**Exponentials and Logarithms**

The other day we worked with exponentials. Now it’s time to get familiar with logarithms.

A logarithmic function is the inverse of an exponential function. More specifically a logarithm is the exponent to which a specified based is raised. To better understand this let’s look at the two equations below and see how they relate to each other.

|  |  |
| --- | --- |
| **Exponential Equation** | **Logarithmic Equation** |
|  |  |

Look carefully at where the “a”, “b”, and the “x” all move to when we switch between exponents and logarithms.

Example #1

Write the exponential equation in logarithmic form.

43 = 64

First thing we do is identify which numbers are a, b, and x. Then we simply convert it over to logarithmic form.

What is a? \_\_\_\_\_\_ What is b? \_\_\_\_\_\_ What is x? \_\_\_\_\_\_

Write out your answer in logarithmic form. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

You should have gotten log4 64 = 3.

Not that bad right. Let’s try going the other way.

Example #2

Write the logarithmic equation in exponential form.

log6 36 = 2

Again identify which numbers are a, b, and x.

What is a? \_\_\_\_\_\_ What is b? \_\_\_\_\_\_ What is x? \_\_\_\_\_\_

Write out your answer in exponential form. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Hopefully you got 62 = 36. If not raise your hand and get some help!

*Special Case:* Logarithm of 1

 → b0 = 1 (Remember, anything to the 0 power is 1.)

**Graphing Logarithms**

Calculators can’t graph logarithmic functions. We get around this by graphing their inverses, exponential functions. To do this we look at the table of values of a logarithmic function and just flip the table of values. Here’s what a question like this will look like.

Example #1 Use the given x-values to graph the function ; x = -2, -1, 0, 1, 2. Then graph it’s inverse.

*Step 1:* Create a table of values using the given x-values.

*Step 2:* Plug in the different x-values and solve for the y-values.

 Original

|  |  |
| --- | --- |
| **x** | **y** |
| -2 |  |
| -1 |  |
| 0 |  |
| 1 |  |
| 2 |  |

*Step 3:* Switch the x and y coordinates. (This gives us the inverse. Remember?!)

|  |  |
| --- | --- |
| **x** | **y** |
|  | -2 |
|  | -1 |
|  | 0 |
|  | 1 |
|  | 2 |

 Inverse

*Step 4:* Graph the logarithmic function using the new table of values.

*Do Homework:* Practice B WS + pg 509 #2-15