

Section 13.6 – Exponential and Logarithm Equations

The objectives for this section include:

- Solve exponential equations
- Solve logarithmic equations

To solve an equation of the form $a^x = b$ for x

1. Take the logarithm of both sides (common or natural)
2. Use the power rule for exponents so that the variable is no longer written as an exponent.
3. Divide both sides by the coefficient of the variable to isolate the variable.
4. If appropriate, use a calculator to find an approximate solution in decimal form.

1. $3^x = \frac{1}{81}$

2. $e^t = 1000$

3. $3^{5-x} = 27$

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

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

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6. $2^{x+3} = 7^x$

7. $125 - (4.5)^y = 0$

8. $2e^{4x} = 15$

To solve logarithmic equations → Use the properties of logarithms and then put in exponential form.

9. $\log_3 x = 3$

10. $4\log x = -8$

11. $3\ln x = -3$

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12. $\log_5(2x-7) = 3$

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

14. $\log x - \log(x+3) = -1$

15. $\log_6(x+7) - \log_6(x-2) = \log_6 5$

16. $\log_2(x+3) + \log_2(x-3) = 4$

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17. $\log_6(x+3) + \log_6(x+2) = \log_6 20$

History Lesson – How did people do these calculations a long time ago?

18. $\frac{790}{8.02}$

19. $\sqrt[8]{308}$

20. $\frac{895}{73.4^{86}}$