



# MATHS

# **BOOKS - CENGAGE MATHS (HINGLISH)**

# LOGARITHM

Solved Examples And Exercises

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

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

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

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

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

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

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

10. Solve: 
$$(\log)_3 (2x^2 + 6x - 5) > 1$$

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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)  $x(\log)_2(2^x+1)$ 

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? zyz = 1 (b)  $x^a y^b z^c = 1 x^{b+c} y^{c+b} = 1$  (d)  $xyz = x^a y^b z^c$ 

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

(d) 32

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

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

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

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

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

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

20. Solve: 
$$rac{1}{4}x^{los_2\sqrt{x}}=\left(2.~x^{\left(\log
ight)_2x}
ight)^{rac{1}{4}}$$

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

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

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

24. If  $x_1andx_2$  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)  $x_1^2 = x_2^3$ Watch Video Solution

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



**28.** If  $S = \left\{x \in R: \left((\log)_{0.6} 0.216\right) (\log)_5 (5-2x) \le 0\right\}$ , 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 
$$S = \left\{x \in N \colon 2 + (\log)_2 \sqrt{x+1} > 1 - (\log)_{rac{1}{2}} \sqrt{4-x^2}
ight\}$$
 , then (a)

 $S=\{1\}$  (b) S=Z (d) S=N (d) none of these

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**30.** Equation

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

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

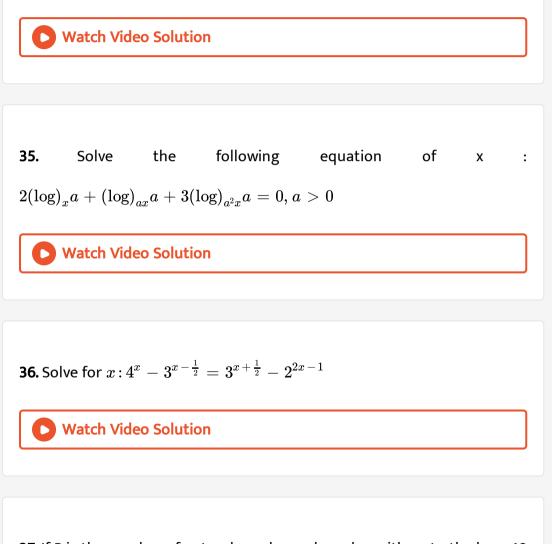
**31.** Solution set of the inequality 
$$\frac{1}{2^x - 1} > \frac{1}{1 - 2^{x-1}}$$
 is  $1, \infty$ ) (b)  $0, (\log)_2\left(\frac{4}{3}\right)$  (c)  $(-1, \infty) \left(0, (\log)_2\left(\frac{4}{3}\right) \cup (1, \infty)\right)$ 

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

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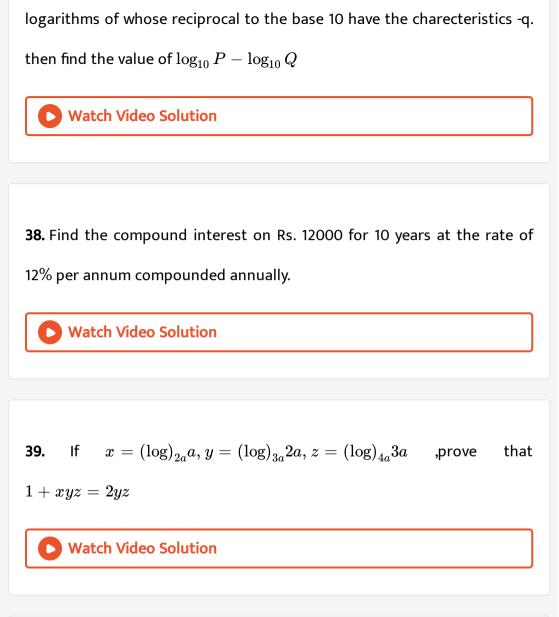
**33.** Which of the following is not the solution of  $(\log)_x \left(\frac{5}{2} - \frac{1}{x}\right) > 1$  $(a)\left(\frac{2}{5}, \frac{1}{2}\right)(b)(1, 2)(c)\left(\frac{2}{5}, 1\right)(d)$  Nonofthese

**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



**37.** If P is the number of natural numbers whose logarithms to the base 10

have the the charecteristic  $\boldsymbol{p}$  and  $\boldsymbol{Q}$  is the numbers of natural numbers



**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  $\frac{LM}{N}$ .

**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



**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?

**44.** If  $(\log)_{10}2 = 0.30103, (\log)_{10}3 = 0.47712$ , then find the number of digits in  $3^{12} \cdot 2^8$ 



**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  $2^{x+2}$ .  $5^{6-x} = 10^x$  ^ 2 is/are 1 (b) 2

(c) 
$$-(\log)_{10}(250)$$
 (d)  $(\log)_{10}4-3$ 

**48.** If  $(\log)_k x \log_5 k = (\log)_x 5, k \neq 1, k > 0$ , then x is equal to (a) k (b)  $\frac{1}{5}$  (c) 5 (d) none of these

