



SOLVING LOG EQUATIONS | EXAMPLE PROBLEM PAIRS

6E. Solve $3 \log 2x - 1 = 11$.

$$3 \log 2x - 1 = 11$$

$$3 \log 2x = 12$$

$$\log 2x = 4$$

$$2x = 10^4$$

$$x = 5000$$

ISOLATE THE TERM
CONTAINING A LOG.

6P. Solve $\frac{1}{2} \log_2 8x + 3 = 8$

7E. Find the exact solution of $2 \log x + \log 4 = \log(2x + 1)$.

$$2 \log x + \log 4 = \log(2x + 1)$$

$$\log x^2 + \log 4 = \log(2x + 1)$$

$$\log(4x^2) = \log(2x + 1)$$

$$\therefore 4x^2 = 2x + 1$$

$$0 = 4x^2 - 2x - 1$$

$$x = \frac{1 \pm \sqrt{5}}{4}$$

SIMPLIFY TO OBTAIN

$$\log a = \log b$$

Since $x = \frac{1 - \sqrt{5}}{4} < 0$, the term containing $2 \log x$ would be undefined.

$\therefore x = \frac{1 + \sqrt{5}}{4}$ is the only solution.

TOP TIP: CHECK THE ORIGINAL EQUATION IS VALID FOR YOUR EQUATIONS.

7P. Find the exact solution of $\log_3 6x + \log_3 2 = \log_3(5x + 4)$

8E. Solve $2 \log 4x = \log 8x + \frac{2}{5}$.

$$2 \log 4x = \log 8x + \frac{2}{5}$$

$$\log[(4x)^2] - \log 8x = \frac{2}{5}$$

$$\log[16x^2] - \log 8x = \frac{2}{5}$$

$$\log\left[\frac{16x^2}{8x}\right] = \frac{2}{5}$$

$$\log[2x] = \frac{2}{5}$$

$$\therefore 2x = 10^{\frac{2}{5}}$$

$$x = \frac{1}{2} \times 10^{\frac{2}{5}}$$

8P. Solve $\log_5 x - 2 \log_5 6 = \frac{3}{4}$.