MATHS

FOR IIT JEE ASPIRANTS OF CLASS 12 FOR MATHS

LOGARITHM

All Questions

1. Find the value of : $(\log)_{81}27$

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2. Find the value of : $(\log)_{10}100$

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3. Find the value of : $(\log)_{1/3} 9\sqrt{3}$

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4. $(\log)_{\sin 30^0} \cos 60^0 = 1$

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5. $\log_{3/4} 1.\bar{3} = -1$

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6. $\log_{2-\sqrt{3}} (2+\sqrt{3}) = -1$

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7. $(\log)_5 \sqrt{5\sqrt{5\sqrt{5..}}}\infty = 1$

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

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9. $7^{(\log)_7 x} + 2x + 9 = 0$

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10. $2^{(\log)_2 (x-3)} + 2(x-3) - 12 = 0$

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11. $(\log)_2 (x-3) = 4$

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12. Find the logarithms of the following numbers to the base 2: (a) $\sqrt[3]{3}$ (b) $\sqrt[2]{2}$ (c) $\frac{1}{\sqrt[5]{2}}$ (d) $\frac{1}{\sqrt[7]{8}}$

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13. Find the logarithms of the following numbers to the base $\frac{1}{3}$. (a) 81 (b) $\sqrt[3]{3}$ (c) $\frac{1}{\sqrt[7]{3}}$ (d) $\frac{1}{9\sqrt[4]{3}}$

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14. Find all number a for which each of the following equalities hold true?

(a) $(\log)_1 a = 2$ (b) $(\log)_{10}(a(a+3)) = 1$ (c) $\log_{1/3}(a^2 - 1) = -1$ (d) $(\log)_2(a^2 - 5) = 2$

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15. Find all values of x for which the following equalities hold true? (a) $(\log)_2 x^2 = 1$ (b) $(\log)_3 x = (\log)_3 (2 - x)$ (c) $(\log)_4 x^2 = (\log)_4 x$ (d) $(\log)_{1/2}(2x + 1) = (\log)_{1/2}(x + 1)$ (e) $(\log)_{1/3}\left(x^2 + 8\right) = -2$

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16. If $2\left(\sqrt{3 + \sqrt{5 - \sqrt{13 + \sqrt{48}}}}\right) = \sqrt{a} + \sqrt{b}$ where a and b are nutural number find $(a + b)$.

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17. $2^{-\log_{1/7} 7} = 2$

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18. $8^{-\frac{1}{\log_3 2}} = \frac{1}{27}$

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19. $\left((\log)_2 3\right)(\log)_3 4(\log)_4 5(\log)_n(n+1) = 10$. Find $n = ?$

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20. prove that $\log 2 + 16\log\left(\frac{16}{15}\right) + 12\log\left(\frac{25}{24}\right) + 7\log\left(\frac{81}{80}\right) = 1$

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21. $\frac{1}{\log_3 2} + \frac{2}{\log_9 4} - \frac{3}{\log_{27} 8} = 0$

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22. Let $a > 1$ be a real number . If S is the set of real number x that are solutions to the equation $a^{2\log_2 x} = 5 + 4x^{\log_2 a}$, then

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23. Simplify (i) $3^{\sqrt{\log_3(2)}} - 2^{\sqrt{\log_2(3)}}$

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24. Solve for x: $x^2 + 7^{\log_7 x} - 2 = 0$

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25. $(x+1)^{\log(x+1)} = 100(x+1)(base\,'is'\,10)$

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26. If $\log_5\left(5^{\frac{1}{x}} + 125\right) = \log_5 6 + 1 + \frac{1}{2x}$, then x =

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

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28. Find the number of digits $(2.5)^{200}$

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29. Find the number of digits 6^{50}.

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30. Find the number of digits 5^{25}.

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31. Find the number of zeros after decimal before a significant figure star in $\left(\frac{9}{8}\right)^{-100}$.

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32. Find the number of zeros after decimal before a significant figure start in 3^{-50}.

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33. Find the number of zeros after decimal before a significant figure start in $(0.35)^{12}$.

