

6.5**Practice A**

In Exercises 1–9, solve the equation. Check your solution.

1. $3^{4x} = 3^{12}$

2. $2^{x+3} = 2^5$

3. $5^{3x} = 5^{2x-7}$

4. $3^x = 27$

5. $5^x = 625$

6. $11^{x-4} = 121^x$

7. $\left(\frac{1}{3}\right)^x = 81$

8. $\frac{1}{125} = 5^{2x+7}$

9. $7^{5-4x} = \frac{1}{343}$

10. Describe and correct the error in solving the exponential equation.

\times	$\left(\frac{1}{6}\right)^{3x-1} = 36^{x-7}$ $(6^{-1})^{3x-1} = (6^{-2})^{x-7}$ $-3x + 1 = -2x + 14$ $x = -13$
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In Exercises 11–16, use a graphing calculator to solve the equation.

11. $5^{x-1} = 10$

12. $3^{x+5} = 7$

13. $\left(\frac{1}{3}\right)^{6x+1} = -5$

14. $\left(\frac{1}{4}\right)^{x+2} = 9$

15. $3^{x-5} = 3x - 4$

16. $4x + 1 = 5^{x-3}$

In Exercises 17–19, solve the equation using the Property of Equality for Exponential Equations.

17. $40 \cdot 5^{x-2} = 200$

18. $8 \cdot 2^{x+6} = 32$

19. $3(4^{-3x-1}) = 48$

20. A bacterial culture triples in size every hour. You begin observing the number of bacteria 2 hours after the culture is prepared. The amount y of bacteria x hours after the culture is prepared is represented by $y = 162(3^{x-2})$. When will there be 8100 bacteria?

In Exercises 21–23, solve the equation.

21. $2^{3x-6} = 8^{x-2}$

22. $9^{3x-2} = 27^{2x-2}$

23. $2^{4(x-3)} = 16^{x+1}$

In Exercises 24 and 25, solve the equation.

24. $7^{x+3} = \sqrt{7}$

25. $\left(\sqrt[4]{10}\right)^x = 10^{3x-1}$

6.5 Practice B

In Exercises 1–9, solve the equation. Check your solution.

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| 1. $3^{8x} = 3^{5x-6}$ | 2. $4^x = 2^{5x+3}$ | 3. $8^{5x} = 4^{4x+7}$ |
| 4. $25^{x-2} = 125^{3x+1}$ | 5. $9^{x-6} = 729^{3(x+2)}$ | 6. $4^{6(-x+2)} = 8^{-3x-4}$ |
| 7. $\left(\frac{1}{8}\right)^{2x+4} = 16^{4-x}$ | 8. $\left(\frac{2}{3}\right)^{x+8} = \left(\frac{3}{2}\right)^{2x-5}$ | 9. $\left(\frac{5}{4}\right)^{3x+5} = \left(\frac{16}{25}\right)^{-4x}$ |

10. Describe and correct the error in solving the exponential equation.

$$\begin{array}{l} \times \quad \left(\frac{1}{16}\right)^{3x} = 64^{x-4} \\ \quad \quad \left(4^{-2}\right)^{3x} = \left(8^2\right)^{x-4} \\ \quad \quad \quad -6x = 2x - 8 \\ \quad \quad \quad x = 1 \end{array}$$

In Exercises 11–16, use a graphing calculator to solve the equation.

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| 11. $4^{-x+2} = -\frac{1}{3}x + 5$ | 12. $\frac{1}{2}x + 3 = \left(\frac{1}{5}\right)^{2x+1}$ | 13. $6^x = 4^{-x+3}$ |
| 14. $5^{x-4} = 3^{-x}$ | 15. $3^{x+2} = -4^{-x+1}$ | 16. $3^{-x-5} = 2^{x+3}$ |

17. A bread dough doubles in size every hour. You begin measuring the volume of the dough 1 hour after the dough is prepared. The volume y (in cubic inches) of the dough x hours after the dough is prepared is represented by $y = 35(2^{x-1})$.

When will the volume of the dough be 4200 cubic inches?

In Exercises 18–20, solve the equation.

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| 18. $125^{x-1} = 5^{3x-2}$ | 19. $8^{2x+1} = 2^{3(2x+1)}$ | 20. $3^{8(2x-1)} = 81^{4x-2}$ |
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21. You deposit \$750 in a savings account that earns 4% annual interest compounded yearly. Write and solve an exponential equation to determine when the balance of the account will be \$1000.

In Exercises 22 and 23, solve the equation.

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| 22. $\left(\sqrt[5]{3}\right)^x = 3^{3x-5}$ | 23. $\left(\sqrt[6]{2}\right)^{2x} = \left(\sqrt[4]{2}\right)^{x-3}$ |
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