High School Algebra 1 Topic 9 - FCPS 2025-2026

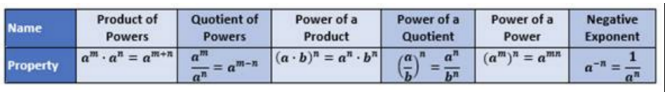
Topic 9: Solving Quadratic Equations	Estimate Time Frame: 10 blocks
Essential Standards: KY.HS.A.3b, KY.HS.A.7, KY.HS.A.19a, KY.HS.A.24 Supporting Standards: KY.HS.A.2, KY.HS.F.4, KY.HS.F.5, KY.HS.F.13, KY.HS.N.4, KY.HS.N.5. KY.HS.N.6 Assessment Resource: enVision Topic 9 and Formative Assessment Lesson **(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 9 Quadratic Equations** ***enVision Teacher Guide: page 362A to 362I for specific Topic 4 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 do you use quadratic equations to model situations? How many solutions can a quadratic equation have, and how does the discriminant play a role in determining them? How can a model help me represent and investigate relationships between varying	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

quantities?		
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 362D for specific Topic 9 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: Write expressions in equivalent forms to solve problems.		
KY.HS.A.3 Choose and produce an equivalent form of an expression to reveal and explain the properties of the quantity represented by the expression. ★ **MP.5, MP.7, KILP.1, KILP.2, KILP.6** b. Factor a quadratic expression to reveal the zeros of the function it defines. *Supporting Standard: KY.HS.A.2, KY.HS.A.7, KY.HS.F.1* ☐ *Conceptual* ☐ *Procedural* ❑ *Application*	I am learning to factor a quadratic equation to reveal the zeros of the function it defines • I can factor a quadratic expression to produce an equivalent form of the original expression. • I can explain the connection between the factored form of a quadratic expression and the zeros of the function it defines. • I can explain the connection between the factored form of a quadratic expression and the zeros of the function it defines. • I can choose and produce an equivalent form of a quadratic expression to reveal and explain the properties of the quantity represented by the	• Lesson 9-2: Solving Quadratic Equations by Factoring • Formative Assessment Lesson **(FAL):** Representing Quadratic Functions Graphically

Considerations:  	original expression.	

Attending to the Standards for Mathematical Practice
Students explain that they need to rewrite quadratic expressions into equivalent factored forms to find the zeros of the function it defines (MP.7). Using technology, students change the exponents to reinforce their understanding of exponent properties (MP.5).

Essential Standards	Sample Learning Intentions & Success Criteria	HQIR/Resource Considerations
Cluster: Understand the relationship between zeros and factors of polynomials.		
KY.HS.A.7 Identify roots of polynomials when suitable factorizations are available. Know these roots become the zeros (x-intercepts) for the corresponding polynomial function. **MP.2, MP.5, MP.7** Considerations: Methods of finding roots could include, but are not limited to: • factoring • synthetic division • long division • an analysis of the graph (created by hand or through use of technology). *Supporting Standard: KY.HS.*F.5	We are learning to find the solutions (roots) of factorable polynomial equations and how they appear on the graph as x-intercepts (zeros). • I can factor and find roots from factored polynomials. • I can explain why roots are solutions and zeros are x-intercepts. • I can sketch, graph, and connect the solutions to what the graph looks like.	• Lesson 9-2: Solving Quadratic Equations by Factoring • ❗ first and second degree polynomials only

Attending to the Standards for Mathematical Practice
Students reason quantitatively as they select a method for finding roots and justify their selection and application (MP. 2). Students use technology to identify the x-intercepts from a polynomial graph and explain that the x-intercepts are zeros and therefore roots of the polynomials (MP.5).

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Essential Standards	Sample Learning Intentions & Success Criteria	HQIR/Resource Considerations
Cluster: Solve equations and inequalities in one variable.		
KY.HS.A.19 Solve quadratic equations in one variable. a. Solve quadratic equations by taking square roots, 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.~~ b. (+) Use the method of completing the square to transform any quadratic equation in x into an equation of the form (x – p) 2 = q with the same solutions. Derive the quadratic formula from this form. c. (+) Solve quadratic equations by completing the square. Considerations: Students observe that methods for solving quadratic equations are interrelated, and certain situations may more appropriately call upon one method than the other. *Supporting Standard: KY.HS.*F.5, *KY.HS.A.19*	I am learning to solve quadratic equations in one variable. • I can solve quadratic equations by inspection (e.g., for x^2= 49), taking square roots, completing the square, the quadratic formula, and factoring. • I can determine appropriate strategies (see first knowledge target listed) to solve problems involving quadratic equations, as applicable, to the initial form of the equation. • I can recognize when the quadratic formula gives complex solutions.	• Lesson 9-1: Solving Quadratic Equations Using Graphs and Tables (*Can omit 9-1 if taught in 8-5) • Lesson 9-2: Solving Quadratic Equations by Factoring • NOTE - Topic 6 Lesson 2 involves Radical practice. (*Option: Review 6-2 **before** lesson 9-3) • Lesson 9-3: Solving Quadratic Equations Using Square Roots ❗ exclude complex solutions • ❗ ONLY Middle School -Lesson 9-4: Completing the square - KY.HS.A.19 b(+), c.(+) • Lesson 9-5: The Quadratic Formula and the Discriminant ❗ exclude complex solutions • **3-Act Task:** Unwrapping Change

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Attending to the Standards for Mathematical Practice		
Students reason about which symbolic representation is needed to focus on a particular feature and then efficiently rewrite the literal equations to feature that characteristic (MP.2). Students analyze the structure of a quadratic equation to determine an efficient strategy to find a solution (MP.7).		
Essential Standards	**Sample Learning Intentions & Success Criteria**	**HQIR/Resource Considerations**
Cluster: Represent and solve equations and inequalities graphically.		
KY.HS.A.24 Justify that the solutions of the equations f(x) = g(x) are the x-coordinates of the points where the graphs of y = f(x) and y = g(x) intersect. Find the approximate solutions graphically, using technology or tables. ★ **MP.3, MP.5** Considerations: Students justify solutions for equations that include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential and logarithmic functions. ★	We are learning how to justify the solutions to the equations. • I can use graphs and graphing technology to find or approximate solutions to equations. • I can determine the solutions to equations using graphs and graphing technology. • I can justify that the solutions of the equations f(x) = g(x) are the x-coordinates of the points where the graphs of y = f(x) and y = g(x) intersect.	• ❗ Exclude Lesson 9-6: Solving Systems of Linear and Quadratic Equations - KY.HS.A.21 is NOT an algebra 1 standard
Attending to the Standards for Mathematical Practice		
Students explain that the solutions of a system of equations or inequalities are all the points represented on the graph and therefore, where two functions overlap illustrates solutions to two functions (MP.1, MP.3). Students use technology to determine solutions to a system of linear inequalities (e.g., using DESMOS or graphing calculators) (MP.5).		
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 descriptive modeling. ★ MP.1, MP.6		

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

KY.HS.A.2 Use the structure of an expression to identify ways to rewrite it and consistently look for opportunities to rewrite expressions in equivalent forms. MP.7, MP.8

KY.HS.F.4 Graph functions expressed symbolically and show key features of the graph, with and without using technology (computer, graphing calculator). ★
a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
MP.4, MP.5

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.
a. Identify the graph's zeros, extreme values, and symmetry within the context of a quadratic function.
b. Use the properties of exponents to interpret expressions for exponential functions and classify the exponential function as representing growth or decay. MP.3, MP.6

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

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 with 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.