

Module 2, Unit 4
Test Review

Evaluate the expression using properties of logarithms.

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|------------------------------|---|--------------------------------------|
| 1. $\log_4 64 =$ | 2. $\log\left(\frac{1}{\sqrt{10}}\right) =$ | 3. $\log_2\left(\frac{1}{64}\right)$ |
| 4. $\log_4 192 - \log_4 3 =$ | 5. $2^{\log_2 15^x} =$ | 6. $\log(10,000) =$ |

Use properties of logs to expand or condense the logarithm as much as possible.
Where possible, evaluate the logarithmic expressions without using a calculator.

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| 7. Expand. $\log_5\left(\frac{2\sqrt{y}x^3}{z^4}\right)$ |
| 8. Expand. $\ln\frac{ex^3}{(x-4)^2}$ |
| 9. Condense. $3(\log x - \log y) + 4\log(z-1)$ |
| 10. Condense. $\frac{1}{2}\ln y + 3\ln x - 3[\ln(x+2) + \ln 2]$ |

Solve each equation.

11. $4^{x+4} = 5^{2x+5}$

12. $3^{x+8} = 5$

13. $7 - 2e^x = 5$

14. $3(5^{x-1}) = 21$

15. $5\log(x-2) = 10$

16. $\ln(x-2) = 8$

17. $\ln 5 = \ln(x-1) - \ln(x+1)$

18. $\ln 5 + \ln(x+3) = 1$

19. $\log_2 5 - 1 = \log_2(x+1)$

20. $\log_3(x+2) + \log_3 x = 1$

Solve.

21. Find the amount of an investment of \$5,000 at 4% compounded monthly for 8 years.

22. Suppose that you have \$3000 to invest. Which investment yields the greater return over 5 years: 1.1% compounded monthly or 1.3% compounded quarterly?

23. Iodine-131 is used to destroy thyroid tissue in the treatment of an overactive thyroid. The half-life of iodine-131 is 8 days. If a hospital receives a shipment of 200 grams of iodine-131, how much would remain in 32 days? Round to the nearest tenth of a gram.

24. The population of a particular country was 29 million in 1980 and in 1989, it was 35 million. Determine the population in 2007. Round to the nearest million.

1. 3
2. $-\frac{1}{2}$
3. -6
4. 3
5. $15x$
6. 4
7. $\log_5 2 + \frac{1}{2}\log_5 y + 3\log_5 x - 4\log_5 z$
8. $1 + 3\ln x - 2\ln(x - 4)$
9. $\log \frac{x^3(z-1)^4}{y^3}$
10. $\ln \frac{x^3\sqrt{y}}{8(x+2)^3}$
11. $\frac{4\ln 4 - 5\ln 5}{2\ln 5 - \ln 4}$ or $\frac{4\log 4 - 5\log 5}{2\log 5 - \log 4}$
12. $\frac{\ln 5 - 8\ln 3}{\ln 3}$ or $\frac{\log 5 - 8\log 3}{\log 3}$
13. 0
14. $\frac{\ln 7 + \ln 5}{\ln 5}$ or $\frac{\log 7 + \log 5}{\log 5}$
15. 102
16. $e^8 + 2$
17. No solution
18. $\frac{e-15}{5}$
19. $\frac{3}{2}$
20. 1
21. \$6,881.98
22. 1.3% compounded quarterly
23. 12.5 grams
24. 51 million