

LOGARITHMS & EXPONENTS

1992 MU ALPHA THETA NATIONAL CONVENTION

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1. $\log_2 8 =$

- a. 3
- b. 4
- c. 8
- d. 16
- e. NOTA

2. If $a = \log_8 225$ and $b = \log_2 15$, then a , given in terms of b , is equal to:

- a. $b/2$
- b. $2b/3$
- c. $3b/2$
- d. $2b$
- e. NOTA

3. $(-i)^{3895} =$

- a. $-i$
- b. i
- c. -1
- d. 1
- e. NOTA

4. If $f(x) = \log_a x$, and $a > 0$, then:

- a. $f(a) = 0$
- b. $f(a) = 1$
- c. $f(1) = a$
- d. $f(0) = a$
- e. NOTA

5. Solve the equation for x : $4^x = 17$

- a. $\log 17 - \log 4$
- b. $\log 13$
- c. $0.5(\log 17)/(\log 2)$
- d. $17/4$
- e. NOTA

6. If $x > y > 1$, then

$\log(x^3 - y^3) - \log(x - y) =$

- a. $\log(x^2 + y^2)$
- b. $\log(x^2 - y^2)$
- c. $2 \log(x + y)$
- d. $\log(x^2 - xy + y^2)$
- e. NOTA

7. Choose the value closest to -1 .

- a. $-(8/27)^{-2/3}$
- b. $-(8/27)^{2/3}$
- c. $-(16/25)^{-1/2}$
- d. $-(16/25)^{1/2}$
- e. NOTA

8. The value of $(256)^{0.15}$ times $(256)^{0.1}$ is:

- a. 4
- b. 16
- c. 64
- d. 256.25
- e. NOTA

9. $[(a^2 - b^2)/(a + b)]^{-1} =$

- a. $-(a - b)/a^2b^2$
- b. $-(a + b)/a^2b^2$
- c. $-a^2b^2/(a - b)$
- d. $-a^2b^2/(a + b)$
- e. NOTA

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10. Find the sum of the roots of the equation:

$$36e^x + 6e^{-x} = 35$$

- a. $1/6$
- b. $35/36$
- c. $-35/36$
- d. $-\ln 6$
- e. NOTA

11. If $a = \log_2 256$ and $b = \log_3 27$, find the sum of the coefficients of the expansion of $(2bx^3 - ay)^9$.

- a. -514
- b. -513
- c. 513
- d. 512
- e. NOTA

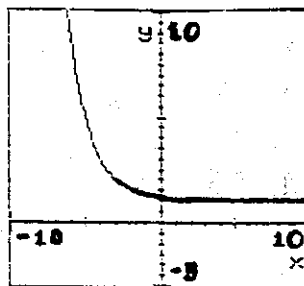
12. Find the value of -2^{2^3}

- a. -256
- b. -64
- c. 64
- d. 256
- e. NOTA

13. Simplify: $\frac{2n^{1/3} - 4n^{-2/3}}{2n^{-2/3}}$

- a. $n - 2$
- b. $n^{1/3} - 2$
- c. $n + 2$
- d. $2/n$
- e. NOTA

14. The equation representing the graph is:



- a. $f(x) = 2^{(x-3)} + 1$
- b. $f(x) = 2^{(x+3)} + 1$
- c. $f(x) = 2^{(-x+3)} + 1$
- d. $f(x) = 2^{(-x-3)} + 1$
- e. NOTA

15. How many digits are in the product of $(16^{20})(125^{27})$?

- a. 78
- b. 79
- c. 80
- d. 81
- e. NOTA

16. $[(2x^2y^{-1}) / (y^{-3})]^4 =$

- a. $2x^8y^8$
- b. $4x^8y^8$
- c. $16x^8y^{-16}$
- d. $16x^6y^6$
- e. NOTA

17. Suppose A and B are positive real numbers for which $\log_A B = \log_B A$. Also, suppose neither A nor B is equal to 1, and A does not equal B. Find the value of AB.

