Name:
Date:

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 _10_
2. LOG 16 + LOG 4 = LOG _64_
3. LOG 15 + LOG 2 = LOG _30_

Express each as a sum of LOGS:

4. LOG (5•4) = LOG _5_ + LOG _4_
5. LOG $3x$ = LOG _3_ + LOG _x_
6. LOG xy = LOG _x_ + LOG _y_

Subtracting LOGs

Rule: **LOG A – LOG B = LOG A/B**
To subtract LOGS we divide their arguments.

Important Vocabulary:
The number that comes after the word LOG is referred to as *the argument.*

Practice:

Express each as a single LOG:

1. LOG 20 – LOG 4 = LOG _5_
2. LOG 10 – LOG 5 = LOG _2_
3. LOG 256 – LOG 128 = LOG _2_

Express each LOG as the difference of LOGS:

4. LOG $\frac{10}{5}$ = LOG _10_ – LOG _5_
5. LOG $\frac{x}{4}$ = LOG _x_ – LOG _4_
6. LOG $\frac{x}{y}$ = LOG _x_ – LOG _y_

Multiple LOGs & Fractions of LOGs

Rule: **B • LOG A = LOG A^B**

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

Practice:

Express each product as a single LOG:

1. 3 • LOG 4 = LOG 4^3
2. 2 • LOG 5 = LOG 5^2
3. $\frac{1}{2}$ • LOG 25 = LOG $\sqrt{25}$ = LOG 5
4. $\frac{1}{5}$ • LOG 1024= LOG $\sqrt[5]{1024}$ = LOG 4

Express each LOG as product:

5. LOG 2^5 = $5 \cdot$ LOG 2
6. LOG 7^9 = $9 \cdot$ LOG 7
7. LOG x^{10} = $10 \cdot$ LOG x
8. LOG Z^x = $x \cdot$ LOG Z

LOG 1

Rule: **LOG 1 = 0**

The LOG 1 is always equal to zero.

Practice:

1. LOG 1 = 0
2. LOG 5 – LOG 5 = LOG 1 = 0
3. $\left(\frac{234}{245672}\right)^{\text{LOG }1} = 1$
4. Why is there is no LOG 1 piece in your set of FiCycle LOGs?

   LOG 1 = 0

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 a years of each another!

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:

$$\text{LOG}\left(\frac{4x}{7y}\right)^2 = 2\cdot\text{LOG}\frac{4x}{7y}$$
$$= 2(\text{LOG }4x - \text{LOG }7y)$$
$$= 2\text{ LOG }4x - 2\text{ LOG }7y$$
$$= 2(\text{LOG }4 + \text{LOG }x) - 2(\text{LOG }7 + \text{LOG }y)$$
$$= 2\text{ LOG }4 + 2\text{ LOG }x - 2\text{ LOG }7 - 2\text{ LOG }y$$

Practice:

1. LOG $\frac{6x}{11y}$ =

   LOG 6x – LOG 11y
   (LOG 6 + LOG x) – (LOG 11 + LOG y)
   LOG 2 + LOG x – LOG 11 – LOG y

2. LOG $\left(\frac{2x}{3y}\right)^9$

   $9 \cdot$ LOG $\frac{2x}{3y}$
   9 (LOG 2x – LOG 3y)
   9 (LOG 2x) – 9 (LOG 3y)
   9(LOG 2 + LOG x) – 9(LOG 3 + LOG y)
   9 LOG 2 + 9 LOG x – 9 LOG 3 – 9 LOG y