MATHS

ALLEN

LOGARITHMS

Others

1. The value of N satisfying $(\log)_a\left[1+(\log)_b\left\{1+(\log)_c\left(1+(\log)_p N\right)\right\}\right]=0$ is-

a.4 b. 3 c.2 d. 1

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2. If $\log_5 p = a$ and $\log_2 q = a,$ then prove that $\dfrac{p^4 q^4}{100} = 100^{2a-1}$

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3. The value of $7\log\left(\frac{16}{15}\right) + 5\log\left(\frac{25}{24}\right) + 3\log\left(\frac{81}{80}\right) =$

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4. If $a^2 + b^2 = 23ab,$ then prove that $\frac{\log((a+b))}{5} = \frac{1}{2}(\log a + \log b)\cdot$

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5. If $(\log)_k x.\ (\log)_5 k = (\log)_x 5,\ k \neq 1,\ k > 0,$ then x is equal to k

(a) k (b) $\frac{1}{5}$ (c) 5 (d) none of these

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6. If $\log_a b + \log_b c = \ + \log_c$ a vanishes where a,b and c are positive reals

different than unity then the value of $(\log_a b)^3 + (\log_b c)^3 + (\log_c a)^3$ is

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7. Evaluate : $3(40)^{\frac{1}{3}} - 4(320)^{\frac{1}{3}} - (5)^{\frac{1}{3}}$

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8. If $||x-1|-2| = 5$ then find x

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9. If $|x-1| + |x+1| = 2,$ then find x.

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10. Solve the equation $|x-1| + |7-x| + 2|x-2| = 4$

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11. Prove that $\sqrt{7}$ is an irrational number.

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12. If in a right angled triangle, $a \text{ and } b$ are the lengths of sides and c is the length of hypotenuse and $c-b \neq 1,\ c+b \neq 1$, then show that $(\log)_{c+b} a + (\log)_{c-b} a = 2(\log)_{c+b} a \dot{\log}_{c-b} a.$

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13. Solve : $(\log)_{(2x-1)}\left(\frac{x^4+2}{2x+1}\right)=1$

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14. $\frac{1}{(\log)_{\sqrt{bc}}abc}+\frac{1}{(\log)_{\sqrt{ca}}abc}+\frac{1}{(\log)_{\sqrt{ab}}abc}$ has the value of equal to:

a.$\frac{1}{2}$ b. 1 c.2 d. 4

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15. The ratio $\frac{2^{\log_2 a^4} - 3^{\log_{27}\left(a^2+1\right)^3} - 2a}{\left(7^{4\log_{49} a} - a - 1\right)}$ simplfies to

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16. The value of expression, $(\log)_4\left(\frac{x^2}{4}\right) - 2(\log)_4\left(4x^4\right)$ when $x = -2$ is

(a)-6 (b) -5 (c) -4 (d) meaningless

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17. If $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = \frac{1}{a+b+c}$ then $(a+b)(b+c)(c+a) = \ldots\ldots.$

a.abc

b. $\frac{1}{abc}$

c.0

d. 1

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18. Which one of the following denotes the greatest positive proper fraction?

a. $\left(\frac{1}{4}\right)^{(\log)_2 6}$ b. $\left(\frac{1}{3}\right)^{(\log)_3 5}$ c. $3^{(\log)_3 2}$ d. $8^{\left(\frac{1}{(\log)_3 2}\right)}$

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19. If $p = \frac{s}{(1+k)^n},\ then\ n$ equals

a. $\frac{\log s}{p(1+k)}$ b. $\frac{\log\left(\frac{s}{p}\right)}{\log(1+k)}$ c. $\frac{\log s}{\log p(1+k)}$ d. $\frac{\log p(1+k)}{\log\left(\frac{s}{p}\right)}$

