MATHS

BOOKS - CENGAGE

LOGARITHM

Solved Examples And Exercises

1. Solve: $(\log)_{(\log)_2\left(\frac{x}{2}\right)}\left(x^2-10x+22\right)>0$

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2. Solve: $(\log)_{x+\frac{1}{x}}\log_2\left(\frac{x-1}{x-2}\right)>0$

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3. Solve: $(\log)_{0.5}\frac{3-x}{x+2}<0$

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4. Solve : $(\log)_2\frac{x-1}{x-2}>0$

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5. Solve $(\log)_{0.2}|x-3|\geq 0.$

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6. Solve $\log_2|x-1|<1$

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7. Solve : $2(\log)_3 x-4(\log)_x 27\leq 5\ (x>1)$

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8. Solve : $(\log)_{(x+3)}\left(x^2-x\right)<1$

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9. Solve $(\log)_{0.04}(x-1)\geq(\log)_{0.2}(x-1)$

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10. Solve: $(\log)_2\left(\frac{x^2+1}{x-1}\right)<0$

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11. If the equation $2^x+4^y=2^y+4^x$ is solved for y in terms of x where $x<0$, then the sum of the solution is (a) $x(\log)_2(1-2^x)$ (b) $x+(\log)_2(1-2^x)$ (c)$(\log)_2(1-2^x)$ (d) $x(\log)_2(2^x+1)$

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12. If $\frac{\log x}{b-c} = \frac{\log y}{c-a} = \frac{\log z}{a-b}$, then which of the following is/are true?

A. $xyz = 1$

B. $x^a y^b z^c = 1$

C. $x^{b+c} y^{c+b} = 1$

D. $xyz = x^a y^b z^c$

Answer: null

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13. If $(\log)_2 x + (\log)_2 y \geq 6,$ then the least value of $x + y$ is 4 (b) 8 (d) 16 (d) 32

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14. Solve : $(\log)_{0.3}\left(x^2-x+1\right)>0$

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15. Solve $1<(\log)_2(x-2)\leq 2.$

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16. Solve : $6(\log_x 2-(\log_4 x)+7=0.$

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17. Solve: $4^{(\log_2 \log x)}=\log x-(\log x)^2+1$ (base is e)

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18. Solve: $4(\log)_{\frac{x}{2}}\left(\sqrt{x}\right)+2(\log)_{4x}\left(x^2\right)=3(\log)_{2x}\left(x^3\right).$

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19. Solve $4^{(\log)_9 x} - 6x^{(\log)_9 2} + 2^{(\log)_3 27} = 0$

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20. Solve: $\frac{1}{4}x^{\log_2 \sqrt{x}} = \left(2.\, x^{(\log)_2 x}\right)^{\frac{1}{4}}$

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21. Solve: $|x-1|^{(\log)_{10} x} \hat{} 2 - (\log)_{10} x^2 = |x-1|^3$

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22. Solve $(\log)_2(x-1) > 4.$

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23. Solve $(\log)_3(x-2) \leq 2$.

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24. If $x_1 and x_2$ are the roots of the equation $e^2 \cdot x^{\ln x} = x^3$ with $x_1 > x_2$, then $x_1 = 2x_2$ (b) $x_1 = x_2^2$ $(c) 2x_1 = x_2^2$ (d) $x_1^2 = x_2^3$

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25. If $xy^2 = 4 and (\log)_3\left((\log)_2 x\right) + (\log)_{\frac{1}{3}}\left((\log)_{\frac{1}{2}} y\right) = 1$,then x equals

(a)4 (b)8 (c)16 (d)64

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26. $x^{\log_5 x} > 5$ implies $x \in$

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27. The number of real values of the parameter k for which $(\log_{16} x)^2 - (\log)_{16} x + (\log)_{16} k = 0$ with real coefficients will have exactly one solution is $(1) 2$ (b) 1 (c) 4 (d) none of these

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28. If $S = \{x \in R : ((\log)_{0.6} 0.216)(\log)_5 (5 - 2x) \leq 0\}$, then S is equal to $(2.5, \infty)$ (b) $[2, 2.5)$ (c) $(2, 2.5)$ (d) $(0, 2.5)$

