

7-3 Word Problem Practice**Logarithms and Logarithmic Functions**

- 1. CHEMISTRY** The pH of a solution is found by the formula $\text{pH} = -\log H$, where H stands for the hydrogen ion concentration in the formula. What is the pH of a solution to the nearest hundredth when H is 1356?

– 3.13

- 2. FIND THE ERROR** Michio wanted to find the value of x in the equation $2(3)^x = 34$. He first converted the equation to $\log_3 2x = 17$. Next he wrote $2x = 3^{17}$ and used a calculator to find $x = 64,570,081$. Was his answer correct? If not, what was his mistake and what is the right answer?

No; he should have converted to $x = \log_3 17$; $x = 2.58$.

- 3. SOUND** The decibel level L of a sound is determined by the formula $L = 10 \log_{10} \frac{I}{M}$. Find I in terms of M for a noise with a decibel level of 120.
 $I = 1,000,000,000,000 M$ or $10^{12} M$

- 4. EARTHQUAKES** The intensity of an earthquake can be measured on the Richter scale using the formula $y = 10^{R-1}$, where y is the absolute intensity of the earthquake and R is its Richter scale measurement.

Richter Scale Number	Absolute Intensity
1	1
2	10
3	100
4	1000
5	10,000

An earthquake in San Francisco in 1906 had an absolute intensity of 6,000,000. What was that earthquake's measurement on the Richter scale?

7.8

- 5. GAMES** Julio and Natalia decided to play a game in which they each selected a logarithmic function and compare their functions to see which gave larger values. Julio selected the function $f(x) = 10 \log_2 x$ and Natalia selected the function $2 \log_{10} x$.

- a.** Which of the functions has a larger value when $x = 7$?

Julio's; Julio's is 28.07 and Natalia's is 1.69.

- b.** Which of their functions has a larger value when $x = 1$?

Neither; both equal 0.

- c.** Do you think the base or the multiplier is more important in determining the value of a logarithmic function?

Answers will vary.