

7.6 Day 2: Solving Log Equations

Solve for x:

① $\log_5 X = \log_5 6$

$\log_5 6 = \log_5 6$

$X = 6$

② $\log_4 (x+3) = \log_4 (3x-1)$

$x+3 = 3x-1$
 $-x+1 \quad -x+1$

$4 = 2x$

$x = 2$

③ $\log_3 (x^2 - 2) = \log_3 x$

$x^2 - 2 = x$
 $-x \quad -x$

$x^2 - x - 2 = 0$

$(x-2)(x+1) = 0$

$x-2=0$

$x=2$ ✓

$x+1=0$

~~$x=-1$~~

check:

$\log_3 (2^2 - 2) = \log_3 2$

$\log_3 2 = \log_3 2$

$\log_3 (1^2 - 2) = \log_3 (-1)$

can't do log of a neg. #!

$8x+3 = x+6$
 $-x-3 \quad -x-3$

$7x = 3$

$x = 3/7$

⑤ $\log_6 (2x+8) = 2$

$6^2 = 2x+8$

$36 = 2x+8$

$-8 \quad -8$

$28 = 2x$

$x = 14$

⑥ $\log_2 (4x-4) = 5$

$2^5 = 4x-4$

$32 = 4x-4$

$36 = 4x$

$9 = x$

$\log_2 (4 \cdot 9 - 4) = 5$

$\log_2 32 = 5$

$2^5 = 32$

$5 = 5$ ✓

⑦ $\log_{\frac{1}{5}} X = -3$

$(\frac{1}{5})^{-3} = X \Rightarrow 5^3 = X$
 $125 = X$

⑧ $\log_4 X = \frac{3}{2}$

$4^{\frac{3}{2}} = X$

$(\sqrt{4})^3 = 2^3 = 8$

()

$$\boxed{125=x}$$

$$(\sqrt[4]{4}) = 2^{\frac{1}{2}} = \boxed{8}$$

$$\textcircled{9} \log(2x) + \log(x-5) = 2$$

$$\log(2x(x-5)) = 2$$

$$\log_{10}(2x^2 - 10x) = \underline{2}$$

$$10^2 = 2x^2 - 10x$$

$$100 = 2x^2 - 10x$$

$$\begin{array}{r} -100 \qquad \qquad \qquad -100 \\ \hline 0 = 2x^2 - 10x - 100 \end{array}$$

$$0 = 2(x^2 - 5x - 50)$$

$$0 = 2(x - 10)(x + 5)$$

$$0 = x - 10$$

$$\boxed{10 = x}$$

$$0 = x + 5$$

$$\cancel{-5 = x}$$