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34. Solve for $x : |3x - 2| + x = 11$

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35. Solve for $x : |x| - |x - 2| = 2$

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

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37. Solve for x : $(\log)_4\left(x^2-1\right)-(\log)_4(x-1)^2=(\log)_4\sqrt{(4-x)^2}$

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38. Solve for x : $2(\log)_3(x-2)+(\log)_3(x-4)^2=0$

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39. Find the value of x satisfying $(\log)_{10}(2^x+x-41)=x(1-\log_{10}5)$.

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40. If the product of the roots of the equation, $x^{\left(\frac{3}{4}\right)(\log_2 x)^2+\log_2 x-\frac{5}{4}}=\sqrt{2}$ is $\frac{1}{(a)^{\frac{1}{b}}}$ (where $a, b \in N$) then the value of $(a+b)$.

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41. For `0

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42. Find the real solutions to the system of equations $\log_{10}(2000xy)-\log_{10} x.\log_{10} y=4 \quad , \quad \log_{10}(2yz)-\log_{10} y\log_{10} z=1$ and $\log_{10} zx-\log_{10} z\log_{10} x=0$

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43. A circle has a radius of $\log_{10}\left(a^2\right)$ and a circumference of $\log_{10}\left(b^4\right)$. The value of $\log_a b$ is equal to (a) $\frac{1}{4\pi}$ (b) $\frac{1}{\pi}$ (c) π (d) 2π

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44. If $\log_{10}\sin x+\log_{10}\cos x=-1$ and $\log_{10}(\sin x+\cos x)=\frac{\log_{10}n-1}{2}$ then the value of n is (a) 24 (b) 36 (c) 20 (d) 12

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45. The ratio $\frac{2^{\log_{2^{\frac{1}{4}}}a}-3^{\log_{27}\left(a^2+1\right)^3}-2a}{7^{4\log_{49}a-a-1}}$ simplfies to

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46. 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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47. If $2^a = 7^b$ then number of ordered pairs (a, b) of real numbers is

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48. The number $2^{2\log_2\left(3^{\log_3 4}\right)}$ simplified as : 12 (b) 16 (c) 24 (d) 72

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49. If $\log_2 \log_3 \log_4 \log_5 A = x,$ then the value of A is (a) 120^x (b) 2^{60x} (c) $2^{3^{4^{5^x}}}$ (d) $5^{4^{3^{2^x}}}$

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50. Suppose $(\log)_a 2 = m, (\log)_a 3 = r,$ $(\log)_a 5 = s$ and $(\log)_a 11 = t.$ The value of $(\log)_a 990,$ is $2mrst$ (b) $m + 2r + s + t$

$m + r + s + t$ (d) $m + 2r + 5 + t$

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51. If $x = 3$, then $\log_4(2\log_3(1 + \log_2(1 + 3\log_3 x)))$ is equal to

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52. $3^{\log_3 \log \sqrt{x}} - \log x + \log^2 x - 3 = 0$

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53. Solve following log equation $x^{\frac{\log x + 5}{3}} = 10^{5 + \log x}$

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54. Solve following log equation $x^{\frac{\log x + 7}{4}} = 10^{\log x + 1}$

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55. Solve following log equation $\log^2 x - 3\log x = \log\left(x^2\right) - 4$

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56. Solve following log equation $(\log)_{1/3}x - 3\sqrt{(\log)_{1/3}x} + 2 = 0$

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57. Solve the value of $x : 2\left(\log_x \sqrt{5}\right)^2 - 3\log_x \sqrt{5} + 1 = 0$

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58. $\log^2(100x) + \log^2(10x) = 14 + \log\left(\frac{1}{x}\right)$

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59. The sum $\sqrt{\frac{5}{4}+\sqrt{\frac{3}{2}}}+\sqrt{\frac{5}{4}-\sqrt{\frac{3}{2}}}$ is equal to

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60. For $N>1$, then product $\frac{1}{\log_2 N}\cdot\frac{1}{\log_N 8}\cdot\frac{1}{\log_{32} N}\cdot\frac{1}{\log_N 128}$ simplifies to (a) $\frac{3}{7}$ (b) $\frac{3}{7\ln 2}$ (c) $\frac{3}{5\ln 2}$ (d) $\frac{5}{21}$

