

Unit 2: Logarithms

Topic: Properties of Logs

Objective: SWBAT simplify expressions by using the properties of logs.

Warm Up #2:

TRUE

FALSE

Which of the following statements are **not** TRUE??

1) $\log_3 9 = \ln e^2$	2) $e^{\ln x^3 + 1} = ex^3$	3) $6\ln e = e^6$
4) $e^{1 - \ln 5} = 5e$	5) $2\ln e^{x+7} - 1 = 2x + 13$	6) $9\log 100 = 4^{\log_4 16} + 2$



Properties of Logs

Remember that logs are exponents. Consequently, the properties of logs are similar to those of exponents.

Property #1:	Property #2:	Property #3:
$\ln x^a = a \ln x$	$\ln(cd) = \ln c + \ln d$	$\ln\left(\frac{c}{d}\right) = \ln c - \ln d$

The properties of logs are used to expand and condense expressions containing logs.



Assignment(s): Complete practice problems #1 – 14
pg. 244 #38-46 and 50-68 EVEN ONLY

Example #1:

Expand and simplify each of the following expressions.

$$1) \ln \sqrt[4]{\frac{a^3\sqrt{c}}{b}}$$

$$2) \log_7 \frac{49}{x^3}$$

Example #2:

Condense and simplify each of the following expressions.

$$3) 4\ln x - \frac{1}{3}\ln(x^2 + 1) + 2\ln(x - 1)$$

$$4) \frac{1}{3}\ln(2x + 1) + \frac{1}{2}[\ln(x - 4) - \ln(x^4 - x^2 - 1)]$$

Problem Set #2:

Expand and simplify each of the following expressions.

1) $\ln \frac{x^2\sqrt{y}}{z^3}$

2) $\ln \frac{2a^3}{\sqrt[3]{b^2c}}$

3) $\ln \sqrt{3x^2y}$

4) $\log \left(\frac{1000}{3x^2} \right)$

5) $\ln \frac{x^5}{y^2z^3}$

6) $\ln \frac{\sqrt{(x+4)^3}}{6x^3}$

Condense and simplify each of the following expressions.

7) $\ln 3x + 2(\ln x - \ln y)$

8) $3\ln 2x + \frac{1}{2}\ln y - 2\ln z$

9) $\ln 2 + \ln(x + 1) - \ln(x^2 - 1)$

10) $(4\ln 2 + 7\ln x) - \frac{1}{2}\ln y$

11) $\frac{1}{2}\ln x + \frac{3}{2}\ln 3y - \ln xy$

12) $2\log(x + 3) - \log 3 - 3\log y$

13) $5(\ln 2 + 2\ln x + \ln y + \ln z)$

14) $3\ln(ab) - 5\ln(bc)$