Alice Unit Portfolio 2017 (Supplemental)

If you feel confident about your understanding of all of the concepts covered in the Alice unit and would like a challenge option instead, you can choose to complete this Supplemental version of the Alice Unit Portfolio as a substitute.

Throughout the Alice unit we were able to not only discover but were able to prove the following exponent rules:

1. $x^a x^b = x^{a+b}$

2. $x^a/x^b = x^{a-b}$

3. $(x^a)^b = x^{ab}$

For example, for the first exponent rule above, we were able to prove that it was true by using the Alice scenario of her eating 3 ounces of cake, taking a break, and then eating 5 ounces of cake. This was the same as just eating 8 ounces all at once. We were also able to prove mathematically (see below):

$2^3 \times 2^5 = 2^8$ → $(2 \times 2 \times 2) \times (2 \times 2 \times 2 \times 2 \times 2) = 2^8$

For this unit portfolio, you will be doing the same as above but proving logarithm rules. Please following the directions below:

Instructions:

1. **Make a copy of this document**
2. **Move the copy into your Google folders**
3. **Answer the prompts below in boxes provided**

This video may be a helpful resource for this unit portfolio.

Product Property
Logarithm of a Product The logarithm of a product is the sum of the logarithms: $\log_b (MN) = \log_b M + \log_b N$ Use the example below to prove why product property for logarithms is true. Which of the exponents rules is it similar to and why? $\log_2(4 \cdot 8) = \log_2 4 + \log_2 8$

Quotient Property
Logarithm of a Quotient $\log_b \frac{M}{N} = \log_b M - \log_b N$ Use the example below to prove why product property for logarithms is true. Which of the exponents rules is it similar to and why? $\log_3 81 - \log_3 27 = \log_3 \frac{81}{27}$

Power Property
Logarithm of a Power $\log_b M^n = n \log_b M$ Use the example below to prove why product property for logarithms is true. Which of the exponents rules is it similar to and why? $\log_3 9^4 = 4 \log_3 9$

Why can't you have negative bases?
You can't have negative numbers as your bases. With negative bases, it would only work with powers that are whole numbers. Why is this true? For example, y= $(-3)^x$ Type this equation into Wolfram Alpha website or desmos to help you.