



Marietta City Schools  
2024–2025 District Unit Planner

*AP Precalculus*

<b>Unit title</b>	Unit 1 - Polynomial and Rational Functions	<b>Unit duration (hours)</b>	30 hours
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**Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit):** *What will students learn?*

**GA DoE Standards**

**Standards:**

**1.1 Change in Tandem**

Learning Objective 1.1a: Describe how the input and output values of a function vary together by comparing function values.

Learning Objective 1.1b: Construct a graph representing two quantities that vary with respect to each other in a contextual scenario.

**1-2 Rates of Change**

Learning Objective 1.2.A: Compare the rates of change at two points using average rates of change near the points.

Learning Objective 1.2.B: Describe how two quantities vary together at different points and over different intervals of a function.

**1.3 Rates of Change in Linear and Quadratic Functions**

Learning Objective 1.3.A: Determine the average rates of change for sequences and functions, including linear, quadratic, and other function types.

Learning Objective 1.3.B: Determine the change in the average rates of change for linear, quadratic, and other function types.

**1.4 Polynomial Functions and Rates of Change**

Learning Objective 1.4.A: Identify key characteristics of polynomial functions related to rates of change.

**1.5 Polynomial Functions and Complex Zeros**

Learning Objective 1.5.A: Identify key characteristics of a polynomial function related to its zeros when suitable factorizations are available or with technology.

Learning Objective 1.5.B: Determine if a polynomial function is even or odd.

**1.6 Polynomial Functions and End Behavior**

Learning Objective 1.6.A: Describe end behaviors of polynomial functions.

**1.7 Rational Functions and End Behavior**

Learning Objective 1.7.A: Describe end behaviors of rational functions.

**1.8 Rational Functions and Zeros**

Learning Objective 1.8.A: Determine the zeros of rational functions.

### **1.9 Rational Functions and Vertical Asymptotes**

Learning Objective 1.9.A: Determine vertical asymptotes of graphs of rational functions.

### **1.10 Rational Functions and Holes**

Learning Objective 1.10.A: Determine the holes in the graphs of rational functions.

### **1.11 Equivalent Representations of Polynomial and Rational Expressions**

Learning Objective 1.11.A: Rewrite polynomial and rational expressions in equivalent forms.

Learning Objective 1.11.B: Determine the quotient of two polynomial functions using long division.

Learning Objective 1.11.C: Rewrite the repeated product of binomials using the binomial theorem.

### **1.12 Transformations of Functions**

Learning Objective 1.12.A: Construct a function that is an additive and/or multiplicative transformation of another function.

### **1.13 Function Model Selection and Assumption Articulation**

Learning Objective 1.13.A: Identify an appropriate function type to construct a function model for a given scenario.

Learning Objective 1.13.B: Describe assumptions and restrictions related to building a function model.

### **1.14 Function Model Construction and Application**

Learning Objective 1.14.A: Construct a linear, quadratic, cubic, quartic, polynomial of degree  $n$ , or related piecewise-defined function model.

Learning Objective 1.14.B: Construct a rational function model based on a context..

Learning Objective 1.14.C: Apply a function model to answer questions about a data set or contextual scenario.

### **Concepts/Skills to support mastery of standards**

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.

2.A Identify information from graphical, numerical, analytical, and verbal representations to answer a question or construct a model, 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.

1.A Solve equations and inequalities represented analytically, with and without technology.

### **Vocabulary**

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

### **Notation**

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

### **Essential Questions**

- How do we model the intensity of light from its source?
- How can I use data and graphs to figure out the best time to purchase event tickets?
- How can we adjust known projectile motion models to account for changes in conditions?

**Assessment Tasks**

*List of common formative and summative assessments.*

**Formative Assessment(s):** Quizzes, TOTD, DeltaMath, Warm Ups

**Summative Assessment(s):** Unit 1 A Assessment (1.1 - 1.6), Unit 1 B Assessment (1.7 - 1.14)

**Learning Experiences**

Add additional rows below as needed.

Objective or Content	Learning Experiences	Personalized Learning and Differentiation
<b>1.3.A Determine the average rates of change for sequences and functions, including linear, Quadratic, and other function types.</b>	<a href="#">How Much Does it Cost to Rent a U-Haul?</a> Students need to notice how is the average rate of change is changing Over each two second interval	Teacher will ask monitoring (guided) questions while the students are working in small groups. Teacher also will Provide an exemplar/ formula on how to find Rate of change over a given interval

**Content Resources**

Math Medic  
 AP Classroom  
 Passwater