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61. If p is the smallest value of x satisfying the equation $2^x+\frac{15}{2^x}=8$ then the value of 4^p is equal to 9 (b) 16 (c) 25 (d) 1

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62. The sum of two numbers a and b is $\sqrt{18}$ and their difference is $\sqrt{14}$. The value of $\log_b a$ is equal to (a) -1 (b) 2 (c) 1 (d) $\frac{1}{2}$

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

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64. Let $N = 10^{\log 2 - 2\log\left(\log 10^3\right) + \log\left(\log 10^6\right)^2}$ where base of the logarithm is 10. The characteristic of the logarithm of N to the base 3, is equal to (a) 2 (b) 3 (c) 4 (d) 5

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65. If $x = \frac{\sqrt{10} + \sqrt{2}}{2}$ and $y = \frac{\sqrt{10} - \sqrt{2}}{2}$ then the value of $\log_2\left(x^2 + xy + y^2\right)$, is equal to 0 (b) 2 (c) 3 (d) 4 4

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66. Suppose that $x < 0$. Which of the following is equal to $\left|2x - \sqrt{(x-2)^2}\right|$ (a) $x - 2$ (b) $3x - 2$ (c) $3x + 2$ (d) $-3x + 2$

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67. If $N = \left(2^{\log_{70} 9800}\right)\left(5^{\log_{70} 140}\right)\left(7^{\log_{70} 2}\right)$ then N is equal to 20 (b) 60 (c) 18 (d) 40

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68. The expression $q^{\left(\sqrt{6+\sqrt{6+\sqrt{6+\ldots.\infty}}}\right)^{\log_3 p\left[\frac{\log_q\left(\log_q r\right)}{\log_q p}\right]}}$

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69. If a, b are co-prime numbers and satisfying $\left(2+\sqrt{3}\right)^{\frac{1}{\log_a\left(2-\sqrt{3}\right)}+\frac{1}{\log_b\left(\frac{\sqrt{3}-1}{\sqrt{3}+1}\right)}} = \frac{1}{12}$ then $(a+b)$ can be is equal to : 13 (b) 5 (c) 7 (d) 8

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70. If $2^{(\log_2 3)^x} = 3^{(\log_3 2)^x}$ then the value of x is equal to

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71. A denotes the product xyz where x, y and z satisfy $\log_3 x = \log 5 - \log 7$ and $\log_5 y = \log 7 - \log 3$ and $\log_7 z = \log 3 - \log 5$ B denotes the sum of square of solution of the equation, $\log_2(\log_2 x^6 - 3) - \log_2(\log_2 x^4 - 5) = \log_2 3$ C denotes characterstio of logarithm $\log_2(\log_2 3) - \log_2(\log_4 3) + \log_2(\log_4 5) - \log_2(\log_6 5) + \log_2(\log_6 7) - \log$ The valuo of $A + B + C$ is equal to

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72. A denotes the product xyz where x, y and z satisfy $\log_3 x = \log 5 - \log 7$ and $\log_5 y = \log 7 - \log 3$ and $\log_7 z = \log 3 - \log 5$ B denotes the sum of square of solution of the equation, $\log_2(\log_2 x^6 - 3) - \log_2(\log_2 x^4 - 5) = \log_2 3$ C denotes characterstio

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73. A denotes the product xyz where x, y and z satisfy $\log_3 x = \log 5 - \log 7$ and $\log_5 y = \log 7 - \log 3$ and $\log_7 z = \log 3 - \log 5$ B denotes the sum of square of solution of the equation, $\log_2\left(\log_2 x^6 - 3\right) - \log_2\left(\log_2 x^4 - 5\right) = \log_2 3$ C denotes characterstio of logarithm

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The valuo of $A + B + C$ is equal to

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74. Let $N = \frac{(\log)_3 135}{(\log)_{15} 3} - \frac{(\log)_3 5}{(\log)_{405} 3}$. Then N is a. A natural number b. a prime number c. an even integer d. an odd integer

