

Algebra II

10-5

Laws of Logarithms

The answer to a logarithm is A Power.

Laws of Exponents

Laws of Logarithms -

1) $x^m x^n = x^{m+n}$	1) $\log_b(M \cdot N) = \log_b M + \log_b N$
2) $\frac{x^m}{x^n} = x^{m-n}$	2) $\log_b\left(\frac{M}{N}\right) = \log_b M - \log_b N$
3) $(x^m)^n = x^{mn}$	3) $\log_b M^n = n \log_b M$

Express each logarithm in terms of $\log_2 M$ and $\log_2 N$. (pg 476)

$$1) \log_2 M^6 N^3 = \log_2 M^6 + \log_2 N^3$$
$$6\log_2 M + 3\log_2 N$$

Express as a logarithm of a single number or expression.

$$23) 4\log_3 A - \frac{1}{2}\log_3 B$$

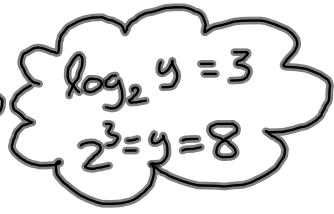
$$\log_3 A^4 - \log_3 B^{\frac{1}{2}}$$

$$\log_3 \frac{A^4}{\sqrt{B}}$$

Express as a logarithm of a single number or expression.

25) $\log_2 M + \log_2 N + 3$

$\log_2 MN + 3$



$\log_2 MN + \log_2 8$

$\log_2 8MN$

Simplify.

$$29) 2 \log_{10} 5 + \log_{10} 4$$

$$\log_{10} 5^2 + \log_{10} 4$$

$$\log_{10} 5^2 \cdot 4$$

$$\log_{10} 100 = x$$

$$10^x = 100$$

$$\boxed{2}$$

Solve.

$$33) \log_a x = 2 \log_a 3 + \log_a 5$$

$$\log_a x = \log_a 3^2 \cdot 5$$

$$\log_a x = \log_a 45$$

$$x = 45$$

$$\{45\}$$

$$39) \log_2 (x^2 - 9) = 4$$

$$2^4 = x^2 - 9$$

$$16 = x^2 - 9$$

$$0 = x^2 - 25$$

$$0 = (x+5)(x-5)$$

$$\{\pm 5\}$$

Pg 476

2-8 even
22-50 even