

Blizzard Bag Day #1
Logarithm Review

Complete the **ODD NUMBERED PROBLEMS** on the the following pages.

For refreshers on how to do the material, look back to Notes for section 3-2, 3-3, and 3-4.

Many of these concepts will be on your final exam so it is important to review.

3-2 Practice

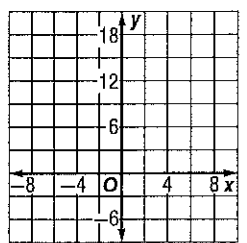
Logarithmic Functions

Evaluate each expression.

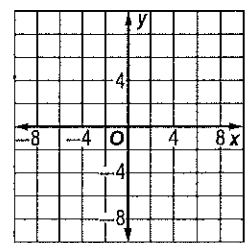
- 1. $\log_7 7^3$
- 2. $\log_{10} 0.001$
- 3. $\log_8 4096$
- 4. $2 \ln e^5$
- 5. $9^{\log_9 18}$
- 6. $\log_8 32$
- 7. $\log_6 216$
- 8. $e^{\ln 0.014x}$
- 9. $\log_{12} 144$

Sketch and analyze the graph of each function. Describe its domain, range, intercepts, asymptotes, end behavior, and where the function is increasing or decreasing.

10. $g(x) = 4^{-x+2}$

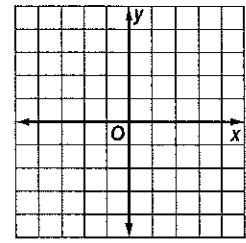


11. $g(x) = e^{2x+1}$



12. Use the graph of f to describe the transformation that results in the graph of g . Then sketch the graphs of f and g .

$$f(x) = \ln x, g(x) = \ln \left(\frac{x}{2} \right) - 2$$



13. **INVESTMENTS** The annual growth rate r for an investment can be found using $r = \frac{1}{t} \ln \frac{P}{P_0}$, where t is time in years, P is the present value, and P_0 is the original investment. An investment of \$4000 was made in 2005 and had a value of \$7500 in 2010. What was the average growth rate of the investment?

3-3 Practice**Properties of Logarithms**Express each logarithm in terms of $\ln 10$ and $\ln 3$.

1. $\ln 300$

2. $\ln 27000$

3. $\ln \frac{10}{9}$

4. $\ln \frac{729}{10000}$

Expand each expression.

5. $\ln \frac{x+1}{\sqrt[4]{x-5}}$

6. $\ln \frac{x^2}{\sqrt{3x+2}}$

7. $\log_2 [(2x)^3(x+1)]$

8. $\log_8 [(4x+2)^3(x-4)]$

9. $\log_{13} \frac{3x^4}{\sqrt[3]{7x-3}}$

10. $\log_2 \frac{(x+1)^3}{\sqrt{x+5}}$

Condense each expression.

11. $\frac{1}{2} \ln(3x-5y) - \ln(4x+y)$

12. $3 \log_2(5x+6) - \frac{1}{2} \log_2(x-4)$

13. $2 - \log_7 6 - 2 \log_7 x$

14. $\log_3 8 + \log_3 x - 2 \log_3(x+4)$

15. $\log y + \log 3 - \frac{1}{3} \log(x) + 2 \log z$

16. $\log_3 y + \log_3 x - \frac{1}{2} \log_3 x + 3 \log_3 z$

Evaluate each logarithm.

17. $\log_{\frac{1}{2}} \frac{1}{5}$

18. $\log_{100} 200$

19. $\log_{0.01} 4$

20. $\log_{0.24} 322$

21. $\log_6 24$

22. $\log_{\frac{1}{3}} 9.8$

23. SEISMOLOGY The intensity of a shock wave from an earthquake is given by the formula $R = \log_{10} \frac{I}{I_0}$, where R is the magnitude, I is a measure of wave energy, and $I_0 = 1$. Find the intensity per unit of area for the following earthquakes.

a. Guam region, in 2008, $R = 6.7$

b. Macquarie Island region, in 2008, $R = 7.1$

3-4 Practice**Exponential and Logarithmic Equations**

Solve each equation.

1. $5^x = 125^{x-2}$

2. $\log_6 x + \log_6 9 = \log_6 54$

3. $\left(\frac{1}{9}\right)^{x+3} = 27^x$

4. $e^{2x} - e^x - 6 = 0$

5. $\log_x 64 = 3$

6. $\ln \frac{1}{e} = x$

7. $\ln(2x - 1) = \ln 16$

8. $3e^{4x} - 9e^{2x} - 15 = 0$

9. $\ln(x - 5) + \ln 4 = \ln x - \ln 2$

10. $4^{x+2} = 6^{-2x-3}$

11. $6e^{6x} - 17e^{3x} + 7 = 0$

12. $6 \ln(x + 2) - 3 = 21$

13. $4e^{2x} - 13e^x + 9 = 0$

14. $\log(2x + 1) + \log(x - 4) = \log(2x^2 - 4)$

15. $2^{-4x+1} = 3^{2x-3}$

16. $\log_5(x + 4) + \log_5 x = \log_5 12$

17. $\log(x + 1) + \log(x - 3) = \log(6x^2 - 6)$

18. $\ln 0.04x = -8$

Solve each equation. Round to the nearest hundredth.

19. $2^{9x} = 1210$

20. $4^{3x} = 1056$

21. $5^{x+3} - 4 = 19$

22. $3^{x-8} + 2 = 38$

23. $6^{2x-1} = 18$

24. $2^{3+2x} = 130$

25. **BANKING** Ms. Cubbatz invested a sum of money in a certificate of deposit that earns 8% interest compounded continuously. The formula for calculating interest that is compounded continuously is $A = Pe^{rt}$. If Ms. Cubbatz made the investment on January 1, 2005, and the account was worth \$12,000 on January 1, 2009, what was the original amount in the account?

26. **FINANCIAL LITERACY** If \$500 is deposited in a savings account providing an annual interest rate of 5.6% compounded quarterly, how long will it take for the account to be worth \$750?