MATHS

BOOKS - KC SINHA ENGLISH

LOGARITHM - FOR BOARDS

Solved Examples

1. Find the value of b satisfying $\log_{\sqrt{8}} b = 3\frac{1}{3}$

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2. Find the value of $\log_b a . \log_c b . \log_a c$.

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3. Prove that: $\log_3 \log_2 \log_{\sqrt{5}}(625) = 1$

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4. If $a^2 + b^2 = 23ab$, show that :

$\log \frac{a+b}{5} = \frac{1}{2}(\log a + \log b).$

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

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6. Simplify: $2^{(\log)_3 5} - 5^{(\log)_3 2}$

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7. If $\frac{\log x}{y-z} = \frac{\log y}{z-x} = \frac{\log z}{x-y}$, then prove that: $x^x y^y z^z = 1$

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8. The value of $(yz)^{\log y - \log z} \times (zx)^{\log z - \log x} \times (xy)^{\log x - \log y}$ is

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9. Prove that:

$$\frac{1}{\log_2 N} + \frac{1}{\log_3 N} + \frac{1}{\log_4 N} + \ldots + \frac{1}{\log_{2011} N} = \frac{1}{\log_{2011!} N}$$

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10. If $0 < x < 1$, prove that:

$$\log(1+x) + \log\left(1+x^2\right) + \log\left(1+x^4\right) + \ldots\infty = -\log(1-x)$$

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11. If $a, b, andc$ are respectively, the pth, qth , and rth terms of a G.P., show that $(q-r)\log a+(r-p)\log b+(p-q)\log c=0.$

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12. If a,b,c are in G.P., prove that: $\log_a x, \log_b x, \log_c x$are in H.P.

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13. If $(\log)_7(\log)_5\left(\sqrt{x+5}+\sqrt{x}\right)=0,$ what is the value o x? a. 3 b. 4 c. 2 d. 5

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

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15. if $\frac{1+3+5-\ldots up \to nterms}{4+7+10+\ldots up \to nterms} = \frac{20}{7\log_{10} X}$ and $n = \log_{10} x + \frac{\log_{10} X^1}{2} + \frac{\log_{10} X^1}{4} + \ldots\ldots\ldots + \infty$, then x is equal to

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16. If $(4)^{\log_9 3} + (9)^{\log_2 4} = (10)^{\log_x 83}$, then x is equal to

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17. If $(4)^{\log_9 3} + (9)^{\log_2 4} = (10)^{\log_x 83}$, then x is equal to

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18. If $\frac{6}{5}a^A - 3^B = 9^C$ where $A = \log_a x.\log_{10} a \log_a 5$, $B = \log_{10}\left(\frac{x}{10}\right)$ and $C = \log_{100} x + \log_4 2$. Find x

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19. Solve for x: $\left(5+2\sqrt{6}\right)^{x^2-3}+\left(5-2\sqrt{6}\right)^{x^2-3}=10$

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20. solve for x: $2\log_{10} x-\log_x(0.01)=5$

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21. For what values of x, $\log_{0.3}\left(x^2+8\right)>\log_{0.3}(9x)$

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22. Solve the inequality: $\log_2(2x-3)>\log_2(24-6x)$

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23. Prove that $\log_{10}2$lies between $\frac{1}{3}$ and $\frac{1}{4}$.

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24. Which one is greater: $\cos(\log_e \theta)$ or $\log_e(\cos\theta)$ if $-\frac{\pi}{2} < \theta < \frac{\pi}{2}$

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25. If $\log_2 x + \log_2 y \geq 6$prove that the smallest possible value of x+y is 16.

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Exercise

1. Evaluate: $\log_9 \tan\left(\frac{\pi}{6}\right)$

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2. Evaluate: $\log_{a^2} b \div \log_{\sqrt{a}} (b)^2$

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3. Evaluate: $\log_{\sqrt{5}} .008$

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4. Evaluate: $\log_{2\sqrt{3}} 144$

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5. Prove that $\log_3 \log_2 \log_{\sqrt{3}} 81 = 1$

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6. Prove that: $\log_a x \times \log_b y = \log_b x \times \log_a y$

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7. Prove that $\log_2 \log_2 \log_2 16 = 1$

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8. Prove that: $\log_a x = \log_b x \times \log_c b \times \ldots \times \log_n m \times \log_a n$

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9. Prove that: $a^x = 10^{x \log_{10} a}$

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10. If $a^2 + b^2 = 7ab$, prove that $\log\left(\frac{a+b}{3}\right) = \frac{1}{2}(\log a + \log b)$.

