Name: _____ Date: _____ Class: _____

Solving Exponential and Logarithmic Equations 3

Property of Equality for Logarithmic Equations: If $\log_b x = \log_b y$, then $x = y$.

In other words, when there is 1 Logarithm on the left, and 1 Logarithm on the right, then then you can Cancel the Logarithmic arguments.

Ex. 1 Solve by using properties of logarithms.

Solve: $\log_7(x-8) + \log_7(2) = \log_7(x-1)$

$\log_7(2x-16) = \log_7(x-1)$

$2x-16 = x-1$

$-x \quad -x$

$x-16 = -1$

$+16 \quad +16$

$x = 15$

Solve: $\log(5x+2) = \log(x+1) + \log(2) + \log(3)$

$\log(5x+2) = \log(6x+6)$

$5x+2 = 6x+6$

$-5x \quad -5x$

$2 = x+6$

$-6 \quad -6$

$-4 = x$

YOU TRY!

Solve: $\log_8(2x+3) + \log_8(4) = \log_8(4-x)$

Ex. 2 Solve by using properties of logarithms.

Solve: $\log_2(2x+3) - \log_2(5) = \log_2(x+1)$

$\log_2\left(\frac{2x+3}{5}\right) = \log_2\frac{(x+1)}{1}$

$5x+5 = 2x+3$

$-2x \quad -2x$

$3x+5 = 3$

$-5 \quad -5$

$\frac{3x}{3} = \frac{-2}{3}$

$x = \frac{-2}{3}$

Solve: $\log(2x+1) - \log(x) = \log(3) + \log(4)$

$\log\left(\frac{2x+1}{x}\right) = \log\frac{(12)}{1}$

$12x = 2x+1$

$-2x \quad -2x$

$\frac{10x}{10} = \frac{1}{10}$

$x = \frac{1}{10}$

YOU TRY!

Solve: $\log(x+1) - \log(10) = \log(10)$

Ex. 3 Solve by using properties of logarithms.

Solve: $\log_3(2x-1) + \log_3(4) = 1$

Change to exponential

$\log_3(8x-4) = 1$

$3^1 = 8x-4$

$3 = 8x-4$

$+4 \quad +4$

$\frac{7}{8} = \frac{8x}{8}$

$x = \frac{7}{8}$

Solve: $\log(x+2) - \log(2x) = 2$

$\log_{10}\left(\frac{x+2}{2x}\right) = 2$

$10^2 = \frac{x+2}{2x}$

$\frac{100}{1} = \frac{x+2}{2x}$

$200x = x+2$

$-x \quad -x$

$\frac{199x}{199} = \frac{2}{199}$

$x = \frac{2}{199}$

YOU TRY!

Solve: $\log_2(3) + \log_2(2x) = 3$

Solve: $\log_2(2x+3) - \log_2(x) = 3$