Unit #7 Exponential and Logaritmic Functions

Content Area: **Mathematics**
Course(s): **Honors Pre-Calculus**
Time Period: **May**
Length: **number of days 20**
Status: **Published**

Unit Overview

This unit will introduce exponential and logarithmic functions. Students will simplify and evaluate exponential expressions with rational and irrational exponents. the students will be able to graph exponential functions and inequalities. Students will be able to apply common and natural logarithms. In addition, they will be able to model real-world situations using common and natural logarithms.

Enduring Understandings

- The characteristics of exponential and logarithmic functions and their representations are useful in solving real-world problems
- A quantity can be represented numerically in various ways. problem solving depends upon choosing the most efficient way.

Essential Questions

- How do exponential functions model real-world problems and their solutions?
- How do logarithmic functions model real-world problems and their solutions?
- How do mathematical ideas interconnect and build on one another to produce a coherent whole?

Standards

MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.4	Model with mathematics.
MA.F-IF.C	Analyze functions using different representations
MA.F-IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.F-IF.C.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

Indicators

MA.F-IF.C.7e	Graph exponential and logarithmic functions, showing intercepts and end behavior, and

	trigonometric functions, showing period, midline, and amplitude.
MA.F-IF.C.8b	Use the properties of exponents to interpret expressions for exponential functions.
MA.F-LE.A.1	Distinguish between situations that can be modeled with linear functions and with exponential functions.

Student Learning Objectives

- The students will be able solve logarithmic equations , including base e, using both the laws of exponents and logarithms.
- The students will be able to evaluate a logarithm using the change of base rule.
- The students will be able to identify and distinguish between the graphs of linear, quadratic, exponential, and logathmic functions.
- The students will be able to solve exponential equations, including base e, using various methods including laws of logarithms
- The students will be able to write an exponential function or expression in an equivalent form using the laws of exponents.
- The students will describe the effect of transformations on graphs of exponential and logaritmic functions.
- The students will describe the properties of linear, quadratic, power, polynomial, rational, exponential, logarithmic, trigonometric and inverse functions
- The students will interpret and solve problems involving exponential and logathmic functions.
- The students will solve real-world applications with common and natural logarithms.

Lesson Titles

- Common Logarithms
- Exponential Functions
- Logarithmic Functions
- Natural Logarithms
- Real Exponents
- The Number e

Career Readiness, Life Literacies & Key Skills

WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
WRK.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
WRK.K-12.P.9	Work productively in teams while using cultural/global competence.

Inter-Disciplinary Connections

LA.RL.11-12.4	Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful. (e.g., Shakespeare as well as other authors.)
LA.RST.11-12.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.
LA.RI.11-12.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze how an author uses and refines the meaning of a key term or terms over the course of a text (e.g., how Madison defines faction in Federalist No. 10).
LA.WHST.11-12.1.E	Provide a concluding paragraph or section that supports the argument presented.
9-12.HS-ETS1-4.5	Using Mathematics and Computational Thinking

Instructional Strategies/Learning Activities/Levels of Blooms/DOK

- demonstrate on calculator how to use log base button
- review homework
- review study guide
- to evaluate expressions involving logarithms, introduce concept of a logarithm, explain how to solve equations involving logarithms, use examples and apply the properties of logarithms. Use graphing calculator to compare logarithmic graph to exponential graph. start worksheet.
- to find common logarithms and antilogarithms. explain what a common logarithm is, boardwork, use calculator to evaluate selected common logarithms, work through examples on how to solve equations using common logarithms, and apply to solving real-world applications, give several examples, work on as a class.
- to find natural logarithms of numbers. describe what a natural logarithm is compare to a common logarithm, demonstrate how to solve equations containing natural logarithms, set up examples on applying the natural logarithm to real-world problems.
- to graph exponential functions and inequalities, review properties of exponents, use graphing calculator to graph selected exponential functions, then use these graphs to solve problems involving growth and decay. Classwork work on board problems.
- To use the exponential function e, review graph exponential functions, compare graph of the number e, do examples from text on using e to solve financial and biological real-life problems, have students problems in groups.
- tutoring during Delsea One
- use quizizz to review simplifying exponents
- use the properties of exponents, list the properties on the board, demonstrate how to evaluate and simplify expressions containing rational exponents, place on board examples on how to solve equations containing rational expressions.

MODIFICATIONS

ELL Modifications

- 1:1 testing
- Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience
- Digital translators
- Intentional scheduling/grouping with student/teacher who speaks the same language if possible
- Offer resources for specific topics in primary language (Youtube web resources)
- Provide formal and informal verbal interaction to provide practice, increase motivation, and self-monitoring

IEP & 504 Modifications

- allowing student to take notes in class for reinforcement but also providing a copy of completed/correct notes to study from
- for testing - if not directly testing directly for reading comprehension offering paraphrasing of quotes, etc... if the student is expected to be testing on understanding that paragraph or quote to answer future questions
- for testing - rewording questions so that there are not higher level vocabulary within the question (you are testing for understanding of the content not the ability to understand the question)
- if not in a co-teaching setting allowing time in the schedule for a special education teacher to consult with general education teachers on what specifically can be modified or how to paraphrase things in a different way specific to that lesson
- math tests could have formula's available on the test and/or sample problems
- providing study guides that don't lead the student to study too much extraneous information (less unnecessary details)/scaffolded study guides
- students could use calculator and/or other math tools (x grids, chips, ect)
- teaching the main ideas/concepts (limiting not needed details)to be taught and repeating them in several different ways over several different days
- tutoring during Delsea One

G & T Modifications

- Ask students' higher level questions that require students to look into causes, experiences, and facts to draw a conclusion or make connections to other areas of learning.
- Effective questioning techniques (focus on what's important, provide processing time, require higher order thinking
- Encourage students to explore concepts in depth and encourage independent studies or investigations.
- Math- provide additional rigorous challenge problems for advanced students
- Refrain from having them complete more work in the same manner.

At Risk Modifications

- additional help during tutoring/Delsea One/Academic Enrichment
- allowing student to take notes in class for reinforcement but also providing a copy of completed/correct notes to study from
- guided notes and study guides
- speaking to students privately when redirecting behaviors

Benchmark Assessments

Skill-based assessments - math practice

Alternative Assessments

Performance tasks

Project-based assignments

Problem-based assignments

Presentations

Formative Assessment

- anticipatory set
- closure
- groupwork
- homework
- participation
- pop quizes
- Quiz on exponents
- Quiz on Properties of Logarithms
- student boardwork
- warm up

Summative Assessment

- Alternate Assessment

- Benchmark assessment
- Marking Period Assessment
- Midchapter test Logarithmic Functions
- Midchapter Test on Common Logarithms, The number e, and Natural Logarithms

Resources & Materials

- Advanced Mathematical Concepts Precalculus with Applications textbook
- Cooperative learning exploration
- Evoke student participation from their seats and at the board
- Google Classroom
- Mathpower4u math videos
- PowerPoint Lessons
- Teacher generated worksheets
- youtube videos to introduce/demonstrate concepts in real-life situations

Technology

- Chromebook
- Desmos graphing calculator
- Equatio
- Graphing Calculator
- Promethean Board
- Quizizz

TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.1.12.D	Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.