Math 3 Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
1-5 Properties of Logarithms

* *I can use properties of logarithms and exponents to write algebraic expressions in equivalent forms and solve equations involving logs and exponents.*

**Warm up:**
Solve the following equation for *x*: 

In this activity, we will be learning some properties of logarithms that will help us solve the above equations efficiently.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

## Earlier in your mathematics career, you learned the rules for simplifying exponents. Just as exponents have rules for simplification, logarithms also have rules for simplification. You will explore/review/discover these rules below:

## Use your calculator to complete the following table. ***ROUND TO 4 DECIMAL PLACES!!***

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **N** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Log N** |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |
| **N** | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 1000 |
| **Log N** |   |   |   |   |   |   |   |   |   |   |

1. (a) Use your table for find log 2 + log 4

(b) Look for a value of N in your table for which log N equals your answer for part (a)

(c) Complete the following equation: log 2 + log 4 = log \_\_\_\_

2. Use your table to complete the following equations

(a) log 8 + log 5 = log \_\_\_\_\_ (b) log 4 + log 20 = log \_\_\_\_

3. Generalize your results from 1 and 2:

**logb *M* + logb *N* = logb \_\_\_\_\_**

4. Use your table to complete these equations:

(a) log 8 – log 2 = log \_\_\_\_\_\_\_\_ (b) log 50 – log 5 = log \_\_\_\_\_\_\_\_

(c) log 60 – log 10 = log \_\_\_\_\_\_\_\_ (d) log 90 – log 30 = log \_\_\_\_\_\_\_\_

5. Generalize your results from 4:

**logb *M* – logb *N* = logb \_\_\_\_\_**

6. Use your table to complete these equations:

(a) 2 log 3 = log \_\_\_\_\_ (b) 2 log 10 = log \_\_\_\_\_ (c) 3 log 10 = log \_\_\_\_\_

7. Generalize your results from number (6):

 ***k* logb *M* = logb \_\_\_\_\_**

**Practice:**

**1. Simplify the following and write as a log of a single number or logarithmic expression.**

NO CALCULATOR!

a.  b.  c. 

**2. Expand each of the following into the sum or difference of logarithms. There should be no exponents.**

a.  b.  c. 

3. Answer the below multiple choice question from the SAT:

If  and , then 

1.  b.  c.  d.  e. 



4. Solve for x:

5. Now that you know the properties of logarithm, go back to the top and see if you can answer the warm up question.