

7-4 Puzzle: Letter Scramble

Properties of Logarithms

Next to each expression in the left column, write the letter of the expression in the right column whose value is equivalent to it. Some letters will be used more than once. Unscramble the letters to find the four-word phrase that answers the question at the bottom of the page.

- | | |
|---|---------------------------------|
| 1. $\log_2 75$ | A. $\log_2 a + 5 \log_2 b$ |
| 2. $\log_2 36$ | B. $4 \log_2 a - 3 \log_2 b$ |
| 3. $\log_2(75 \times 2^a) - a$ | C. -1 |
| 4. $\log_2 ab^5$ | D. $\log_2(5a) - 9$ |
| 5. $\log_2(36 \times 2^5) - 5$ | E. $5 \log_2 2 + \log_2 2^{20}$ |
| 6. $\log_2 108$ | F. $\log_2(3b)$ |
| 7. $\log_2 2^8$ | G. $\log_2(3a) + 9$ |
| 8. $\log_2(a \times 2^8)$ | I. $2(\log_2 2 + \log_2 3)$ |
| 9. $\log_2(3a \times 2^9)$ | K. 20 |
| 10. $\log_2 2^{16} - 8$ | L. 8 |
| 11. $\log_2 \left(\frac{6^2}{2a} \right) + \log_2(2a)$ | M. $3a$ |
| 12. $\log_2(a^4 b^3)$ | N. $2 \log_2 5 + \log_2 3$ |
| 13. $(\log_2 75)(\log_2(2^{a+1}) - a)$ | O. $\log_2 a + 8$ |
| 14. $(\log_2 2)(\log_2 ab^5)$ | P. $3 \log_2 3 + \log_2 4$ |
| 15. $\log_2 \left(\frac{a^4}{b^3} \right)$ | R. $a + b$ |
| 16. $\log_2 16 - 5$ | S. $4 \log_2 a + 3 \log_2 b$ |

Where do simple exponents live? _____

7-4 Practice

Properties of Logarithms

Form G

Write each expression as a single logarithm.

1. $\log_5 4 + \log_5 3$

4. $5 \log_7 x = 2 \log_7 x$

7. $2 \log x - 3 \log y$

10. $5 \log 2 - 2 \log 2$

13. $(\log 3 - \log 4) - \log 2$

16. $\log 2 + \log 4 - \log 7$

19. $\frac{1}{2} \log x + \frac{1}{3} \log y - 2 \log z$

Expand each logarithm. Simplify if possible.

22. $\log xyz$

24. $\log 6x^3y$

25. $\log 7(3x - 2)^2$

27. $\log \frac{5x}{4y}$

28. $\log_5 5x^{-5}$

30. $\log_4 (3xyz)^2$

Use the Change of Base Formula to evaluate each expression. Round your answer to the nearest thousandth.

31. $\log_4 32$

32. $\log_3 5$

33. $\log_2 15$

34. $\log_6 17$

35. $\log_6 10$

36. $\log_5 6$

37. $\log_8 1$

38. $\log_9 11$

39. The concentration of hydrogen ions in a batch of homemade ketchup is 10^{-4} . What is the pH level of the ketchup?