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.

N 1. $\log_2 75$ $\log_2 3 + 2\log_2 5$

I 2. $\log_2 36$ $2\log_2 3 + 2\log_2 2$

N 3. $\log_2(75 \times 2^a) - a$ $\log_2 3 + 2\log_2 5$

A 4. $\log_2 ab^5$ $5\log_2 b + \log_2 a$

I 5. $\log_2(36 \times 2^5) - 5$ $2\log_2 2 + 2\log_2 3$

P 6. $\log_2 108$ $2\log_2 2 + 3\log_2 3$

L 7. $\log_2 2^8$ 8

O 8. $\log_2(a \times 2^8)$ $\log_2 a + 8$

G 9. $\log_2(3a \times 2^9)$ $\log_2 3 + \log_2 a + 9$

L 10. $\log_2 2^{16} - 8$ $16 - 8$

I 11. $\log_2\left(\dfrac{6^2}{2a}\right) + \log_2(2a)$ $2\log_2 6$

S 12. $\log_2(a^4 b^3)$ $4\log_2 a + 3\log_2 b$

N 13. $(\log_2 75)(\log_2(2^{a+1}) - a)$ $2\log_2 5 + \log_2 3$

A 14. $(\log_2 2)(\log_2 ab^5)$ $\log_2 a + 5\log_2 b$

B 15. $\log_2\left(\dfrac{a^4}{b^3}\right)$ $4\log_2 a - 3\log_2 b$

C 16. $\log_2 16 - 5$ -1

A. $\log_2 a + 5\log_2 b$

B. $4\log_2 a - 3\log_2 b$

C. -1

D. $\log_2(5a) - 9$

E. $5\log_2 2 + \log_2 2^{20}$

F. $\log_2(3b)$

G. $\log_2(3a) + 9$

I. $2(\log_2 2 + \log_2 3)$

K. 20

L. 8

M. $3a$

N. $2\log_2 5 + \log_2 3$

O. $\log_2 a + 8$

P. $3\log_2 3 + \log_2 4$ 2^2 $2\log_2 2$

R. $a + b$

S. $4\log_2 a + 3\log_2 b$

Where do simple exponents live? **NI NAIPL OGL ISNABC**

in Plain LOG CAbins

7-4 **Practice** *Form G*

Properties of Logarithms

Write each expression as a single logarithm.

1. $\log_5 4 + \log_5 3$ $\log_5 12$

4. $5\log_7 x - 2\log_7 x$ $\log_7(x^3)$

7. $2\log x - 3\log y$ $\log\left(\dfrac{x^2}{y^3}\right)$

10. $5\log 2 - 2\log 2$ $\log 2^3$ or $3\log 2$

13. $(\log 3 - \log 4) - \log 2$ $\log\dfrac{(3/4)}{2} = \log\dfrac{3}{8}$

16. $\log 2 + \log 4 - \log 7$ $\log\left(\dfrac{8}{7}\right)$

19. $\dfrac{1}{2}\log x + \dfrac{1}{3}\log y - 2\log z$ $\log\left(\dfrac{x^{\frac{1}{2}} y^{1/3}}{z^2}\right)$

Expand each logarithm. Simplify if possible.

22. $\log xyz$ $\log x + \log y + \log z$

24. $\log 6x^3 y$ $\log 6 + 3\log x + \log y$

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

27. $\log\dfrac{5x}{4y}$ $\log 5 + \log x - \log 4 - \log y$

28. $\log_5 5x^{-5}$ $-5\log_5 x + 1$

30. $\log_4 (3xyz)^2$ $2\log_4 3 + 2\log_4 x + 2\log_4 y + 2\log_4 z$

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

31. $\log_4 32$ 2.5

32. $\log_3 5$ 1.465

33. $\log_2 15$ 3.907

34. $\log_6 17$ 1.581

35. $\log_6 10$ 1.285

36. $\log_5 6$ 1.113

37. $\log_8 1$ 0

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? 4