9.4 Solving Log Equations

Essential Question

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~~Method I.~~ CONDENSE.

ex. $\log_3 x = 2\log_3 4 - \log_3 2$

$\log_3 x = \log_3 16 - \log_3 2$

$\log_3 x = \log_3 (8)$

$\boxed{x = 8}$

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~~Method 2.~~ Rewrite in exponential form.

$\log_b a = x \Leftrightarrow b^x = a$

ex. $\log_3(2x - 3) = 2$

$3^2 = 2x - 3$

$9 = 2x - 3$

$12 = 2x$

$\boxed{6 = x}$

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~~Method 3.~~ Combine method 1 & 2.

ex. $\log(x+2) + \log(x-1) = 1$

$\log_{10}((x+2)(x-1)) = 1$

$10^1 = (x+2)(x-1)$

$10 = x^2 + x - 2$

$0 = x^2 + 1x - 12$

$(x-3)(x+4)$

$\boxed{x=3}$ $\cancel{x=-4}$

Argument of log can never be neg!

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~~Method 4.~~ Rewrite with the same base or as a log or take the log of both sides.

ex. $3^{x+2} = 7$

$\log_3 7 = x+2$

$\boxed{\log_3 7 - 2 = x}$ ✓

$\log 3^{x+2} = \log 7$

$\frac{(x+2)\log 3}{\log 3} = \frac{\log 7}{\log 3}$

$x+2 = \frac{\log 7}{\log 3}$

$-2 \qquad -2$

ex. $3^{x+2} = 9$

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

$x+2 = 2$