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29. If $S = \left\{x \in N : 2 + (\log)_2 \sqrt{x+1} > 1 - (\log)_{\frac{1}{2}} \sqrt{4 - x^2}\right\}$, then (a) $S = \{1\}$ (b) $S = Z$ (d) $S = N$ (d) none of these

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30. Equation

$(\log)_4(3-x)+(\log)_{0.25}(3+x)=(\log)_4(1-x)+(\log)_{0.25}(2x+1)has$

(a) only one prime solution (b) two real solutions (c) no real solution (d) none of these

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31. Solution set of the inequality $\frac{1}{2^x-1}>\frac{1}{1-2^{x-1}}$ is $1,\infty)$ (b) $0,(\log)_2\left(\frac{4}{3}\right)$ (c) $(-1,\infty)$ $\left(0,(\log)_2\left(\frac{4}{3}\right)\cup(1,\infty)\right.$

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32. The solution set of the inequality $(\log)_{10}\left(x^2-16\right)\leq(\log)_{10}(4x-11)$ is $4,\infty)$ (b) $(4,5)$ (c) $\left(\frac{11}{4},\infty\right)$ (d) $\left(\frac{11}{4},5\right)$

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33. Which of the following is not the solution of $(\log)_x\left(\frac{5}{2}-\frac{1}{x}\right)>1$

$(a)\left(\frac{2}{5},\frac{1}{2}\right)(b)(1,2)(c)\left(\frac{2}{5},1\right)(d)Nonofthese$

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34. The equation $x^{\left(\frac{3}{4}\right)(\log_2 x)^2+(\log_2 x)-\left(\frac{5}{4}\right)}=\sqrt{2}$ has (1)at least one real solution (2)exactly three solutions (3)exactly one irrational solution (4)complex roots

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35. Solve the following equation of x : $2(\log)_x a+(\log)_{ax}a+3(\log)_{a^2x}a=0, a>0$

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36. Solve for $x: 4^x-3^{x-\frac{1}{2}}=3^{x+\frac{1}{2}}-2^{2x-1}$

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37. If P is the number of natural numbers whose logarithms to the base 10 have the the charecteristic p and Q is the numbers of natural numbers logarithms of whose reciprocal to the base 10 have the charecteristics -q. then find the value of $\log_{10} P - \log_{10} Q$

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38. Find the compound interest on Rs. 12000 for 10 years at the rate of 12% per annum compounded annually.

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39. If $x = (\log)_{2a} a, y = (\log)_{3a} 2a, z = (\log)_{4a} 3a$,prove that $1 + xyz = 2yz$

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40. Let L denote antilog_32 0.6 and M denote the number of positive integers which have the characteristic 4, when the base of log is 5, and N denote the value of $49^{(1-(\log)_7 2)}+5^{-(\log)_5 4}$. Find the value of $\frac{LM}{N}$.

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41. Let $x=(0.15)^{20}$. Find the characteristic and mantissa of the logarithm of x to the base 10. Assume $(\log)_{10}2=0.301 and (\log)_{10}3=0.477$.

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42. Using logarithms, find the value of 6.45 x 981.4

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43. In the 2001 census, the population of India was found to be $8.7 \cdot 10^7$. If the population increases at the rate of 2.5% every year, what would be the population in 2011?

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44. Given that $\log_{10}2 = 0.30103, \quad \log_{10}3 = 0.47712$ (approximately), find the number of digits in $2^8, 3^{12}$.

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45. If $a = (\log)_{12}18, b = (\log)_{24}54,$ then find the value of $ab + 5(a - b)$.

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46. Solve the equations for x and y: $(3x)^{\log 3} = (4y)^{\log 4}, 4^{\log x} = 3^{\log y}$.

