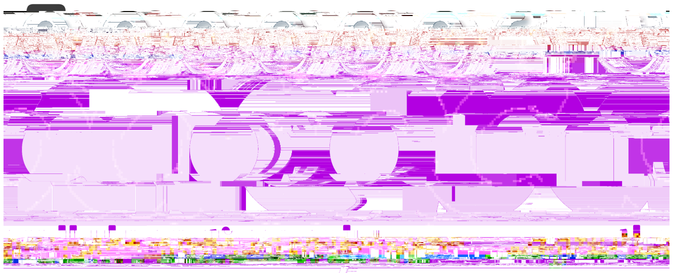

Berkeley City College, Cal State East Bay
College of Alameda, Laney College
Merritt College, Ohlone College
San Francisco State University

[illegible]ponential Functio[illegible]s

Pacing: ____________
(week/section/date)

S[illegible] WHAT?

Understanding exponential functions is [illegible] [illegible] people. Pandemics can be model[illegible] using expone[illegible] functions and an [illegible]

[illegible] owth/decay, pH, [illegible]. In calculus, you will [illegible]

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Click any Course Topic to view its Course Guide

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Exponential Functions

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Exponential functions can be used to model many real world phenomena. These models can then be used to help us answer questions in areas such as finance (compounding interest), infectious disease (pandemics), population growth and decay, and many other areas that impact our daily lives. STEM fields such as chemistry and biology use models that rely on exponential functions and their inverses, logarithmic functions. A solid understanding of the properties of exponentials will prepare you for further analysis in calculus.

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- Written Homework- Exponential Functions
- Activity - Exponential Functions
- Activity - Exponent Rules and Computations

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- Use rules of exponents to rewrite exponential expressions in equivalent forms.
- Define exponential functions and identify exponential and non-exponential functions by applying the definition.
- Determine the limits as x Ÿ ±∞ (end behavior) of exponential functions.
- Justify through analysis of the base and/or by sketching a graph.
- Describe how graphs of exponential functions vary for different values of the base.
- Define horizontal asymptote using limits and identify horizontal asymptotes of exponential functions.
- Recognize and be able to produce the graphs of non-transformed exponential functions.

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Logarithmic Functions

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The importance of exponentials in STEM (and beyond) means that the inverses of exponentials are also very useful. The inverse of an exponential is a logarithm! Understanding how to use exponentials to model something like bacteria growth, means also understanding how to use logarithms. A good foundation in how to use and manipulate logarithms will be helpful as we try to solve problems that involve exponentials.

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- Written Homework- Logarithmic Functions
- Activity - Logarithm Computations
- Activity - Log functions as inverses
- Activity - Comparing Growth
- Log Rules and Graphs (DESMOS)
- Activity - Undoing Exponential Functions
- Activity - Graphs of Logarithmic Functions
- Activity - How do logs work?

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- Define logarithmic functions as inverses of exponential functions.
- Use the definition and basic properties of logarithms to convert between logarithmic and exponential expressions.
- Recognize and be able to graph non-transformed and transformed logarithmic functions.
- Describe how graphs of logarithmic functions vary for different values of b (the base).
- Determine the limits (end behavior) of logarithmic functions.
- Define one-sided limits, recognize one-sided limit notation, and use the notation appropriately.
- Identify vertical asymptotes of logarithmic functions.

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This topic combines ideas about exponential, logarithmic, and inverse functions in the context of solving equations. Exponential and logarithmic equations can be used to model growth and decay of bacteria, measure and compare strength of earthquakes, and other applications. For the first time, students have to choose the most appropriate solution method for the problem in front of them. We develop intuition about how to select strategies by trying things and seeing whether or not they work. Students learn to use the concept of inverse functions to manipulate equations into a form that’s easier to work with, and then check

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We use trig graphs to model periodic behavior, for example modeling heart beats, the behavior of planets, or sound/electricity/light waves. The graphs of trig functions offer us an alternate way of seeing the relationship between angles and lengths.

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- Use the unit circle to explain the behavior of the sine and cosine as functions of the real numbers. Make connections between the unit circle and domain/range and intercepts of these functions.
- Recognize and be able to produce the graphs of y = sin (x) and y = cos (x). Use the graphs to find the period of each function. Also, recognize transformed versions of these graphs using the transformations presented earlier this semester.
- Use the sine and cosine functions to explain the behavior of tangent as a function of the real numbers.
- Use zeros of the sine and cosine functions to explain the domain and intercepts of the tangent function.
- Use one-sided limits to determine the limits of the tangent function at the points of discontinuity in the domain.

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