

Goal: Solve logarithmic or exponential equations



Using the rules we have established for logarithmic functions, we can now start to solve logarithmic equations. Remember, an equation has an equal sign, so the solution must equal something.

Be careful of logarithmic equations though, the solutions must be a part of the domain of that function

$$y = \log_b x \quad \text{Note: } b > 0, b \neq 1$$

Steps for solving logarithmic equations:

1. If a constant exists in the equation, bring all the logs to one side, constant(s) on the other.

OR

If no constant exists in the equation, combine logs on each side into single logs with a common base.

2. Convert to exponential form using $\log_b x = y \Leftrightarrow b^y = x$

OR

Use rule: $\log_b x = \log_b y \Leftrightarrow x = y$

3. Solve the resulting equation for the unknown variable.

4. Reject any extraneous root(s) using: $y = \log_b x$; $b > 0, b \neq 1$ and $x > 0$

Example 1: Solve for x: $\log_9(x - 5) = 1 - \log_9(x + 3)$