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47. The real solutions of the equation $2^{x+2}.5^{6-x}=10^{x}\hat{}2$ is/are 1 (b) 2 (c) $(\log)_{10}(250)$ (d) $(\log)_{10}4-3$

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48. If $(\log)_{k}x\log_{5}k=(\log)_{x}5, k\neq 1, k>0,$ then x is equal to (a)k (b) 1/5 (c) 5 (d) none of these

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49. If $p, q\in N$ satisfy the equation $x^{\sqrt{x}}=\left(\sqrt{x}\right)^{x},$ then $pandq$ are (a)relatively prime (b) twin prime (c) coprime (d)if $(\log)_{q}p$ is defined, then $(\log)_{p}q$ is not and vice versa

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50. Solution set of the inequality $(\log)_{0.8}\left((\log)_6 \frac{x^2+x}{x+4}\right)<0$ is)`

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51. Which of the following is not the solution of $(\log)_3\left(x^2-2\right)<(\log)_3\left(\frac{3}{2}|x|-1\right)$ is (a) $\left(\sqrt{2}, 2\right)$ (b) $\left(-2, -\sqrt{2}\right)$ (c) $\left(-\sqrt{2}, 2\right.$ (d) none of these

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52. The true solution set of inequality $(\log)_{(x+1)}\left(x^2-4\right)>1$ is equal to $2, \infty)$ (b) $\left(2, \frac{1+\sqrt{21}}{2}\right)$ $\left(\frac{1-\sqrt{21}}{2}, \frac{1+\sqrt{21}}{2}\right)$ (d) $\left(\frac{1+\sqrt{21}}{2}, \infty\right)$

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53. Solve the following equation of $x: 2(\log)_x a + (\log)_{ax} a + 3(\log)_{a^2 x} a = 0, a > 0$

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54. The x, y, z are positive real numbers such that $(\log)_{2x} z = 3, (\log)_{5y} z = 6, and (\log)_{xy} z = \frac{2}{3}$, then the value of $\left(\frac{1}{2z}\right)$ is .....

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55. Which of the following, when simplified, reduces to unity? (a) $(\log)_{10} 5 \log_{10} 20 + \left((\log)_{10} 2\right)^2$ (b) $\frac{2\log 2 + \log 3}{\log 48 - \log 4}$. (c) $-(\log)_5 (\log)_3 \sqrt{5\sqrt{9}}$ (d) $\frac{1}{6}(\log)_{\frac{\sqrt{3}}{2}} \left(\frac{64}{27}\right)$

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56. If $(\log)_a x = b$ for permissible values of a and x, then identify the statement(s) which can be correct. (a)If a and b are two irrational numbers, then x can be rational. (b)If a is rational and b is irrational, then x can be rational. (c)If a is irrational and b is rational, then x can be rational. (d)if $aandb$ are rational, then x can be rational.

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57. The number of positive integers satisfying $x + (\log)_{10}(2^x + 1) = x(\log)_{10}5 + (\log)_{10}6$ is.....

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58. Solve: $\left(\left(\frac{1}{2}\right)^{\log(10)a^2} + 2 > \frac{3}{2^{(\log)_{10}(-a)}}\right)$

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59. Write the characteristic of each of the following numbers by using their standard forms: (i) 1235.5 (ii) 346.41 (iii) 62.723 (iv) 7.12345 (v) 0.35792 (vi) 0.034239 (vii) 0.002385 (viii) 0.0009468

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60. Solve: $(\log)_2\left(\frac{x^2+1}{x-1}\right)<0$

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61. Solve: $\frac{x-1}{(\log)_3(9-3^x)-3}\leq 1.$

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62. Find the mantissa of the logarithm of the number 0.002359

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63. Use the logarithm tables to find the logarithm of the following numbers (1)25795 (ii)25.795

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64. Write the significant digits in each of the following numbers to compute the mantissa of their logarithms: 3.239 (ii) 8 (iii) 0.9 (iv) 0.02 0.0367 (vi) 89 (vii) 0.0003 (viii) 0.00075

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65. Find the mantissa of the logarithm of the number 5395

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66. Find the antilogarithm of each of the following: 2.7523 (ii) 3.7523 (iii) 5.7523 (iv) 0.7523 1.7523 (vi) 2.7523 (vii) 3.7523

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67. Evaluate $(72.3)^{\frac{1}{3}}$ if $\log 0.723 = -1.8591$.

