

LESSON **7-4** **Practice B**
Properties of Logarithms

Express as a single logarithm. Simplify, if possible.

1. $\log_3 9 + \log_3 27$

$\log_3 243 = 5$

2. $\log_2 8 + \log_2 16$

$\log_2 128 = 7$

3. $\log_{10} 80 + \log_{10} 125$

$\log_{10} 10,000 = 4$

4. $\log_6 8 + \log_6 27$

$\log_6 216 = 3$

5. $\log_3 6 + \log_3 13.5$

$\log_3 81 = 4$

6. $\log_4 32 + \log_4 128$

$\log_4 4096 = 6$

Express as a single logarithm. Simplify, if possible.

7. $\log_2 80 - \log_2 10$

$\log_2 \frac{80}{10} \Rightarrow \log_2 8 = 3$

8. $\log_{10} 4000 - \log_{10} 40$

$\log_{10} \frac{4000}{40} \Rightarrow \log_{10} 100 = 2$

9. $\log_4 384 - \log_4 6$

$\log_4 \frac{384}{6} \Rightarrow \log_4 64 = 3$

10. $\log_2 1920 - \log_2 30$

$\log_2 \frac{1920}{30} \Rightarrow \log_2 64 = 6$

11. $\log_3 486 - \log_3 2$

$\log_3 \frac{486}{2} \Rightarrow \log_3 243 = 5$

12. $\log_6 180 - \log_6 5$

$\log_6 \frac{180}{5} \Rightarrow \log_6 36 = 2$

Simplify, if possible.

13. $\log_4 4^6$

$6 \log_4 4 = 6(1) = 6$

14. $\log_5 5^{x-5}$

$= x - 5$

15. $7^{\log_7 30}$

$= 30$

16. $12^{\log_{12} 1}$

$= 1$

17. $\log_8 8^5$

$5 \log_8 8 = 5(1) = 5$

18. $\log_3 9^4$

$4 \log_3 9 = 4(2) = 8$

Evaluate. Round to the nearest hundredth.

19. $\log_{12} 1$

$= 0$

20. $\log_3 30 \Rightarrow \frac{\log 30}{\log 3}$

$= 3.10$

21. $\log_5 10 \Rightarrow \frac{\log 10}{\log 5}$

$= 1.43$

Solve.

22. The Richter magnitude of an earthquake, M , is related to the energy released in ergs, E , by the formula $M = \frac{2}{3} \log \left(\frac{E}{10^{11.8}} \right)$.

Find the energy released by an earthquake of magnitude 4.2.

LESSON
7-4

Practice C
Properties of Logarithms

Express as a single logarithm. Simplify, if possible.

1. $\log_6 12 + \log_6 18$

$\log_6 216 = 3$

2. $\log_3 81 - \log_3 27$

$\log_3 \frac{81}{27} \Rightarrow \log_3 3 = 1$

3. $\log_4 128 - \log_4 8$

$\log_4 \frac{128}{8} \Rightarrow \log_4 16 = 2$

4. $\log_6 18 + \log_6 72$

$\log_6 1296 = 4$

5. $\log_5 3125 - \log_5 25$

$\log_5 \frac{3125}{25} \Rightarrow \log_5 125 = 3$

6. $\log_8 128 + \log_8 256$

$\log_8 32,768 = 5$

7. $\log_5 5 + \log_5 125$

$\log_5 625 = 4$

8. $\log_2 256 - \log_2 64$

$\log_2 \frac{256}{64} \Rightarrow \log_2 4 = 2$

9. $\log_3 8019 - \log_3 99$

$\log_3 \frac{8019}{99} \Rightarrow \log_3 81 = 4$

10. $\log_8 80 + \log_8 51.2$

$\log_8 4096 = 4$

11. $\log_7 13.3 - \log_7 1.9$

$\log_7 \frac{13.3}{1.9} \Rightarrow \log_7 7 = 1$

12. $\log_{10} 125 + \log_{10} 80$

$\log_{10} 10,000 = 4$

Evaluate. Round to the nearest hundredth.

13. $\log_8 8^6$

$= 6$

14. $2^{\log_2 8^x}$

$= 8^x$

15. $\log_2 16^5$

$5 \log_2 16 = 5(4) = 20$

16. $\log_3 3^{(2x+1)}$

$= 2x + 1$

17. $\log_4 16^{(x-1)}$

$(x-1) \log_4 16 = (x-1)2 = 2x - 2$

18. $5^{\log_5 17}$

$= 17$

19. $\log_3 5^2 \quad 2 \left(\frac{\log 5}{\log 3} \right)$

$2 \log_3 5 = 2.93$

20. $\log_5 \left(\frac{1}{125} \right)^2$

$2 \log_5 \frac{1}{125} = 2(-3) = -6$

21. $\log_6 \left(\frac{1}{6^4} \right)^3$

$3 \log_6 \frac{1}{6^4} = 3(-4) = -12$

22. $\log_4 20^2 \quad 2 \left(\frac{\log 20}{\log 4} \right)$

$2 \log_4 20 = 4.32$

23. $\log_9 27^4 \quad 4 \left(\frac{\log 27}{\log 9} \right)$

$4 \log_9 27 = 6$

24. $\log_2 10$

$\frac{\log 10}{\log 2} = 3.32$

Solve.

25. Carmen has a painting presently valued at \$5000. An art dealer told her the painting would appreciate at a rate of 6% per year. In how many years will the painting be worth \$8,000?

a. Write a logarithmic expression.

b. Simplify your expression.
