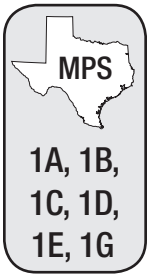
Modeling Logarithmic Functions

Instruction

Essential Questions



1. If an exponential function is $f(x) = a^x$, what is its inverse function?
2. What exponential function has as its inverse the logarithmic function $\log_a g(x) = x$?
3. What are the domain and range of the logarithmic function that is the inverse of the exponential function $f(x) = a^x$?
4. What function is the inverse of the exponential function $f(x) = ab^{cx}$?
5. How do the values of an exponential function and its inverse logarithmic function vary over a domain and what are the restrictions, if any, on the domain values?

WORDS TO KNOW

argument	the result of raising the base of a logarithm to the power of the logarithm, so that b is the argument of the logarithm $\log_a b = c$
base	the quantity that is being raised to an exponent in an exponential expression; in a^x, a is the base; or, the quantity that is raised to an exponent which is the value of the logarithm, such as 2 in the equation $\log_2 g(x) = 3 - x$
common logarithm	a base-10 logarithm which is usually written without the number 10, such as $\log x = \log_{10} x$
e	an irrational number with an approximate value of 2.71828; e is the base of the natural logarithm ($\ln x$ or $\log_e x$)
exponential function	a function that has a variable in the exponent, such as $f(x) = 5^x$
logarithmic function	the inverse of an exponential function; for the exponential function $f(x) = 5^x$, the inverse logarithmic function is $g(x) = \log_a x$
natural logarithm	a logarithm whose base is the irrational number e; usually written in the form "ln," which means "$\log_e$"
power	the result of raising a base to an exponent; 32 is a power of 2 since $2^5 = 32$

Recommended Resources

- The Math Page. "Logarithmic and Exponential Functions."

  http://www.walch.com/rr/00230

  This tutorial offers a brief, step-by-step introduction to functions and inverses. The site offers an abundant and diverse selection of examples and problems as well.

- Patrick JMT: Just Math Tutorials. "Properties of Logarithms."

  http://www.walch.com/rr/00231

  This 20-minute instructional video reviews graphing logarithmic functions and the rules of logarithms, and provides detailed instruction on applying these rules.

- S.O.S. Math. "Logarithms and Their Inverses."

  http://www.walch.com/rr/00232

  This comprehensive site gives detailed examples and explanations of how to find the inverses of logarithmic functions.