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75. If $\left(a^{\log_b x}\right)^2 - 5\,a^{\log_b x} + 6 = 0,$ where $a > 0, b > 0 \,\&\, ab \neq 1,$ then the value of x can be equal to (a) $2^{\log_b a}$ (b) $3^{\log_a b}$ (c) $b^{\log_a 2}$ (d) $a^{\log_b 3}$

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76. Which of the following statement(s) is/are true? (a) $\log_{10} 2$ lies between $\frac{1}{4} and \frac{1}{3}$ (b) $\log_{\cos ec(\pi/6)}\left(\cos\frac{\pi}{3}\right) = -1$ (c) $e^{\ln(\ln 3)}$ is smaller than 1 (d) $\log_{10} 1 + \frac{1}{2}\log_{10} 3 + \log_{10}\left(2+\sqrt{3}\right) = \log_{10}\left(1+\sqrt{3}+\left(2+\sqrt{3}\right)\right)$

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77. The equation $\log_{x^2} 16 + \log_{2x} 64 = 3$ has (a) one irrational solution (b) no prime solution two real solutions (d) no integral solution

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78. Which of the following real numbers is (are) non-positive ?

$(\log)_{1/2}\left(\frac{2+\sqrt{3}}{2-\sqrt{3}}\right)$ (b) $(\log)_{12}\left(\sqrt{65}-7\right)$ (c) $(\log)_2\left((\log)_5 3\cdot(\log)_7 5.\,(\log)_3 7\right)$ (d) $(\log)_7\left(\frac{3}{2}\right)^{(-2)/3}$

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79. The expression $x=\log_2\log_9\sqrt{6+\sqrt{6+\sqrt{6+\ldots\ldots\infty}}}$ simplifies to

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80. The number $N=2^{\log_2 3\cdot\log_3 4\,.\log_4 5\,\ldots\,\ldots\,.\log_{99}100}$ simplifies to

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81. The expression $\frac{1}{\log_5 3}+\frac{1}{\log_6 3}-\frac{1}{\log_{10}3}$ simplifies to

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82. The number $N = \sqrt{2+\sqrt{5}-\sqrt{6-3\sqrt{5}+\sqrt{14-6\sqrt{5}}}}$ simplifies to

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83. The value(s) of x, which does not satisfy the equation $\log_2^2(x^2-x) - 4\log_2(x-1)\cdot\log_2 x = 1$, is (are)

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84. The value of x satisfying the equation $2^{\log_2 e^{In^5 \log 7^{\log_{10}^{\log_{10}(8x-3)}}}}$

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85. he number $N = \left(\frac{1}{\log_2 \pi} + \frac{1}{\log_6 \pi}\right)$ is less then

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86. Let $I = (\log_3 4 + \log_2 9)^2 - (\log_3 4 - \log_2 9)^2$ and $m = (0.8)\left(1 + 9^{\log_3 8}\right)^{\log_{65} 5}$ then $(l + m)$ is divisible by

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87. Let A denotes the value of $\log_{10}\left\{\frac{ab + \sqrt{(ab)^2 - 4(a+b)}}{2}\right\} + \log_{10}\left\{\frac{\log_{10}\left(ab - \sqrt{(ab)^2 - 4(a+b)}\right.}{2}\right.$ and B denotes the value of the expression $\left(2^{\log_6 18}\right) \cdot \left(3^{\log_6 3}\right)$ Find the value of $(A \cdot B)$

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88. If $k^{\log_2 5} = 16$, find the value of $k^{(\log_2 5)^2}$

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89. For $x, y \in \mathbb{N}$, if $3^{2x-y+1} = 3^{y-2x+1} - 8$ and $\log_6 |2x^2y - xy^2| = 1 + \log_{36}(xy)$. Then find the absolute value of $(x - y)$

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90. Let $\log_2 x + \log_4 y + \log_4 z = 2; \quad \log_9 x + \log_3 y + \log_9 z = 2;$ $\log_{16} x + \log_{16} y + \log_4 z = 2$. Find the value of $\frac{yz}{x}$.

