5.2 HW

METHODS AND MEANINGS

MATH NOTES

Logarithms and Their Notation

A **logarithm** (called a "log" for short) is an exponent. An expression in logarithmic form, such as $\log_2(32)$, is read, *"the log, base 2, of 32."* To evaluate log expressions, think of the exponent: $\log_2(32) = 5$, because the exponent needed for base 2 to become 32 is 5.

An equation in logarithmic form is equivalent to another equation in exponential form, as shown at right. This conversion helps show why (based on an $x \to y$ interchange) $y = \log_b(x)$ and $y = b^x$ are inverse functions.

$$y = \log_b(x) \iff b^y = x$$

- **5-73.** Let $y = \log_2(x)$. Rewrite the equation so that it begins with $x =$. Think about how you defined $y = \log_2(x)$ if you get stuck. Put a large box around both equations. Do the two equations look the same? Do the two equations mean the same thing? Are they equivalent? How do you know? This is very important. Think about it, and write a clear explanation. Homework Help ✎

- **5-74.** Every exponential equation has an equivalent logarithmic form and every logarithmic equation has an equivalent exponential form. For example,

$$\underset{\text{base}}{4}^{\overset{\text{exponent}}{3}} = 64 \quad \text{is equivalent to} \quad \underset{\text{exponent}}{3} = \log_{\underset{\text{base}}{4}} 64$$

Copy the table shown below and fill in the missing form in each row. Homework Help ✎

	Exponential Form	Logarithmic Form
a.	$y = 5^x$	
b.		$y = \log_7(x)$
c.	$8^x = y$	
d.	$\mathrm{A}^{\mathrm{K}} = \mathrm{C}$	
e.		$\mathrm{K} = \log_{\mathrm{A}}(\mathrm{C})$
f.		$\log_{1/2}(\mathrm{K}) = \mathrm{N}$

- **5-76.** Although the quadratic formula always works as a strategy to solve quadratic equations, for many problems it is not the most efficient method. Sometimes it is faster to factor or complete the square or even just "out-think" the problem. For each equation below, choose the method you think is most efficient to solve the equation and explain your reason. Then solve the problems that can be factored. Homework Help ✎

    a. $x^2 + 7x - 8 = 0$

    b. $(x + 2)^2 = 49$

    c. $5x^2 - x - 7 = 0$

    d. $x^2 + 4x = -1$

- **5-77.** If $10^{3x} = 10^{(x-8)}$, solve for x. Show that your solution works by checking your answer. Homework Help ✎