

Solving Logarithmic and Exponential Equations WKST

I. Solve the logarithmic equation.

1. $\log_9(x^2 - 4x) = \log_9(3x - 10)$	2. $\log_{\sqrt{3}} x = 6$	3. $2 - \log_2(x + 1) = 4$
4. $\log_x 49 = 2$	5. $\log_{12}(x^2 - 7) = \log_{12}(x + 5)$	6. $\log(x - 7) = 3$
7. $\log_6(x^2 - 6x) = \log_6(-8)$	8. $\log_4(2x + 2) - \log_4(x - 2) = 1$	9. $3\log_5(4 - x) + 1 = 7$
10. $\log_3 6 + \log_3 x = \log_3 12$	11. $6\ln(-x) + 3 = 21$	12. $13\log x - 6 = 6$
13. $\log_6 x + \log_6(x + 1) = 1$	14. $\log_3(x^2 - 3) = \log_3 2 + \log_3 x$	
15. $\log_{81} x = \frac{3}{4}$	16. Challenge: $(\log_2 x)^2 = 2\log_2 x + 3$	

II. Solve the exponential equation.

17. $3^{x+5} = 7$	18. $\left(\frac{1}{125}\right)^{x+2} = 25^{3-x}$	19. $4^{2x-3} = 12$	20. $4^x = 8^{\text{chocolate}}$
21. $3\sqrt{27} = 3^{4x}$	22. $3^{x+4} = 6^{2x-5}$	23. $\frac{3000}{2 + e^{2x}} = 2$	24. $16^{18} + 16^{18} + 16^{18} + 16^{18} = 4^x$
25. $4^{1/x} = 16$	26. $5^{2x} - 5 \cdot 5^x + 6 = 0$	27. $8^x(16^{x-1}) = 4(32^{2x+3})$	28. $7^{3x-8} = 2^{5-x}$

III. Solve.

29. $\ln e^{3x+5} = 11$	30. $\log_x 125 = \frac{3}{2}$
31. $\log_2 x^3 = \log_2 x$	32. $\log_4(3x + 1) - \log_4(x - 4) = \log_4 2$
33. $\ln^4 \sqrt{x-1} = 1$	34. If $f(x) = \log(x + 3)$, find $f^{-1}(2)$
35. $\frac{e^x + 7e^{-x}}{-2} = -4$	36. $e^{2x} \ln x + e^{2x} = 0$
37. $2x \ln\left(\frac{1}{x}\right) - x = 0$	38. $\log_2(x + 1) = \log_4 4x$

ANSWERS

1. 5

2. 27

3. $-3/4$

4. 7

5. 4, -3

6. 1007

7. no solution

8. 5

9. -21

10. 2

11. $-e^3$

12. $10^{12/13}$

13. 2

14. 3

15. 27

16. 0.5, 8

17. $-5 + \log_3 7$

18. -12

19. $\frac{3 + \log_4 12}{2}$

20. 3chocolate/2

21. 5/8

22. $\frac{4 \log 3 + 5 \log 6}{2 \log 6 - \log 3}$

23. $\frac{\ln 1498}{2}$

24. 37

25. 1/2

26. $\log_5 3, \log_5 2$

27. -7

28. $\frac{5 \log 2 + 8 \log 7}{3 \log 7 + \log 2}$

29. 2

30. 25

31. 1

32. no solution

33. $e^4 + 1$

34. 97

35. 0, $\ln 7$

36. e^{-1}

37. 0, $e^{-1/2}$

38. 1