Name _____ Date _____

LESSON 4.4

Practice B

For use with the lesson "Evaluate Logarithms and Graph Logarithmic Functions"

Rewrite the equation in exponential form.

1. $\log_7 49 = 2$ **2.** $\log_2 16 = 4$ **3.** $\log_5 125 = 3$

4. $\log_{16} 4 = \frac{1}{2}$ **5.** $\log_4 \frac{1}{4} = -1$ **6.** $\log_3 \frac{1}{9} = -2$

Evaluate the logarithm without using a calculator.

7. $\log_9 81$ **8.** $\log_8 1$ **9.** $\log_3 \frac{1}{3}$

10. $\log_4 2$ **11.** $\log_{27} 3$ **12.** $\log_4 4^{2/3}$

Use a calculator to evaluate the logarithm. Round the result to three decimal places.

13. $\ln \sqrt{5}$ **14.** $\log 110$ **15.** $\ln \frac{1}{2}$

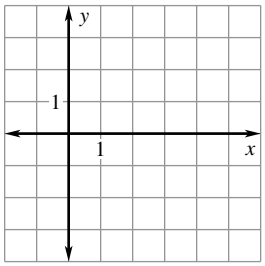
Find the inverse of the function.

16. $y = \log_5 x$ **17.** $y = \ln x$ **18.** $y = \log_{1/5} x$

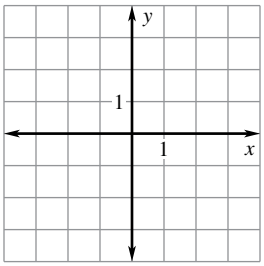
19. $y = \log \frac{x}{2}$ **20.** $y = \log_6(x + 2)$ **21.** $y = \log_3 9x$

Graph the function. State the domain and range.

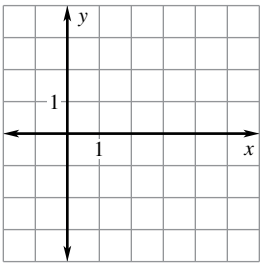
22. $f(x) = \log_3 x$



23. $f(x) = \log_3(x + 2)$



24. $f(x) = -\log_3 x - 1$



25. **Galloping Speed** Four-legged animals run with two different types of motion: trotting and galloping. An animal that is trotting has at least one foot on the ground at all times. An animal that is galloping has all four feet off the ground at times. The number S of strides per minute at which an animal breaks from a trot to a gallop is related to the animal's weight w (in pounds) by the model $S = 256.2 - 47.9 \log w$. Approximate the number of strides per minute for a 450 pound horse when it breaks from a trot to a gallop.

26. **Tornadoes** The wind speed S (in miles per hour) near the center of a tornado is related to the distance d (in miles) the tornado travels by the model $S = 93 \log d + 65$. Approximate the wind speed of a tornado that traveled 75 miles.

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Lesson 4.4 Evaluate Logarithms and Graph Logarithmic Functions

Teaching Guide

1. 1; $3^4 = 81$

Investigating Algebra Activity

1. a. 9 **b.** $\frac{1}{8}$ **c.** 1 **d.** 8 **e.** 36

2. Answers may vary. **3.** They are the same.

4. They are the same. **5.** They are the same.

6. To rewrite an exponential equation as a logarithmic equation, begin by writing *log* followed by a subscript, which is the base in the exponential equation. Next, write the value of the exponential equation followed by an equal sign. Finally, write the exponent. **a.** $\log_2 32 = 5$

b. $\log_4 \frac{1}{16} = -2$ **c.** $\log_3 81 = 4$

Practice Level A

1. $10^1 = 10$ **2.** $2^2 = 4$ **3.** $3^3 = 27$ **4.** $6^2 = 36$

5. $5^0 = 1$ **6.** $2^4 = 16$ **7.** 2 **8.** 2 **9.** 2 **10.** 1

11. 3 **12.** 3 **13.** 1.255 **14.** 1.778 **15.** 0.816

16. 2.197 **17.** −0.799 **18.** 3.993 **19.** x **20.** x

21. $2x$ **22.** x **23.** $3x$ **24.** $2x$ **25.** B **26.** C

27. A **28.** A **29.** C **30.** B **31.** 110 decibels

Practice Level B

1. $7^2 = 49$ **2.** $2^4 = 16$ **3.** $5^3 = 125$

4. $16^{1/2} = 4$ **5.** $4^{-1} = \frac{1}{4}$ **6.** $3^{-2} = \frac{1}{9}$

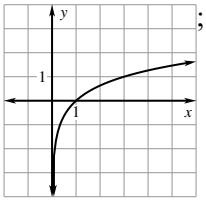
7. 2 **8.** 0 **9.** −1 **10.** $\frac{1}{2}$ **11.** $\frac{1}{3}$ **12.** $\frac{2}{3}$

13. 0.805 **14.** 2.041 **15.** −0.693

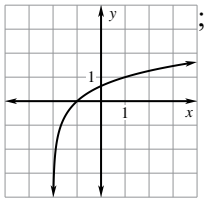
16. $f^{-1}(x) = 5^x$ **17.** $f^{-1}(x) = e^x$

18. $f^{-1}(x) = \left(\frac{1}{5}\right)^x$ **19.** $f^{-1}(x) = 2(10^x)$

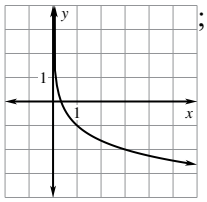
20. $f^{-1}(x) = 6^x - 2$ **21.** $f^{-1}(x) = 3^{x-2}$

22. 

; domain: $x > 0$; range: all real numbers

23. 

; domain: $x > -2$; range: all real numbers

24. 

; domain: $x > 0$; range: all real numbers

25. 129 **26.** 239.4 mi/h

Practice Level C

1. $4^{1/2} = 2$ **2.** $3^4 = 81$ **3.** $\left(\frac{1}{4}\right)^{-3} = 64$

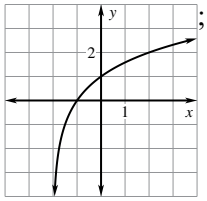
4. −3 **5.** $\frac{3}{2}$ **6.** $\frac{5}{2}$ **7.** $\frac{2}{3}$ **8.** $-\frac{1}{4}$ **9.** $\frac{3}{2}$

10. 2.946 **11.** 7.974 **12.** −8.950

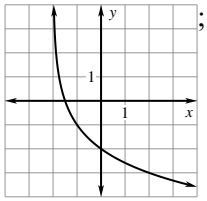
13. $f^{-1}(x) = 7^x$ **14.** $f^{-1}(x) = \frac{3^x}{4}$

15. $f^{-1}(x) = \left(\frac{1}{2}\right)^{x-2}$ **16.** $f^{-1}(x) = e^{x-2}$

17. $f^{-1}(x) = e^{x+3} + 1$ **18.** $f^{-1}(x) = \frac{1}{3}x + 1$

19. 

; domain: $x > -2$; range: all real numbers

20. 

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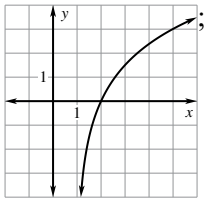
21. 

; domain: $x > 1$; range: all real numbers

22. 42.79 sec

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