- a. 0.5
- b. 1
- c. 1.25
- d. 2
- e. NOTA

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18. Solve for x when $(1/49)^{2x-3} = 343^{3x-2}$

- a. $-13/12$
- b. $-12/13$
- c. $12/13$
- d. $13/12$
- e. NOTA

19. When $y = [x]$ is defined as the greatest integer function, find:

$$[\log_3 769] + [\log_6 1024] + [\log_5 15124] + [\log 0.000019467] + [\log_7 1299]$$

- a. 12
- b. 13
- c. 14
- d. 15
- e. NOTA

20. $(\log_8 0.04)(\log_9 4096)(\log_{625} 36)(\log_6 2) =$

- a. -4
- b. -2
- c. $-\log_4 3$
- d. $\log_3 0.25$
- e. NOTA

21. Solve for x , if x is a real number and $3^{\log x} = 3x$.

- a. $x = 3^{(\log_3 10)/(\log_3 0.3)}$
- b. $x = 3^{(\log_3 10)/(\log_3 1.3)}$
- c. $x = 10^{(\log 0.3)/(\log 1.3)}$
- d. $x = 10^{(\log 0.3)/(\log 10/3)}$
- e. NOTA

22. Find the rational number c which satisfies

$$\log_4 a + \log_{64} b = c,$$
$$ab^3 = 1992, \text{ and } a^3b = 32.$$

- a. $5/6$
- b. 2
- c. 2.5
- d. $(\log 1992)/(\log 64)$
- e. NOTA

23. Find the sum of the roots of:

$$x^{4/3} - 6x^{2/3} + 8 = 0$$

- a. 2
- b. $8 - 2^2$
- c. 6
- d. $8 + 2^2$
- e. NOTA

24. If $f(x) = 2^x$, find the true statement.

- a. $f(x+2) - f(x) = 2 \cdot 2^x$
- b. $f(x+5)/(f(x)) = 25$
- c. $f(14) = 16384$
- d. $f(x+3) - f(x) = 6 \cdot 2^x$
- e. NOTA

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25. Find the sum of the absolute values of all of the real values of x which satisfy the equation:

$$x^{(x+3)^2} = x^{64}$$

- a. 0
- b. 4
- c. 16
- d. 18
- e. NOTA

26. Find the domain of $\log(x^3 - 2x^2 - 5x + 6) = y$

- a. $\{x: -2 < x < 1\} \cup \{x: x > 3\}$
- b. $\{x: x < -2\} \cup \{x: 1 < x < 3\}$
- c. $\{x: -3 < x < 1\} \cup \{x: x > 2\}$
- d. $\{x: x < -3\} \cup \{x: 1 < x < 2\}$
- e. NOTA

27. Find the sum:

$$\log_2 8 + \log_3 3 + \log_{16} 16 + \log_{16} 2 +$$

$$\log_8 2 + \log_{256} (2)^{0.5} + \log_{512} 2 + \dots$$

- a. 35/12
- b. 43/12
- c. 35/6
- d. 43/6
- e. NOTA

28. Suppose a and b are positive numbers for which

$$\log_9(a) = \log_{15}(b) = \log_{25}(a + 2b).$$

What is the value of b/a ?

- a. 5/3
- b. $1 + \sqrt{2}$
- c. 25/9
- d. $0.5(1 + \sqrt{5})$
- e. NOTA

29. Approximately how much money will be in an account at the end of ten years when \$600,000 is invested at 10% compounded continuously?

- a. 1 million
- b. 1.4 million
- c. 1.6 million
- d. 2 million
- e. NOTA

30. Find the value of the following determinant:

$$\begin{vmatrix} e^{(\ln 6 - \ln 2)} & e^{(\ln 9 + \ln 1)} \\ e^{(2 \ln 3 + 0.5 \ln 4)} & e^{(\ln 7 + \ln 3)} \end{vmatrix}$$

- a. -99
- b. -69
- c. e
- d. 225
- e. NOTA