High School Algebra 2 FCPS 2025-2026 Math Unit Framework Topic 5

Algebra 2 Topic 5: Rational Exponents and Radical Functions	Estimate Time Frame: 11 Block Days
Essential Standards: A.2, A.17, F.1, F.8, F.9 Assessment Resource: enVision Topic 5 and Formative Assessment Lesson **(FAL):** Evaluating Statements About Radicals	

FCPS Supporting Links	Additional Supporting Links
Pacing Guide enVision Algebra 2 Standards Crosswalk Resource FCPS P-12 Mathematics Guidance Document	Kentucky Academic Standards KSA Blueprint Achieve the Core Operations and Algebraic Thinking Progressions Target of the Standards - conceptual, procedural & application Three-Reads Routine Notice and Wonder Routine MILC Resources Topic 5 Rational Exponents and Radical Functions ***enVision Algebra 2 Teacher Guide: page 224A to 224D for specific Topic 5 Focus-Coherence-Rigor***

Big Ideas
Students will extend their previous understanding of radical functions. Students will use properties of rational exponents and radicals. Students will learn methods to graph radical functions, solve radical equations, and combine functions. Students will identify inverses of functions and learn to write the equations of inverse functions.

Essential Questions	Common Preconceptions/Misconceptions
•How are rational exponents and radical equations used to solve real-world problems? • What happens to the output when the input value gets very large in magnitude?	• Students often solve rational and radical equations without checking that their solutions may be erroneous. One method that helps students understand extraneous roots is to look at the graph of the original function associated with the equation. Students need to check their

	work and determine whether a possible solution works. ● When writing an expression in radical form, students may confuse which number in the fraction represents the power and which number represents the index of the radical. Have students rewrite the fraction as a multiplication sentence. Ask them which value represents a power and which value represents a root. ● Students will need to analyze solution sets of equations to determine processes (for example, squaring both sides of an equation) that might lead to a solution set that differs from the original. ● When rationalizing the denominator, students may multiply only the denominator. To avoid this error, have students write the intermediate step. ● Students may struggle to draw a graph accurately after it has been translated. Have them sketch the parent function from the coordinate point (h,k) and then apply the stretch factor. ● Students will need examples to show that association does not necessarily provide evidence for cause and effect. Students often have difficulty separating the ideas of association and causality. ● Students work with set notation to represent multiple contexts. Allowing time for students to grapple with the connections between these ideas can help them develop fluency with notation and connect notation to various problem situations. ● A function is often described and understood in terms of the output behavior or over what input values it is increasing, decreasing, or constant. Important questions include, “For what input values is the output value positive, negative, or 0? What happens to the output when the input value gets huge in magnitude?”

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 224D for specific 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: Interpret the structure of expressions.		
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, KILP.2, KILP.6** *Supporting Standard(s): KY.HS.A.3, KY.HS.A.7* ☐ Conceptual ☐ Procedural ❑ Application	We are learning to rewrite expressions in equivalent forms. • I can identify ways to factor expressions based on the structure of the expression. • I can apply algebraic properties and rules to rewrite expressions, demonstrating proficiency in simplifying and manipulating expressions to achieve equivalent forms.	• Topic 5-1 • Topic 5-2
Cluster: Understand solving equations as a process of reasoning and explain the reasoning.		

KY.HS.A.17 Solve and justify equations in one variable. Justify the solutions and give examples showing how extraneous solutions may arise. **a.** Solve rational equations written as proportions in one variable. **b.** Solve radical equations in one variable. **MP.3, MP.5, MP.7, KILP.1, KILP.2, KILP.6** *Supporting Standard(s): KY.HS.A.15* ☐ Conceptual ☐ Procedural ❑ Application	We are learning to solve radical equations with one variable. • I can square both sides of the equation to eliminate the radical and solve for the variable, • I can justify solutions and recognize when extraneous solutions may arise. • I can substitute solutions into the original equation to verify that they satisfy it.	• Topic 5-4
Cluster: Understand the concept of a function and use function notation.		
KY.HS.F.1 Understand properties and key features of functions and the different ways functions can be represented. **c.** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the amounts and sketch graphs showing key features given a verbal description of the relationship. **MP.2, MP.4, MP.7, KILP.1, KILP.2, KILP.7** *Supporting Standard(s): KY.HS.A.2, KY.HS.N.1, & KY.HS.N.2* ☐ Conceptual ❑ Procedural ❑ Application	We are learning to graph and interpret key features of graphs of radical functions. • I can identify the domain and range of a radical function. • I can sketch the graphs of a radical function. We are learning to interpret key features of graphs and tables of functions that model relationships between two quantities and sketch the graph. • I can sketch graphs that accurately represent the key features described verbally, including shape, direction, and position of essential points. • I can interpret key features of graphs and tables given a verbal description.	• Topic 5-3 *Change the problems for Topic 5-3 Example 3 to simplify Ex: 9x-45+3 Or 4x+16-2
Cluster: Build new functions from existing functions.		