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20. Value of x satifying $(\log)_{10}\sqrt{1+x} + 3(\log)_{10}\sqrt{1-x} = (\log)_{10}\sqrt{1-x^2} + 2$ is

a. $0 < x < 1$ b. $-1 < x < 1$ c. $-1 < x < 0$ d. None of this

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21. Given system of simultaneous equations $2^x . 5^y = 1 \, and \, 5^{x+1} . 2^y = 2$. Then - (a) . $x = (\log)_{10}5 \, and \, y = (\log)_{10}2$

(b) . $x = (\log)_{10}2 \, and \, y = (\log)_{10}5$ (c) . $x = (\log)_{10}\left(\frac{1}{5}\right) \, and \, y = (\log)_{10}2$ (d) . $x = (\log)_{10}5 \, and \, y = (\log)_{10}\left(\frac{1}{2}\right)$

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22. The value of N satisfying $(\log)_a\left[1 + (\log)_b\left\{1 + (\log)_c\left(1 + (\log)_p N\right)\right\}\right] = 0$ is-

a.4 b. 3 c.2 d. 1

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23. If α, β, γ are the roots of the cubic $x^3 - px^2 + qx - r = 0$

Find the equations whose roots are

(i) $\beta\gamma + \frac{1}{\alpha}, \gamma\alpha + \frac{1}{\beta}, \alpha\beta + \frac{1}{\gamma}$

(ii)$(\beta+\gamma-\alpha),(\gamma+\alpha-\beta),(\alpha+\beta-\gamma)$

Also find the valueof $(\beta+\gamma-\alpha)(\gamma+\alpha-\beta)(\alpha+\beta-\gamma)$

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24. If $a^x=b, b^y=c, c^z=a$ and $x=(\log)_b a^2, y=(\log)_c b^3, z=(\log)_a c^k$,

where $a, b, c>0$ and $a, b, c\neq 1$ then k is equal to

a.$\frac{1}{5}$ b. $\frac{1}{6}$ c.$(\log)_{64}2$ d. $(\log)_{32}2$

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25. The number of real solutions of the equation $\left(\frac{9}{10}\right)^x=-3+x-x^2$ is

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26. Which of the following when simplified reduces to an integer?

a. $\dfrac{2\log 6}{\log 12+\log 3}$ b. $\dfrac{\log 32}{\log 4}$

c. $\dfrac{(\log)_5 15-(\log)_5 4}{(\log)_5 128}$ d. $(\log)_{1/4}\left(\dfrac{1}{16}\right)^2$

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27. The equation $\dfrac{(\log)_8\left(\frac{8}{x^2}\right)}{((\log)_8 x^2)}=3$ has

a. no integral solution b. one natural

c. two real solution

d. one irrational solution

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28. Which of the following when simplified reduces to an integer?

a. $\dfrac{2\log 6}{\log 12+\log 3}$ b. $\dfrac{\log 32}{\log 4}$

c. $\dfrac{(\log)_5 15-(\log)_5 4}{(\log)_5 128}$ d. $(\log)_{1/4}\left(\dfrac{1}{16}\right)^2$

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29. If α, β be the roots of the equation $x^2 - px + q = 0$, then find the equation whose roots are $\frac{q}{p-\alpha}$ and $\frac{q}{p-\beta}$

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30. Which one of the following denotes the greatest positive proper fraction?

a. $\left(\frac{1}{4}\right)^{(\log)_2 6}$ b. $\left(\frac{1}{3}\right)^{(\log)_3 5}$ c. $3^{(\log)_3 2}$ d. $8^{\left(\frac{1}{(\log)_3 2}\right)}$

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31. If $\log_a b + \log_b c = \ + \log_c$ a vanishes where a,b and c are positive reals different than unity then the value of $(\log_a b)^3 + (\log_b c)^3 + (\log_c a)^3$ is

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32. The solution set of the system of equations

$$\log_{12} x\left(\frac{1}{\log_x 2}+\log_2 y\right)=\log_2 x \text{ and } \log_2 x.\left(\log_3(x+y)\right)=3\log_3 x$$

is :