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91. Find the value of x satisfying $(\log)_{10}(2^x + x - 41) = x\left(1 - (\log)_{10}5\right)$.

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92. Positive numbers x, y and z satisfy $xyz = 10^{81}$ and $(\log_{10} x) \cdot (\log_{10} yz) + (\log_{10} y) \cdot (\log_{10} z) = 468$. Find the value of $(\log_{10} x)^2 + (\log_{10} y)^2 + (\log_{10} z)^2$.

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93. Find the number of integral solution of the equation $\log_{\sqrt{x}}(x + |x - 2|) = \log_x(5x - 6 + 5|x - 2|)$.

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94. Suppose p, q, r and $s \in \mathbb{N}$ satisfying the relation $p + \dfrac{1}{q + \frac{1}{r + \frac{1}{s}}} = \dfrac{89}{68}$,then find the value of $(pq + rs)$.

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95. 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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96. given $\log_{10}(34.56)$ find the value of the following log_(10)(3.456) , log_(10)(0.3456), log_(10)(0.003456)

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97. If $\log_{10}2=0.3010,\ \log_{10}3=0.4771.$ Find the number of integers in : (a) 5^{200} (b) 6^{15} & the number of zeros after the decimal in 3^{-100}

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98. If $\log_3 M=a_1+b_1$ and $\log_5 M=a_2+b_2$ where $a_1,a_2\in N$ and $b_1,b_2\in[0,1)$. if $a_1a_2=6$ then find the number of integral values of M.

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99. If $\log_{3x} 45 = \log_{4x} 40\sqrt{3}$ then find the characteristic of x^3 to the base 7.

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100. If $(x_1, y_1) \& (x_2, y_2)$ are the solutions of the equaltions, $(\log)_{225}(x) + \log_{64}(y) = 4 and (\log)_x(225) - (\log)_y(64) = 1$, $(\log)_{225} x_1 \log_{225} x_2 = 4$ b. $(\log)_{225} x_1 + (\log)_{225} x_2 = 6$ c. $\left|(\log)_{64} y_1 - (\log)_{64} y_2\right| = 2\sqrt{5}$ d. $(\log)_{30}(x_1 x_2 y_1 y_2) = 12$

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101. Prove that $2\left\{\sqrt{\log_a 4\sqrt{ab} + \log_b 4\sqrt{ab}} - \sqrt{(\log_a) 4\sqrt{\frac{b}{a}} + \log_b 4\sqrt{\frac{a}{b}}}\right\}\sqrt{\log_a b} = \{2, b \geq a > 1 \text{and}$ $2^{\log_b a}, 1 < b < a$

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102. Find the value of x satisfying the equation, $\sqrt{\left(\log_3(3x)^{\frac{1}{3}}+\log_x(3x)^{\frac{1}{3}}\right)\log_3(x^3)}+\sqrt{\left(\log_3\left(\frac{x}{3}\right)^{\frac{1}{3}}+\log_x\left(\frac{3}{x}\right)^{\frac{1}{3}}\right)\log$

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103. Given that $\log_2 a = s, \log_4 b = 5^2$ and $\log_{c^2}(8) = \frac{2}{s^3+1}$. Write $\frac{\log_2(a^2b^3)}{c^4}$ as a function of 's' $(a, b, c > 0, c \neq 1)$.

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104. let $y = \sqrt{\log_{23}\log_2(12)\log_2(48)\log_2(192)+16} - \log_2(12)\log_2(48)+10$find $y \in N$

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105. The least value of the expression $2(\log)_{10}x-(\log)_x(0.01)$, for $x>1$, is (1980, 2M) (a) 10 (b) 2 (c) -0.01 (d) None of these

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106. Solve:

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

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107. 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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108. The number of solutions of $(\log)_4(x-1)=(\log)_2(x-3)$ is (2001, 2M) 3 (b) 1 (c) 2 (d) 0

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109. Let (x_0, y_0) be the solution of the following equations: $(2x)^{\ln 2} = (3y)^{\ln 3}$ and $3^{\ln x} = 2^{\ln y}$ Then value of x_0 is:

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110. 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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