GRAPHING LOGS

$y = 2^x$

0	1
1	2
2	4
3	8

$y = \log_2 x$

1	0
2	1
4	2
8	3

inverses of each other

$y = 3^{x+3} - 1$

Left 3 Down 1

exponential
↑ x-axis asymp

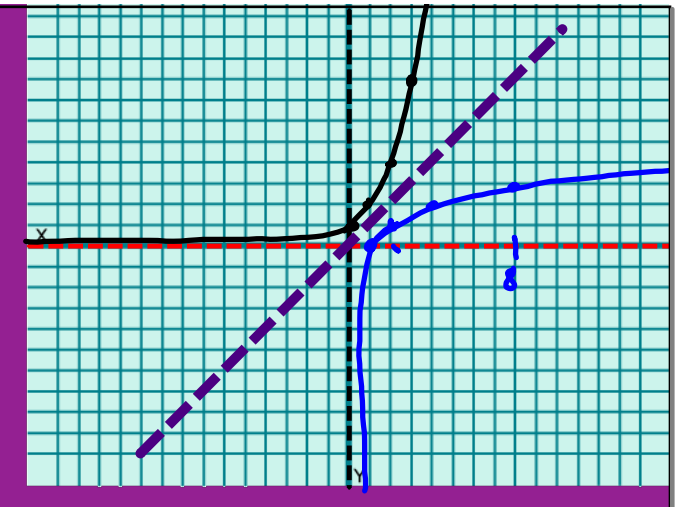
0	1
1	3
2	9
3	27

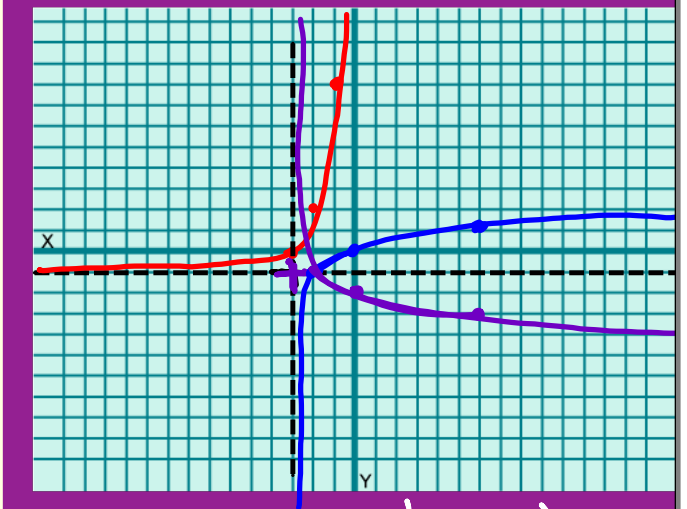
$y = \log_3(x+3) - 1$

Left 3 Down 1

log

1	0
3	1
9	2





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Log Operations

$\log_{10} 10^7 = 7$ $\quad \ln e^{217} = 217$ $\quad 6^{\log_6 39} = 39$

Solve

$\log_5 x = 4$ $\quad$ Exponentiate!

$5^{\log_5 x} = 5^4$

$x = 5^4$

$\boxed{x = 625}$

- Must check answers
- must be log of a positive number & have a + base!

$\log_a 64 = 2$

$a^{\log_a 64} = a^2$

$\sqrt{64} = \sqrt{a^2}$

$\pm 8 = a$

$\log_{25} \sqrt[4]{5} = x$

$25^{\log_{25} \sqrt[4]{5}} = 25^x$

Make common bases!

$\sqrt[4]{5^1} = 25^x$

$5^{1/4} = 5^{2x}$

$\frac{1}{2} \cdot \frac{1}{4} = 2x \cdot \frac{1}{2}$

$\boxed{\frac{1}{8} = x}$

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Properties of Logarithms

$\log_b m + \log_b n = \log_b (m \cdot n)$

$\log_b m - \log_b n = \log_b \left(\frac{m}{n}\right)$

$\log_b m^p = p \cdot \log_b m$

$\log_7 7^5 = 5 \cdot \log_7 7^1$

$5 = 5 \cdot 1$

$\log_7(x+5) + \log_7(x-3) = 2\log_7 3$

$\log_7((x+5)(x-3)) = \log_7 3^2$

$\log_7(x^2+2x-15) = \log_7 9$

$7^{\log_7(x^2+2x-15)} = 7^{\log_7 9}$

1) Use properties to change each side to one log

2) Exponentiate + solve

$x^2+2x-15 = 9$

$-9 \quad -9$

$x^2+2x-24 = 0$

$(x+6)(x-4) = 0$

$x=-6 \quad x=4$

$\ln 4x + \ln 3 - \ln 6 = 3\ln 4$

$\ln\left(\frac{4x\cdot 3}{6}\right) = \ln 4^3$

$e^{\ln_e(2x)} = e^{\ln_e 64}$

$2x = 64$

$x = 32$

$\log x + \log(x+3) = 1$

$10^{\log_{10}(x^2+3x)} = 10^1$

$x^2+3x = 10$

$x^2+3x-10 = 0$

$(x-2)(x+5) = 0$

$x=2 \quad x=-5$

$\log(2-x)$

$2--5$

$8^x = 117$

$\log 8^x = \log 117$

1) Add logs to both sides
2) Plog the exponents

$x \cdot \log 8 = \log 117$

$\log 8 \quad \log 8$

$x = 2.29$