

11-4

NAME _____ DATE _____ PERIOD _____

Practice

Logarithmic Functions

Write each equation in exponential form.

1. $\log_3 81 = 4$

$3^4 = 81$

2. $\log_8 2 = \frac{1}{3}$

$8^{\frac{1}{3}} = 2$

3. $\log_{10} \frac{1}{100} = -2$

$10^{-2} = \frac{1}{100}$

Write each equation in logarithmic form.

4. $3^3 = 27$

$\log_3 27 = 3$

5. $5^{-3} = \frac{1}{125}$

$\log_5 \frac{1}{125} = -3$

6. $\left(\frac{1}{4}\right)^{-4} = 256$

$\log_{\frac{1}{4}} 256 = -4$

Evaluate each expression.

7. $\log_7 7^3$

3

8. $\log_{10} 0.001$

-3

9. $\log_8 4096$

4

10. $\log_4 32$

$\frac{5}{2}$

11. $\log_3 1$

0

12. $\log_6 \frac{1}{216}$

-3

Solve each equation.

13. $\log_x 64 = 3$

4

14. $\log_4 0.25 = x$

-1

15. $\log_4 (2x - 1) = \log_4 16$

$\frac{17}{2}$

16. $\log_{10} \sqrt{10} = x$

$\frac{1}{2}$

17. $\log_7 56 - \log_7 x = \log_7 4$

14

18. $\log_5 (x + 4) + \log_5 x = \log_5 12$

2

19. **Chemistry** How long would it take 100,000 grams of radioactive iodine, which has a half-life of 60 days, to decay to 25,000 grams? Use the formula $N = N_0 \left(\frac{1}{2}\right)^t$, where N is the final amount of the substance, N_0 is the initial amount, and t represents the number of half-lives. **120 days**

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Musical

The frequencies of notes on a piano are related to the frequency of the note C_n .

C₁

1. Find the frequency of the note C_2 .
2. Find the frequency of the note C_3 .

The frequency of the note C_n is given by the formula $f_n = 2^{n-1} f_1$. The general formula for the frequency of the note C_n is $f_n = 2^{n-1} f_1$.

3. If the frequency of the note C_1 is 261.6 Hz, find the frequency of the note C_2 . (Hint: The frequency of the note C_2 is 523.2 Hz.)

$r = \sqrt[12]{2}$

4. Substitute the frequency of the note C_1 into the formula $f_n = 2^{n-1} f_1$ to find the frequency of the note C_2 .
5. Find the frequency of the note C_7 .

$f_7 = 261.6 \times 2^6$

6. The frets on a piano are spaced logarithmically. The frequency of the note C_n is $f_n = 2^{n-1} f_1$. The frequency of the note C_1 is $f_1 = 261.6$ Hz. The frequency of the note C_2 is $f_2 = 523.2$ Hz. The frequency of the note C_3 is $f_3 = 794.4$ Hz. The frequency of the note C_4 is $f_4 = 1188.8$ Hz. The frequency of the note C_5 is $f_5 = 1783.2$ Hz. The frequency of the note C_6 is $f_6 = 2616.0$ Hz. The frequency of the note C_7 is $f_7 = 3924.0$ Hz. The frequency of the note C_8 is $f_8 = 5848.0$ Hz. The frequency of the note C_9 is $f_9 = 8696.0$ Hz. The frequency of the note C_{10} is $f_{10} = 12896.0$ Hz. The frequency of the note C_{11} is $f_{11} = 18960.0$ Hz. The frequency of the note C_{12} is $f_{12} = 27648.0$ Hz.

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