

# 7-4 Standardized Test Prep

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## Properties of Logarithms

### Multiple Choice

For Exercises 1–4, choose the correct letter.

1. Which statement correctly demonstrates the Power Property of Logarithms?

A  $\frac{1}{2} \log_5 9 = \log_5 81$

C  $\frac{1}{2} \log_5 9 = \log_5 18$

B  $\frac{1}{2} \log_5 9 = \log_5 \frac{9}{2}$

D  $\frac{1}{2} \log_5 9 = \log_5 3$

2. Which expression is the correct expansion of  $\log_4 (3x)^2$ ?

F  $\frac{1}{2} (\log_4 3 - \log_4 x)$

H  $2 (\log_4 3 - \log_4 x)$

G  $2 (\log_4 3 + \log_4 x)$

I  $2 \log_4 3 + \log_4 x$

3. Which expression is equivalent to  $\log_7 16$ ?

A  $\frac{\log_7 16}{\log 10}$

C  $\frac{\log 16}{\log 7}$

B  $\frac{\log_{16} 10}{\log_7 10}$

D  $\frac{\log 7}{\log 16}$

4. Which statement correctly expresses  $4 \log_3 x + 7 \log_3 y$  as a single logarithm?

F  $\log_3 x^4 y^7$

H  $\log_3 (x^4 + y^7)$

G  $\log_3 (4x + 7y)$

I  $\log_3 (4x - 7y)$

### Short Response

5. The pH of a substance equals  $-\log[H^+]$ , where  $[H^+]$  is the concentration of hydrogen ions. The concentration of hydrogen ions in pure water is  $10^{-7}$  and the concentration of hydrogen ions in a sodium hydroxide solution is  $10^{-14}$ .

a. Without using a calculator, what is the difference of the pH levels of pure water and the sodium hydroxide solution?

b. Explain in words or show work for how you determined the difference of the pH levels.