

Lesson 58 Objective: SWBAT expand logs.

* Extra help has been moved to tomorrow!

Kickoff-

Complete your participation rubric!!!

Before we begin, let's recall the following information...

- 1) $\log x = \log_{10} x$ If no base is written, always it's base 10!
- 2) $\log_e x = \ln x$ Log with base e is always used as Ln
- 3) $\sqrt[n]{a} = a^{\frac{1}{n}}$, $\sqrt[3]{a} = a^{\frac{1}{3}}$, $\sqrt[4]{a} = a^{\frac{1}{4}}$ Remember how to change exponentials to radicals!

Log Properties:		
Type	Condensed Log Form	Expanded Log Form
Product	$\log_b AC$	$\log_b A + \log_b C$
	$\ln AC$	$\ln A + \ln C$
Quotient	$\log_b \frac{A}{C}$	$\log_b A - \log_b C$
	$\ln \frac{A}{C}$	$\ln A - \ln C$
Power <small>*Drop it like it's hot!</small>	$\log_b A^c$	$c \log_b A$
	$\ln A^c$	$c \ln A$

Expand each log expression.

1) $\log_b cd$

$\log_b c + \log_b d$

3) $\log_7 d^4$

$4 \log_7 d$

2) $\log_5 \frac{c}{d}$

$\log_5 c - \log_5 d$

4) $\ln(a^2 c)$

$\ln a^2 + \ln c$

$2 \ln a + \ln c$

5) $\log \sqrt{b} \rightarrow b^{\frac{1}{2}}$

$\frac{1}{2} \log b$

6) $\ln\left(\frac{\sqrt{a}}{b}\right)$

$\frac{1}{2} \ln a - \ln b$

7) $\log_z \frac{\sqrt{x}}{y}$ $x^{\frac{1}{2}}$

$\log_z \sqrt{x} - \log_z y$

$\frac{1}{2} \log_z x - \log_z y$

9) $\ln(a\sqrt{b})$

$\ln a + \frac{1}{2} \ln b$

8) $\ln \sqrt{\frac{x}{y}}$ $\left(\frac{x}{y}\right)^{\frac{1}{2}}$

$\frac{1}{2} \ln x - \frac{1}{2} \ln y$

10) $\log_5 (a^2 b)^3$

$a^6 b^3$

$6 \log_5 a + 3 \log_5 b$

Important Facts about Logs and Ln	
$\log_b b =$ 1	$b^x = b$
$\log_b 1 =$ 0	$b^x = 1$
$\ln 1 =$ 0	$\log_e 1$
$\ln e =$ 1	$\log_e e$

Expand each log expression in terms of x, if applicable, and simplify:

11) $\log(10x)$
 ~~$\log_{10} 10 + \log x$~~
 $1 + \log x$

12) $\ln\left(\frac{4}{e^2}\right)$
 $\ln 4 - 2 \ln e$
 $\ln 4 - 2$

13) $\log_4(4^2 x)$
 ~~$2 \log_4 4 + \log_4 x$~~
 $2 + \log_4 x$

14) $\ln\left(\frac{1}{e^4}\right)$
 ~~$\ln 1 - 4 \ln e$~~
 $0 - 4(1) = -4$