

An example of using logarithms to solve exponential equations.

- Solve for x .

$$4^x = 3$$

to "undo" the exponential function 4^x , take \log_4 of both sides

$$\log_4 4^x = \log_4 3$$

log rules

$$x \cdot \log_4 4 = \log_4 3$$

$$x \cdot 1 = \log_4 3$$

$$\text{so } x = \log_4 3$$

Another:

$$1 + 3^{2x-3} = 4 \quad \left. \vphantom{1 + 3^{2x-3} = 4} \right\} \text{isolate factor with the 'x'}$$

$$\begin{aligned} 3^{2x-3} &= 3 \\ 3^{2x-3} &= 3 \end{aligned} \quad \left. \vphantom{3^{2x-3} = 3} \right\} \log_3 \text{ both sides}$$

$$\log_3 3^{2x-3} = \underbrace{\log_3 3}_{=1} \quad \left. \vphantom{\log_3 3^{2x-3} = \log_3 3} \right\} \text{log rules}$$

$$2x - 3 = 1$$

$$2x = 4$$

$$x = \frac{4}{2} = \boxed{2}$$