1) $\log_3 81 = x$

$3^x = 81$

$x = 4$

$\log_3 81 = 4$

2) $\log_5 \frac{1}{25} = x$

$5^x = \frac{1}{25}$

$x = -2$

$\log_5 \frac{1}{25} = -2$

3) $\log_{10} 100,000 = x$

$10^x = 100,000$

$x = 5$

$\log_{10} 100,000 = 5$

4) $\log_4 (-16) = x$

$4^x = -16$

impossible
undefined

5) $\log_2 x = -5$

$2^{-5} = x$

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

$\frac{1}{32} = x$

$x = \frac{1}{32}$

6) $\log_x 49 = 2$

$x^2 = 49$

$x = 7$

7) $\log_{10} x = 4$

$10^4 = x$

$10,000 = x$

$x = 10,000$

8) $\log_8 x = 0$

$8^0 = x$

$1 = x$

$x = 1$

9) $\log_{10} 0.01 = x$

$10^x = 0.01$

$x = -2$

$\log_{10} 0.01 = -2$

10) $\log_9 9 = x$

$9^x = 9$

$x = 1$

11) $\log_3 x = 4$

$3^4 = x$

$81 = x$

$x = 81$

12) $\log_{10} 0.00000001 = x$

$10^x = 0.00000001$

$x = -8$

$\log_{10} 0.00000001 = -8$

13) $\log_x 9 = 2$

$x^2 = 9$

$x = 3$

14) $\log_{10} \frac{1}{100,000} = x$

$10^x = \frac{1}{100,000}$

$x = -5$

$\log_{10} \frac{1}{100,000} = -5$

15) $\log_{25} x = \frac{1}{2}$

$25^{\frac{1}{2}} = x$

$\sqrt{25} = x$

$5 = x$

$x = 5$

16) $\log_{10} x = -4$

$10^{-4} = x$

$\dfrac{1}{10^4} = x$

$\dfrac{1}{10,000} = x$

$x = \dfrac{1}{10,000}$

17) $\log_3 1 = x$

$3^x = 1$

$x = 0$

18) $\log_x \dfrac{1}{9} = -2$

$x^{-2} = \dfrac{1}{9}$

$x^2 = 9$

$x = 3$

19) $\log_{\frac{1}{5}} 125 = x$

$\left(\dfrac{1}{5}\right)^x = 125$

$x = -3$

20) $\log_{\frac{1}{2}} x = -3$

$\left(\dfrac{1}{2}\right)^{-3} = x$

$2^3 = x$

$8 = x$

$x = 8$

21) $\log_7 \sqrt{7} = x$

$7^x = \sqrt{7}$

$7^x = 7^{\frac{1}{2}}$

$x = \dfrac{1}{2}$

22) $\log_x \dfrac{25}{9} = -2$

$x^{-2} = \dfrac{25}{9}$

$x^2 = \dfrac{9}{25}$

$x = \dfrac{3}{5}$