Unit Four Information

Curriculum Map: Rational and Radical Relationships
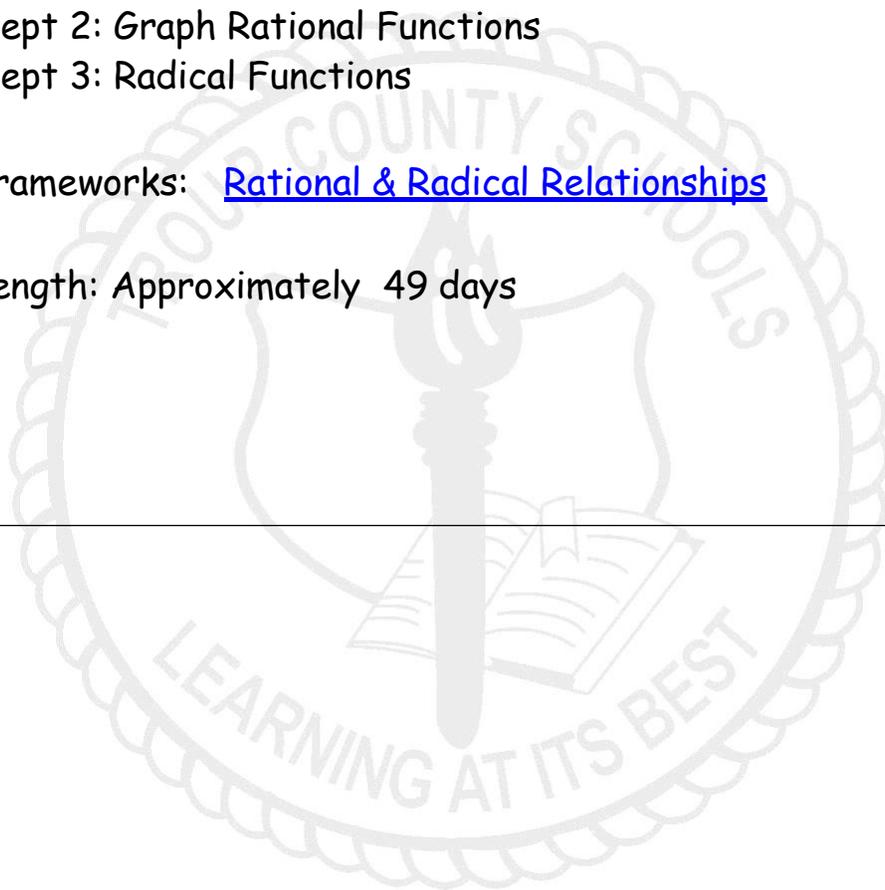
Content Descriptors:
   Concept 1: Write, simplify, and solve Rational Functions
   Concept 2: Graph Rational Functions
   Concept 3: Radical Functions

GSE Frameworks: [Rational & Radical Relationships](#)

Unit Length: Approximately 49 days

TCSS – GSE Advanced Algebra – Unit 4
Curriculum Map

Unit Rational:
Rational numbers extend the arithmetic of integers by allowing division by all numbers except 0. Similarly, rational expressions extend the arithmetic of polynomials by allowing division by all polynomials except the zero polynomial. A central theme of this unit is that the arithmetic of rational expressions is governed by the same rules as the arithmetic of rational numbers. Similarly, radical expressions follow the rules governed by irrational numbers.

Prerequisites: As identified by the GSE Frameworks	Length of Unit
✓ Computation with fractions ✓ Factoring polynomials ✓ Solving linear and quadratic equations	**49 Days**