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68. Integral value of x which satisfies the equation $= \log_6 54 + (\log)_x 16 = (\log)_{\sqrt{2}} x - (\log)_{36}\left(\frac{4}{9}\right) is..$

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69. If $(\log)_4 A = (\log)_6 B = (\log)_9 (A+B), then \left[4\left(\frac{B}{A}\right)\right]$ (where [ ] represents the greatest integer function) equals .....

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70. The value of $(\log_{10} 2)^3 + \log_{10} 8 \log_{10} 5 + (\log_{10} 5)^3$ is .....

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71. If $(\log)_a b = 2, (\log)_b c = 2, and (\log)_3 c = 3 + (\log)_3 a,$ then the value of $c/(ab)$ is.....

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72. The inequality $\sqrt{x^{(\log)_2 \sqrt{x}}} \geq 2$ is satisfied by (A) only one value of x (B) $x \in \left[0, \left(\frac{1}{4}\right)\right]$ $(C) x \in [4, \infty]$ (d) $x \in (1, 2)$

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73. The value of $\frac{6a^{(\log)_e b}\left((\log)_{a^2} b\right)\left((\log)_{b^2} a\right)}{e^{(\log)_e a (\log)_e b}} is$ (a) independent of a (b) independent of b (c) dependent on a (d) dependent on b

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74. If $(\log)_{10}5 = a and (\log)_{10}3 = b, then \quad (A)(\log)_{30}8 = \frac{3(1-a)}{b+1}$ $(B)(\log)_{40}15 = \frac{a+b}{3-2a}$ $(C)(\log)_{243}32 = \frac{1-a}{b}$ (d) none of these

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75. The equation $(\log)_{x+1}(x-.5) = (\log)_{x-0.5}(x+1)$ has (A) two real solutions (B) no prime solution (C) one integral solution (D) no irrational solution

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76. Sum of all integral values of x satisfying the inequality $\left(3^{\left(\frac{5}{2}\right)\log(12-3x)}\right) - \left(3^{\log x}\right) > 32$ is.....

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77. The difference of roots of the equation $\left((\log)_{27}x^3\right)^2 = (\log)_{27}x^6$ is .....

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78. Number of integers satisfying the inequality $(\log)_{\frac{1}{2}}|x-3| \succ 1$ is.....

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79. The number of elements in set of all x satisfying the equation $x^{\log_3 x^2 + (\log_3 x)^2 - 10} = \frac{1}{x^2} is$ (a)1 (b) 2 (c) 3 (d) 0

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80. Number of real values of x satisfying the equation $\log_2(x^2 - x) \cdot \log_2\left(\frac{x-1}{x}\right) + (\log_2 x)^2 = 4$,is (a)0(b)2 (c)3 (d)7

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81. Let $a > 1$ be a real number. Then the number of roots equation $a^{2(\log)_2 x} = 15 + 4x^{(\log)_2 a}$ is 2 (b) infinite (c) 0 (d) 1

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82. Number of integers ≤ 10 satisfying the inequality $2(\log)_{\frac{1}{2}}(x-1) \leq \frac{1}{3} - \frac{1}{(\log)_{x^2-x} 8}$ is.....

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83. The number of roots of the equation $(\log)_{3\sqrt{x}} x + (\log)_{3x}\sqrt{x} = 0$ is 1 (b) 2 (c) 3 (d) 0

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84. The value of $(\log)_{\sqrt{4+2\sqrt{2}}\sqrt{4-2\sqrt{2}}} 2^9$ is.....

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85. The number of solution of $x^{\log x(x+3)^2} = 16$ is a)0 (b) 1 (c) 2 (d) ∞

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86. Find the value of log_(2) (2root(3)9-2) + log_(2) (12root(3)3+4+4root(3)9).`

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87. Find the number of solutions of the following equations: 1. $x^{-\frac{1}{2}}(\log)_{0.5}x = 1$, 2. x^2-4x+3-(log)_(2)x=0`

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88. Find the number of solution to equation $(\log)_2(x+5) = 6 - x$:

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89. Solve : $2(25)^x - 5(10^x) + 2(4^x) \geq 0.$

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90. If $\frac{x(y+z-x)}{\log x} = \frac{y(z+x-y)}{\log y}\frac{z(x+y-z)}{\log z}$, $prove that x^y y^x = z^x y^z = x^z$

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91. If $(\log)_2 y = x and (\log)_3 z = x,$ find 72^x in terms of y and z.