$(i)x=6, y=2$

$(ii)x=4, y=3$

$(iii)x=2, y=6$

$(iv)x=3, y=4$

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33. If x_1 and x_2 are the solution of the equation $x^{3\log_{10}^3 x-\frac{2}{3}\log_{10} x}=100\sqrt[3]{10} then-a.$ x1x2=1$b. x1\cdot x2=x1+x2$ c. $\log_{x2} x1=-1$ d. $\log(x_1\cdot x_2)=0$

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34. If $a^x=b, b^y=c, c^z=a$ and $x=(\log)_b a^2, y=(\log)_c b^3, z=(\log)_a c^k,$

where $a, b, c > 0$ and $a, b, c \neq 1$ then k is equal to

a.$\frac{1}{5}$ b. $\frac{1}{6}$ c.$(\log)_{64}2$ d. $(\log)_{32}2$

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35. If $(\log)_k x.\ (\log)_5 k = (\log)_x 5,\ k \neq 1,\ k > 0,$ then x is equal to k

(a) k (b) $\frac{1}{5}$ (c) 5 (d) none of these

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36. The equation $\frac{(\log)_8\left(\frac{8}{x^2}\right)}{\left((\log)_8 x^2\right)} = 3$ has

a. no integral solution b. one natural

c. two real solution

d. one irrational solution

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37. $\frac{(\log)_{10}(x-3)}{(\log)_{10}(x^2-21)}=\frac{1}{2}$

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38. $x^{(\log_2 x)+4}=32$

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39. Solve for x if $\log(x-1)+\log(x+1)=\log 1$

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40. $9^{1+\log x}-3^{1+\log x}-210=0$ where the base of log is 10

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41. Statement I: If $a=y^2,\ b=z^2, c=x^2,\ then 8(\log)_a x^3 \dot{\log}_b y^3 \dot{\log}_c z^3=27$

Statement II: $(\log)_b a \dot{\log}_c b=(\log)_c a,$ also $(\log)_b a=\dfrac{1}{\log_a b}$

Statement 1 is True: Statement 2 is True; Statement 2 is a correct explanation for statement 1.

Statement 1 is true, Statement 2 is true;2 Statement 2 not a correct explanation for statement 1.

Statement 1 is true, statement 2 is false

Statement 1 is false, statement 2 is true

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42. Statement I: If $(\log)_{((\log)_5 x)} 5=2,\ thn\ x=5^{\sqrt{5}}$

Statement II: $(\log)_x a=b,\quad$ if $\quad a>0,\ then\ x=a^{1/b}$

Statement 1 is True: Statement 2 is True, Statement 2 is a correct explanation for statement 1.

Statement 1 is true, Statement 2 is true;2 Statement 2 not a correct explanation for statement 1.

Statement 1 is true, statement 2 is false.

Statement 1 is false, statement 2 is true

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43. Statement 1 is True: Statement 2 is True; Statement 2 is a correct explanation for statement 1

Statement 1 is true, Statement 2 is true;2 Statement 2 not a correct explanation for statement 1.

Statement 1 is true, statement 2 is false

Statement 1 is false, statement 2 is true

Statement I: the equation $(\log)_{\frac{1}{2+|x|}}(5+x^2)=(\log)_{(3+x^2)}(15+\sqrt{x})$ has real solutions. Because Statement II: $(\log)_{1/b}a=-\log_b a\ (where\ a,\ b>0\ and\ b\neq 1)$ and if number and base both are greater than unity then the number is positive. a.A b. B c. C d. D

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44. Comprehension 1 Let $a^{(\log)_b x} = c\, where\, a,\ b,\ c\, \&\, x$ are parameters. On the basis of above information, answer the following questions: If $a = 2\, x = a^{(\log)_5 25} \&\, c = \sqrt{2}$, then b is- a.2 b. 16 c. 12 d. 2

