06 Rational Functions and Equations

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **2-3 weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

This unit will focus on strengthening the prerequisite skills and conceptual understanding needed to graph rational functions and identify key components of a rational function. Lesson activities will reinforce new content and address common misconceptions and errors to support students' progress toward analyzing rational functions and solving rational equations.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Objectives/Enduring Understandings:

- Solving equations is a process of reasoning.
- Every rational function can be expressed as a ratio of two polynomial functions

Essential Questions:

- When a change is made in a rational function to the numerator, does this change differ when applied to the denominator?
- What causes restrictions on the domain and range of rational functions?
- Why might a rational function have asymptotes? What do they represent?

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

- Operations can be performed within the set of rational expression and equations.
- The role of asymptotes aids in graphing rational functions.
- Rational expressions and equations can be written in specific forms (factored, standard or other) for specific purposes. (solving, identifying critical attributes, graphing)
- Equations must be written accurately in order to represent an application

Procedural Knowledge

Students will be able to:

- Simplify rational expression/functions
- Perform operations with rational functions.
- Simplify complex fractions
- Demonstrate knowledge of factoring as it applies to combining rational functions
- Identify restrictions on domain/range of rational functions
- Identify nature of any discontinuities in graphs
- Determine coordinates of holes
- Determine equation of vertical asymptote
- Graph rational functions/equations
- Create rational equations to solve various types of number problems (number relationships, distance/rate, work/rate)
- Analyze rational functions using different representations

CONTENT AREA STANDARDS

MA.F-IF.B.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
MA.F-IF.C.7d	Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.
MA.N-RN.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
MA.A-APR.D.6	Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x)$ + $r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.
MA.A-APR.D.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.
MA.A-REI.A.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

CS.K-12.3.a	Identify complex, interdisciplinary, real-world problems that can be solved computationally.
CS.K-12.3.b	Decompose complex real-world problems into manageable sub-problems that could integrate existing solutions or procedures.
CS.K-12.3.c	Evaluate whether it is appropriate and feasible to solve a problem computationally.
LA.K-12.NJSLSA.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
TECH.9.4.12.IML.3	Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).
TECH.9.4.12.IML.4	Assess and critique the appropriateness and impact of existing data visualizations for an intended audience (e.g., S-ID.B.6b, HS-LS2-4).
TECH.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
TECH.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.

EVIDENCE OF LEARNING

Formative Assessments

- Student feedback/questioning/observation
- Error analysis
- Specific skill assessment/questions
- Survey/polling
- Task completion and review of quizzes and material presented in the Algebra II class

Summative Assessments

There will be no formal assessments in this course.

RESOURCES (Instructional, Supplemental, Intervention Materials)

Desmos Activities:Factoring Practice, Factoring Practice a = 1,Factoring Practice # 2, Rational functions, Learning to graph rational functions, asymptotes of rational functions
Kuta Software worksheets

Approved course textbook

INTERDISCIPLINARY CONNECTIONS

Interdisciplinary connections are frequently addressed through modeling and application problems whereby students solve and analyze situations taken from business, physics, engineering, biology, statistics, geography, and numerous other fields. Examples can be found in topic specific textbook problems and digital resources.

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.