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92. If $(\log)_a 3 = 2 and (\log)_b 8 = 3,$ then prove that $(\log)_a b = (\log)_3 4.$

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93. Find the value of $\log \tan 1^0 \log \tan 2^0 \ldots\ldots\ldots . \log \tan 89^0$

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94. Sum of integers satisfying $\sqrt{(\log)_2 x - 1} - \frac{1}{2}(\log)_2\left(x^3\right) + 2 > 0$ is.....

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95. The value of b for which the equation $2(\log)_{\frac{1}{25}}(bx + 28) = -(\log)_5\left(12 - 4x - x^2\right)$ has coincident roots is

$b = -12$ (b) $b = 4$ or $b = -12$ $b = 4$ or $b = -12$ (d) $b = -4$ or $b = 12$

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96. The least integer greater than $(\log)_2(15) \cdot (\log)_{\frac{1}{6}} 2 \cdot (\log)_3 \frac{1}{6}$ is .....

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97. The reciprocal of $\frac{2}{(\log)_4(2000)^6} + \frac{3}{(\log)_5(2000)^6}$ is .....

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98. The value of $5^{(\log)_{\frac{1}{5}}\left(\frac{1}{2}\right)} + (\log)_{\sqrt{2}} \frac{4}{\sqrt{7}+\sqrt{3}} + (\log)_{\frac{1}{2}} \frac{1}{10+2\sqrt{21}}$ is.....

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99. The value of $N = \frac{(\log)_5 250}{(\log)_{50} 5} - \frac{(\log)_5 10}{(\log)_{1250} 5}$ is.....

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100. If $x and y$ are real numbers such that $2\log(2y-3x)=\log x+\log y$,then find $\frac{x}{y}$.

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101. If $\log_e\left(\frac{a+b}{2}\right)=\frac{1}{2}(\log_e a+\log_e b)$, then find the relation between $a and b$.

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102. If $2x^{(\log)_4 3}+3^{(\log)_4 x}=27$, then x is equal to

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103. The value of $\log ab-\log|b|=$ (a)$\log a$ (b) $\log|a|$ (c) $-\log a$ (d) none of these

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104. If $(21.4)^a = (0.00214)^b = 100$, then the value of $\frac{1}{a} - \frac{1}{b}$ is 0 (b) 1 (c) 2 (d) 4

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105. Given that $\log(2) = 0.3010$, the number of digits in the number 2000^{2000} is 6601 (b) 6602 (c) 6603 (d) 6604

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106. The number of $N = 6 - \left(6(\log)_{10}2 + (\log)_{10}31\right)$ lies between two successive integers whose sum is equal to (a)5 (b) 7 (c) 9 (c) 10

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107. $(\log)_4 18$ is (a) a rational number (b) an irrational number (c) a prime number (d) none of these

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108. Solve:

$$(\log)_{(2x+3)}\left(6x^2+23x+21\right)+(\log)_{(3x+7)}\left(4x^2+12x+9\right)=4$$

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109. Given $aandb$ are positive numbers satisfying $4(\log_{10} a)^2+\left((\log)_2 b\right)^2=1$. Find the range of values of $aandb$.

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110. If

$$\frac{(\log)_a N}{(\log)_c N}=\frac{(\log)_a N-(\log)_b N}{(\log)_b N-(\log)_c N}, whereN>0andN\neq 1, a, b, c>0$$

and not equal to 1, then prove that $b^2 = ac$

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111. If $(\log)_b a(\log)_c a + (\log)_a b(\log)_c b + (\log)_a c(\log)_b c = 3$ (where a, b, c are different positive real numbers $\neq 1$), then find the value of abc.

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112. Solve for: $x : (2x)^{(\log)_b 2} = (3x)^{(\log)_b 3}$.

