



Marietta City Schools
2025–2026 District Unit Planner

Precalculus

Unit title	<i>Unit 1: Modeling with Rational and Piecewise Functions</i>	Unit duration (hours)	<i>15 - 18.75</i>
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Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): *What will students learn?*

GA DoE Standards

Standards

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

PC.FGR.2.1 - Graph piecewise-defined functions, including step functions and absolute value functions.

PC.FGR.2.2 - Describe characteristics by interpreting the algebraic form and graph of a piecewise-defined functions.

PC.FGR.2.3 - Represent the limit of a function using both the informal definition and the graphical interpretation in the context of piecewise-defined functions; interpret limits expressed in analytic notation.

PC.FGR.2.4 - Divide polynomials using various methods.

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.

G.MM.1: Apply mathematics to real-life situations; model real-life phenomena using mathematics.

G.MM.1.1 Explain mathematically applicable problems using a mathematical model.

G.MM.1.2 Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.

G.MM.1.3 Using abstract and quantitative reasoning, make decisions about information and data from a mathematically applicable situation.

G.MM.1.4 Use various mathematical representations and structures with this information to represent and solve real-life problems.

Concepts/Skills to be Mastered by Students

Model real-life problems with piecewise defined functions that incorporate linear, polynomial, logarithmic, exponential, and radical functions.

Identify characteristics of piecewise functions including domain, range, continuity, end behavior, intercepts, and intervals of increase and decrease.

Determine if a limit exists or not and use appropriate limit notation.

Use one-sided limits to investigate continuity at a point (Intro during Piecewise functions, focus during rational functions)

Connect the Remainder Theorem and Factor Theorem to the division process.

Graph rational functions with and without the use of technology.

Identify characteristics including zeros, asymptotes, domain, range, intercepts, intervals of increase and decrease, relative extrema, symmetries, discontinuities, and end behavior.

Solve simple rational equations in one variable, and show how extraneous solutions may arise.

Use both interval and inequality notation to report key characteristics.

Vocabulary

Asymptotes, Continuity, Discontinuity, End Behavior, Limit, Modeling Philosophy, One-sided limit, Piecewise-Defined Function, Rational Function, Step Function, Two-sided Limits

Notation

$\lim_{x \rightarrow 3^+} \frac{x-1}{x-3}$ for vertical asymptotes

$\lim_{x \rightarrow \infty} \frac{x-1}{x-3}$ for horizontal asymptotes

$\lim_{x \rightarrow \infty} \frac{x^2-1}{x-3}$ for end behavior

Essential Questions

1. How do we as mathematicians make sense of quantities and situations symbolically?
2. What model (s) can we use as mathematicians to solve Piecewise and Rational Functions?
3. How can we as mathematicians use and apply patterns and structures to solve Piecewise and Rational Functions?
4. How do we as mathematicians analyze the problem in order to choose the best strategy(ies) or resource to make sense of the problem?
5. What tools are available and efficient for us as mathematicians to use while solving Piecewise and Rational Functions?

Assessment Tasks

List of common formative and summative assessments.

Formative Assessment(s): Unit 1 Quiz, Skill checks, Warm-ups

Summative Assessment(s): Unit 1 Assessment

Learning Experiences

Add additional rows below as needed.

Objective or Content	Learning Experiences	Personalized Learning and Differentiation
<p>PC.FGR.2.1 - Graph piecewise-defined functions, including step functions and absolute value functions.</p> <p>PC.FGR.2.2 -Describe characteristics by interpreting the algebraic form and graph of a piecewise-defined functions.</p>	<p>What makes a good shot? - Engage, Explore, and Apply</p> <ul style="list-style-type: none"> I can use characteristics of other functions to describe characteristics of a piecewise defined function. I can describe characteristics of a piecewise-defined function using equations and graphs. 	<p>Supporting the Learning:</p> <ul style="list-style-type: none"> Making explicit connections between domain and range of previously explored functions, such as linear, quadratic and exponential functions. Provide copies of notes, graph paper to recreate graphs, access to graphing technology tools, and utilize color coding to distinguish domain from range and the associated intervals to connect mathematical representations. <p>Extending the Learning:</p> <ul style="list-style-type: none"> Describe a contextual situation where a piecewise-defined function is applicable (encourage students to brainstorm). Find contextual situations in print or online media and construct limit descriptions to correctly describe the contextual behavior of the data. Allow opportunity for mathematical discourse. <p>Language Supports: Provide multiple opportunities for structured peer interactions or conversations (pairs or triads) to negotiate meaning using provided graphs, graphic organizers, a word bank, and/or sentence frames. Sample sentence frames:</p> <ul style="list-style-type: none"> I notice... The domain appears to begin at ... and end at... The range appears to begin at... and end at...
<p>PC.FGR.2.5 - Graph rational functions and identify key characteristics.</p> <p>PC.FGR.2.6 Represent the behavior of a rational function using limit notation for vertical and horizontal asymptotes and end behavior.</p>	<p>A Functional Way to Practice - Diagnostic, Explore, and Ref</p> <ul style="list-style-type: none"> I can analyze a piecewise function and the truth of given characteristic statements about the function. I can identify characteristics of a rational function and identify its graph. I can analyze rational functions graphically by building upon prior function family 	<p>Supporting the Learning:</p> <ul style="list-style-type: none"> Make explicit connections between current and prior learning experiences. Use a whiteboard or chart paper to draw the graphs of the rational function equations. Teams can match the equations with their corresponding graphs as part of the puzzle-solving process. Pose purposeful questions to assess prior knowledge and elicit student thinking to address concepts needing review. <p>Extending the Learning:</p> <ul style="list-style-type: none"> Introduce bonus puzzles that require teams to analyze and compare multiple rational function equations to determine relationships or transformations

<p>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.</p> <p>PC.FGR.2.8 - Solve simple rational equations in one variable, and give examples showing how extraneous solutions may arise.</p>	<p>knowledge and utilizing content-rich vocabulary.</p> <ul style="list-style-type: none"> I can apply part-whole reasoning to solve simple rational equations. 	<p>between them.</p> <ul style="list-style-type: none"> Create additional levels of difficulty for the puzzles, incorporating more complex rational function equations or including multiple missing characteristics to determine. <p>Language Supports:</p> <ul style="list-style-type: none"> Provide multiple opportunities for structured peer interactions or conversations (pairs or triads) to negotiate meaning using charts, graphic organizers, a word bank, and/or sentence frames.
<p>PC.FGR.2.8 - Solve simple rational equations in one variable, and give examples showing how extraneous solutions may arise.</p>	<p>Solving Rational Equations Circuit - Diagnostic, Engage, Explore, Reflect</p> <ul style="list-style-type: none"> I can apply part-whole reasoning to solve simple rational equations. I can solve rational equations while paying special attention to potential extraneous solutions. 	<p>Supporting the Learning:</p> <ul style="list-style-type: none"> Make explicit connections to part-whole reasoning with numerical quantities to solving simple rational equations. <p>Extending the Learning:</p> <ul style="list-style-type: none"> Ask students for the different ways they see and can solve the problems and encourage discussion of different ways of seeing problems. <p>Language Supports: Ask questions to strengthen student reasoning. Sample questions:</p> <ul style="list-style-type: none"> Why is that true? What is your reasoning? Do you think it is always true?
<p>Content Resources</p>		
<p>Delta Math Math Medic Savvas</p>		