9.4 Logarithmic Equations   Name: **Key**

Solve for x.

1. $2^{5x+2} = 2^{3x-4}$

$x = -3$

2. $4^{x-5} = \dfrac{1}{4}$

$x = 4$

3. $3^{x-1} = \sqrt{3}^{x+1}$

$x = 3$

4. $\left(\dfrac{1}{8}\right)^{x-1} = \left(\dfrac{1}{4}\right)^{1-x}$

$x = 1$

5. $\log_x 81 = 2$

$x = 9$

6. $\log_3 x = -3$

$\dfrac{1}{27} = x$

7. $\log_4 x = \dfrac{-5}{2}$

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

8. $\log_8 x = \dfrac{-4}{3}$

$\dfrac{1}{16} = x$

9. $\log_x 81 = -2$

$x = \dfrac{1}{9}$

10. $\log_x 64 = -3$

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

11. $\log_{\sqrt{2}} x = 8$

$x = 16$

12. $\log_2(3x-4) = 3$

$4 = x$

13. $\log_5 x = 2\log_5 10$

$x = 100$

14. $\ln x = \ln 2 - \ln 5$

$x = \dfrac{2}{5}$

15. $\ln x = \ln e^2 - 1$

$x = e$

16. $\ln(x-2) - \ln 2 = \ln 3 - \ln(x-1)$

$x = 4$

17. $e^x = 1$

$x = 0$
OR
$x = \ln 1$

18. $e^x = 2$

$x = \ln 2$

19. $\ln x + \ln(5-x) = \ln 2 + \ln 3$

$\{2, 3\}$

20. $\ln x = \sqrt{3}$

$e^{\sqrt{3}} = x$

21. $\log x + \log(x-9) = 1$

$x = 10$

22. $\log_3(x-4) + \log_3(x+4) = 2$

$x = 5$

23. $2^x = 10$

$x = \dfrac{\log 10}{\log 2}$
OR
$\log_2 10$

24. $2^x = 3^{x-1}$

$x = \dfrac{-\log 3}{\log 2 - \log 3}$ OR $\dfrac{-\log 3}{\log\left(\frac{2}{3}\right)}$
OR
$-\log_{\frac{2}{3}}(3)$

25. $3^{x+2} = 5^{x-1}$

$x = \dfrac{-2\log 3 - \log 5}{\log 3 - \log 5}$ OR
$\dfrac{\log\left(\frac{1}{45}\right)}{\log\left(\frac{3}{5}\right)} = \log_{\frac{3}{5}}\left(\frac{1}{45}\right)$