

Chapter 7 Test (continued)

Form G

Use the Change of Base Formula to rewrite each expression using common logarithms.

20. $\log_4 12$

$$\frac{\log 12}{\log 4}$$

21. $\log_2 5$

$$\frac{\log 5}{\log 2}$$

22. $\log_8 14$

$$\frac{\log 14}{\log 8}$$

23. A parent increases a child's allowance by 15% each year. If the allowance is \$3 now, when will it reach \$15? in 12 years

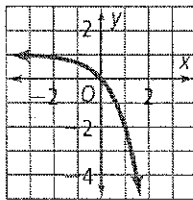
24. A scientist notes that the number of bacteria in a colony is 50. Two hours later, she notes that the number of bacteria has increased to 80. If this rate of growth continues, how much more time will it take for the number of bacteria to reach 100? about 0.95 hour

(or about 57 minutes)

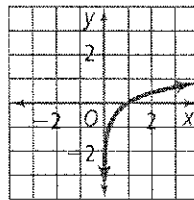
$80 = 50b^2 \Rightarrow 1.6 = b^2$
 $b = \sqrt{1.6} = 1.26491$
 $100 = 80(1.26491)^x$
 $1.25 = (1.26491)^x$

Graph each function.

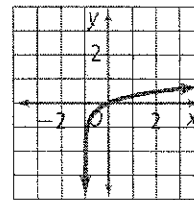
25. $y = -3^x + 1$



26. $y = \log_5 x$



27. $y = \log(x + 1)$



$\log_{1.26491} 1.25 = x$
 $x \approx 0.949543$

Do you UNDERSTAND?

28. **Writing** Describe the effect of different values of a on the function $y = ab^x$.
 If $|a| > 1$, it will stretch the graph of $y = b^x$. If $0 < |a| < 1$, it will compress (shrink) the graph of $y = b^x$. If $a < 0$, there will be a reflection over the x -axis.

29. **Vocabulary** State which property or properties need to be used to write each expression as a single logarithm.

a. $\log_6 16 - \log_6 4$
 Quotient Property

b. $2\log_2 3 + \log_2 4$
 Product and Power Properties

30. **Reasoning** Identify each function as *linear*, *quadratic*, or *exponential*. Explain your reasoning.

- a. $y = 4(2)^x$ exponential; the variable is in the exponent.
- b. $y = 6(x)^2 + 1$ quadratic; the variable is raised to the power of 2.

31. **Writing** Explain the difference between exponential growth and exponential decay.
 Answers may vary. Sample: The value of b is greater than 1 in exponential growth, whereas the value of b is between 0 and 1 in exponential decay. The values of y increase as the values of x increase in exponential growth. The values of y decrease as the values of x increase in exponential decay.

Chapter 7 Test

Form G

Do you know HOW?

Solve each equation.

1. $8 - 3^x = -1$ 2

2. $\log_3 81 = x$ 4

3. $\log x - \log 3 = 2$ 300

4. You put \$2000 into an account earning 4% interest compounded continuously. Find the amount in the account at the end of 8 years. \$2754.25

Describe how the graph of each function is related to the graph of its parent function.

5. $y = -2^x + 1$ The graph is the graph of $y = 2^x$ reflected across the x-axis and shifted up 1 unit.

6. $y = e^{x-4}$ The graph is the graph of $y = e^x$ shifted right 4 units.

7. $y = 5^{x+1} - 2$ The graph is the graph of $y = 5^x$ shifted left 1 unit and down 2 units.

Evaluate each logarithm.

8. $\log_5 125$ 3

9. $\log_{\frac{1}{2}} 4$ 2

10. $\log_3 729$ 6

11. $\log_9 \frac{1}{3}$ $-\frac{1}{2}$

12. $\log_{\frac{1}{4}} 16$ -2

13. $\log_8 \frac{1}{256}$ $-\frac{8}{3}$

Write each equation in logarithmic form.

14. ~~$7^3 = 343$~~ $\log_7 343 = 3$

15. $\left(\frac{2}{3}\right)^{-3} = \frac{27}{8}$ $\log_2 \frac{27}{8} = -3$

16. $2^{-4} = 0.0625$ $\log_2 0.0625 = -4$

$e^0 = 1$ $\ln(1) = 0$

Write each logarithmic expression as a single logarithm.

17. $\log 2 + 3 \log 1$
 $\log 2$

18. $\log a - \log ab$
 $\log \frac{1}{b}$ or $-\log b$

19. $\frac{1}{3}(\log_4 x + \log_4 z)$
 $\log_4 \sqrt[3]{xz}$

$\ln \frac{1}{b}$ or $-\ln b$