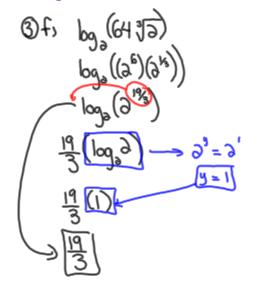
#### **Questions from Homework**



6 
$$\log_a x = m$$
  $\log_a y = n$ 

a) 
$$\log_{a}(\frac{x}{5})$$
 $\log_{a}x - \log_{a}y$ 
 $m - n$ 

b) 
$$log_{\alpha}(xy)^{3}$$
 $2(log_{\alpha}x+log_{\alpha}y)$ 
 $2(log_{\alpha}x+log_{\alpha}y)$ 

## Logarithms

#### exponential form

$$x = a^y$$

Say "the base a to the exponent y is x."

#### logarithmic form

$$y = \log_a x$$

Say "y is the exponent to which you raise base a to get the answer x."

$$x = a^y \longleftrightarrow y = \log_a x$$

## Logarithm of a Product

$$\log_a M + \log_a N = \log_a (M \times N)$$

# Logarithm of a Quotient

$$\log_a M - \log_a N = \log_a \left(\frac{M}{N}\right)$$

## Law of Logarithms for Powers

$$\log_a(N^p) = p \log_a N$$
  $N \in R, a > 0, a \ne 1$ 

Since *p* can be expressed as a whole number or a fraction, this law can be expressed as follows.

## Law of Logarithms for Roots

$$\log_a(N^{\frac{p}{q}}) = \frac{p}{q}\log_a N \qquad N \in R, a > 0, a \neq 1$$

When you work with equations involving logarithms you need to use the laws of logarithms, which are summarized below:

$$\log_a M + \log_a N = \log_a (M \times N) \quad \text{Product}$$

$$\log_a M - \log_a N = \log_a \left(\frac{M}{N}\right) \quad \text{Quotient}$$

$$\log_a (N^p) = p \log_a N \quad \text{Power}$$

$$\log_a (N^{\frac{p}{q}}) = \frac{p}{q} \log_a N \quad \text{Root}$$

### Example 1

Solve the following and remember to verify your solution

$$\log_3 x - \log_3 4 = \log_3 12$$

$$\log_3 x = \log_3 12 + \log_3 4$$

$$\log_3 x = \log_3 12 + \log_3 4$$

$$\log_3 x = \log_3 12$$

$$\log_3 x = \log_3 12$$

$$\log_3 x = \log_3 12$$

## Example 2

If  $\log_a x = m$  and  $\log_a y = n$  then express the following in terms of m and n.

$$\log_a \left( \frac{ax}{y} \right)$$

$$\partial \left( \log_a \left( \frac{ax}{y} \right) \right)$$

$$\partial \left( \log_a 0x - \log_a y \right)$$

$$\partial \left( \log_a 0 + \log_a x - \log_a y \right)$$

$$\partial \left( 1 + m - n \right)$$

### Homework

(1) a) 
$$\log_3 64 = 6$$

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