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LOGARITHMS – inverses of exponential functions

must be +

$y = b^x$

$b > 0, b \neq 1$

Domain: $(-\infty, \infty)$

Range: $(0, \infty)$

$y = \log_b x$

$b > 0, b \neq 1$

Domain: $(0, \infty)$

Range $(-\infty, \infty)$

Domain?

$y = \log_7 (x-3)$

$(3, \infty)$ — / +

3

$y = \log_8 (25 - x^2)$ $(5-x)(5+x)$

$(-5, 5)$ — / + / —

-5 5

$y = b^x$

$x = b^y$

$\log_b x = y$

John Napier – find distances to planet.

$2,300,000$

$2.3 * 10^6$

$\log_{10}(2.3)$ $\log_{10} 10^6$

6

6.___

purpose – to solve for exponents

Natural Logs

$\log_e x = \ln x$

$\ln x$

Common Logs

$\log_{10} x = \log x$

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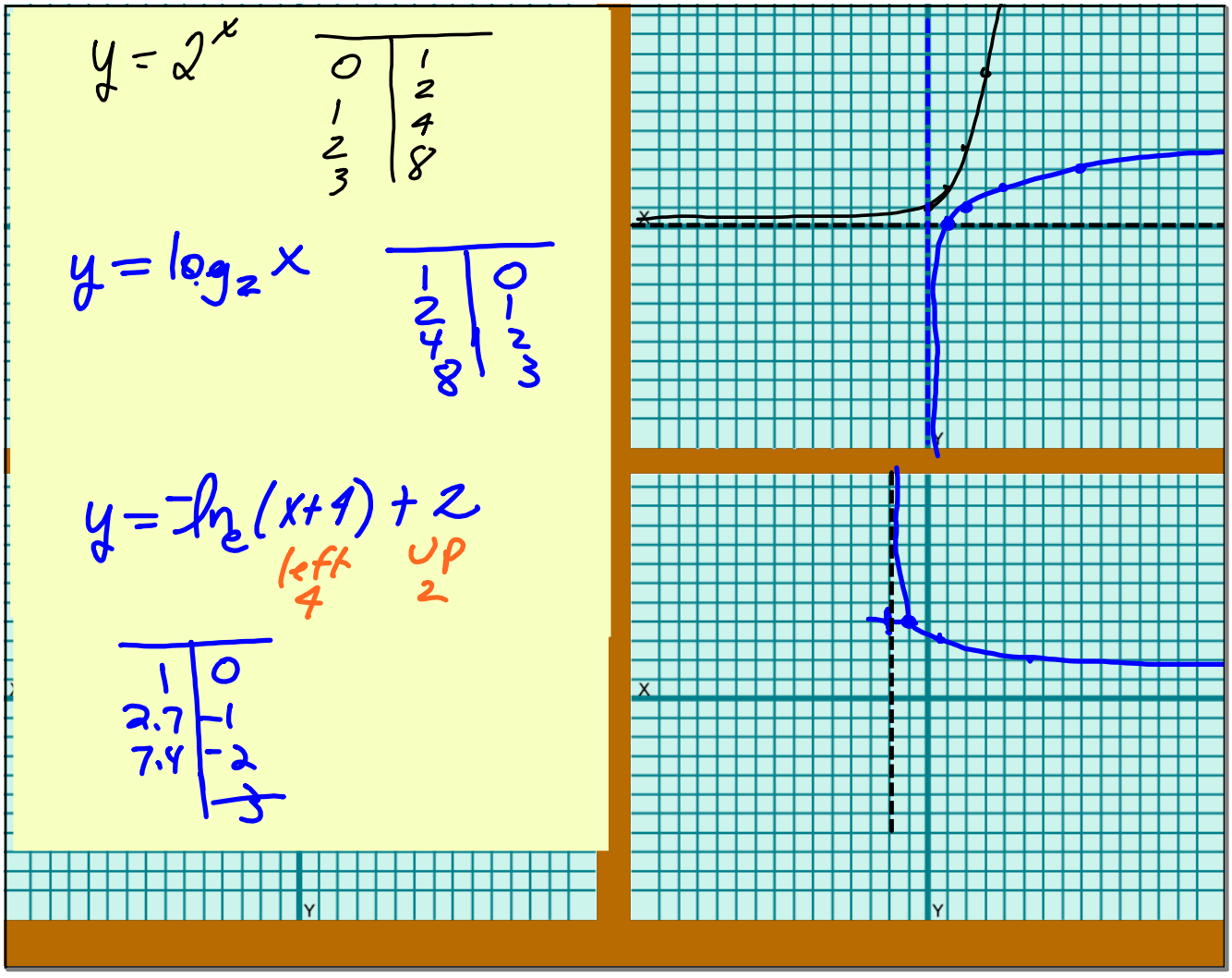

Evaluate.

$\log_9 81 = \log_9 9^2 = 2$

$\log_6 \frac{1}{36} = \log_6 6^{-2} = -2$

$\log_7 \sqrt[5]{49} = \log_7 \sqrt[5]{7^2} = \log_7 7^{2/5} = 2/5$

$\log_{10} 1000 = \log_{10} 10^3 = 3$

$\ln e^{3178} = 3178$

$\ln \frac{1}{\sqrt[7]{e^3}} = \ln e^{-3/7} = -3/7$

$e^{2 \ln 8} = e^{\ln 8^2} = 64$

Solving Log Equations

Properties of Logs

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

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

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

Exp. Form	Log Form
$y = b^x$	$x = \log_b y$

$\log_7(x-2) + \log_7(2x-3) = 2\log_7 x$ $\quad x = 1, 6$

$\log_7 (x-2)(2x-3)$

$\log_7 (2x^2-7x+6) = \log_7 x^2$

EXPONENTIATE!

$7^{\log_7(2x^2-7x+6)} = 7^{\log_7 x^2}$

$2x^2-7x+6 = x^2$

$-x^2 \quad -x^2$

$x^2-7x+6 = 0$

$(x-6)(x-1) = 0$

$x = 1, 6$

$4^{\log_4 8} = 4^x$

$8 = 4^x$

$2^3 = 2^{2x}$

$3 = 2x$

$3/2 = x$