Concept 1	Concept 2	Concept 3
Write, simplify, and solve rational functions	Graph rational functions	Radical Functions
GSE Standards	GSE Standards	GSE Standards
MGSE9-12.A.APR.7 Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions. **MGSE9-12A.CED.1** Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear, quadratic, simple rational, and exponential functions ~~(integer inputs only)~~.	**MGSE9-12.A.CED.2** Create linear, quadratic, and exponential equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. (The phrase "in two or more variables" refers to formulas like the compound interest formula, in which $A = P\left(1 + \dfrac{r}{n}\right)^{nt}$ has multiple variables.) (Limit to radical and rational functions.) **MGSE9-12.F.IF.4** Using tables, graphs, and verbal descriptions, interpret the key characteristics of a function which models the relationship between two quantities. Sketch a graph showing key features including: intercepts; interval where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; ~~and periodicity~~. (Limit to radical and rational functions.)	**MGSE9-12.A.REI.2** Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise **MGSE9-12.F.IF.7** Graph functions expressed algebraically and show key features of the graph both by hand and by using technology. (Limit to radical and rational functions.) **MGSE9-12.F.IF.7b** Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

	MGSE9-12.F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function. (Limit to radical and rational functions.) **MGSE9-12.F.IF.7** Graph functions expressed algebraically and show key features of the graph both by hand and by using technology. (Limit to radical and rational functions.) **MGSE9-12.F.IF.7d** Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.	
Lesson Essential Question	*Lesson Essential Question*	*Lesson Essential Question*
How do I rewrite rational expressions using inspection and division? How do you add, subtract, multiply and divide rational functions? How do you solve rational equations and inequalities in one variable? Why are all solutions not necessarily the solution to an equation? How can you identify these extra solutions? Why is it important to set a rational inequality to 0 before solving?	How do you graph rational functions by hand and using technology? How do you identify characteristics of rational functions? How do I solve the equation f(x)= g(x) graphically? How are horizontal asymptotes, slant asymptotes, and vertical asymptotes alike and different?	How do I solve radical equations? How do you graph radical functions by hand and using technology? How do you identify characteristics of radical functions? How can you compare the properties of functions that are represented in different ways (algebraically, graphically, in tables or verbally)?
Vocabulary	*Vocabulary*	*Vocabulary*
Polynomial Radical Function Degree Rational Function Coefficient Reciprocal Equations Variable Expression Inequality Extraneous Solutions	Zeros Asymptote End behavior Increasing Decreasing	Maximum Minimum Domain Range

TCSS – GSE Algebra II – Unit 4

Resources – Concept 1	Resources – Concept 2	Resources – Concept 3
❖ Simplifying Rational Notes (power point) ❖ Support guided notes/review with practice ❖ Simplifying Rational Expressions graphic organizer/activator/summarizer ❖ Simplifying Rational Exponents worksheet ❖ Adding and Subtracting graphic organizer/activator/summarizer blank ❖ Multiply and Divide Rational Expressions activator/summarizer blank ❖ Multiplying rational expressions worksheet ❖ Solving Rational equations & inequalities folder activity ❖ Harvesting Fields application problem (A.CED.1) Teacher Student	❖ Parent Functions ❖ Graphing Rational Functions/Identifying Characteristics ❖ Rational functions worksheet 1 ❖ Graphing Rational Functions with step by step notes ❖ Graphing Rational Functions worksheet 2 ❖ Graphing Rationals Extra Practice ❖ Graphing Rational Functions ❖ Magnum P.I. Application Task ❖ Matt Murdock Application Task	❖ Radical Practice ❖ Unit 4 Review Practice Problems ❖ Linear Piecewise Function notes/practice ❖ Graphing and finding characteristics of Piecewise Functions ❖ Absolute Value Piecewise Functions ❖ Quadratic Piecewise Functions ❖ Parking Task (step function)
Concept 1 Differentiated Activities	Concept 2 Differentiated Activities	Concept 3 Differentiated Activities
❖ Extra Solving Rational expressions notes, examples and practice project	❖ Canoe trip application problem Variation 1 Variation 2	❖ Radical Task Cards (BYOD)

At the end of Unit 4 student's should be able to say "I can…"

- ✓ can rewrite rational expressions in different forms.

- ✓ can add, subtract, multiply and divide rational expressions.

- ✓ can solve rational and radical equations.

- ✓ can use the structure of polynomials to identify ways to rewrite them and write polynomials in equivalent forms to solve problems

- ✓ can solve rational inequalities.

- ✓ can graph rational and radical functions and identify key characteristics.

- ✓ can interpret solutions to graphs and equations given the context of the problem.