Name _____ Date _____ Class _____

LESSON 16-1

Properties of Logarithms

Practice and Problem Solving: A/B

Express as a single logarithm. Simplify, if possible.

1. $\log_3 9 + \log_3 27$ _____
2. $\log_2 8 + \log_2 16$ _____
3. $\log_{10} 80 + \log_{10} 125$ _____
4. $\log_6 8 + \log_6 27$ _____
5. $\log_3 6 + \log_3 13.5$ _____
6. $\log_4 32 + \log_4 128$ _____

Express as a single logarithm. Simplify, if possible.

7. $\log_2 80 - \log_2 10$ _____
8. $\log_{10} 4000 - \log_{10} 40$ _____
9. $\log_4 384 - \log_4 6$ _____
10. $\log_2 1920 - \log_2 30$ _____
11. $\log_3 486 - \log_3 2$ _____
12. $\log_6 180 - \log_6 5$ _____

Simplify, if possible.

13. $\log_4 4^6$ _____
14. $\log_5 5^{x-5}$ _____
15. $7^{\log_7 30}$ _____
16. $12^{\log_{12} 1}$ _____
17. $\log_8 8^5$ _____
18. $\log_3 9^4$ _____

Evaluate. Round to the nearest hundredth.

19. $\log_{12} 1$ _____
20. $\log_3 30$ _____
21. $\log_5 10$ _____

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. _____

Name _____ Date _____ Class _____

LESSON 16-1

Properties of Logarithms

Practice and Problem Solving: C

Express as a single logarithm. Simplify, if possible.

1. $\log_6 12 + \log_6 18$ _____
2. $\log_3 81 - \log_3 27$ _____
3. $\log_4 128 - \log_4 8$ _____
4. $\log_6 18 + \log_6 72$ _____
5. $\log_5 3125 - \log_5 25$ _____
6. $\log_8 128 + \log_8 256$ _____
7. $\log_5 5 + \log_5 125$ _____
8. $\log_2 256 - \log_2 64$ _____
9. $\log_3 8019 - \log_3 99$ _____
10. $\log_8 80 + \log_8 51.2$ _____
11. $\log_7 13.3 - \log_7 1.9$ _____
12. $\log_{10} 125 + \log_{10} 80$ _____

Evaluate. Round to the nearest hundredth.

13. $\log_8 8^6$ _____
14. $2^{\log_2 8^x}$ _____
15. $\log_2 16^5$ _____
16. $\log_3 3^{(2x+1)}$ _____
17. $\log_4 16^{(x-1)}$ _____
18. $5^{\log_5 17}$ _____
19. $\log_3 5^2$ _____
20. $\log_5 \left(\frac{1}{125}\right)^2$ _____
21. $\log_6 \left(\frac{1}{6^4}\right)^3$ _____
22. $\log_4 20^2$ _____
23. $\log_9 27^4$ _____
24. $\log_2 10$ _____

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 $8000?

    a. Write a logarithmic expression representing the situation. _____

    b. Simplify your expression. How many years will it take? _____

Name _____ Date _____ Class_____

Name _____ Date _____ Class_____

MODULE 16 Logarithmic Properties and Exponential Equations

LESSON 16-1

Practice and Problem Solving: A/B

1. $\log_3 243 = 5$
2. $\log_2 128 = 7$
3. $\log_{10} 10{,}000 = 4$
4. $\log_6 216 = 3$
5. $\log_3 81 = 4$
6. $\log_4 4096 = 6$
7. $\log_2 8 = 3$
8. $\log_{10} 100 = 2$
9. $\log_4 64 = 3$
10. $\log_2 64 = 6$
11. $\log_3 243 = 5$
12. $\log_6 36 = 2$
13. 6
14. $x - 5$
15. 30
16. 1
17. 5
18. 8
19. 0
20. 3.10
21. 1.43
22. $1.26(10)^{18}$ ergs

Practice and Problem Solving: C

1. $\log_6 216 = 3$
2. $\log_3 3 = 1$
3. $\log_4 16 = 2$
4. $\log_6 1296 = 4$
5. $\log_5 125 = 3$
6. $\log_8 32{,}768 = 5$
7. $\log_5 625 = 4$
8. $\log_2 4 = 2$
9. $\log_3 81 = 4$
10. $\log_8 4096 = 4$
11. $\log_7 7 = 1$
12. $\log_{10} 10{,}000 = 4$
13. 6
14. 8^x
15. 20

16. $2x + 1$
17. $2x - 2$
18. 17
19. 2.93
20. -6
21. -12
22. 4.32
23. 6
24. 3.32
25. a. $\log_{1.06} 1.6$
    b. about 8 years

Practice and Problem Solving: Modified

1. 4
2. 64; 64; 6
3. 3125; 3125; 5
4. $\log_{10} 10{,}000 = 4$
5. $\log_6 6 = 1$
6. $\log_8 64 = 2$
7. $\log_5 25 = 2$
8. $\log_3 3 = 1$
9. $\log_2 32 = 5$
10. $\log_4 16 = 2$
11. $\log_6 36 = 2$
12. $\log_5 125 = 3$
13. 4
14. 4
15. 9
16. 4
17. 12
18. 2
19. 1.59
20. 1.77
21. 1.46
22. 10^{22} ergs

Reading Strategies

1. True; Product Property
2. True; Quotient Property
3. False; Power Property
4. False; Change of Base Property
5. 5 log x; Power Property
6. log x; Quotient Property
7. 1; Product Property

8. $x \log x$; Power Property