Solving Log Equations and Inequalities

Definition:
Logarithmic Equations – these are equations that involve _____ of variable expressions

Property of Equality for Logarithmic Equations – if b, x, and y are positive numbers, $log_b x = log_b y$ if and only if x = y

Ex. If $log_2 x = log_2 7$, then _____

Example 1) Solve $log_5(4x - 7) = log_5(x + 5)$

The property of equality for exponential equations implies that if x = y, then you can _____ each side and obtain the equation $b^x = b^y$. This technique can be used to _____ some logarithmic equations.
Example 2) Solve $log_4(5x - 1) = 3$

Logarithmic Inequalities – an inequality that involves logarithms.

Property of Inequality for Logarithmic Functions – If b > 1, x > 0, and $\log_b x$ > y, then $x > b^y$. If b > 1, x > 0, and $\log_b x$ < y, then 0 < x < b^y.

- So if the inequality is > or ≥, then that will be your answer.
- If the inequality is < or ≤, then you have to find the lower boundary because it cannot be ≤ 0.

Examples) $\log_3 x > 4$ $\log_2 x < 4$

$\log_4(x+3) > \log_4(2x+1)$

$\log_5(2x+1) \leq \log_5(x+4)$

$\log_7(2x+8) > \log_7(x+5)$

$\log_3(7x-6) < \log_3(4x+9)$