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45. Let $f(\theta) = \sin\left(\tan^{-1}\left(\frac{\sin\theta}{\sqrt{\cos 2\theta}}\right)\right)$, where $-\frac{\pi}{4} < \theta < \frac{\pi}{4}$. Then, the value of $\frac{d}{d(\tan\theta)}.\ f(\theta)$, is

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46. Comprehension 1 Let $a^{(\log)_b x} = c\, where\, a,\ b,\ c\, \&\, x$ are parameters. On the basis of above information, answer the following questions: If $b = (\log)_{\sqrt{3}} 3,\ c = 2(\log)_b \sqrt{b}$ and $\sin\theta = a$ (where, $x > 1$) then θ can be

a. $\frac{\pi}{4}$

b. $\frac{3\pi}{2}$

c. $\frac{\pi}{2}$

d. 0

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47. Comprehension 2 In comparison of two numbers, logarithm of smaller number is smaller, if base of the logarithm is greater than one. Logarithm of smaller number is larger, if base of logarithm is in between zero and one. For example $\log_2 4$ is smaller than $(\log)_2 8\ and (\log)_{\frac{1}{2}} 4$ is larger than $(\log)_{\frac{1}{2}} 8$. Identify the correct order:

$(\log)_3 8 < \log_3 6$

$(\log)_3 8 > \log_3 6$

$(\log)_2 6 > \log_3 6$

$(\log)_4 6 < \log_3 6$

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48. Comprehension 2: In comparison of two numbers, logarithm of smaller number is smaller, if base of the logarithm is greater than one. Logarithm of smaller number is larger, if base of logarithm is in between zero and one.

For example $\log_2 4$ is smaller than $(\log)_2 8$ and $(\log)_{\frac{1}{2}} 4$ is larger than $(\log)_{\frac{1}{2}} 8$ and $(\log)_{\frac{2}{3}} \frac{5}{6}$ is-

a. less than zero

b. greater than zero and less than one

c. greater than one

d. none of these

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49. Comprehension 3: If P is the non negative characteristic of $(\log)_{10} N$, the number of significant digit in N i s $P+1$. If P is the negative characteristic of $(\log)_{10} N$, then number of zeros after decimal before a significant digit start are $P-1$.

(Use $\log_{10} 2 = 0.\,301, \log)_{10} 3 = 0.\,4771$) Number of significant digit in N, where $N = \left(\frac{5}{3}\right)^{100}$, is-

a.23

b. 22

c.21

d. none

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50. Comprehension 3 : If P is the non negative characteristic of $(\log)_{10}N$, the number of significant digit in N is $P+1$. If P is the negative characteristic of $(\log)_{10}N$, then number of zeros after decimal before a significant digit start are $P-1$

(Use $\log_{10}2=0.301.(\log)_{10}3=0.4771$) Number of zeros after decimal before a significant digit start in N, where $N=\left(\frac{81}{16}\right)^{-25} is -$

a.16

b. 17

c.18

d. 19

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51. If $(\log)_{10}33.8=1.5289$, then $(\log)_{10}0.338$ is-

a.1.5289 b. -0.4711 c.-1.5289 d. 2.5289

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52. Prove that $\frac{(\log)_a N}{(\log)_{ab} N} = 1 + (\log)_a b$

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53. $\log_{\frac{1}{3}} \sqrt[4]{729 \cdot \sqrt[3]{9^{-1} \cdot 27^{-\frac{4}{3}}}}$ is equal to

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54. Compute the following $a^{\frac{(\log)_b((\log)_a N)}{(\log)_b(\log a)}}$

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55. Prove the identity;

$(\log)_a N \cdot (\log)_b N + (\log)_b N \cdot (\log)_c N + (\log)_c N \cdot (\log)_a N = \frac{(\log)_a N \cdot (\mathrm{lo}}{(\mathrm{lo}}$

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56. Which is smaller? 2 or $\left((\log)_{e-1}2+(\log)_2(e-1)\right)$

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57. Solve for $x:(\log)_4(\log)_3(\log)_2x=0$

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58. Find the value of 49^A+5^B where $A=1-(\log)_7 2,\ B=-(\log)_5 4.$

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59. If $4^A+9^B=10^C$, where $A=(\log)_{16}4,\ B=(\log)_3 9,\ C=(\log)_x 83$ then find x.