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11. Prove that: $\frac{\log_a(\log_b a)}{\log_b(\log_a b)} = -\log_a b$

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12. Prove that $\log(1+2+3) = \log 1 + \log 2 + \log 3$

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13. Prove that:

$2\log(1+2+4+7+14) = \log 1 + \log 2 + \log 4 + \log 7 + \log 14$

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14. 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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15. Prove that: $\frac{\log_9 11}{\log_5 3} = \frac{\log_3 11}{\log_{\sqrt{5}} 3}$.

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16. If $\log_{10} 343 = 2.5353$ then the least positive integer 'n' such that $7^n > 10^5$ is

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17. If a,b,c are in G.P., prove that: $\log_a x, \log Pbx, \log_c x$ are in H.P.

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18. Prove that: $\log \sin 8x = 3 \log 2 + \log \sin x + \log \cos 2x + \log \cos 4x$

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19. If $\log_4 10 = x, \log_2 20 = y$ and $\log_5 8 = z$.prove that $\frac{1}{x+1} + \frac{1}{y+1} + \frac{1}{z+1} = 1.$

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20. if $x = \log_a(bc), y = \log_b(ca)$ and $z = \log_c(ab)$ then $\frac{1}{x+1} + \frac{1}{y+1} + \frac{1}{z+1}$

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21. $\frac{1}{1+\log_b a + \log_b c} + \frac{1}{1+\log_c a + \log_c b} + \frac{1}{1+\log_a b + \log_a c}$

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22. prove that $x^{\log y - \log z} \cdot y^{\log z - \log x} \cdot z^{\log x - \log y} = 1$

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23. $\frac{\log a}{y-z} = \frac{\log b}{z-x} = \frac{\log c}{x-y}$, $then a^x b^y c^z$ is equal to

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

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25. If $\frac{\log a}{b-c} = \frac{\log b}{c-a} = \frac{\log c}{a-b}$, then $a^{b+c}.\ b^{c+a}.\ c^{a+b}$=

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26. If $\frac{\log x}{q-r} = \frac{\log y}{r-p} = \frac{\log z}{p-q}$ prove that $x^{q+r}.\ y^{r+p}.\ z^{p+q} = x^p.\ y^q.\ z^r$

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27. Show that: $\frac{1}{\log_2 n}+\frac{1}{\log_3 n}+\frac{1}{\log_4 n}+\ldots+\frac{1}{\log_{43} n}=\frac{1}{\log_{43!} n}$

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28. $2\left(\log a+\log a^2+\log a^3+\log a^4+\ldots\ldots\ldots\ldots+\log a^n\right)$ is equal to

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29. How many zeroes are there between the decimal point and first significasnt digits in $(0.0504)^{10}$. Given $\log 2=0.301, \log 3=0.477 nd \log 7=0.845$

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30. Find the number of digits in $(72)^{15}$ without actual computation. Given $\log 2=0.301, \log 3=0.477$.

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31. How many positive integers have characteristics 2 when base is 5.

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32. If $\log 2 = 0.301$ and $\log 3 = 0.477$, find the number of digits in: $(3^{15} \times 2^{10})$

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33. If $\log 2 = 0.30101,\ \log 3 = 0.47712,$ then the number of digits in 6^{20} is 15 b. 16 c. 17 d. 18

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

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35. Solve the equation: $\log_2 x + \log_4(x+2) = 2$

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36. $\log_X(X+2) + \log_{X+2} X = \frac{5}{2}$

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37. Solve the equation: $\frac{\log(x+1)}{\log x} = 2$

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38. The number of solution (s) for the equation $2\log_x a + \log_{ax} a + 3\log_{a^2x} a = 0$, is

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39. The number of positive integers satisfying $x + \log_{10}(2^x + 1) = x \log_{10} 5 + \log_{10} 6$ is _____.

