Lesson 7.4 Warm Up (Clickers)

1. Simplify: $\sqrt{5}*\sqrt{10}$

2. Write the logarithm for $5^3 = 125$.

3. Find $\log_3 81$.

Lesson 7.4 Properties of Logarithms

Essential Understanding: Logarithms and exponents have corresponding properties.

Properties Properties of Logarithms

For any positive numbers m, n, and b where $b \neq 1$, the following properties apply.

Product Property	$\log_b mn = \log_b m + \log_b n$
Quotient Property	$\log_b \frac{m}{n} = \log_b m - \log_b n$
Power Property	$\log_b m^n = n \log_b m$

What is each expression written as a single logarithm?

1. $\log_4 32 - \log_4 2$

2. $6 \log_2 x + 5 \log_2 y$

3. $\log_4 5x + \log_4 3x$

1 What is the expression as a single logarithm?

$\log_5 4y - \log_5 2y$

2 What is the expression written as a single logarithm?

$2\log_4 6 - \log_4 9$

Ex. What is each logarithm expanded?

1. log (4x/y)

2. $\log_9(x^4/729)$

3. $\log_3(250/37)$

3 What is the logarithm expanded?

$\log_3 9x$

4 What is the logarithm expanded?

$\log_5(125/x)$

5 What is the logarithm expanded?

$\log x^2y^2$

You have seen logarithms with many bases. The 'log' key on a calculator find $\log_{10}$ of a number. To evaluate a logarithm with any base, use the Change of Base Formula.

Property Change of Base Formula

For any positive numbers m, b, and c, with $b \neq 1$ and $c \neq 1$,

$$\log_b m = \frac{\log_c m}{\log_c b}.$$

Ex. What is the value of the expression $\log_{81}27$?

Solution: Use calculator--log27/log81

= 0.75

Ex. What is the value of $\log_5 36$?

6 What is the value of the expression $\log_8 32$?