformations on the graphs of quadratic functions by replacing \( f(x) \) with \( f(x) + k \), \( k f(x) \), \( f(kx) \), and \( f(x + k) \) for specific values of \( k \) (both positive and negative) and finds the value of \( k \) given the graphs.

**F-LE.B**

- The student applies quadratic functions to physical problems, such as the motion of an object under the force of gravity.

#### Claim 2: Students can solve a range of well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies.

<table>
<thead>
<tr>
<th>Standard clusters that may be assessed in Claim 2:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• A-SSE.A</td>
</tr>
<tr>
<td>• A-SSE.B</td>
</tr>
<tr>
<td>• A.CED.A</td>
</tr>
<tr>
<td>• A-REI.C</td>
</tr>
<tr>
<td>• A-REI.D</td>
</tr>
<tr>
<td>• F-IF.B</td>
</tr>
<tr>
<td>• F-IF.C</td>
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</tbody>
</table>

#### Claim 3: The student can clearly and precisely construct viable arguments to support their own reasoning and critique the reasoning of others.

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<tr>
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</tr>
<tr>
<td>• F-IF.C</td>
</tr>
<tr>
<td>• F-BF.B</td>
</tr>
</tbody>
</table>

#### Claim 4: The student can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.

<table>
<thead>
<tr>
<th>Standard clusters that may be assessed in Claim 4:</th>
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<tbody>
<tr>
<td>• A-SSE.B</td>
</tr>
<tr>
<td>• A-CED.A</td>
</tr>
<tr>
<td>• A-REI.B</td>
</tr>
<tr>
<td>• A-REI.C</td>
</tr>
<tr>
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</tr>
<tr>
<td>• F-IF.C</td>
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#### Other Evidence

<table>
<thead>
<tr>
<th>Formative Assessment Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Informal teacher observations</td>
</tr>
<tr>
<td>• Checking for understanding using active participation strategies</td>
</tr>
<tr>
<td>• Exit slips/summaries</td>
</tr>
<tr>
<td>• Modeling Lessons (SMP 4)</td>
</tr>
<tr>
<td>• Tasks</td>
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| Access Formative Assessment for Differentiation for suggestions. Located on the LBUSD website – “M” Mathematics – Curriculum Documents |

FORMATIVE ASSESSMENT OPPORTUNITIES

- Informal teacher observations
- Checking for understanding using active participation strategies
- Exit slips/summaries
- Modeling Lessons (SMP 4)
- Tasks

Access [Using Formative Assessment for Differentiation](#) for suggestions. Located on the LBUSD website – “M” Mathematics – Curriculum Documents
# Unit 4 Polynomials and Quadratic Functions

## Learning Plan – Stage 3

### Suggested Sequence of Key Learning Events and Instruction

<table>
<thead>
<tr>
<th>Days</th>
<th>Learning Target</th>
<th>Expectations</th>
<th>Big Ideas Math Algebra 1 (Activities and Lessons)</th>
<th>Curriculum Intranet</th>
</tr>
</thead>
</table>
| 1 day | I will explore polynomials and quadratic functions by participating in the Opening Task. | OPENING TASK – Growing Shapes
This Opening Task is an activity from Jo Boaler’s “Week of Inspirational Math.” A video is included in the lesson plan about making mistakes to promote a growth mindset, but it is not necessary to show the video to do the Opening Task. The goal of this task is for students to look at a pattern to see how it “grows” and then connect it to a table and algebraic expression. This Opening Task can be done as a Solo-Team-Teach activity. Facilitate a class discussion about how the students see the pattern growing utilizing Talk Moves. This task is a gateway into the entire unit on polynomials and quadratic functions. | Conceptual Understanding:
• Growing Shapes |
| 5-6 days | I will perform arithmetic operations on polynomials by… | • Identifying the parts of a polynomial.
• Writing polynomials in standard form.
• Using algebra tiles to represent operations with polynomials. (SMP 5)
• Adding, subtracting, and multiplying polynomials.
• Applying special product rules, such as difference of two squares and perfect square trinomials, when multiplying polynomials. (SMP 7, 8)
• Explaining that polynomials form a system analogous to integers in that they are closed under the operations of addition, subtraction, and multiplication. (SMP 3)
• Solving polynomial equations in factored form.
• Answering questions such as…
  o How can you use algebra tiles to represent operations with polynomials?
  o How are operations with polynomials similar to operations with integers?
  o “The product of two binomials is not always a trinomial.” Why? Give an example to justify your reasoning.
  o Synergy Item Bank: Item ID 54446 | • Section 7.1
• Section 7.2
• Section 7.3
• Section 7.4
• Conceptual Understanding:
• Multiplying Binomials Task
• Procedural Skills and Fluency:
  • Multiplying Binomials and Polynomials Partner Coach
  • Cooperative Frames: Polynomial Operations
  • Mixed Polynomial Operations Math-O
  • Multiplying Special Binomials Dominoes
• Application:
  • Skeleton Tower Task |
## Learning Plan – Stage 3

