Name _____

6-5 Additional Practice

Properties of Logarithms

Use the properties of logarithms to expand each expression.

1. $\ln (a^4b^7)$

2. $\ln (x^4)$

3. $\log_7 (a^2b^3c)$

4. $\log \left(\frac{7}{8}\right)^x$

5. $\log_5 \left(\frac{x}{7y}\right)$

6. $\log \left(\frac{a}{b^2}\right)$

Use the properties of logarithms to write each expression as a single logarithm.

7. $3 \log 4 - 2 \log 7$

8. $2 \ln 4 + 2 \ln 5$

9. $2 \log_4 a + 5 \log_4 b$

10. $\log 4 + \log 5 + \log 7$

11. $2 \log 2 + 5 \log(2x)$

12. $4 \log_6 a - 7 \log_6 b$

13. Use the formula $\text{pH} = \log \left(\frac{1}{[H^+]}\right)$ to write an expression for the concentration of hydrogen ions in a liter of a sports drink that has a pH level of 2.5. What is the concentration of hydrogen ions?

Use the Change of Base Formula to evaluate each logarithm. Round to the nearest thousandth, if necessary.

14. $\log_2 10$

15. $\log_5 7$

16. $\ln e$

17. $\log_7 9$

18. $\log_5 13$

19. $\log_3 9$

Use the Change of Base Formula to solve each equation for *x*. Give an exact solution as a logarithm and an approximate solution rounded to the nearest thousandth.

20. $5^x = 7$

21. $4^x = 20$

22. $7^x = 42$

23. $4^x = 77$

24. $8^x = 50$

25. $3^x = 16$

26. Explain why $\frac{2}{3} \neq \frac{\ln 2}{\ln 3}$.

6-5 Additional Practice

Properties of Logarithms

Use the properties of logarithms to expand each expression.

1. $\ln(a^4b^7)$
   $4\ln a + 7\ln b$
2. $\ln(x^4)$
   $4\ln x$
3. $\log_7(a^2b^3c)$
   $2\log_7 a + 3\log_7 b + \log_7 c$
4. $\log\left(\frac{7}{8}\right)^x$
   $x\log 7 - x\log 8$
5. $\log_5\left(\frac{x}{7y}\right)$
   $\log_5 x - \log_5(7y)$
6. $\log\left(\frac{a}{b^2}\right)$
   $\log a - 2\log b$

Use the properties of logarithms to write each expression as a single logarithm.

7. $3\log 4 - 2\log 7$
   $\log\left(\frac{4^3}{7^2}\right) = \log\left(\frac{64}{49}\right)$
8. $2\ln 4 + 2\ln 5$
   $\ln 400$
9. $2\log_4 a + 5\log_4 b$
   $\log_4(a^2b^5)$
10. $\log 4 + \log 5 + \log 7$
    $\log 140$
11. $2\log 2 + 5\log(2x)$
    $\log(4 \times (2x)^5)$
    $= \log 128x^5$
12. $4\log_6 a - 7\log_6 b$
    $\log_6\left(\frac{a^4}{b^7}\right)$
13. Use the formula $\text{pH} = \log\left(\frac{1}{[H^+]}\right)$ to write an expression for the concentration of hydrogen ions in a liter of a sports drink that has a pH level of 2.5. What is the concentration of hydrogen ions? $\text{pH} = 2.5 = \log\left(\frac{1}{[H^+]}\right)$ $H^+ = 10^{-2.5}$

    The concentration of hydrogen ions in a liter of coca cola is $10^{-2.5}$ mole.

Use the Change of Base Formula to evaluate each logarithm. Round to the nearest thousandth.

14. $\log_2 10$ 3.322
15. $\log_5 7$ 1.209
16. $\ln e$ 1
17. $\log_7 9$ 1.129
18. $\log_5 13$ 1.594
19. $\log_3 9$ 2

Use the Change of Base Formula to solve each equation for *x*. Give an exact solution as a logarithm and an approximate solution rounded to the nearest thousandth.

20. $5^x = 7$ 1.209
21. $4^x = 20$ 2.161
22. $7^x = 42$ 1.921
23. $4^x = 77$ 3.133
24. $8^x = 50$ 1.881
25. $3^x = 16$ 2.524
26. Explain why $\frac{2}{3} \neq \frac{\ln 2}{\ln 3}$?

    $\frac{2}{3} = 0.667; \frac{\ln 2}{\ln 3} = 0.631; 0.667 \neq 0.631$, therefore $\frac{2}{3} \neq \frac{\ln 2}{\ln 3}$.