High School Algebra 1 Topic 8 - FCPS 2025-2026

Topic 8: Quadratic Functions	Estimate Time Frame: 10 blocks
Essential Standards: KY.HS.F.4a, KY.HS.F.5a, KY.HS.F.13, KY.HS.SP.6 Supporting Standards: KY.HS.A.13, KY.HS.F.1, KY.HS.F.3, KY.HS.F.6, KY.HS.N.4, KY.HS.N.5. KY.HS.N.6 Assessment Resource: enVision Topic 8 and Formative Assessment Lesson **(FAL):** Representing Quadratic Functions Graphically	

FCPS Supporting Links	Additional Supporting Links
Pacing Guide Standards Resources Crosswalk FCPS P-12 Mathematics Guidance Document FCPS Achievement & Trauma-Informed Strategies in the Classroom	Kentucky Academic Standards KSA Blueprint Target of the Standards - conceptual, procedural & application Three-Reads Routine Notice and Wonder Routine **MILC Resources: Topic 8 Quadratic Functions** ***enVision Teacher Guide: page 320A to 320I for specific Topic 8 Focus-Coherence-Rigor***

Big Ideas
Students will extend their previous understanding of quadratic functions. Students will learn different methods for solving quadratic equations. Students will interpret categorical and quantitative data, make inferences, and justify conclusions.

Essential Questions	Common Preconceptions/Misconceptions

How many solutions can a quadratic equation have?
How can this be determined from the discriminant?
How can you write a quadratic equation that models a situation?
How can a model help me represent and
	• Students in 8th-grade Algebra may struggle to complete the square when approaching it from a purely symbolic, algorithmic approach. Using area models, including **AlgeBlocks and algebra tiles**, is one way to give students another approach to this process.
	• Skills Previously Taught:
	  ○ Simplifying square roots when the radicand is a perfect square
	  ○ Solving quadratics by taking the square root when the radicand is a perfect square

investigate relationships between varying quantities? Why is it important to interpret standard deviation with a data set in real-world situations?		
Standards for Mathematical Practices	Kentucky Interdisciplinary Literacy Practices (KILP)	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. MP.4. Model with mathematics. MP.5. Use appropriate tools strategically. MP.6. Attend to precision. MP.7. Look for and make use of structure. MP.8. Look for and express regularity in repeated reasoning. ***enVision Teacher Guide: page 320D for specific Topic 8 Math Practice suggestions***	1. Recognize that text is anything that communicates a message. 2. Employ, develop, and refine schemas to understand and create text. 3. View literacy experiences as transactional, interdisciplinary, and transformational. 4. Utilize receptive and expressive language arts to better understand self, others, and the world. 5. Apply strategic practices, with scaffolding and then independently, to approach new literacy tasks. 6. Collaborate with others to create new meaning. 7. Utilize digital resources to learn and share with others. 8. Engage in specialized, discipline-specific literacy practices. 9. Apply high-level cognitive processes to think deeply and critically about text. 10. Develop a literacy identity that promotes lifelong learning. *Incorporating texts into math instruction fosters interdisciplinary learning for a more engaging educational experience.*	
Essential Standards	Sample Learning Intentions & Success Criteria	HQIR/Resource Considerations
Cluster: Analyze functions using different representations.		
KY.HS.F.4 Graph functions expressed symbolically and show key features of the graph, with and without using technology (computer, graphing calculator). ★ **MP.4, MP.5** a. Graph linear and quadratic functions and show intercepts, maxima, and minima. ☐ Conceptual ☐ Procedural ❑ Application	I am learning to graph linear and quadratic functions expressed symbolically and demonstrate key graph features, including intercepts, maxima, and minima. • I can graph linear functions and identify intercepts. • I can graph quadratic functions and identify intercepts. • I can use technology to graph functions and check accuracy.	• Lesson 8-1: Key Features of Graphs of a Quadratic Function • Lesson 8-2: Quadratic Functions in Vertex Form • Lesson 8-3: Quadratic Functions in Standard Form

Considerations: Within a family, the functions often have commonalities in the shapes of their graphs and in the kinds of features essential for identifying and describing functions. This standard indicates the function families in students' repertoires, detailing which features are required for several key families. Students demonstrate fluency with linear, quadratic, and exponential functions, including the ability to graph without using technology. In other function families, students graph simple cases without technology and more complex ones with technology. *Supporting Standard: KY.HS.A.13, KY.HS.F.1e*	• I can locate and label maxima and minima on function graphs. • I can explain the significance of intercepts, maxima, and minima. • I can analyze linear and quadratic function graphs effectively.	
KY.HS.F.5 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. **MP.3, MP.6, KILP.1, KILP.2, KILP.6** a. Identify the graph's zeros, extreme values, and symmetry within the context of a quadratic function. ☐ Conceptual ☐ Procedural ❑ Application Considerations: a. Quadratic functions provide a rich playground for developing this ability, since the three principal forms for a quadratic expression (expanded, factored, and completed square) each give insight into different aspects of the function. Supporting Standard: KY.HS.F.1, KY.HS.F.2,	I am learning to write a function defined by an expression in different but equivalent forms (expanded, factored, completed square). • I can explain different properties of a function. • Given a quadratic function, I can identify zeros, extreme values, and symmetry. • I can analyze the graphs of quadratic functions effectively.	• Lesson 8-4: Modeling With Quadratic Functions • Formative Assessment Lesson **(FAL):** Representing Quadratic Functions Graphically

KY.HS.F.3, KY.HS.F.6		

Attending to the Standards for Mathematical Practice

Students use graphs to answer questions and/or make predictions for a given context (MP. 4). Students use technology to explore concepts of function families and show key features of the graph (MP. 5).
Students compare and contrast different characteristics of functions to connect the graph's features with different real-world contexts (MP.6).
Students manipulate expressions, carefully preserving equivalence and describing why a particular expression provides insights into the function (MP.3, MP.6).