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113. Let $a = (\log)_3(\log)_3 2$. An integer k satisfying $1 < 2^{-k+3^{(-a)}} < 2$, must be less than .....

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114. The value of $6+(\log)_{\frac{3}{2}}\left[\frac{1}{3\sqrt{2}}\cdot\sqrt{\left(4-\frac{1}{3\sqrt{2}}\right)\sqrt{4-\frac{1}{3\sqrt{2}}\ldots\ldots}}\right]$ is .....

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115. $(\log)_{x-1}x(\log)_{x-2}(x-1)(\log)_{x-12}(x-11)=2, x$ is equal to: 9 (b) 16 (c) 25 (d) none of these

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116. If $f(x)=\log\left(\frac{1+x}{1-x}\right), then$ (a)$f(x_1)f(x)=f(x_1+x_2)$ (b) $f(x+2)-2f(x+1)+f(x)=0$ (c)$f(x)+f(x+1)=f\left(x^2+x\right)$ (d) $f(x_1)+f(x_2)=f\left(\frac{x_1+x_2}{1+x_1x_2}\right)$

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117. If a, b, c are consecutive positive integers and $(\log(1+ac) = 2K,$ then the value of K is $\log b$ (b) $\log a$ (c) 2 (d) 1

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118. If $\frac{a+(\log)_4 3}{a+(\log)_2 3} = \frac{a+(\log)_8 3}{a+(\log)_4 3} = b$,then b is equal to $\frac{1}{2}$ (2) $\frac{2}{3}$ (c) $\frac{1}{3}$ (d) $\frac{3}{2}$

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119. If $p > 1$ and $q > 1$ are such that $\log(p+q) = \log p + \log q$, then the value of $\log(p-1) + \log(q-1)$ is equal to (a) 0 (b) 1 (c) 2 (d) none of these

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120. The value of $\frac{1+2(\log)_3 2}{\left(1+(\log)_3 2\right)^2} + \left((\log)_6 2\right)^2$ is 2 (b) 3 (c) 4 (d) 1

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121. If $(\log)_4 5 = a and (\log)_5 6 = b,$ then $(\log)_3 2$ is equal to $\frac{1}{2a+1}$ (b) $\frac{1}{2b+1}$ (c) $2ab+1$ (d) $\frac{1}{2ab-1}$

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122. If $(\log)_{10} 2 = a, (\log)_{10} 3 = b then (\log)_{0.72}(9.6)$ in terms of a and b is equal to (a) $\frac{2a+3b-1}{5a+b-2}$ (b) $\frac{5a+b-1}{3a+2b-2}$ (c) $\frac{3a+b-2}{2a+3b-1}$ (d) $\frac{2a+5b-2}{3a+b-1}$

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123. There exists a natural number N which is 50 times its own logarithm to the base 10, then N is divisible by

A. 5

B. 7

C. 9

D. 11

Answer: null

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124. The value of $\frac{(\log)_2 24}{(\log)_{96} 2} - \frac{(\log)_2 192}{(\log)_{12} 2}$ is 3 (b) 0 (c) 2 (d) 1

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125. Find the number of solutions of equation $(2x-3)2^x = 1$

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126. Find the value of $(\log)_{2\sqrt{3}} 1728.$

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127. Prove that $\frac{1}{3} < (\log)_{10}3 < \frac{1}{2}$.

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128. Arrange $(\log)_2 5$, $(\log)_{0.5}5$, $(\log)_7 5$, $(\log)_3 5$ in decreasing order.

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129. If $3^x = 4^{x-1}$, then $x =$ $\frac{2(\log)_3 2}{2(\log)_3 2 - 1}$ (b) $\frac{2}{2 - (\log)_2 3}$ $\frac{1}{1 - (\log)_4 3}$ (d) $\frac{2(\log)_2 3}{2(\log)_2 3 - 1}$

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130. Solve: $|x-3|^{3x^2 - 10x + 3} = 1$

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131. Solve: $\left(\frac{1}{2}\right)^{x} \hat{} (2-2x) < 1/4.$

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132. Find the smallest integral value of x satisfying $(x-2)^{x^2-6x+8}) > 1$

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133. The least value of the expression $2(\log)_{10}x - (\log)_x(0.01)\cdot$ for $x > 1$ is (a)10 (b)2 (c) -0.01 (d)4

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134. The solution of the equation $(\log)_7(\log)_5\left(\sqrt{x+5}+\sqrt{x}=0\right.$ is...

