Topic 6.4 Logarithmic Functions

Essential Question:

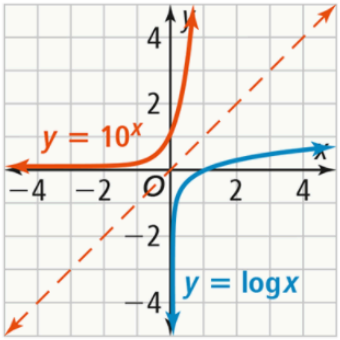
How is the relationship between logarithmic and exponential functions revealed in the key features of their graphs?

Explore & Reason

Complete online.

CONCEPT Summary: Logarithmic Functions

GRAPH



The functions are inverses so their graphs are reflections of each other across the line with equation $y = x$.

	$y = \log x$	$y = 10^x$
EQUATIONS		
KEY FEATURES	Domain: $\{x \mid x > 0\}$ Range: all real numbers x-intercept: 1 Asymptote: y-axis	Domain: all real numbers Range: $\{y \mid y > 0\}$ y-intercept: 1 Asymptote: x-axis
END BEHAVIOR	As $x \to 0$, $y \to -\infty$ As $x \to \infty$, $y \to \infty$	As $x \to -\infty$, $y \to 0$ As $x \to \infty$, $y \to \infty$

Q: How are the domain and the range of $y = \log x$ relate to the domain and the range of $y = 10^x$?

Q: How are the x-intercept and the asymptote of $y = \log x$ affected if the graph is translated 3 unites to the right?

Examples & Questions

Examples 1

Q: When graphing $y = \log_2 x$, why is it helpful to start by graphing $y = 2^x$?

Examples 2

Q: How is graphing transformations of logarithmic functions the same as graphing transformations of exponential functions? How is it different?

Examples 3

Q: Why does a horizontal shift in an exponential equation become a vertical shift in its inverse.

Examples 4

Q: Why did you need to subtract 25 and divide by 12 before rewriting the equation in exponential form?

Examples 5

Q: How is finding the average rate of change on an interval similar to finding the rate of change, or slope, of the line between two points?

Practice and Problem Solving

Complete MathXL for School: Practice and Problem Solving (online)
Complete MathXL for School: Enrichment (online)

Challenge: # – key will be posted in Power School Learning.

Lesson Quiz 6.4/Notes