Logarithm Rules Worksheet NAME:

Remember to think of $\log_b x$ as the number to which I raise *b* to get *x*. This is very important in the study of logs.

Let *b*, *v*, and *w* be positive real numbers where *b* is not equal to one. Let *k* be a real number.

1. In words, what is $\log_b b$? It's the number to which I raise _____ to get _____.

What does this number we call $\log_b b$ have to be?

2. In words, what is $\log_b 1$? It's the number to which I raise _____ to get _____.

What does this number we call $\log_b 1$ have to be?

3. In words, what is $\log_b (b^k)$? It's the number to which I raise _____ to get _____.

What does this number we call $\log_b (b^k)$ have to be?

4. Now $\log_b v$ is the number to which I raise *b* to get *v*. Therefore *b* raised to this power or $b^{\log_b v}$ should be what number?

5. Complete the table.

$\log_3 3 =$	$\log_3 9 =$	$\log_3 27 =$
$\log_5 25 =$	$\log_5 5 =$	$\log_5 125 =$
$\log_2 16 =$	$\log_2 4 =$	$\log_2 64 =$

Now use the three rows of the table to determine the relationship between $\log_b v$, $\log_b w$, and $\log_b (vw)$. Write the rule down and then show it works using an example from the table.

6. Complete the table.

$\log_3 27 =$	$\log_3 9 =$	$\log_3 3 =$
$\log_5 125 =$	$\log_5 25 =$	$\log_5 5 =$
$\log_2 64 =$	$\log_2 4 =$	$\log_2 16 =$

Now use the three rows of the table to determine the relationship between $\log_b v$, $\log_b w$, and $\log_b (\frac{v}{w})$. Write the rule down and then show it works using an example from the table.

7. Complete the table. You may use your calculator for the first two. Round your answers to three decimal places. The last one you should be able to work out logically.

$\log(3^5) =$	$5 * \log 3 =$
$\log_e(6^2) =$	$2 * \log_e 6 =$
$\log_5(5^2) =$	$2 * \log_5 5 =$

Now use the three rows of the table to determine the relationship between $\log_b v^k$ and $k * \log_b v$. Write the rule down and then show it works using an example from the table.