Marietta City Schools

2023–2024 District Unit Planner

AP Precalculus

Unit title	Unit 2 - Exponential and Logarithmic Functions	**Unit duration (hours)**	*30 Hours*

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

GA DoE Standards

Standards:

2.1 Change in Arithmetic and Geometric Sequences:
2.1.A: Express arithmetic sequences found in mathematical and contextual scenarios as functions of the whole numbers.
2.1.B: Express geometric sequences found in mathematical and contextual scenarios as functions of the whole numbers.

2.2 Change in Linear and Exponential Functions:
2.2.A: Construct functions of the real numbers that are comparable to arithmetic and geometric sequences.
2.2.B: Describe similarities and differences between linear and exponential functions.

2.3 Exponential Functions:
2.3.A: Identify key characteristics of exponential functions.

2.4 Exponential Function Manipulation:
2.4.A: Rewrite exponential expressions in equivalent forms.

2.5 Exponential Function Context and Data Modeling:
2.5.A: Construct a model for situations involving proportional output values over equal-length input-value intervals.
2.5.B: Apply exponential models to answer questions about a data set or contextual scenario.

2.6 Competing Function Model Validation:
2.6.A: Construct linear, quadratic, and exponential models based on a data set.
2.6.B: Validate a model constructed from a data set.

2.7 Composition of Functions:
2.7.A: Evaluate the composition of two or more functions for given values.

2.7.B: Construct a representation of the composition of two or more functions.
2.7.C: Rewrite a given function as a composition of two or more functions.

2.8 Inverse Functions:
2.8.A: Determine the input-output pairs of the inverse of a function.
2.8.B: Determine the inverse of a function on an invertible domain.

2.9 Logarithmic Expressions:
2.9.A: Evaluate logarithmic expressions.

2.10 Inverses of Exponential Functions:
2.10.A: Construct representations of the inverse of an exponential function with an initial value of 1.

2.11 Logarithmic Functions:
2.11.A: Identify key characteristics of logarithmic functions.

2.12 Logarithmic Function Manipulation:
2.12.A: Rewrite logarithmic expressions in equivalent forms.

2.13 Exponential and Logarithmic Equations and Inequalities
2.13.A: Solve exponential and logarithmic equations and inequalities.
2.13.B: Construct the inverse function for exponential and logarithmic functions.

2.14 Logarithmic Function Context and Data Modeling:
2.14.A: Construct a logarithmic function model.

2.15 Semi-log Plots:
2.15.A: Determine if an exponential model is appropriate by examining a semi-log plot of a data set.
2.15.B: Construct the linearization of exponential data.

Concepts/Skills to support mastery of standards:

1.B Express functions, equations, or expressions in analytically equivalent forms that are useful in a given mathematical or applied context.

3.A Describe the characteristics of a function with varying levels of precision, depending on the function representation and available mathematical tools.

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.

3.B Apply numerical results in a given mathematical or applied context.

2.A Identify information from graphical, numerical, analytical, and verbal representations to answer a question or construct a model, with and without technology.

3.C Support conclusions or choices with a logical rationale or appropriate data.

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.

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

Vocabulary: Arithmetic sequences, Geometric sequences, Exponential Growth, Exponential Decay, Residual Plot, Additive and multiplicative transformations, Common Logarithm, Natural Logarithm.

Notation:

$\lim_{x \to \pm\infty} ab^x = -\infty$, or $\lim_{x \to \pm\infty} ab^x = 0.$ $f \circ g$ f^{-1},

Essential Questions
• How can I make a single model that merges the interest I earn from my bank with the taxes that are due so I can know how much I will have in the end? • How can we adjust the scale of distance for a model of planets in the solar system so the relationships among the planets are easier to see? • If different functions can be used to model data, how do we pick which one is best?
Assessment Tasks
Formative Assessment(s): Quizzes, TOTD, DeltaMath, Warm Ups **Summative Assessment(s):** Unit 2 A Assessment (2.1 - 2.8), Unit 2 B Assessment (2.9 - 2.15)

Learning Experiences

Add additional rows below as needed.

Objective or Content	Learning Experiences	Personalized Learning and Differentiation

2.6.A: Construct linear, quadratic, and exponential models based on a data set**.** **2.6.B:** Validate a model constructed from a data set.	Experimenting with Function Models (2.6) In this activity, students will work in groups to collect data for three different situations. Then They will use the collected data to find three different models (Linear, Quadratic, and exponential)	Assisting will be provided for students who need help while they are collecting data from three different situations. Vocabulary bank will be available
Content Resources		
AP Precalculus Community: The Author Bryan Passwater **AP Classroom**		