Marietta City Schools

2024–2025 District Unit Planner

Enhanced Advanced Algebra & AP Precalculus

Unit title	Unit 3: Modeling Rational Functions (DOE Unit 4)	**Unit duration (hours)**	15 - 20 hours

Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): ***What will students learn?***

GA DoE Standards

Standards

AP PC 1.7 - 1.14

1.7 Rational Functions and End Behavior
1.8 Rational Functions and Zeros
1.9 Rational Functions and Vertical Asymptotes
1.10 Rational Functions and Holes
1.11 Equivalent Representations of Polynomial and Rational Expressions
1.12 Transformations of Functions
1.13 Function Model Selection and Assumption Articulation
1.14 Function Model Construction and Application

AA.FGR.8: Analyze the behaviors of rational functions to model applicable, mathematical problems.

AA.FGR.8.1 Rewrite simple rational expressions in equivalent forms.
AA.FGR.8.2 Add, subtract, multiply and divide rational expressions, including problems in context and express rational expressions in irreducible form.
AA.FGR.8.3 Graph rational functions, identifying key characteristics..
AA.FGR.8.4 Solve simple rational equations in one variable, and give examples showing how extraneous solutions may arise.

PC.FGR.2: Analyze the behaviors of rational and piecewise functions to model contextual mathematical problems.

PC.FGR.2.5 Graph rational functions and identify key characteristics.

PC.FGR.2.6 Represent the behavior of a rational function using limit notation for vertical and horizontal asymptotes and end behavior.

PC.FGR.2.7 Represent the limit of a function using both the informal definition and the graphical interpretation in the context of rational functions; interpret limits expressed in analytic notation.

PC.FGR.2.8 Solve simple rational equations in one variable and give examples showing how extraneous solutions may arise.

PC.FGR.2.9 Perform partial fraction decomposition of rational functions using non-repeated linear factors.

Concepts/Skills to be Mastered by Students

1.A Solve equations and inequalities represented analytically, with and without technology.
1.B Express functions, equations, or expressions in analytically equivalent forms that are useful in a given mathematical or applied context.
1.C Construct new functions, using transformations, compositions, inverses, or regressions, that may be useful in modeling contexts, criteria, or data, with and without technology.
2.A Identify information from graphical, numerical, analytical, and verbal representations to answer a question or construct a model, with and without technology.
2.B Construct equivalent graphical, numerical, analytical, and verbal representations of functions that are useful in a given mathematical or applied context, with and without technology.
3.A Describe the characteristics of a function with varying levels of precision, depending on the function representation and available mathematical tools.
3.B Apply numerical results in a given mathematical or applied context.
3.C Support conclusions or choices with a logical rationale or appropriate data.

Vocabulary

Asymptote	Axis	Decreasing	End Behavior	Extraneous Solutions	Features
Horizontal Asymptote	Increasing	Irrational Number	Negative Exponent	Quadrant	Rational Expression
Rational Function	Reciprocal	Root	Slant Asymptote	Vertical Asymptote	Zero

Notation

Inequality and Interval Notation for Graphing Characteristics (Domain, Range, Intervals of Inc/Dec, and End Behavior)

$\lim_{x \to \infty} p(x) = \infty$ OR $\lim_{x \to \infty} p(x) = -\infty$

Essential Questions

1. What are rational expressions, and how do they differ from rational numbers?
2. How can we simplify rational expressions and determine restrictions on their domain?
3. What methods can we use to add, subtract, multiply, and divide rational expressions?
4. How do we solve equations involving rational expressions, including those with extraneous solutions?

5. How can we apply rational expressions to real-world problems, such as rates, proportions, and mixtures?
6. What is the significance of asymptotes in rational functions, and how do we find and interpret them?
7. How do we graph rational functions, considering key features like intercepts, holes, and end behavior?
8. What transformations can we apply to the graph of a rational function, and how do they affect its behavior?
9. How do rational expressions and functions relate to other types of functions, such as linear and quadratic functions?

Assessment Tasks

List of common formative and summative assessments.

Formative Assessment(s): Unit Quiz

Summative Assessment(s): Unit Test

Learning Experiences

Add additional rows below as needed.

Objective or Content	Learning Experiences	Personalized Learning and Differentiation All information included by PLC in the differentiation box is the responsibility and ownership of the local school to review and approve per Board Policy IKB.
PC.FGR.2: Analyze the behaviors of rational and piecewise functions to model contextual mathematical problems. ● PC.FGR.2.5 Graph rational functions and identify key characteristics.	DOE Task: Beyond the Limits Beyond-Limits-Enhanced-Advanced-Algebra-AP-Precalculus-Unit-4-Learning-Plan (gadoe.org) (Note: Will only complete Diagnostic, Engage, and Explore) In this learning plan, students will use their understanding of characteristics of various functions, including rational, exponential, and logarithmic functions to	Students will be able to work at their own pace in collaborative groups where additional scaffolding is available as needed.

● PC.FGR.2.6 Represent the behavior of a rational function using limit notation for vertical and horizontal asymptotes and end behavior. ● PC.FGR.2.7 Represent the limit of a function using both the informal definition and the graphical interpretation in the context of rational functions; interpret limits expressed in analytic notation	identify key characteristics of the functions and represent end behavior using limit notation. Students will also use limit notations representing end behavior of a rational function to graph the function. **<u>Learning Goals</u>** ● I can evaluate one-sided and two-sided limits of piecewise and rational functions. ● I can connect end behavior to limit notation involving infinity.	

Content Resources

Math Medic

AP Classroom

Bryan Passwater Notes

Textbook Correlation: enVision A|G|A - Algebra 2

AA.FGR.8.1 - Lessons 4-3, 4-4
AA.FGR.8.2 - Lessons 4-3, 4-4
AA.FGR.8.3 - Lessons 4-1, 4-2
AA.FGR.8.4 - Lessons 4-5, Topic 4-Mathematical Modeling in 3 Acts