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135. Let (x_0, y_0) be the solution of the following equations: $(2x)^{1n2} = (3y)^{1n3}$ $3^{1nx} = 2^{1ny}$ The x_0 is $\frac{1}{6}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) 6

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136. If a , b, c, ... are in G.P. then $2a, 2b, 2c, \ldots$ are in ....

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137. Prove that number $(\log)_2 7$ is an irrational number.

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138. If $3^x = 4^{x-1}$, then $x = \frac{2(\log)_3 2}{2(\log)_3 2 - 1}$ (b) $\frac{2}{2 - (\log)_2 3}$ $\frac{1}{1 - (\log)_4 3}$ (d) $\frac{2(\log)_2 3}{2(\log)_2 3 - 1}$

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139. If $(\log)_3 2, (\log)_3(2^x - 5) and (\log)_3\left(2^x - \frac{7}{2}\right)$ are in arithmetic progression, determine the value of x.

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140. Solve $x^{(\log)_y x} = 2 and y^{(\log)_x y} = 16$

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141. Solve $(\log)_{2x} 2 + (\log)_4 2x = -3/2.$

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142. If $a \geq b > 1,$ then find the largest possible value of the expression $(\log)_a\left(\frac{a}{b}\right) + (\log)_b\left(\frac{b}{a}\right).$

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143. Solve : $3^{(\log_9 x)} \times 2 = 3\sqrt{3}$

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144. Solve the inequality $\sqrt{(\log)_2\left(\frac{2x-3}{x-1}\right)} < 1$

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145. Find the number of solutions of equation $2^x + 3^x + 4^x - 5^x = 0$

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146. If $y = a^{\frac{1}{1-(\log)_a x}}$ and $z = a^{\frac{1}{1-(\log)_a y}}$,then prove that $x = a^{\frac{1}{1-(\log)_a z}}$

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147. Solve $(\log)_x 2(\log)_{2x} 2 = (\log)_{4x} 2.$

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148. Let a, b, c, d be positive integers such that $(\log)_a b = \frac{3}{2} and (\log)_c d = \frac{5}{4}$. If $(a - c) = 9$, then find the value of $(b - d)$.

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149. Solve $\sqrt{\log(-x)} = \log \sqrt{x^2}$ (base is 10).

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150. If $(\log)_3\{5 + 4(\log)_3(x - 1)\} = 2$, then x is equal to 4 (b) 3 (c) 8 (d) $(\log)_2 16$

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151. If $(\log)_{10}\left[\frac{1}{2^x+x-1}\right]=x\left[(\log)_{10}5-1\right]$, then $x=$ 4 (b) 3 (c) 2 (d) 1

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152. The value of x satisfying the equation $3\sqrt{5}^{(\log_5)5^{\left((\log)_5(\log)_5\log_5\left(\frac{x}{2}\right)\right)}=3}$ 1 (b) 3 (c) 18 (d) 54

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153. If $2^{x+y}=6^y and 3^{x-1}=2^{y+1}$, then the value of $(\log 3-\log 2)(x-y)$ is 1 (b) $(\log)_2 3-(\log)_3 2$ $\log\left(\frac{3}{2}\right)$ (d) none of these

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154. The value of $3^{(\log)_4 5}-5^{(\log)_4 3}$ is 0 (b) 1 (c) 2 (d) none of these

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155. If $a^4b^5 = 1$ then the value of $\log_a\left(a^5b^4\right)$ equals

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156. If

$(\log)_2 x + (\log)_x 2 = \frac{10}{3} = (\log)_2 y + (\log)_y 2 and x = y, the x + y =$ 2