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60. Value of $\left[\frac{2}{(\log)_4(2000)^6}+\frac{3}{(\log)_5(2000)^6}\right]$ is

a. $4^{\frac{1}{3}}.5^{\frac{1}{2}}$ b. $\frac{1}{6}$ c. 33 d. none of these

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61. Solve the system of equations:

$(\log)_a x(\log)_a(xyz)=48,\ (\log)_a y\log_a(xyz)=12,$

$a>0,\ a\neq 1(\log)_a z\log_a(xyz)=84$

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62. Compute the following $\frac{81^{\frac{1}{(\log)_5 9}}+3^{\frac{3}{(\log)_{\sqrt{6}}3}}}{409}\left(\sqrt{7}\right)^{\frac{2}{(\log)_{25}7}}-(125)^{(\log)_{25}6}$

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63. Compute the following

$56+(\log)_{\sqrt{2}}\frac{4}{\sqrt{7}+\sqrt{3}}+(\log)_{1/2}\frac{1}{10+2\sqrt{21}}$

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64. $4^{5\log_{4\sqrt{2}}\left(3-\sqrt{6}\right)-6\log_{8}\left(\sqrt{3}-\sqrt{2}\right)}$

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65. Solve for $x : 5^{\log x}+5x^{\log 5}=3(a>0);$ where base of $\log$ is a

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

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67. Solve for $x : (\log)_{\mathrm{x}+1}\left(x^{2}+x-6\right)^{2}=4$

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68. Solve for $x : x + (\log)_{10}(1 + 2^x) = x\left(\dot{\log}_{10}5 + \log_{10} 6\right)$

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69. Given $a^2 + b^2 = c^2, a > 0; b > 0; c > 0,\ c - b \neq 1,\ c + b \neq 1,$

prove that : $(\log)_{c+b} a + (\log)_{c-b} a = 2(\log)_{c+b} a\dot{\log}_{c-b} a$

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70. Given $(\log)_{10}34.\,56 = 1.\,5386,$

find $(\log)_{10}3.\,456$; $(\log)_{10}0.\,3456$ and $(\log)_{10}0.\,003456$

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71. Find the number of positive integers which have the characteristics 3 when the base of the logarithm is 7.

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72. If $(\log)_{10}2 = 0.3010 \&(\log)_{10}3 = 0.4771$. Find the value of $(\log)_{10}(25)$

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73. 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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74. Find the antilogarithm of 0.75 if the base of the logarithm is 2401.

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75. If $x, y > 0, (\log)_y x + (\log)_x y = \frac{10}{3}$ and $xy = 144$, then $\frac{x+y}{2} = \sqrt{N}$ where N is a natural number, find the value of N.

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76. let

$$y = \sqrt{\log_2(3)\log_2(12)\log_2(48)\log_2(192) + 16} - \log_2(12)\log_2(48) + 10$$

find $y \in N$

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77. If $x = 1 + (\log)_a bc, y = 1 + (\log)_b ca$ and $z = 1 + (\log)_c ab$, then prove that $xyz = xy + yz + zx$

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78. A rational number which is 50 times its own logarithm to the base 10, is

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79. Prove that $a^x - b^y = 0$ where $x = \sqrt{(\log)_a b}, y = \sqrt{(\log)_b a}, a > 0, b > 0, a, b \neq 1$

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80. If $\frac{(\log)_a N}{(\log)_c N} = \frac{(\log)_a N - (\log)_b N}{(\log)_b N - (\log)_c N}$, where $N > 0$ and $N \neq 1, a, b, c > 0, \neq 1$, then prove that $b^2 = ac$

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81. 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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82. Prove that $(\log)_7 10$ is greater than $(\log)_{11} 13$.

