Honors Algebra 2 UNIT PLANNER

Unit title	Unit 4 Rational and Radical Relationships	Unit duration	8 weeks

Essential Questions (OR GUIDING QUESTIONS?)

- How are rational exponents and roots of expressions similar?
- How can we extend arithmetic properties and processes to algebraic expressions and how can we use these properties and processes to solve problems?
- How do the polynomial pieces of a rational function affect the characteristics of the function itself?
- How are horizontal asymptotes, slant asymptotes, and vertical asymptotes alike and different?
- 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 zero before solving?

Assessments

Rational Expressions TOTD - Common Formative
Rational Equations Quiz - Common Formative
Graphing Rational & Radical Functions TOTD - Common Formative
Unit 4 Test - Common Summative

Content Standards

Extend the properties of exponents to rational exponents.

MGSE9-12.N.RN.1 Explain how the meaning of rational exponents follows from extending the properties of integer exponents to rational numbers, allowing for a notation for radicals in terms of rational exponents. *For example, we define* $5^{(1/3)}$ *to be the cube root of 5 because we want* $[5^{(1/3)}]^3 = 5^{[(1/3) \times 3]}$ *to hold, so* $[5^{(1/3)}]^3$ *must equal 5.*

MGSE9-12.N.RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.

Rewrite rational expressions

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.

Create equations that describe numbers or relationships

MGSE9-12.A.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. *(Limit to rational and radical functions. The phrase "in two or more variables" refers to formulas like the compound interest formula, in which* $A = P(1 + r/n)^{nt}$ *has multiple variables.)*

Understand solving equations as a process of reasoning and explain the reasoning

MGSE9-12.A.REI.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

Interpret functions that arise in applications in terms of the context

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.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.)*

Analyze functions using different representations

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.7d Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.

Learning Activities and Experiences

Topic	Resources	Content Covered	Standards
	Operations with Rational Expressions Assessments - Unit Test on Operations		
Operations on Rational Expressions	**4-3 Multiplying and Dividing Rational Expressions** **Pearson enVision pg. 210 – 216**	• Use the structure of rational expressions to rewrite simple rational expressions in different forms. • Understand that rational expressions for a system analogous to the system of rational numbers and use that understanding to multiply and divide rational expressions.	MGSE9-12.A.APR.7
	4-4 Adding and Subtracting Rational Expressions **Pearson enVision pg. 217 - 223**	• Understand that rational expressions for a system analogous to the system of rational numbers and use that understanding to add and subtract rational expressions.	MGSE9-12.A.APR.7
	Additional Resources: • Operations with Rational Functions Task (DOE)		
	Graphing Rational Functions & Solving Rational Equations		
Solving Rational Equations	**4-5 Solving Rational Equations** **Pearson enVision pg. 224 - 231**	• Solve rational equations in one variable. • Identify extraneous solutions to rational equations and give example of how they arise.	MGSE9-12.A.CED.1 MGSE9-12.A.REI.2
	3 Act Task – Real Cool Waters **Pearson enVision pg. 232**		
	Additional Resources: • An Extraneous Solution (Illustrative Mathematics)		

Characteristics of Rational Functions	**4-2 Graphing Rational Functions** **Pearson enVision pg. 201 -209**	• Graph rational functions by identifying asymptotes and end behaviour. • Rewrite simple rational expressions in different forms using long division.	MGSE9-12.F.IF.4 MGSE9-12.F.IF.5 MGSE9-12.F.IF.7 MGSE9-12.F.IF.7d
	Additional Resources: • Desmos – Graphing Rational Functions Polygraph - https://teacher.desmos.com/polygraph-rationals • Desmos – Graphing Rational Functions Polygraph II - https://teacher.desmos.com/polygraph/custom/5615f927bd554ea00761a5a6 • Finding the domain (Illustrative Mathematics)		
Radical Expressions and Equations	**5-1 *n*th Roots, Radicals, and Rational Exponents** **Pearson enVision pg. 239 – 246**	• Find all real *n*th roots of a number • Evaluate expressions with rational exponents • Use *n*th roots to solve equations by rewriting expressions using the properties of exponents.	MGSE9-12.N.RN.1 MGSE9-12.N.RN.2
	5-2 Properties of Exponents and Radicals **Pearson enVision pg. 247 - 254**	• Use the properties of exponents and radicals to identify way to rewrite radical expressions. • Interpret radical expressions that represent a quantity in terms of its context.	MGSE9-12.N.RN.2
	5-4 Solving Radical Equations **Pearson enVision pg. 263 - 272**	• Solve radical equations in one variable. • Explain how extraneous solutions may arise when solving radical equations.	MGSE9-12.A.REI.2
	3-Act Task – The Snack Shack **Pearson enVision pg. 272**		
	Additional Resources: • The Real Number System (DOE Task)		
Graphing Radical Functions	**5-3 Graphing Radical Functions** **Pearson enVision pg. 255 - 263**	• Graph radical functions, including square root and cube root functions. • Identify the effect of transformations on the key features of the graphs of radical functions.	MGSE9-12.F.IF.4 MGSE9-12.F.IF.5 MGSE9-12.F.IF.7 MGSE9-12.F.IF.7b
	Additional Resources: • Desmos – Polygraph Square Root Functions - https://teacher.desmos.com/polygraph/custom/560ad29158fd074d156300b6 • DOE Task - Combining and Describing Functions		

Personalized Learning and Differentiation

Teachers differentiate by providing examples (work samples or task-specific clarifications of assessment criteria); structuring support (advance organizers, flexible grouping, peer relationships); establishing flexible deadlines, and adjusting the pace.

-SWD/504- Accommodations provided
-ELL- Five Principle ELL Curriculum Framework and Vocabulary Supports
-Intervention Support- Re-teaching Activities in Small Groups with Progress Monitoring

-Extensions- Enrichment Tasks and Projects
Resources
Savvas Algebra 2 Textbook & Resources GADOE Task and Resources