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</table>
| 2-3 days | I will check my understanding of polynomials by participating in the FAL.     | **OPTION 1: FORMATIVE ASSESSMENT LESSON**  
- Generalizing Polynomials from Patterns  
  (SMP 1, 2, 3, 4, 5, 6, 7, 8)                                                                 |                                                   |                                     |
| 5-6 days | I will factor polynomials by...                                                | - Using algebra tiles to represent factoring polynomials in the forms $x^2 + bx + c$ and $ax^2 + bx + c$.  
  (SMP 5)  
- Explaining how a polynomial and its factored form are equivalent expressions.  
  (SMP 3)  
- Using GCF and grouping to factor completely.  
- Answering questions such as…  
  o How do you determine if a polynomial has a greatest common factor?  
  o How can you use algebra tiles to represent factoring?  
  o How do you factor polynomials with more than one variable?  
  o How do you choose an appropriate factoring method?  
  o How do you know if an expression is factored completely? | - Section 7.5  
- Section 7.6  
- Section 7.7  
- Section 7.8  
- STEM Video: Birds Dropping Food | Conceptual Understanding:  
- Factoring PowerPoint  
- Factoring Quadratics Task  

**Procedural Skills and Fluency:**  
- Factoring Trinomials with a Leading Coefficient of 1: Solo-Team-Teach  
- Factoring Trinomials with a Leading Coefficient Not 1: Frames  
- Mixed Factoring Partner Coach  
- Factoring Special Products Concentration  
- Mixed Factoring Math-O  

**Application:**  
- STEM Performance Task: Flight Path of a Bird |
## Learning Plan – Stage 3

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</thead>
</table>
| 9-10 days | I will graph quadratic functions by… | • Recognizing that the graph of a quadratic function is a parabola.  
• Graphing simple quadratic functions by hand and using technology to graph more complex graphs. (SMP 5)  
• Using transformations to build new quadratic functions from the parent function of \( f(x) = x^2 \).  
• Identifying the effect of transformations on the graph of the quadratic function \( f(x) = x^2 \) by replacing \( f(x) \) with \( f(x) + k, k f(x), f(kx) \), and \( f(x + k) \) for specific values of \( k \) (both positive and negative).  
• Graphing quadratic functions in the form \( f(x) = ax^2 + bx + c \) or \( y = ax^2 + bx + c \).  
• Describing key features of a quadratic function, including zeros, vertex, axis of symmetry, minimum/maximum, and directionality.  
• Interpreting the domain, range, and key features of a quadratic function and relating them to the relationship it describes. (SMP 2)  
• Answering questions such as…
  - What are some key features of quadratic functions?  
  - How do you determine the domain and range of a quadratic function?  
  - How do you graph a quadratic function?  
  - How does understanding transformations of quadratic functions help you when graphing and writing equations?  
  - How can you describe key attributes of the graph of \( f(x) = ax^2 + bx + c \) by analyzing its equation?  
  - Synergy Item Bank: Item ID 56202 | • Section 8.1  
• Section 8.2  
• Section 8.3 | Conceptual Understanding:  
• Create a Quadratic, Given a Constraint Task  
• Desmos: Quadratics  
• Exploring Quadratics with Desmos  
• Building Functions Task  
Procedural Skills and Fluency:  
• Desmos: Polygraph  
• Graphing Quadratic Functions Frames  
• Vertex and Axis of Symmetry: Tic-Tac-Toe |
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|       | I will graph quadratic functions in various forms by ...                        | • Using vertex form, standard form, and intercept form to reveal key features about the parabola. (SMP 7)  
• Describing the domain and range of a quadratic function and relating them to the relationship it describes. (SMP 2)  
• Sketching the graph of a quadratic function showing key features given a verbal description of the relationship between two quantities.  
• Writing quadratic equations in two variables to represent relationships among quantities.  
• Answering questions such as...  
  o Explain how different forms of a quadratic function reveal key attributes. (SMP 3)  
  o In the graph of \( f(x) = a(x - p)(x - q) \), does the sign of \( a \) change the x-intercepts? Explain your reasoning. (SMP 3)  
  o How do you write quadratic equations from their graph? | • Section 8.4  
• Section 8.5 (skip examples 7 and 8)                                                                 | Conceptual Understanding:  
• Desmos: Marbleslides for Parabolas  
• Minimum Value of a Quadratic in Vertex Form  
• Maximum Value of a Quadratic in Vertex Form  
• Quadratics with Defined Roots in Vertex Form Task                                                                 |
| 2-3   |                                                                                 |                                                                                                                                                                                                            |                                                                                                                 |                                                                                                     |
|       | I will compare linear, exponential, and quadratic functions by ...               | • Identifying the type of function.  
• Comparing functions in different representations, such as graphically, algebraically, numerically in tables, or by verbal descriptions.  
• Choosing appropriate functions and writing functions to model data. (SMP 2)  
• Answering questions such as...  
  o Compare and contrast linear functions with quadratic functions.  
  o How can you compare the growth rates of linear, exponential, and quadratic functions?  
  o Which function has a growth rate that will eventually exceed the growth rates of the other two functions? Explain your reasoning. (SMP 3) | • Section 8.6  
• STEM Video: Comparing Growth Models                                                                 | Application:  
• STEM Performance Task: Growth Models                                                                 |
## Learning Plan – Stage 3

