Exponential and Logarithmic equations can be solved in many ways. Below are examples of some different ways of solving for x.

"Re-base method"

. $3^{1-2x} = 81^x$

$3^{1-2x} = (3^4)^x$

$3^{1-2x} = 3^{4x}$

$1-2x = 4x$

$1 = 6x$

$\frac{1}{6} = x$

"Taking the log of both sides…"

16. $3^{4x-6} = 7^x$

$\log 3^{4x-6} = \log 7^x$

$(4x-6)\log 3 = x\log 7$

$4x\log 3 - 6\log 3 = x\log 7$

$4x\log 3 - x\log 7 = 6\log 3$

$x(4\log 3 - \log 7) = 6\log 3$

$x = \frac{6\log 3}{4\log 3 - \log 7}$

"Switching from an exponential to a logarithm"

11. $\frac{3.5(5^{3x})}{3.5} = \frac{10.3}{3.5}$

$5^{3x} = 2.943$

$\log_5 2.943 = 3x$

$\frac{\log 2.943}{\log 5} = 3x$

$0.6707 = 3x$

$0.2236 = x$

"Canceling logs using a property of logs"

1. $-2\log_7 x = \log_7 36$

$\log_7 x^{-2} = \log_7 36$

$x^{-2} = 36$

$\frac{1}{x^2} = 36$

$1 = 36x^2$

$\frac{1}{36} = x^2$

Extraneous

$x = -\frac{1}{6}$

$x = \frac{1}{6}$

"Switching from a log to an exponential"

8. $\log_3(x-1)^2 = 2$

$3^2 = (x-1)^2$

$9 = (x-1)^2$

$9 = x^2 - 2x + 1$

$0 = x^2 - 2x - 8$

$0 = (x-4)(x+2)$

$x = 4$ $\quad$ $x = -2$

"Using properties of logs and then canceling logs"

13. $\log(2x) + \log(x+1) = \log(12)$

$\log(2x(x+1)) = \log 12$

$2x(x+1) = 12$

$2x^2 + 2x = 12$

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

$2(x^2 + x - 6) = 0$

$2(x+3)(x-2) = 0$

$x = 2$

$x = -3$ Extraneous