

Logarithmic Equations

Topics

- 1) Solve log equations by using the definition of logs and rewriting in exponential form.
 - 2) Solve log equations by using the one-to-one property of logs.
 - 3) Solve applied problems.
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- 1) **Solve log equations by using the definition of logs and rewriting in exponential form.**

Definition of logs: $\log_b x = y$ is interchangeable with $b^y = x$.

Steps

- 1) Move all logs to one side and all constants to the other.
- 2) Use log properties to rewrite as a single log.
- 3) Rewrite in exponential form.
- 4) Solve.
- 5) Check your answers!

Solve.

a) $\log_4(x+3) = 2$

b) $3\ln(2x) = 12$

c) $\log_3(x-5) + \log_3(x+3) = 2$

d) $\log_2(x+2) - \log_2(x-5) = 3$

Logarithmic Equations

2) Solve log equations by using the one-to-one property of logs.

FACT: If $\log_b M = \log_b N$ then $M = N$.

Steps

- 1) Use log properties so that the equation has the form $\log_b M = \log_b N$.
- 2) "Drop" the logs.
- 3) Solve.
- 4) Check your answers!

Solve.

a) $\ln(x+2) - \ln(4x+3) = \ln\left(\frac{1}{x}\right)$

b) $\log(2x-1) = \log(x+3) + \log 3$

3) Solve applied problems.

The population of a certain country is growing at a rate of 2.3% per year. How long will it take for this country's

population to double? Use the formula $t = \frac{\ln 2}{k}$, which gives the time, t , for a population with growth rate k , to double. (Round to the nearest whole year.)