

LESSON
9-1**Practice C****Properties of Logarithms****Express as a single logarithm. Simplify, if possible.**

1. $\log_6 12 + \log_6 18$

2. $\log_3 81 - \log_3 27$

3. $\log_4 128 - \log_4 8$

4. $\log_6 18 + \log_6 72$

5. $\log_5 3125 - \log_5 25$

6. $\log_8 128 + \log_8 256$

7. $\log_5 5 + \log_5 125$

8. $\log_2 256 - \log_2 64$

9. $\log_3 8019 - \log_3 99$

10. $\log_8 80 + \log_8 51.2$

11. $\log_7 13.3 - \log_7 1.9$

12. $\log_{10} 125 + \log_{10} 80$

Evaluate. Round to the nearest hundredth.

13. $\log_8 8^6$

14. $2^{\log_2 8^x}$

15. $\log_2 16^5$

16. $\log_3 3^{(2x+1)}$

17. $\log_4 16^{(x-1)}$

18. $5^{\log_5 17}$

19. $\log_3 5^2$

20. $\log_5 \left(\frac{1}{125} \right)^2$

21. $\log_6 \left(\frac{1}{6^4} \right)^3$

22. $\log_4 20^2$

23. $\log_9 27^4$

24. $\log_2 10$

Solve.

25. Carmen has a painting presently valued at \$5000. An art dealer told her the painting would appreciate at a rate of 6% per year. In how many years will the painting be worth \$8,000?

a. Write a logarithmic expression. _____

b. Simplify your expression. _____

9-1 PROPERTIES OF LOGARITHMS

Practice A

- 4
- 64; 64; 6
- 3125; 3125; 5
- $\log_{10} 10,000 = 4$
- $\log_6 6 = 1$
- $\log_8 64 = 2$
- $\log_5 25 = 2$
- $\log_3 3 = 1$
- $\log_2 32 = 5$
- $\log_4 16 = 2$
- $\log_6 36 = 2$
- $\log_5 125 = 3$
- 4
- 4
- 9
- 4
- 12
- 2
- 1.59
- 1.77
- 1.46
- 10^{22} ergs

Practice B

- $\log_3 243 = 5$
- $\log_2 128 = 7$
- $\log_{10} 10,000 = 4$
- $\log_6 216 = 3$
- $\log_3 81 = 4$
- $\log_4 4096 = 6$
- $\log_2 8 = 3$
- $\log_{10} 100 = 2$
- $\log_4 64 = 3$
- $\log_2 64 = 6$
- $\log_3 243 = 5$
- $\log_6 36 = 2$
- 6
- $x - 5$
- 30
- 1
- 5
- 8
- 0
- 3.10
- 1.43
- $1.26 \times 10^{18.1}$ ergs

Practice C

- $\log_6 216 = 3$
- $\log_3 3 = 1$
- $\log_4 16 = 2$
- $\log_6 1296 = 4$
- $\log_5 125 = 3$
- $\log_8 32,768 = 5$
- $\log_5 625 = 4$
- $\log_2 4 = 2$
- $\log_3 81 = 4$
- $\log_8 4096 = 4$
- $\log_7 7 = 1$
- $\log_{10} 10,000 = 4$
- 6
- 8^x
- 20
- $2x + 1$
- $2x - 2$
- 17
- 2.93
- 6
- 12
- 4.32
- 6
- 3.32
- a. $\log_{1.06} 1.6$
- 8 years

Review for Mastery

- 3
- $\log_2 16; 4$
- $\log_9 (3 \cdot 27); \log_9 81; 2$
- $2 \cdot 3 = 6$
- $4 \cdot 4 = 16$
- $3 \log_9 81; 3 \cdot 2 = 6$
- $5y$
- 75
- $3x$

Challenge

- Both expressions equal $\frac{3}{2}$.
- Result is $\frac{3}{2}$; formula is easier to compute.
- Result is $\frac{6}{5}$; formula is easier to compute.
- $\log_a b \cdot \log_b c = \log_a c$
 $\log_a b \cdot \log_b c = \frac{\log b}{\log a} \cdot \frac{\log c}{\log b}$
 $= \frac{\log c}{\log a} \cdot \frac{\log b}{\log b} = \frac{\log c}{\log a} = \log_a c$
- $\log_2 13 = \frac{\log 13}{\log 2} \approx 3.7$
- $\log_2 32 = 5$; possible answer: using the Chain Rule is much easier.

Problem Solving

- a. $7.8 = \frac{2}{3} \log \left(\frac{E}{10^{11.8}} \right)$
b. $23.5 = \log E$
c. Yes; by the definition of logarithm; $E = 10^{23.5}$
d. They are both correct; $10^{23.5} = 3.16 \times 10^{23}$.
- A
- G
- C
- F

Reading Strategies

- True; Product Property
- True; Quotient Property
- False; Power Property
- False; Inverse Property