Algebra 2 Honors **Name______________________**
Notes: 4.4 **Date____________Block______**

<u>Product Property of Logarithms</u>

For any positive numbers m, n, and b ($b \neq 1$), the logarithm of a ________________ is equal to the

_____________ of the logarithms of its factors.

Example:

Example 1: Express as a single logarithm. Simplify, if possible.

(a) $\log_6 4 + \log_6 9$

(b) $\log_5 625 + \log_5 25$

(c) $\log_{1/3} 27 + \log_{1/3} \frac{1}{9}$

<u>Quotient Property of Logarithms</u>

For any positive numbers m, n, and b ($b \neq 1$), the logarithm of a ________________ is equal to the

logarithm of the _________________________ _____________ the logarithm of the _______________.

Example:

Example 2: Express as a single logarithm. Simplify, if possible.

(a) $\log_5 100 - \log_5 4$

(b) $\log_7 49 - \log_7 7$

Power Property of Logarithms

For any real number p and positive numbers a and b ($b \neq 1$), the logarithm of a _______________ is equal to the _______________ of the exponent and the logarithm of the base.

Example:

Example 3: Express as a product. Simplify, if possible.

(a) $\log_2 32^6$

(b) $\log_8 4^{20}$

(c) $\log 10^4$

(d) $\log_5 25^2$

Inverse Properties of Logarithms and Exponents

For any base b such that $b > 0$ and $b \neq 1$,

$\log_b b^x =$ ____ AND $b^{\log_b x} =$ _____

Example 4: Simplify each expression.

(a) $\log_3 3^{11}$

(b) $\log_3 81$

(c) $5^{\log_5 10}$

(d) $\log 10^{0.9}$

(e) $2^{\log_2 8x}$

<u>Change of Base Formula</u>

For $a > 0$ and $a \neq 1$ and any base b such that $b > 0$ and $b \neq 1$, ______________________________.

Example:

Example 5: Evaluate by using the change of base formula.

(a) $\log_{32} 8$

(b) $\log_{9} 27$

(c) $\log_{8} 16$