Unit 3: Exponential and Logarithmic Expressions

Content Area: **Math**
Course(s):
Time Period:
Length: **10 Days**
Status: **Published**

State Mandated Topics Addressed in this Unit

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N/A	N/A

Exponential and Logarithmic Expressions

Learning Objectives

- Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.★
- Determine an explicit expression, a recursive process, or steps for calculation from a context.
- Graph exponential and logarithmic functions, showing intercepts and end behavior.
- Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★
- Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret P(1+r)n as the product of P and a factor not depending on P
- Interpret expressions that represent a quantity in terms of its context.
- Interpret parts of an expression, such as terms, factors, and coefficients.
- Interpret the parameters in a linear or exponential function in terms of a context.
- Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as y = (1.02)t, y = (0.97)t, y =(1.01)12t, y = (1.2)t/10, and classify them as representing exponential growth or decay.
- Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
- Write a function that describes a relationship between two quantities.★

Essential Skills

- *Determine an explicit expression, recursive process, or steps for calculations from a given context*
- Calculate the average rate of change of a function from a graph or a function on an interval.
- Classify exponential functions as exponential growth or decay.

- Estimate the average rate of change from a graph.
- Graph complicated functions using technology.
- Graph exponential & logarithmic functions showing intercepts and end behavior.
- Graph simple functions by hand showing key features of the graph.
- Identify the percent rate of change in an exponential function.
- Interpret complicated expressions by viewing its parts as a single entity.
- Interpret expressions in terms of context.
- Interpret parts of an expression in context, such as terms, factors, and coefficients.
- Interpret parts of expressions including terms, factors, and coefficients.
- Interpret the average rate of change.
- Interpret the parameters of a linear or exponential functions in context.
- Reveal different properties of a function by expressing it in different forms.
- Use the properties of exponents to interpret exponential functions.
- Write a function shown as an expression in equivalent forms.
- Write a function that describes a relationship between two quantities.

Standards

MATH.9-12.F.BF.A.1.a	Determine an explicit expression, a recursive process, or steps for calculation from a context.
MATH.9-12.F.IF.B.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
MATH.9-12.F.IF.C.7.e	Graph exponential and logarithmic functions, showing intercepts and end behavior.
MATH.9-12.F.IF.C.8.b	Use the properties of exponents to interpret expressions for exponential functions.
MATH.9-12.A.SSE.A.1.a	Interpret parts of an expression, such as terms, factors, and coefficients.
MATH.9-12.A.SSE.A.1.b	Interpret complicated expressions by viewing one or more of their parts as a single entity.
MATH.9-12.F.LE.B.5	Interpret the parameters in a linear or exponential function in terms of a context.

Instructional Tasks/Activities

- Topic #1: Graphing exponential functions
- Topic #10: Compound and continuous interest
- Topic #2: Exponential equations not requiring logarithms
- Topic #3: Exponents and logarithms
- Topic #4: Evaluating logarithms
- Topic #5: Logarithms and exponents as inverses
- Topic #6: Properties of logarithms
- Topic #7: Writing logs in terms of others
- Topic #8: Exponential equations requiring logarithms
- Topic #9: Graphing logarithmic functions

Assessment Procedure

- Class Discussions
- Classroom Total Participation Technique
- Classwork/homework
- Compare/Contrast Journals
- DBQ
- Electronic Active Responders
- Essay
- Exit Ticket/Entrance Ticket/Do Now
- Identify the Error Problems
- Journal / Student Reflection
- Kahoot
- Other named in lesson
- Peer Review
- Performance
- Problem Correction
- Project
- Quiz
- Quizzes/Tests
- Response and Analysis Questions
- Rubric
- Teacher Collected Data
- Teacher Observations
- Test
- Worksheet

Recommended Technology Activities

- Appropriate Content Specific Online Resource
- Chromebook
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Desmos
- Gimkit
- GoGuardian
- Google Classroom

- Google Docs
- Google Forms
- Google Slides
- Kahoot
- MagicSchool AI
- Other- Specified in Lesson
- Quiziz
- Screencastify
- TI-Nspire CX-Cas activities throughout the unit as appropriate

Accommodations & Modifications & Differentiation

Accommodations and Modifications should be used to meet individual needs. Their IEP and 504 plans should be used in addition to the following suggestions.

Special Education

- 1. Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)
- 2. Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- 3. Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- 4. Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
- 5. Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
- 6. Use project-based science learning to connect science with observable phenomena.
- 7. Structure the learning around explaining or solving a social or community-based issue.
- 8. Provide ELL students with multiple literacy strategies.
- 9. Collaborate with after-school programs or clubs to extend learning opportunities.

Gifted and Talented

- Compare & Contrast
- Conferencing
- Debates
- Jigsaw
- Peer Partner Learning

- Problem Solving
- Structured Controversy
- Think, Pair, Share
- Tutorial Groups

Instruction/Materials

- alter format of materials (type/highlight, etc.)
- color code materials
- eliminate answers
- extended time
- extended time
- large print
- modified quiz
- modified test
- Modify Assignments as Needed
- Modify/Repeat/Model directions
- necessary assignments only
- Other (specify in plans)
- other- named in lesson
- provide assistance and cues for transitions
- provide daily assignment list
- read class materials orally
- reduce work load
- shorten assignments
- study guide/outline
- utilize multi-sensory modes to reinforce instruction

Environment

- alter physical room environment
- assign peer tutors/work buddies/note takers
- assign preferential seating
- individualized instruction/small group
- modify student schedule (Describe)
- other- please specify in plans
- provide desktop list/formula

Honors Modifications

Honors level Pre-Calculus students are also expected to persevere through a number of application and synthesis word problems found in the college level Pre-Calculus: A Concise Course textbook by Larson and Hostetler.

Resources

- http://www.corestandards.org/the-standards/mathematics
- https://njctl.org/courses/math/pre-calculus/
- Infinite Pre-calculus