Warm-Up:

1) Rewrite in logarithmic form.

$12^2 = 144$

$\log_{12} 144 = 2$

2) Evaluate the logarithm.

a) $\log_4 64$

$b = 4$ $\quad 4^y = 64$

$x = 64$ $\quad 4^y = 4^3$

$y = 3$

b) $\log_8 16$

$\log_8 16$

$b = 8 \quad y = y \quad x = 16$

$8^y = 16$

$2^{3y} = 2^4$

$\frac{3y}{3} = \frac{4}{3}$ $\quad y = 4/3$

ACT Question of the Day

2. The monthly fees for single rooms at 5 colleges are \$370, \$310, \$380, \$340, and \$310, respectively. What is the mean of these monthly fees?

F. \$310
G. \$340
H. \$342
J. \$350
K. \$380

NC Final Exam Released Question

19 Which function is equivalent to $y = x^2 - 6x + 10$?

A $y = (x + 3)^2 - 1$

B $y = (x - 3)^2 + 1$

C $y = (x + 6)^2 - 10$

D $y = (x - 6)^2 + 10$

$-10 \quad -10$

$x^2 - 6x = -10$

$x^2 - 6x + \left(\frac{-6}{2}\right)^2 = -10 + \left(\frac{-6}{2}\right)^2$

$x^2 - 6x + 9 = -1$

$-3 \times -3 = 9$, -6

$(x-3)^2 = -1$

$+1 \quad +1$

$(x-3)^2 + 1$

Unit 6 ~ Logarithms & Exponentials

Day 3: Properties of Logarithms

What's Happening here???

1. Take 30 secs to think about what's happening?
2. Based on your observation, write down the property for each log
3. Share with a partner

$\log_3(5) + \log_3(6) = \log_3(30)$

$\log_5(10) - \log_5(2) = \log_5(5)$

$2\log_4(3) = \log_4(3^2)$

Properties of Logartihms

1st flap outside 1st flap top

Product Property: $\log_b mn = \log_b m + \log_b n$

2nd flap outside 2nd flap top

Quotient Property: $\log_b \frac{m}{n} = \log_b m - \log_b n$

3rd flap outside 3rd flap top

Power Property: $\log_b m^n = n\log_b m$

Example 2:

Write each expression as a single logarithm.

a) log 7 + log 2

$\log(7 \cdot 2) = \log 14$

b) log 15 - log3

$\log\left(\frac{15}{3}\right) = \log 5$

c) 5log3

$\log 3^5 = \log 243$

d) 5log3 + log 4

$\log 3^5 + \log 4$

$\log(243 \cdot 4) = \log(972)$

e) 4logm - 5logn

$\log m^4 - \log n^5$

$\log\left(\frac{m^4}{n^5}\right)$

f) $\log_6 5 + \log_6 x + 6\log_6 y$

$\log_6 5 + \log_6 x + \log_6 y^6$

$\log_6 5xy^6$

g) $\log_3 4 + \log_3 y - 3\log_3 x$

$\log_3 4 + \log_3 y - \log_3 x^3$

$\log_3 4y - \log_3 x^3$

$\log_3 \frac{4y}{x^3}$

Change of Base Formula:

$\log_b m = \frac{\log m}{\log b}$

use this when the bases are diff.

Example 1:

Use the Change of Base Formula to evaluate each expression.

a) $\log_{12} 20$

$\frac{\log 20}{\log 12} \approx 1.21$

b) $\log_3 81$

$\frac{\log 81}{\log 3} = 4$

c) $\log_3 54$

$\frac{\log 54}{\log 3} \approx 3.6$

d) $\log_3 33$

$\frac{\log 33}{\log 3} \approx 3.2$