


## Algebra Curriculum Bundle #9

<b>Title</b>		<b>Suggested Dates</b>
Quadratic Functions		February 22 – March 12 (15 days)

<b>Big Idea/Enduring Understanding</b>	<b>Guiding Questions</b>
<p>The basic characteristics of quadratic functions can be determined from graphs of parent quadratic functions and the changes in the parameters of the function.</p>	<ol style="list-style-type: none"> <li>1. What real-world situations can be modeled by quadratic functions (i.e. vertical motion)?</li> <li>2. How can you find axis of symmetry and vertex of the graph of a quadratic function?</li> <li>3. What happens to the graph when changes are made to <math>a</math> in the function <math>ax^2 + c</math>?</li> <li>4. What happens to the graph when changes are made to <math>c</math> in the function <math>ax^2 + c</math>?</li> </ol>

The resources included here provide teaching examples and/or meaningful learning experiences to address the District Curriculum. In order to address the TEKS to the proper depth and complexity, teachers are encouraged to use resources to the degree that they are congruent with the TEKS and research-based best practices. Teaching using only the suggested resources does not guarantee student mastery of all standards. Teachers must use professional judgment to select among these and/or other resources to teach the District Curriculum.

<b>Knowledge &amp; Skills with Student Expectations</b>	<b>District Specificity/Examples</b>	<b>Suggested Resources</b> (See note above)	
<p><b>A.2 The student uses the properties and attributes of functions.</b></p> <p>A.2A The student <b>identifies</b> and <b>sketches</b> the general forms of linear (<math>y = x</math>) and quadratic (<math>y = x^2</math>) parent functions.</p> <p><i>Note: Focus on quadratics</i></p>	<ul style="list-style-type: none"> <li>• Investigations with and without a graphing calculator</li> <li>• Identify from a table, graph, concrete model, and/or verbal description as match to the parent function <math>y = x</math> and <math>y = x^2</math></li> <li>• Connect from graphical representations of the parent functions to correct symbolic representation.</li> <li>• Sketch the graph corresponding to a given symbolic representation.</li> </ul>	<p><b>Holt:</b> Section 9.1, 9.1 lab</p> <p><b>Discovering:</b> Section 7.6, 8.3, 8.4</p>	<p><a href="#">Dana Center</a> Function Families (Set A &amp; B only)</p> <p><b>A&amp;M:</b> Spring Section 6.1 – 6.2</p>

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<p><b>A.9 The student understands that the graphs of quadratic functions are affected by the parameters of the function and can interpret and describe the effects of changes in the parameters of quadratic functions.</b></p> <p>A.9A The student <b>determines</b> the domain and range values for quadratic functions in given situations.</p>	<ul style="list-style-type: none"> <li>• Differentiate between the domain and range for a problem situation and the domain and range of the mathematical function.</li> <li>• Determine domain and range from a graph, table, equation, or verbal situation.</li> <li>• Label the vertex as a maximum or minimum</li> </ul>	<p><b>Holt:</b> Section 9.2</p> <p><b>Discovering:</b> Section 9.1 (focus on graphing) – 9.2</p>	<p><b><a href="#">Dana Center</a></b> Mathematical Domain and Range for Non-linear Functions (Focus on Quadratics)</p> <p><b>LTF:</b> Analysis of Functions</p> <p><b>A&amp;M:</b> Spring Section 6.1 – 6.2</p>
<p><b>A.9 The student understands that the graphs of quadratic functions are affected by the parameters of the function and can interpret and describe the effects of changes in the parameters of quadratic functions.</b></p> <p>A.9B The student <b>investigates, describes,</b> and <b>predicts</b> the effects of changes in <math>a</math> on the graph of <math>y = ax^2 + c</math>.</p>	<ul style="list-style-type: none"> <li>• Describe the effect on the graph of a quadratic equation when <math>a</math> is less than 0, between 0 and 1, and greater than 1.</li> <li>• Interpret the meaning of the changes in the graph due to changes in <math>a</math>. (narrower/wider)</li> </ul>	<p><b>Holt:</b> Section 9.3 – 9.4, 9.3 lab</p> <p><b>Discovering:</b> Section 7.6, 8.3, 8.4</p> <p><b>Mathopenref.com:</b> <a href="#">Quadratic Function Explorer:</a> Interactive look at change in <math>a</math>, <math>ax^2 + bx + c</math></p>	<p><b><a href="#">Dana Center</a></b> Investigating the Effect of <math>a</math> &amp; <math>c</math> on the graph of <math>y = ax^2 + c</math> Transformations of Quadratics</p> <p><b>LTF:</b> Investigation – Graphing Quadratic Equations</p> <p><b>A&amp;M:</b> Spring Section 6.4 – 6.6</p>
<p><b>A.9 The student understands that the graphs of quadratic functions are affected by the parameters of the function and can interpret and describe the effects of changes in the parameters of quadratic functions.</b></p> <p>A.9C The student <b>investigates, describes,</b> and <b>predicts</b> the effects of changes in <math>c</math> on the graph of <math>y = ax^2 + c</math>.</p>	<ul style="list-style-type: none"> <li>• Describe the effect on the graph of a quadratic equation when <math>c</math> is less than zero, equal to zero, or greater than zero.</li> <li>• Interpret the meaning of changes in the graph due to changes in <math>c</math>. (shift up/down)</li> </ul>	<p><b>Holt:</b> Section 9.3 – 9.4, 9.3 lab</p> <p><b>Discovering:</b> Section 8.2</p>	<p><b><a href="#">Dana Center</a></b> Investigating the Effect of <math>a</math> &amp; <math>c</math> on the graph of <math>y = ax^2 + c</math> Transformations of Quadratics</p> <p><b>LTF:</b> Investigation – Graphing Quadratic Equations</p> <p><b>A&amp;M:</b> Spring Section 6.4 – 6.6</p>
<p><b>A.9 Quadratic and Other Nonlinear Functions. The student understands that the graphs of quadratic functions are affected by the parameters of the function and can interpret and describe the effects of changes in the parameters of quadratic functions.</b></p> <p>A.9D The student analyzes graphs of quadratic functions and draws conclusions.</p>	<ul style="list-style-type: none"> <li>• Name and interpret the meaning of the vertex (minimum/maximum)</li> <li>• Name and interpret the meaning of the roots (<math>x</math>-intercepts)</li> <li>• Interpret the meaning of intercepts, maximum, minimum, opening up or down.</li> <li>• With and without graphing calculator</li> </ul>	<p><b>Holt:</b> Sections 9.1, 9.2, 9.5</p> <p><b>Discovering:</b> Sections 9.1, 9.2</p>	<p><b><a href="#">Dana Center</a></b> Ostrich Pen The Dog Run</p> <p><b>LTF:</b> Graphing Quadratic Functions</p>