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83. Solve the system the equations $(ax)^{\log a} = (by)^{\log b}; b^{\log x} = a^{\log y}$ where $a > 0, b > 0$ and $a \neq b,\ ab \neq 1$

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84. Solve for $x : (\log)_5 120 + (x - 3) - 2. (\log)_5 \left(1 - 5^{x-3}\right) = -(\log)_5 \left(0.2 - 5^{x-4}\right)$

.

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85. Solve the equation for $x : \log 4 + \left(1 + \frac{1}{2x}\right)\log 3 = \log\left(3^{\frac{1}{x}} + 27\right)$

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86. Find the real solutions to the system of equations

$\log_{10}(2000xy) - \log_{10} x . \log_{10} y = 4$,

$\log_{10}(2yz) - \log_{10} y \log_{10} z = 1$ and $\log_{10} zx - \log_{10} z \log_{10} x = 0$

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87. Find the x satisfying the equation

$\log^2\left(1 + \frac{4}{x}\right) + \log^2\left(1 - \frac{4}{x+4}\right) = 2\log^2\left(\frac{2}{x-1} - 1\right).$

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88. Solve for

$x: \log^2(4-x) + \log(4-x) \cdot \log\left(x + \frac{1}{2}\right) - 2\log^2\left(x + \frac{1}{2}\right) = 0$

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89. Solve the following equation for x & y: $(\log)_{100}|x+y|=\frac{1}{2}, (\log)_{10}y-(\log)_{10}|x|=\log_{100}4.$

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90. Find all real numbers x which satisfy the equation $2(\log)_2\log{}_2x+(\log)_{\frac{1}{2}}(\log)_2\left(2\sqrt{2}x\right)=1.$

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91. $\log_{\frac{3}{4}}\log_8\left(x^2+7\right)+\log_{\frac{1}{2}}\log_{\frac{1}{4}}\left(x^2+7\right)^{-1}=-2$

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92. Given $(\log)_{10}34.56=1.5386,$

find $(\log)_{10}3.456$; $(\log)_{10}0.3456$ and $(\log)_{10}0.003456$

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93. Find the number of positive integers which have the characteristics 3 when the base of the logarithm is 7.

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94. If $(\log)_{10}2 = 0.3010 \&(\log)_{10}3 = 0.4771$. Find the value of $(\log)_{10}(2.25)$

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95. Find the antilogarithm of 0.75 if the base of the logarithm is 2401.

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96. Let 'L' denotes the antilog of 0.4 to the base 1024. and 'M' denotes the number of digits in 6^{10} (Given log,02-03 and 'N' denotes the number of positive integers which have the characteristic 2, when base of the logarithm is 6. Find the value of LMN

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97. Find the product of the positive roots of the equation $\sqrt{(2008)}(x)^{(\log)_{2008}x} = x^2.$

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98. Solve: $(\log)_3\left(\sqrt{x}+\left|\sqrt{x}-1\right|\right)=(\log)_9\left(4\sqrt{x}-3+4\left|\sqrt{x}-1\right|\right)$

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99. Find the value of x satisfying the equation $\left((\log)_3(3x)^{\frac{1}{3}}+(\log)_x(3x)^{\frac{1}{3}}\right)\dot{\log}_3 x^3+\left((\log)_3\left(\frac{x}{3}\right)^{\frac{1}{3}}+(\log)_x\left(\frac{3}{x}\right)^{\frac{1}{3}}\right)\dot{\log}_3$

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100. The number of solutions of $(\log)_4(x-1)=(\log)_2(x-3)$ is (2001, 2M)

(a) 3 (b)1 (c) 2 (d) 0

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

(a)$\frac{1}{6}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) 6

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

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