KY.HS.F.8 Understand the effects of transformations on the graph of a function. a. 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. ☐ Conceptual ☐ Procedural ❑ Application b. Experiment with cases and explain the effects on the graph using technology. **MP.3, MP.5, KILP.5, KILP.8, KILP.9** *Supporting Standard(s): KY.HS.A.1* ☐ Conceptual ☐ Procedural ☐ Application	We are learning about the effects of transformations on the graph of a function. • I can understand transformations such as translations, reflections, stretches, and compressions. • I can understand how translations affect the graph horizontally and vertically, shifting the function left, right, up, or down. • I can comprehend how reflections across the x-axis and y-axis change the orientation of the graph. • I can 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. • I can use technology to support my understanding and explain the effects of a transformation.	• Topic 5-3 Mastery of Part a of this standard includes recognizing even and odd functions from their graphs and algebraic expressions. Desmos: Graphs of Radical Functions Formative Assessment Lesson **(FAL):** Evaluating Statements About Radicals
Cluster: Build new functions from existing functions.		
KY.HS.F.9 Find inverse functions. a. Given the equation of an invertible function, find the inverse. b. (+) Verify by composition that one function is the inverse of another. c. (+) Read values of an inverse function from a graph or a table, given that the function has an inverse. d. (+) Produce an invertible function from a non-invertible function by restricting the domain.	We are learning to find the inverse functions when provided with the equation of an invertible function. • I can identify an invertible function and understand its unique inverse function. • I can apply algebra to find the inverse of a given invertible function, such as solving for the variable in terms of the output or interchanging the roles of input and output variables. • I can verify the correctness of the inverse function by composing it with the original function and observing that the result is	• Topic 5-6 a. Students can complete the process of finding the inverse when given an equation for an invertible function. b-d. Students need a formal sense of inverse functions. Students understand that a function and its inverse

MP.2, MP.6 *Supporting Standard(s):* □ Conceptual □ Procedural □ Application	the identity function. • I can graphically represent the inverse function by reflecting the original function's graph across the line y = x. • I can apply the inverse function to solve equations and real-world problems involving the original function.	describe the same relationship, but in different ways. MILC: Inverse Relation Tattoos

Attending to the Standards for Mathematical Practice

Students simplify problems and describe their processes using appropriate vocabulary, such as terms, coefficients, and degrees (MP.6).
Students describe the meaning of parts of an expression, such as a particular term or coefficient, and explain the expression's meaning (MP.7).
Students fluently manipulate expressions into equivalent forms, based on patterns they have noticed across problems (MP.8).
Students use graphical representations to create plausible arguments about the effects of transformations instead of relying on computational rules (MP.3).

Supporting Standards

KY.HS.N.1 Extend the properties of integer exponents to rational exponents, allowing for the expression of radicals in terms of rational exponents. **MP.2, MP.7 Topic 5-1**

KY.HS.N.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents. **MP.7 Topic 5-1**

KY.HS.F.3.b. Estimate the rate of change from a graph**. ★ MP.2, MP.4 Topic 5-3**

KY.HS.A.1 Interpret expressions representing a quantity in terms of its context. ★ **MP.2, MP.6 Topic 5-1**
a. Interpret parts of an expression, such as terms, factors, and coefficients.
b. Interpret complicated expressions, given a context, by viewing one or more of their parts as a single entity. **Topic 5-5**

Vocabulary

Rational Exponents/Radical Functions Vocabulary:
complex conjugate

exponent
Index
nth root
radical symbol
radicand
radical expression
rational exponent
domain
composite function
composition of functions
dependent variable
independent variable
relation
inverse function
inverse relation

*****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.