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<p><b>A.2 The student uses the properties and attributes of functions.</b></p> <p>A.2B The student <b>identifies</b> the mathematical domains and ranges and <b>determines</b> reasonable domain and range values for given situations, both continuous and discrete.</p>	<ul style="list-style-type: none"> <li>• Identify domain and range from data in a table, a graph, concrete model, and/or verbal description of real world situation with inequality notation; for example the domain: <math>2 \leq x &lt; 5</math></li> </ul>	<p>Incorporate into other resources</p>	
<p><b>A.1 The student understands that a function represents a dependence of one quantity on another and can be described in a variety of ways.</b></p> <p>A.1E The student <b>interprets and makes decisions</b>, predictions, and critical judgments from functional relationships.</p>	<ul style="list-style-type: none"> <li>• Relate functional relationships to real world situations</li> <li>• Extend data in a table, from a concrete model using equations, or from analyzing the graph.</li> <li>• Answer questions and make predictions based on the representations: verbal, tabular, graphical, model, and/or symbolic</li> <li>• Determine choices, options, or draw conclusions from different representations, of the problem situation.</li> <li>• Including quadratic relationships area of circle and square communicated with concrete models, tables, graphs, diagrams, verbal descriptions, equations, and inequalities.</li> </ul>	<p>Incorporate into other resources</p>	
<p><b>A.10 The student understands there is more than one way to solve a quadratic equation and solves them using appropriate methods.</b></p> <p>A.10B The student <b>makes connections</b> among the solutions (roots) of quadratic equations, the zeros of their related functions, and the horizontal intercepts (x-intercepts) of the graph of the function.</p> <p>Note: Continued into next bundle to provide additional time; focus on solving by graphing; solving by factoring appears in bundle 8.</p> <p>Prior to teaching solving quadratic equations using square roots, it might be necessary to review square roots and real numbers (seen in Holt 1.5)</p>	<ul style="list-style-type: none"> <li>• Understand that roots, solutions, x-intercepts, and zeros are related in a function and use each appropriately</li> <li>• Determine the solutions from each of different representations of a quadratic function</li> </ul>	<p><b>Holt:</b> Section: 9.5 – 9.7, 9.9</p> <p><b>Discovering:</b> Section 9.2, 9.4, 9.7</p>	<p><a href="#">Dana Center</a> Block That Kick BRRR!</p> <p><b>LTF:</b> Another Way to Look at Factoring</p>