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| 9-10 days | I will solve quadratic equations in one variable by... | • Simplifying radicals using the Product Property of Square Roots.  
• Using various methods, such as graphing, factoring, taking square roots, completing the square, and using the quadratic formula.  
• Explaining that the solution(s) to a quadratic equation in one variable is the value(s) of \( x \) that make the equation true and that each quadratic equation has a related quadratic function in two variables, \( y = ax^2 + bx + c \), that is a parabola when graphed whose \( x \)-intercepts represent the solution(s). (SMP 3)  
• Completing the square to rewrite quadratic equations from standard form to vertex form.  
• Deriving the quadratic formula.  
• Recognizing when the quadratic formula gives no solutions.  
• Interpreting the discriminant to determine the number of \( x \)-intercepts a quadratic equation contains.  
• Writing and solving quadratic equations to represent real-world and mathematical problems, including physical problems. (SMP 2)  
• Answering questions such as...  
  o Compare and contrast solving quadratic equations by graphing, factoring, taking square roots, completing the square, and using the quadratic formula.  
  o How can you solve a quadratic equation in one variable by graphing its related quadratic function in two variables?  
  o How can you write and solve a quadratic equation to solve real-world physical problems?  
  o Synergy Item Bank: Item ID 54465, 54581, 55281 | • Section 9.1  
(only example 1)  
• Section 9.2  
• Section 9.3  
• Section 9.4  
• Section 9.5  
• STEM Video: Comparing Golden Rectangle | Conceptual Understanding:  
• Factoring Quadratics with a Fraction Solution Task  
• Factoring Quadratics with One Solution 2 Task  
• Quadratic Formula Task  

Procedural Skills and Fluency:  
• Simplifying Radicals Activity  
• Solving Quadratics by Graphing: Solo-Team-Teach  
• Solving Equations by Factoring: Math-O  
• Solving Quadratic Equations with Square Roots: Partner Coach  
• Using the Quadratic Formula: Cooperative Frames  
• Quadratic Equations: Carousel  

Application:  
• Sidewalk Stones Task  
• STEM Performance Task: The Golden Ratio
## Learning Plan – Stage 3

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<th>Days</th>
<th>Learning Target</th>
<th>Expectations</th>
<th>Big Ideas Math Algebra 1 (Activities and Lessons)</th>
<th>Curriculum Intranet</th>
</tr>
</thead>
</table>
| 2-3 days | I will check my understanding of quadratic functions by participating in the FAL. | **OPTION 2: FORMATIVE ASSESSMENT LESSON**  
- Representing Quadratic Functions Graphically (SMP 1, 2, 3, 5, 6, 7, 8) | | |
| 3-4 days | I will solve systems of equations in two variables containing a linear equation and a quadratic equation by... |  
- Approximating the solution by graphing.  
- Using algebraic methods, such as substitution and elimination.  
- Answering questions such as...  
  - How can you solve a system when one equation is linear and the other is quadratic?  
  - How does using technology, such as Desmos, help you solve systems?  
  - How is solving a system of equations containing a linear equation and a quadratic equation similar to solving a system of two linear equations?  
  - Synergy Item Bank: Item ID 64463 |  
- Section 9.6 |  
- Conceptual Understanding:  
  - Exploring Systems with Technology  
  - Linear and Quadratic Functions Task  
  - Which One Doesn’t Belong? Systems with Quadratic and Linear Functions  
- Application:  
  - A Linear and Quadratic System Task | |
| 1-2 days | I will prepare for the unit assessment on polynomials and quadratic functions by... |  
- Incorporating the Standards for Mathematical Practice (SMPs) along with the content standards to review the unit. |  
- Ch. 7 Review (p. 410 – 415)  
- Ch. 8 Review (p. 470 – 475)  
- Ch. 9 Review (p. 534 – 539) |  
- Procedural Skills and Fluency:  
  - Factoring Jeopardy  
  - Quadratics Jeopardy  
- Application:  
  - Modeling: How Many Hotdogs Did They Eat? (SMP 4)  
  - Modeling: Where Would the Angry Birds Have Landed? (SMP 4)  
  - Modeling: Fall of Javert (SMP 4) | |
| 1 day | | | | |

**Unit Assessment**  
Synergy: 2016-17 Algebra 1 Unit 4