Pre-Assessment Review

Adding LOGs

Rule: \( \log A + \log B = \log AB \)

To add LOGs we multiply their arguments.

Practice:
Express each as a single LOG:

1. \( \log 5 + \log 2 = \log \) ___
2. \( \log 16 + \log 4 = \log \) ___
3. \( \log 15 + \log 2 = \log \) ___

Express each as a sum of LOGS:

4. \( \log (5 \cdot 4) = \log \) ___ + \( \log \) ___
5. \( \log 3x = \log \) ___ + \( \log \) ___
6. \( \log xy = \log \) ___ + \( \log \) ___

Subtracting LOGs

Rule: \( \log A - \log B = \log A/B \)

To subtract LOGs we divide their arguments.

Practice:
Express each as a single LOG:

1. \( \log 20 - \log 4 = \log \) ___
2. \( \log 10 - \log 5 = \log \) ___
3. \( \log 256 - \log 128 = \log \) ___

Express each LOG as the difference of LOGS:

4. \( \log \frac{10}{5} = \log \) ___ - \( \log \) ___
5. \( \log \frac{x}{4} = \log \) ___ - \( \log \) ___
6. \( \log \frac{x}{y} = \log \) ___ - \( \log \) ___

Important Vocabulary:
The number that comes after the word LOG is referred to as the argument.
Multiple LOGs & Fractions of LOGs

Rule: \( B \cdot \log A = \log A^B \)

To multiply a LOG by a constant we can raise the argument to power of that constant.

Express each product as a single LOG:

1. \( 3 \cdot \log 4 = \log \_\_\_\_ \)
2. \( 2 \cdot \log 5 = \log \_\_\_\_ \)
3. \( \frac{1}{2} \cdot \log 25 = \log \_\_\_\_ \)
4. \( \frac{1}{5} \cdot \log 1024 = \log \_\_\_\_ \)

Express each LOG as product:

5. \( \log 2^5 = \)
6. \( \log 7^9 = \)
7. \( \log x^{10} = \)
8. \( \log Z^x = \)

LOG 1

Rule: \( \log 1 = 0 \)

The LOG 1 is always equal to zero.

Practice:

1. \( \log 1 = \)
2. \( \log 5 - \log 5 = \log \_\_\_\_ \_\_\_\_\_\_ = \_\_\_\_ \)
3. \( \left( \frac{234}{245672} \right)^{\log 1} = \)

Putting it all together... and taking it all apart

Using the LOG rules, break apart each single LOG into a sum, product, and/or difference of as many different LOGS as possible.

Example:

\[
\log \left( \frac{4x}{7y} \right)^2 = 2 \cdot \log \frac{4x}{7y}
\]
\[
= 2(\log 4x - \log 7y)
\]
\[
= 2 \log 4x - 2 \log 7y
\]
\[
= 2(\log 4 + \log x) - 2(\log 7 + \log y)
\]
\[
= 2 \log 4 + 2 \log x - 2 \log 7 - 2 \log y
\]

Practice:

1. \( \log \frac{6x}{11y} = \)
2. \( \log \left( \frac{2x}{3y} \right)^9 = \)

Where do LOGs come from?
Both John Napier (1550-1617), Scottish baron, and Joost Bürgi (1552-1632), a Swiss craftsman, independently invented the idea of LOGs within years of each another!