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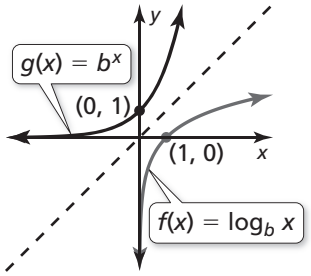
6.3 Notetaking with Vocabulary (continued)

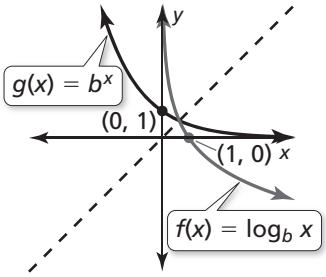
Parent Graphs for Logarithmic Functions

The graph of $f(x) = \log_b x$ is shown below for $b > 1$ and for $0 < b < 1$.
Because $f(x) = \log_b x$ and $g(x) = b^x$ are inverse functions, the graph of $f(x) = \log_b x$ is the reflection of the graph of $g(x) = b^x$ in the line $y = x$.

Graph of $f(x) = \log_b x$ for $b > 1$



Graph of $f(x) = \log_b x$ for $0 < b < 1$



Note that the y-axis is a vertical asymptote of the graph of $f(x) = \log_b x$. The domain of $f(x) = \log_b x$ is $x > 0$, and the range is all real numbers.

Notes:

Extra Practice

In Exercises 1–4, rewrite the equation in exponential form.

1. $\log_{10} 1000 = 3$ **2.** $\log_5 \frac{1}{25} = -2$ **3.** $\log_{10} 1 = 0$ **4.** $\log_{1/4} 64 = -3$

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6.3 Notetaking with Vocabulary (continued)

In Exercises 5–8, rewrite the equation in logarithmic form.

5. $12^2 = 144$ **6.** $20^{-1} = \frac{1}{20}$ **7.** $216^{1/3} = 6$ **8.** $4^0 = 1$

In Exercises 9–12, evaluate the logarithm.

9. $\log_4 64$ **10.** $\log_{1/8} 1$ **11.** $\log_2 \frac{1}{32}$ **12.** $\log_{1/25} \frac{1}{5}$

In Exercises 13 and 14, simplify the expression.

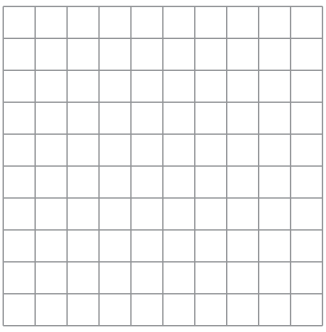
13. $13^{\log_{13} 6}$ **14.** $\ln e^{x^3}$

In Exercises 15 and 16, find the inverse of the function.

15. $y = 15^x + 10$ **16.** $y = \ln(2x) - 8$

In Exercises 17 and 18, graph the function. Determine the asymptote of the function.

17. $y = \log_2(x + 1)$



18. $y = \log_{1/2} x - 4$