

Investigating Logarithms

log2 + log3	0.7782
log6	0.7782
log3 + log7	1.322
log21	1.322
log4 + log 20	1.903
log80	1.903
log0.2 + log11	0.3424
log2.2	0.3424
log0.3 + log 0.4	-0.9208
log0.12	-0.9208

This table to the left clearly shows that the log of 2 numbers added together will equal the log of the number multiplied. The table below clearly shows that $\log(x) + \log(y)$ will equal $\log(xy)$. Let $\log x = a$, let $\log y = b$. Therefore $10^a = x$ and $10^b = y$, these two equations can then be simplified to $10^{(a+b)} = x*y$. it is then possible to convert this back to $\log(xy) = a + b$.

log5 + log4	log20	1.301
log3 + log2	log6	0.7782
log4 + log8	log32	1.505
log6 + log3	log18	1.255
log3 + log26	log78	1.892
log7 + log4	log28	1.447

log12 - log3	0.6021
log4	0.6021
log50 - log2	1.398
log25	1.398
log7 - log5	0.1461
log1.4	0.1461
log3 - log4	-0.1249
log0.75	-0.1249
log20 - log40	-0.3010
log0.5	-0.3010

This table to the left clearly shows that the log of 2 numbers subtracted from each other will equal the log of the numbers divided by each other. The table below clearly shows the $\log(x) - \log(y)$ will equal $\log(x/y)$. Let $\log x = a$, let $\log y = b$. Therefore $10^a = x$ and $10^b = y$, these two equations can be converted into $10^{(a-b)} = x/y$. Finally, this equation can then be converted back into $\log x - \log y = \log(x/y)$.

log6 - log2	log3	0.4771
log18 - log3	log6	0.7782
log 16 - log 2	log8	0.9031
log50 - log5	log10	1
log25 - log5	log5	0.6989
log32 - log8	log4	0.6021

4 log2	1.204
log2⁴	1.204
5 log6	3.891
log6⁵	3.891
½ log4	0.3011
log4^{1/2}	0.3011
2/5 log7	0.3380
log7^{2/5}	0.3380
-3 log5	-2.097
log5⁻³	-2.097

The table located to the left clearly shows that the log of a number multiplied by another number will equal the log of a number to the power of the multiplying number. This table below proves that $n \log(x)$ will equal $\log(x^n)$. 4 log 2 is producing log2 + log2 + log2 + log2, log 2⁴ is producing log16. Log 16 counteracts the additional logs that need to be added together in 4 log2, it is doing this by decreasing the amount of logs that need to be

3 log6	log6³	2.3345
4 log2	log2⁴	1.2041
2 log8	log8²	1.8062
5 log7	log7⁵	4.2255
7 log3	log3⁷	3.3398
6 log4	log4⁶	3.6124

added in log 16, and replacing them with a higher x value.

Let's investigate the function $y = \log x$

When $x = 1$, $y = \log 1$, therefore, $y = 0$

Therefore when $y = 0$, x will equal 1. On a graph this would mean that the curve would cut the x axis at 1. In this function x cannot equal zero or less than zero, this means that the restricted domain of the function will be $D\{x: x > 1\}$.

x	0.000001	0.00001	0.0001	0.001	0.01	0.1	1
y = log x	-6	-5	-4	-3	-2	-1	0

The table above displays that as x is multiplied by ten, the y value increases by 1.

x	1	2	3	4	5	6	7	8	9	10
y = log x	0	0.3010	0.4771	0.6021	0.6989	0.7782	0.8451	0.9010	0.9542	1

The graph below demonstrates the curve of the function $y = \log x$

