Properties of Logarithms

Because exponentials & logarithms are INVERSES of one another, when the \_\_\_\_\_\_\_ of an exponential & the BASE of a logarithm are the \_\_\_\_\_\_\_\_ we can \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_!

Why is this helpful? We can now use logs to help us simplify exponentials where the bases are \_\_\_\_\_\_\_\_ the same or could NOT be rewritten.

**Simplify each expression.**

|  |  |
| --- | --- |
| a.) | b.) |
| c.) | d.) |

Product Property

 Expand: Condense:

Quotient Property

 Expand: Condense:

Power Property

 Expand: Condense:

“Logs” & “ln” follow the same properties. We can use the properties to \_\_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ logs.

When we expand, we take the expression from \_\_\_\_\_\_\_ log or ln to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ logs or ln’s.

When we condense, we take the expression from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ logs or ln’s to a \_\_\_\_\_\_\_\_\_\_\_ log or ln.

\*There are special cases where multiple logs or ln’s would appear.

**Tips for rewriting with more than one property at a time:**

|  |  |
| --- | --- |
| *Expanding*\*Undo multiplication/division in order from left to right\*Move exponents to coefficients | *Condensing*\*Move coefficients back to exponents\*undo addition/subtraction in order from left to right |

\*Anything that you want to be considered in the denominator, should be put in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Example: Condense the expression.**

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|  |

**Example: Expand the expression.**

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