(b) 65/8 (c) 37/6 (d) none of these

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157. If $(x+1)^{(\log)_{10}(x+1)} = 100(x+1),$ then

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158. if $(\log)_y x + (\log)_x y = 2, x^2 + y = 12,$ the value of xy is 9 (b) 12 (c) 15 (d) 30

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159. If $\sqrt{(\log)_2 x - 0.5} = (\log)_2 \sqrt{x,}$ then x equals odd integer (b) prime number composite number (d) irrational

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160. Find the value of $81^{(1/\log_5 3)} + \left(27^{\log_9 36}\right) + 3^{\left(\frac{4}{\log_7 9}\right)}$

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161. Find the value of $\left(\frac{1}{49}\right)^{1+(\log)_7 2} + 5^{-1(\log)_{\left(\frac{1}{5}\right)}(7)}$

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162. Prove that: $2^{\sqrt{(\log)_a 4\sqrt{ab}+(\log)_b 4\sqrt{ab}-(\log)_a 4\sqrt{\frac{b}{a}}+(\log)_b 4\sqrt{\frac{a}{b}}}\sqrt{(\log)_a b}} = \begin{cases} 2 & \text{if } b \geq a > 1 \\ \end{cases}$

if 1

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163. Prove that $\frac{2^{(\log)_{2^{\frac{1}{4}}} x} - 3^{\log}\_(27)\left(x^2+1\right)^3 - 2x >}{7^{4(\log)_{49} x} - x - 1} 0$

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164. Solve $(\log)_4 8 + (\log)_4(x+3) - (\log)_4(x-1) = 2.$

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165. Which of the following pairs of expression are defined for the same set of values of x ? $f_1(x) = 2(\log)_2 x and f_2(x) = (\log)_{10} x^2$

$f_1(x) = (\log)^2_{\times} and f_2(x) = 2$

$f_1(x) = (\log)_{10}(x-2) + (\log)_{10}(x-3) and f_{2(x)} = (\log)_{10}(x-2)(x-3)$

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166. Solve $(\log)_2(3x-2) = (\log)_{\frac{1}{2}} x$

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167. Solve $\log(-x) = 2\log(x+1)$.

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168. Solve: $(\log)_2(4.3^x - 6) - (\log)_2(9^x - 6) = 1.$

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169. Solve $2^{x+2}27^{x/(x-1)} = 9$

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170. Suppose $x, y, z = 0$ and are not equal to 1 and $\log x + \log y + \log z = 0.$ Find the value of $\frac{1}{x^{\log y}} + \frac{1}{\hat{}(\log z)} \frac{1}{y^{\log z}} + \frac{1}{\hat{}(\log x)} \frac{1}{z^{\log x}} + \frac{1}{\hat{}(\log y)}$

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171. If $(\log)_{12} 27 = a,$ then find $(\log)_6 16 \int ermsofa$

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172. If $y^2 = xz$ and $a^x = b^y = c^z,$ then prove that $(\log)_a b = (\log)_b c$

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173. Simplify: $\frac{1}{1 + (\log)_a bc} + \frac{1}{1 + (\log)_b ca} + \frac{1}{1 + (\log)_c ab}$

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174. If $a^x = b, b^y = c, c^z = a,$ then find the value of xyz.

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175. Find the value of $((\log)_3 4)((\log)_4 5)((\log)_5 6)((\log)_6 7)((\log)_7 8)((\log)_8 9)$.

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176. $y = 2^{\frac{1}{(\log)_x 4}}$, then find x in terms of y.

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177. If $n > 1, then prove that$

$$\frac{1}{(\log)_2 n} + \frac{1}{(\log)_3 n} + + \frac{1}{(\log)_{53} n} = \frac{1}{(\log)_{53!} n}.$$

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178. What is logarithm of $32^{5}\sqrt{4}$ to the base $2\sqrt{2}$?

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179. Which is greater: $x = (\log)_3 5$ or $y = (\log)_{17} 25$?

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180. The product of roots of the equation $\frac{\log_8\left(\frac{8}{x^2}\right)}{(\log_8 x)^2} = 3$ is 1 (b) (c) 1/3

(d) $1/4$

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