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40. Solve for x :: $x^{\frac{3}{4}(\log_2(x)) - \left(\frac{5}{4}\right)} = \sqrt{2}$.

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41. The number $\log_{20} 3$ lies in

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42. Prove that $\log_{10} 2$lies between $\frac{1}{3}$ and $\frac{1}{4}$.

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43. Find the values of x satisfying the inequalities : $\log_{0.1}\left(4x^2-1\right) > \log_{0.1} 3x$

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44. Find the values of x satisfying the inequalities : $\log_2\left(x^2-24\right) > \log_2(5x)$`

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45. The value of $\frac{1}{\log_3 \pi} + \frac{1}{\log_4 \pi}$ is

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46. For what value of x $\log_3\left(x^2+10\right) > \log_3(7x)$

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47. Solve the inequality : $x^{\log x} > 10$.

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48. $\log_x 2 > 1$

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49. If $\log_{30} 3 = x, \log_{30} 5 = y, then \log_{30} 8 =$

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50. If $\log_{12} 18 = \alpha$ and $\log_{24} 54 = \beta$. Prove that $\alpha\beta + 5(\alpha - \beta) = 1$

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51. If a,b,c are in G.P., prove that: $\log_a x, \log Pbx, \log_c x$are in H.P.

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52. If $\log_a x, \log_b x, \log_c x$ are in A.P then $c^2 =$

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53. If a, b, c are distinct positive real numbers each different from unity such that $(\log_b a.\log_c a - \log_a a) + (\log_a b.\log_c b - \log b_b) + (\log_a c.\log_b c - \log_c c) =$ then prove that $abc = 1$.

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54. If $\log 2, \log(2^x - 1) and \log 2 \log(2^x + 3)$ are in A.P., write the value of x.

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55. If $a \neq 0$ and $\log_x\left(a^2+1\right) < 0$ then x lies in the interval

(A) $(0, \infty)$

(B) $(0, 1)$

(C) $(0, a)$

(D) none of these

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56. The number $(\log)_2 7$ is (1990, 2M) (a) an integer (b) a rational number (c) an irrational number (d) a prime number

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57. If $\log_{0.5}(x-2) < \log_{0.25}(x-2)$then x lies is the interval (A) $(-3, -2)$ (B) (2,3)(C)(3,oo)` (D) none of these

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58. The number of solution (s) for the equation $2\log_x a + \log_{ax} a + 3\log_{a^2x} a = 0$, is

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59. Solve:

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

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60. If $\log_{10} 343 = 2.5353$ then the least positive integer 'n' such that $7^n > 10^5$ is

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61. Show that: `1/(log_2n)+1/(nog_3n)+1/(log_4n)+...+1/(log_43n)=1/(log_43n)

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62. Solve : $\log_7 \log_5 \left(\sqrt{x+5}+\sqrt{x}\right)=0$

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63. For $x>1$, show that: $2\log_{10} x-\log_x 0.01 \geq 4$

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64. The least value of the expression $2(\log)_{10}x-(\log)_x(0.01), f$ or $x>1,$ is a. 10 b. 2 c. -0.01 d. none of these

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65. Show that: $|\log_b a+\log_a b| \geq 2$

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66. If $\log_{0.3}(x-1) < \log_{0.09}(x-1)$, then x lies in the interval :

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67. The equation $x^{\frac{3}{4}(\log_2 x)^2+\log_2 x-\frac{5}{4}} = \sqrt{2}$ has :

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68. If $\log_3 2, \log_3(2^x-5)$ and $\log_3\left(2^x-\frac{7}{2}\right)$ are in A.P., then x is equal to

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69. The number $(\log)_2 7$ is (1990, 2M) ,a) an integer (b) a rational number ,c) an irrational number (d) a prime number

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70. The number of solution of $\log_4(x-1) = \log_2(x-3)$ is :

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71. If 1,$\log_9\left(3^{1-x}+2\right)$ and $\log_3(4.3^x-1)$ are A.P. then x is

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