

Sec 4.3 Properties of Logarithms
Today- condensing

Log Rules

$$\mathbf{Log(AB) = LogA + LogB}$$

Log Form
 $\log_2 16 = 4$

$$\mathbf{Log\left(\frac{A}{B}\right) = LogA - LogB}$$

Equivalent
to

Index Form
 $2^4 = 16$

$$\mathbf{Log(A^n) = n \times LogA}$$

Consider learning to
"add like terms" first

$$4x + 3x$$

before learning to solve...
 $3(2 + 4x) + 5x = -3x + 2x + 5$

Condensing logs
serves the same
purpose...

- Later we will
1. Condense/Isolate
a log
 2. Rewrite
 3. Solve resulting
equation

Condense-

$$\log_4 2 + \log_4 32$$

$$= \log_4 64$$

$$= 3$$

***the sum of TWO
logs is the
PRODUCT
of one
 $2(32) = 64$**

**you can use a
calculator, but
also...
4 to what
power is 64?**

***To evaluate using a calculator, go to the "MATH" menu, then to "LOGBASE", where you can enter any base. The log on the face of the calculator assumes base 10.**

Condense-

$$\log(4x-3) - \log x$$

$$= \log \frac{4x-3}{x}$$

**the difference of two logs
is the quotient
(division/fraction) of one**

$$\frac{1}{2} \log x + 4 \log(x-1)$$

$$\log x^{1/2} + \log(x-1)^4$$

$$\log x^{1/2}(x-1)^4$$

$$\text{or } \log \sqrt{x}(x-1)^4$$

***Coefficients in the front can be moved to be a power/exponent of the argument.**

Condense-

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

$$= \ln(x+7)^3 - \ln x$$
$$= \ln \left[\frac{(x+7)^3}{x} \right]$$

Condense-

$$4 \log_b x - 2 \log_b 6 - \frac{1}{2} \log_b y$$

$$\log_b x^4 - \log_b 36 - \log_b y^{1/2}$$

$$\log_b x^4 - (\log_b 36 + \log_b y^{1/2})$$


$$\log_b x^4 - \log_b 36 y^{1/2}$$

$$\log_b \frac{x^4}{36 y^{1/2}}$$

Suggested Practice
Sec 4.3
page 477
41-68
the left column
(essentially, the odds, with a few
of the more challenging)

41-65, 67 see back of text

$$66. \log_4 (x+1)^2 \sqrt[3]{\frac{x}{y}}$$

$$\left(\frac{x}{y}\right)^{1/3}$$


$$68. \frac{1}{3} \left[\ln \frac{(x+6)^5}{x(x^2-25)} \right]$$

$$= \ln \left[\frac{(x+6)^5}{x(x^2-25)} \right]^{1/3} \text{ or } \ln \sqrt[3]{\text{same}}$$