Essential Standards	Sample Learning Intentions & Success Criteria	HQIR/Resource Considerations
Cluster: Construct and compare linear, quadratic and exponential models and solve problems.		
KY.HS.F.13 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. **MP.7, MP.8** Considerations: Students compare functions by focusing on how the output values change over intervals of equal length. Even though a linear function may initially increase faster than an exponential function, an increasing exponential function always eventually exceeds an increasing linear function. *Supporting Standards: KY.HS.F.1b, KY.HS.F.6*	I am learning that a function increasing exponentially eventually exceeds a function increasing linearly or quadratically. • I can compare functions. • I can analyze graphs of linear functions effectively. • I can analyze graphs of exponential functions effectively. • I can analyze graphs of quadratic functions effectively.	• Lesson 8-5: Comparing Linear, Exponential, and Quadratic Models • MILC - Foldable for 8-5 • **3 ACT Task:** The Long Shot (basketball)

Attending to the Standards for Mathematical Practice

Students reason about the particular characteristics of linear, quadratic, and exponential functions, for example, comparing the rates of change across different types of functions (MP.3).
Students recognize families of functions more generally to discern that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically (MP.8).

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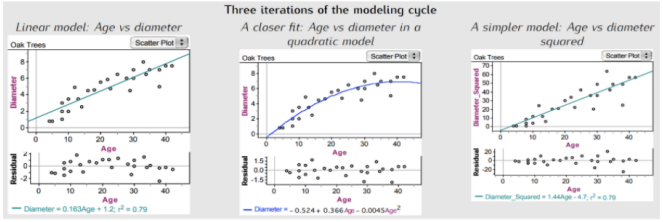
Essential Standards	Sample Learning Intentions & Success Criteria	HQIR/Resource Considerations
Cluster: Summarize, represent and interpret data on two categorical and quantitative variables.		
KY.HS.SP.6 Represent data on two quantitative variables on a scatter plot and describe how the explanatory and response variables are related. a. Calculate an appropriate mathematical model, or use a given mathematical model, to solve problems in context. b. Informally assess the fit of a model (through calculating correlation for linear data, plotting, calculating, and/or analyzing residuals). **MP.3, MP.4, MP.5** Considerations: Emphasize linear, quadratic, and exponential models as illustrated below.  *Supporting Standards: KY.HS.F.1b, KY.HS.F.6*	I am learning to represent data on a scatter plot and describe how quantities relate. • I can use a model to solve a quadratic function. • I can analyze graphs of a function by calculating the correlation. • I can determine the fit of a model by calculating and analyzing residuals.	• Lesson 8-4: Modeling With Quadratic Functions • Lesson 8-5: Comparing Linear, Exponential, and Quadratic Models

Attending to the Standards for Mathematical Practice

Students discover structures or patterns in data to answer statistical questions using tables or appropriate representations (MP.7). Students informally determine whether a selected model is appropriate for a set of data and use technology when appropriate to do so (MP 5). Students draw and discuss conclusions about a statistical question (MP.3) using appropriate mathematical models.

Supporting Standards

KY.HS.N.4 Use units in context as a way to understand problems and to guide the solution of multi-step problems; ★ MP.5, MP.6

a. Choose and interpret units consistently in formulas;
b. Choose and interpret the scale and the origin in graphs and data displays.

KY.HS.N.5 Define appropriate units in context for the purpose of descriptive modeling. ★ MP.1, MP.6

KY.HS.N.6 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ MP.2, MP.6

KY.HS.A.13 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. MP.2, MP.5

KY.HS.F.1 Understand properties and key features of functions and the different ways functions can be represented.MP.2, MP.4
b Using appropriate function notation, evaluate functions for inputs in their domains and interpret statements that use function notation in terms of a context.
c. 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.
d. Relate the domain of a function to its graph, where applicable, to the quantitative relationship it describes. (algebraically, graphically, numerically in tables, or by verbal descriptions).
e. Compare properties of two functions, each represented differently (algebraically, graphically, numerically in tables, or by verbal descriptions).

KY.HS.F.3 Understand average rate of change of a function over an interval. a. Calculate and interpret a function's average rate of change (presented symbolically or as a table) over a specified interval. b. Estimate the rate of change from a graph. ★ MP.2, MP.4

KY.HS.F.6 Write a function that describes a relationship between two quantities. ★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. c. (+) Compose functions. MP.4, MP.7

Vocabulary

axis of symmetry, quadratic function, vertex, vertex form, parabola, standard form of a quadratic function, Zero of a function, Zero product property, Perfect square trinomial, completing the square, Radicand, Discriminant, Quadratic Formula.

*Disclaimer: Success Criteria is the evidence students must produce to demonstrate learning. This example is not comprehensive.
** Mathematical Practices (A.MP. 1- 8) should be evidenced at some point throughout each unit, depending on the explored tasks. It is important to note that MP. 2 should support learning in every lesson.
*** Modeling Standards: Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards

indicated by a star symbol (★). The star symbol sometimes appears on the heading for a group of standards; in that case, it should be understood to apply to *all* standards in that group.