

LESSON
9-2**Practice B****Exponential and Logarithmic Equations and Inequalities****Solve and check.**

1. $5^{2x} = 20$

2. $12^{2x-8} = 15$

3. $2^{x+6} = 4$

4. $16^{5x} = 64^{x+7}$

5. $243^{0.2x} = 81^{x+5}$

6. $25^x = 125^{x-2}$

7. $\left(\frac{1}{2}\right)^x = 16^2$

8. $\left(\frac{1}{32}\right)^{2x} = 64$

9. $\left(\frac{1}{27}\right)^{x-6} = 27$

Solve.

10. $\log_4 x^5 = 20$

11. $\log_3 x^6 = 12$

12. $\log_4 (x-6)^3 = 6$

13. $\log x - \log 10 = 14$

14. $\log x + \log 5 = 2$

15. $\log (x+9) = \log (2x-7)$

16. $\log (x+4) - \log 6 = 1$

17. $\log x^2 + \log 25 = 2$

18. $\log (x-1)^2 = \log (-5x-1)$

Use a table and graph to solve.

19. $2^{x-5} < 64$

20. $\log x^3 = 12$

21. $2^x 3^x = 1296$

Solve.

22. The population of a small farming community is declining at a rate of 7% per year. The decline can be expressed by the exponential equation $P = C(1 - 0.07)^t$, where P is the population after t years and C is the current population. If the population was 8,500 in 2004, when will the population be less than 6,000?
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5. $5 \log x$; Power Property
6. $\log x$; Quotient Property
7. 1; Product Property
8. $x \log x$; Power Property
9. $2 \log xy$; Quotient Property and Power Property
10. 7; Product Property and Inverse Property
11. $x = 1$

13. $x = 8000$
15. $x = 7$ or $x = -2$
17. $x = 5$
19. $x = \pm 20$
21. $x \leq 1$ or $x \geq 3$
22. a. $A = 9000(1.0425)^t$
b. 20 years
c. \$72,118.34
14. $x = 10^9$
16. $x = \pm 11$
18. $x = -0.1, 1$
20. $x = -3$, or $x = \frac{1}{2}$

9-2 EXPONENTIAL AND LOGARITHMIC EQUATIONS AND INEQUALITIES

Practice A

1. 129; $x \approx 0.645$
3. $x \approx 0.161$
5. $x = 2$
7. $x = 9$
9. $x = -2$
11. $x = 3125$
13. $x = 9000$
15. $x = 2$
2. $x \approx 3.43$
4. $x = -3$
6. $x \approx 1.686$
8. $x = -10$
10. $x = 8$
12. $x = 10$ (or $x = -2$)
14. $x = 2.5$
16. 19 years

Practice B

1. $x \approx 0.9307$
3. $x = -4$
5. $x \approx -6.67$
7. $x = -8$
9. $x = 5$
11. $x = 9$
13. $x = 10^{15}$
15. $x = 16$
17. $x = \pm 2$
19. $x < 11$
21. $x = 4$
2. $x \approx 4.5449$
4. $x = 3$
6. $x = 6$
8. $x = -0.6$
10. $x = 256$
12. $x = 22$
14. $x = 20$
16. $x = 56$
18. $x = -1, -2$
20. $x = 10,000$
22. 2009

Practice C

1. $x = 2$
3. $x \approx 3.4$
5. $x = -3.75$
7. $x = -0.5$
9. $x = -0.5$
11. $x = 20$
2. $x \approx 1.414$
4. $x = 12$
6. $x = -2$
8. $x = -6.5$
10. $x = 32.5$
12. $x = 1$

Review for Mastery

1. $x = -2.5$; $4^{-(-2.5)} = 32$
2. $x \approx 1.024$; $3^{4(1.024)} \approx 90.01$
3. $\log 5^{x-3} = \log 600$
 $(x-3) \log 5 = \log 600$
 $x \approx 6.975$
 $5^{6.975-3} \approx 600.352$
4. $3^2 = x$
 $x = 9$
5. $4x + 8 = 100$
 $4x = 92$
 $x = 23$
6. $\log\left(\frac{75x}{3}\right) = 1$; $\log 25x = 1$; $10^1 = 25x$;
 $10 = 25x$; $x = \frac{2}{5}$

Challenge

1. $T(t) - T_A = [T_o - T_A] b^t$
 $\frac{T(t) - T_A}{T_o - T_A} = b^t$
 $\log\left(\frac{T(t) - T_A}{T_o - T_A}\right) = t \log b$
 $= \frac{\log\left(\frac{T(t) - T_A}{T_o - T_A}\right)}{t} = \log b$
 $= 10^{\left(\frac{\log\left(\frac{T(t) - T_A}{T_o - T_A}\right)}{t}\right)} = b$