Name_____ Date _____

5.4 Practice B

In Exercises 1–3, use $\log_5 3 \approx 0.683$ and $\log_5 6 \approx 1.113$ to evaluate the logarithm.

1. $\log_5 81$

2. $\log_5 \frac{1}{6}$

3. $\log_5 \frac{1}{2}$

In Exercises 4–6, expand the logarithmic expression.

4. $\log_3 12x^7$

5. $\log_6 \frac{5x^2}{y^3}$

6. $\log_8 6\sqrt{xy}$

7. Describe and correct the error in expanding the logarithmic expression.

$\times \quad \ln \sqrt[3]{xy} = \frac{1}{3} \ln x + \ln y$

In Exercises 8–11, condense the logarithmic expression.

8. $5 \log_9 x - \log_9 4$

9. $\log_8 5 + \frac{1}{4} \log_8 x$

10. $2 \ln 4 + 5 \ln x + 3 \ln y$

11. $\log_6 9 + 2 \log_6 \frac{1}{3} - 3 \log_6 x$

In Exercises 12–14, use the change-of-base formula to evaluate the logarithm.

12. $\log_8 15$

13. $\log_3 30$

14. $\log_4 \frac{8}{17}$

15. Your friend claims you can use the change-of-base formula to write the expression $\frac{\ln y}{\ln 3}$ as a logarithm with base 3. Is your friend correct? Explain your reasoning.

16. For a sound with intensity I (in watts per square meter), the loudness $L(I)$ of the sound (in decibels) is given by the function $L(I) = 10 \log \frac{I}{I_0}$, where I_0 is the intensity of a barely audible sound $\left(\text{about } 10^{-12} \text{ watts per square meter}\right)$. The bass guitar player in a band turns up the volume of the speaker so that the intensity of the sound triples. By how many decibels does the loudness increase?