R.E.A.L. Math 1010 Supplemental Activity Name: _____
S15 Introduction to Logarithms

1. Complete the table for $f(x) = 10^x$

x	f(x)
0	
1	
2	
3	
4	

2. With a calculator, complete the table for $g(x) = \log x$

x	g(x)
1	
10	
100	
1000	
10000	

3.

a) What do you notice about the two tables?

b) What is the relationship between the two equations?

c) A logarithmic function is _____.

4. What do we call the position of the number 10 in the equation in exercise 1? What is happening to the 10 in exercise 1?

5. What does 10 have to do with the equation in exercise 2?

NOTE: All logarithms have a base. The base is written as a subscript like this: $y = \log_3 x$ and this equation is read "y equals log base 3 of x." When no base is indicated we understand it to be base 10. It is called the "Common Logarithm" and is the base that the LOG button on the calculator uses. Exponential and logarithmic functions that are inverses of each other have the same base.

6. Write the inverse of the following functions and equations.

a) $f(x) = 2^x$

b) $y = \log_3 x$

c) $y = 7^x$

d) $f(x) = \log_{12} x$

e) $y = \log_b x$

f) $y = b^x$

7. Look at the table in exercise 2.

a) Describe the relationship between the base (10), the x, and the y in the equation. (It might help to write in 10 as the base for this exercise.)

b) Can you write a general rule that explains what a logarithm is?

8. Use your general rule of a logarithm to calculate these logs without using a calculator.

a) $\log_3 9$

b) $\log_2 8$

c) $\log_4 64$

d) $\log_5 5$

e) $\log_7 1$

f) $\log_2 \frac{1}{2}$

g) $\log 100$

h) $\log_5 5^3$

9. Using the logs and your answers from exercise 8, write each log and its answer in its equivalent exponential format. For example:

a) $\log_3 9 = 2$ and $3^2 = 9$

b)

c)

d)

e)

f)

g)

h)

10. Do the two formats used in exercise 9 represent inverse relationships or the same relationship? Why?

11. Let's develop a second "definition" of a logarithm.

a) In the logarithmic form of 9a, what is the value of the logarithm?

b) In the exponential form of 9a, what is the value of the exponent?

c) Does this relationship hold true for all the logs and exponents in exercise 9?

d) Therefore, we can also say a logarithm is _____

This can't be emphasized enough:

A logarithm is an exponent.

The following expression describes the exponent on the base of 2 that gives 8.

$\log_2 8$

The log expression is equal to 3 because $2^3 = 8$

12. What is the exponent that each expression is describing?

a) $\log_{10} 100$

b) $\log_8 64$

c) $\log_3 27$

d) $\log_2 16$