

Practice Problems

Solve the following equations:

Remember that the arguments of all logarithms must be greater than 0. Also exponentials in the form of a^x will be greater than 0. Be sure to check all your answers in the original equation.

1. $3^{x-1} = 81$

2. $8^x = 4$

3. $e^x = 5$

4. $-14 + 3e^x = 11$

5. $-6 + \ln 3x = 0$

6. $\log(3x + 1) = 2$

7. $\ln x - \ln 3 = 4$

8. $2 \ln 3x = 4$

9. $5^{x+2} = 4$

10. $\ln(x + 2)^2 = 6$

11. $4^{-3x} = 0.25$

12. $2e^{2x} - 5e^x - 3 = 0$

13. $\log_7 3 + \log_7 x = \log_7 32$

14. $2 \log_6 4x = 0$

15. $\log_2 x + \log_2(x - 3) = 2$

16. $\log_2(x + 5) - \log_2(x - 2) = 3$

17. $4 \ln(2x + 3) = 11$

18. $\log x - \log 6 = 2 \log 4$

19. $2^x = 64$

20. $5^x = 25$

21. $4^{x-3} = \frac{1}{16}$

22. $3^{x-2} = 81$

23. $\log_3 x = 5$

24. $\log_4 x = 3$

25. $\log_2 2x = \log_2 100$

26. $\ln(x + 4) = \ln 7$

27. $\log_3(2x + 1) = 2$

28. $\log_5(x - 10) = 2$

29. $3^x = 500$

30. $8^x = 1000$

31. $\ln x = 7.25$

32. $\ln x = -0.5$

33. $2e^{0.5x} = 45$

34. $100e^{-0.6x} = 20$

35. $12(1 - 4^x) = 18$

36. $25(1 - e^t) = 12$

37. $\log 2x = 1.5$

38. $\log_2 2x = -0.65$

39. $\frac{1}{3} \log_2 x + 5 = 7$

40. $4 \log_5(x + 1) = 4.8$

41. $\log_2 x + \log_2 3 = 3$

42. $2 \log_4 x - \log_4(x - 1) = 1$

$$\frac{2 \log_4 \frac{x}{x-1}}{2} = \frac{1}{2}$$

$$\log_4 \frac{x}{x-1} = \frac{1}{2}$$

$x+4=7$
 $x=3$

$e^{7.25} = x$

$$\log_7 3 + \log_7 x = \log_7 32$$

$$\log_7 3x = \log_7 32$$

$$3x = 32$$

$$x = \frac{32}{3}$$

$$2^x = 2^5$$

$$\#14) \frac{2 \log_6 4x = 0}{2}$$

$$\log_6 4x = 0$$

$$6^0 = 4x$$

$$1 = 4x$$

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

$$\#15) \log_2 x + \log_2 (x-3) = 2$$

$$\log_2 x(x-3) = 2$$

$$\log_2 (x^2 - 3x) = 2$$

$$x^2 - 3x = 2^2$$

$$x^2 - 3x = 4$$

$$x^2 - 3x - 4 = 0$$

$$(x-4)(x+1) = 0$$

$$x=4 \quad x=-1$$

$$\#16) \log_2(x+5) - \log_2(x-2) = 3$$

$$\log_2\left(\frac{x+5}{x-2}\right) = 3$$

$$2^3 = 8$$

$$(x-2)\left(\frac{x+5}{x-2}\right) = 2^3(x-2)$$

$$8(x-2)$$

$$x+5 = 8x-16$$

$$5 = 7x-16$$

$$21 = 7x$$

$$x = 3$$

$$\#17) \frac{4 \ln(2x+3)}{4} = \frac{11}{4}$$

$$\ln(2x+3) = \frac{11}{4}$$

$$e^{\frac{11}{4} - 3} = 2x + 3$$

$$e^{\frac{11}{4} - 3} - 3 = 2x$$

$$x = \frac{e^{\frac{11}{4} - 3} - 3}{2}$$

$$\frac{e^{\frac{11}{4}}}{2} - \frac{3}{2}$$

#18)

$$\log x - \log 6 = 2 \log 4$$

$$\log x - \log 6 = \log 4^2$$

$$\log\left(\frac{x}{6}\right) = \log 16$$

$$\frac{x}{6} = 16$$

$$x = 96$$

$$\#21) \quad 4^{x-3} = \frac{1}{16}$$

$$4^{x-3} = 4^{-2}$$

$$x-3 = -2$$

$$x = 1$$

$$\ln 4^{x-3} = \ln \frac{1}{16}$$

$$(x-3) \ln 4 = \ln \frac{1}{16}$$

$$x-3 = \frac{\ln \frac{1}{16}}{\ln 4}$$

$$x = \frac{\ln \frac{1}{16}}{\ln 4} + 3$$

$$29) 3^x = 500$$

$$\ln 3^x = \ln 500$$

$$x \ln 3 = \ln 500$$

$$x = \frac{\ln 500}{\ln 3}$$

$$\log_3 500 = x$$

$$32) \ln x = -0.5$$

$$e^{-0.5} = x$$

$$x = \sqrt{e^{-1}}$$

$$= \frac{1}{\sqrt{e}}$$

$$35) \quad 12(1-4^x) = 18$$

$$1-4^x = \frac{3}{2}$$

$$\begin{array}{r} -1 \quad -1 \\ -4^x = \frac{1}{2} \end{array}$$

$$4^x = -\frac{1}{2}$$

No Solution

~~$$4^x = -2^{-1}$$
$$2^{2x} = -2^{-1}$$~~

$$\frac{3}{2} - \frac{2}{2} = \frac{1}{2}$$

$$\#38) \log_2 2x = -0.65$$

$$2^{-.65} = 2x$$

$$x = \frac{2^{-.65}}{2}$$
$$= 2^{-1.65}$$
$$= .319$$

$$\#39) \frac{1}{3} \log_2 x + 5 = 7$$

$$\log_2 x + 15 = 21 \quad \frac{1}{3} \log_2 x = 2$$

$$\rightarrow \log_2 x = 6$$

$$2^6 = x$$

$$x = 64$$

$$\log_2 x^{\frac{1}{3}} = 2$$

$$2 = x^{\frac{1}{3}}$$

$$(4)^3 = (x^{\frac{1}{3}})^3$$

$$64 = x$$

