

Math 3 Unit 9 Worksheet 5
Laws of Logarithms

Name: _____
Date: _____ Period: _____

Completely expand and simplify each expression.

1. $\log_3 9x$

2. $\ln 15x$

3. $\log 10x^4$

4. $\log_5 x^5$

5. $\log_2 \frac{2}{5}$

6. $\ln \frac{e^3}{5}$

7. $\log_4 \frac{64}{5y}$

8. $\ln ex^2 \sqrt{y}$

9. $\log_2 16x^3yz^2$

10. $\log_6 36x^2$

11. $\ln e^2 \sqrt[4]{x}$

12. $\log 1000x^3 \sqrt[3]{y}$

13. $\log_2 \sqrt{x}$

14. $\ln \frac{e^4 \sqrt{x}}{y^2}$

15. $\ln \sqrt[4]{x^3}$

Condense each expression into a single logarithm and simplify if possible.

16. $\log_4 7 - \log_4 10$

17. $\ln 12 - \ln 4$

18. $2 \log x + \log 11$

Condense each expression into a single logarithm and simplify if possible.

19. $6 \ln x + 4 \ln y$

20. $5 \log x - 3 \log 2$

21. $5 \log_4 2 + 7 \log_4 x + 4 \log_4 y$

22. $\ln 40 + 2 \ln \frac{1}{2} + \ln x$

23. $2 \log_5 4 + \frac{1}{3} \log_5 x$

24. $6 \ln 2 - 4 \ln y$

25. $2 \log_6 2 + 2 \log_6 3$

26. $\log 5 + 2 \log 4 - 3 \log 2$

27. $2 \log_4 3 + \frac{1}{2} \log_4 36 - 3 \log_4 3$

{hint: For #28-30, rewrite the constant as a log}

28. $1 + \log_3 x - 2 \log_3 y$

29. $3 - \frac{1}{2} \log_2 x + \log_2 y$

30. $2 - \ln x - 3 \ln y^2$