Investigation: Discovering the Laws of Logarithms

In this learning activity, you will be investigating three important laws of logarithms that will make future problem solving much more efficient and direct.

Please work through the entire investigation without Googling “laws of logarithms” and copying down what you might find on the Internet. You will gain a much more thorough and lasting understanding of these concepts if you complete the investigation on your own.

You will need a calculator that can compute common logarithms for all three parts of the investigation.

Please turn in all of the written work for this assignment to your teacher for evaluation and feedback.

**Investigation Part One**

Use your calculator to find the following common logs:

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* 

Write down any patterns or connections you recognize between your answers. What relationships can you identify?

Develop a general rule to write  as a single logarithm, for all positive values of *A* and *B*.

Test your general rule on several other values for *A* and *B.*

Using what you have previously learned about the laws of exponents and common logs, develop an informal algebraic proof of your findings.

**Investigation Part Two**

Use your calculator to find the following common logs:

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* 

Write down any patterns or connections you recognize between your answers. What relationships can you identify?

Develop a general rule to write  as a single logarithm, for all positive values of *A* and *B*.

Test your general rule on several other values for *A* and *B.*

Using what you have previously learned about the laws of exponents and common logs, develop an informal algebraic proof of your findings.

**Investigation Part Three**

Use your calculator to find the following common logs:

* 
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* 

Write down any patterns or connections you recognize between your answers. What relationships can you identify?

Develop a general rule to write  as the logarithm of a single constant, for all positive values of *A* and all real values of *n*.

Test your general rule on several other values for *A* and *n.*

Using what you have previously learned about the laws of exponents and common logs, develop an informal algebraic proof of your findings.