WAKE COUNTY PUBLIC SCHOOL SYSTEM

High School Programs

Math 2 UNIT 3 OVERVIEW: Rational & Radical Functions Parent Guide

Unit Outcomes At the end of this unit, your student should be able to:	**Key Vocabulary** Terms to deepen the student's understanding
✓ Identify the parts of a square root expression ✓ Identify the parts of an inverse variation expression ✓ Interpret a square root expression made up of multiple parts ✓ Create equations and inequalities in one variable that represent square root and inverse variation relationships between quantities and use them to solve problems. ✓ Create and graph in two variables to represent square root and inverse variation relationships between quantities. ✓ Create systems of equations including the square root and inverse variation functions to model situations in context. ✓ Use mathematical reasoning to justify a chosen solution method for square root and inverse variation. ✓ Use mathematical reasoning to justify each step of the solving process for square root and inverse variation. ✓ Identify the point of intersection as the solution to a system of equations. ✓ Approximate solutions using graphing technology or successive approximations with a table of values. ✓ Interpret key features of a square root and inverse variation function in context, including positive/negative slope, increasing/decreasing, intercepts, and domain/range when given the function as a table, graph, and/or verbal description. ✓ Generate different representations of square root function and inverse variation functions to show key features. ✓ Compare key features of two functions each with different representation. ✓ Write a function that describes an inverse relationship between two quantities given a graph, a description or ordered pairs. ✓ Rewrite expressions with radicals as expressions with rational exponents and vice versa.	✓ Rational expression ✓ radical ✓ radicand ✓ base ✓ index ✓ extraneous roots ✓ parent graph ✓ Asymptote ✓ Direct variation ✓ inverse variation ✓ joint variation ✓ constant of variation ✓ Transformations ✓ Translation ✓ Reflection ✓ Dilation ✓ system

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✓ Apply the properties of exponents to expressions with rational exponents. ✓ Determine if a solution is an extraneous solution to an inverse variation or square root equation. Understand… ● Each individual part of the square root expression has an effect on the graph of the function. ● Each individual part of the inverse variation expression has an effect on the graph of the function. ● The context which would require a square root or inverse variation to represent it. ● The relationship between the equation and transformations for square root and inverse variation. ● The solution to a system of equations is the point of intersection of the two functions. ● What the solution of a square root or inverse equation represents in the context of the situation. ● There are multiple ways to solve equations and that I must be able to justify my method using appropriate mathematical reasoning. ● The relationship between the solution to a system of two equations and the graphical representation of that solution. ● The different components of a square root function and an inverse variation function and the effect of constants and coefficients in different parts of the function on domain/range, increase/decrease, max/min, symmetry and end behavior. ● The relationship between the symbolic, graphical, numerical, and verbal description of two functions. ● The context of the situation in which an inverse variation function describes the relationship between two variables. ● The position of a constant within an inverse variation and square root function has an effect on its graphical representation. ● The effects of the graphical and tabular representations of a square root and inverse variation function f with k*f(x), f(x) + k, f(x + k) for specific values of k (both positive and negative). ● Expressions with rational exponents can be rewritten as radical expressions. ● How extraneous solutions are produced.	

Key Standards Addressed	**Where This Unit Fits**

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Connections to Common Core/NC Essential Standards	Connections to prior and future learning
NC.M2.N-RN.1 Explain how expressions with rational expressions can be rewritten as radical expressions. **NC.M2.N-RN.2** Rewrite expressions with radicals and rational exponents into equivalent expressions using the properties of exponents. **NC.M2.A-SSE.1** Interpret expressions that represent a quantity in terms of its context. a. Identify and interpret parts of a quadratic, **square root**, **inverse variation**, or right triangle trigonometric expression, including terms, factors, coefficients, radicands, and exponents. b. Interpret quadratic and square root expressions made of multiple parts as a combination of single entities to give meaning in terms of a context. **NC.M2.A-CED.1** Create equations and inequalities in one variable that represent quadratic, **square root**, **inverse variation**, and right triangle trigonometric relationships and use them to solve problems. **NC.M2.A-CED.2** Create and graph equations in two variables to represent quadratic, **square root** and **inverse variation** relationships between quantities. **NC.M2.A-CED.3** Create systems of linear, quadratic, square root, and inverse variation equations to model situations in context. **NC.M2.A-REI.1** Justify a chosen solution method and each step of the solving process for quadratic, **square root** and **inverse variation** equations using mathematical reasoning. **NC.M2.A-REI.2** Solve and interpret one variable inverse variation and square root equations arising from a context, and explain how extraneous solutions may be produced. **NC.M2.A.REI.11** Extend the understanding that the x-coordinate of the points where the	**Coming into this unit, students should have a strong foundation in:** **NOTE***: In 8th grade math students will have worked with square roots as well as direct variation. I unit 2 of Math 2 they would have also worked with simplifying square roots while solving quadratics with the quadratic formula.* ✓ Using systems to solve an equation of any type. ✓ **I**nterpret key features of graphs, tables, and verbal descriptions in context to describe linear and quadratic functions that arise in applications relating two quantities, including: domain and range, rate of change, symmetries, and end behavior. ✓ Analyze quadratic functions by generating different representations, by hand in simple cases and using technology for more complicated cases, to show key features, including: domain and range; intercepts; intervals where the function is increasing, decreasing, positive, or negative; rate of change; maximums and minimums; symmetries; and end behavior. **This unit builds to the following future skills and concepts:** ✓ Continue work of rational functions with polynomials in M3 ✓ Continue the work of radicals of other indexes in M3 ✓ Continue the work on inverse functions ✓ Continue to build on graphing all functions with key features (including end behavior, increasing, decreasing, intercepts,

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graphs of two square root and/or inverse variation equations y = (x) and y = (x) intersect are the solutions of the equation (x) = (x) and approximate solutions using graphing technology or successive approximations with a table of values. **NC.M2.F-IF.4** Interpret key features of graphs, tables, and verbal descriptions in context to describe functions that arise in applications relating two quantities, including: domain and range, rate of change, symmetries, and end behavior. **NC.M2.F-IF.7** Analyze quadratic, **square root**, and **inverse variation** functions by generating different representations, by hand in simple cases and using technology for more complicated cases, to show key features, including: domain and range; intercepts; intervals where the function is increasing, decreasing, positive, or negative; rate of change; maximums and minimums; symmetries; and end behavior. **NC.M2.F-IF.9** Compare key features of two functions (linear, quadratic, square root, or inverse variation functions) each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions). **NC.M2.F-BF.1** Write a function that describes a relationship between two quantities by building quadratic functions with real solution(s) and **inverse variation** functions given a graph, a description of a relationship, or ordered pairs (include reading these from a table). **NC.M2.F-BF.3** Understand the effects of the graphical and tabular representations of a linear, quadratic, **square root**, and **inverse variation** function f with $k \cdot f(x)$, $f(x) + k$, $f(x + k)$ for specific values of k (both positive and negative).	max, min, transformations)

Additional Resources
Materials to support understanding and enrichment

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- Working with Direct, Joint, Inverse, and Combination Variations
- Direct Variation
- Inverse Variation
- Variation Equations
- Simplifying Radical Expressions
- Fractional Exponents
- Transforming Functions
- Graphing Radical Functions
- Graphing Radical Functions (including domain and range)
- Radicals Vocabulary Quiz
- Solve Rational Equations
- Finding the Zeros to Radical Functions
- Solving Equations with Radicals inside Radicals

*** Please note**, the unit guides are a work in progress. If you have feedback or suggestions on improvement, please feel free to contact sdupree@wcpss.net.