

Practice: Logarithmic Functions as Inverses**B**

For problems 1–3, write the inverse of each logarithmic function.

1. $f(x) = 6 + 4 \cdot \log_{10}(2x - 1)$

2. $g(x) = \frac{3 - 4\log_5 x}{6 + \log_5 x}$

3. $h(x) = \frac{1}{3} \log_4 \sqrt[3]{x}$

For problems 4–7, state the domain and range of the logarithmic function.

4. $a(x) = \log_9(8 - x) - 7$

5. $b(x) = \frac{4}{\log_3 2x}$

6. $c(x) = 12 - \log_6(x + 1)$

7. $d(x) = \frac{2}{3} \log_4(5 - x)$

continued

Use the information given in each scenario to complete problems 8–10.

8. The “loudness” of a whisper is about 20 decibels. The loudness of a school cafeteria is about 60 decibels. The decibel loudness of a sound is given by the function $D(i) = \log_{10} \left(\frac{i}{i_0} \right)$, where i is the intensity of a sound in watts per meter squared. The quantity i_0 is 10^{-12} watt per meter squared, which is the threshold of human hearing. How much greater is the intensity i of the cafeteria sound than the intensity of the whisper?
9. The net pH of the stomach acid for a person with indigestion is about 2.75. After taking an antacid, the person’s stomach pH changes to 4.15. If the pH is given by the formula $\text{pH} = -\log_{10} C$, where C is the concentration of the stomach acid solution, determine the concentration of the solution before and after the antacid was taken.
10. The chance of a fair coin landing heads-up once is 1 in 2. The chance of the coin landing heads-up on each of 3 successive flips of the coin is 1 in 8. What is the chance, $C(n)$, of the coin landing heads-up on each of 12 flips in a row? Write an exponential function for the chance $C(n)$ of the coin landing heads-up n times in a row. Write the inverse, $C^{-1}(n)$, using a logarithm.