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**49.** If  $p,q \in N$  satisfy the equation  $x^{\sqrt{x}} = (\sqrt{x})^x$ , 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  $(-4, -3)$  (b)  $(-3, 4) \cup (8, \infty)$   $(-3, \infty)$  (d)  $(-4, -3) \cup (8, \infty)$ 

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**51.** Which of the following is not the solution of  $(\log)_3(x^2-2) < (\log)_3\left(rac{3}{2}|x|-1
ight)$  is  $(\sqrt{2},2)$  (b)  $(-2, -\sqrt{2})$ 

$$(\,-\sqrt{2},2$$
 (d) none of these



52. The true solution set of inequality  $\left(\log
ight)_{(x+1)}\left(x^2-4
ight)>1$  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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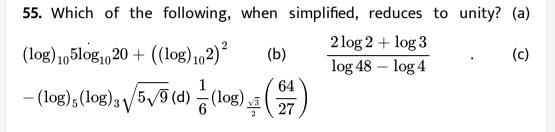
53. Solve the following equation of  $x: 2(\log)_x a + (\log)_{ax} a + 3(\log)_{a^2x} a = 0, a > 0$ 

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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  $\left(\frac{1}{2z}\right)$ 







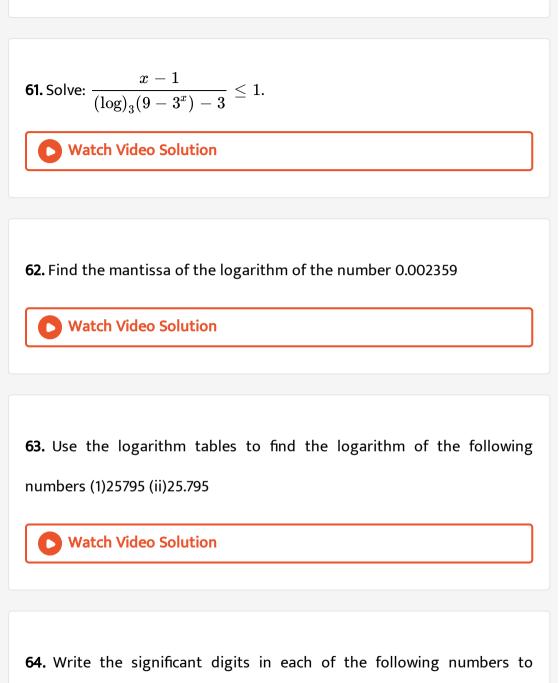
**56.** If  $(\log)_a x = b$  for permissible values of a and x, then identify the statement(s) which can be correct. (a)If a and b are two irrational numbers, then x can be rational. (b)If a is rational and b is irrational, then x can be rational. (c)If a is irrational and b is rational, then x can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

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

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

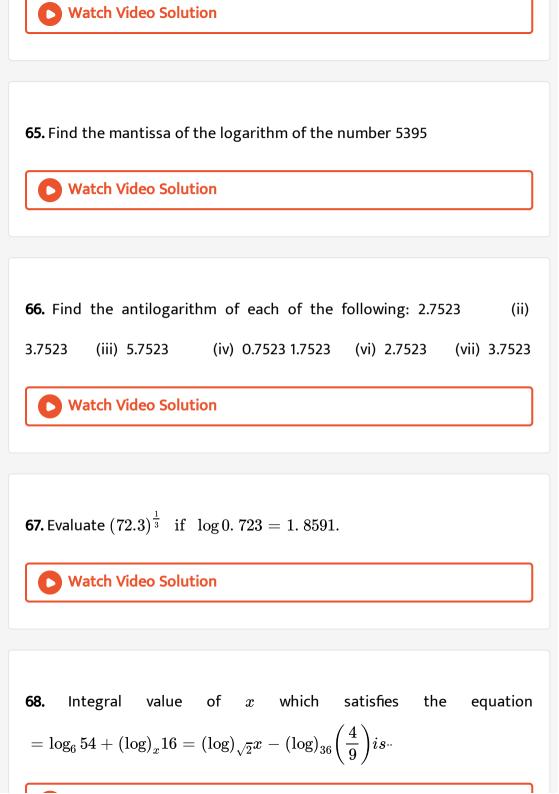
**59.** Write the characteristic of each of the following numbers by using their standard forms: 1235.5 (ii) 346.41 (iii) 62.723 (iv) 7.12345 0.35792 (vi) 0.034239 (vii) 0.002385 (viii) 0.0009468

**60.** Solve: 
$$(\log)_{0.1} \left( (\log)_2 \left( \frac{x^2 + 1}{x - 1} \right) < 0 
ight)$$



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



**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  $\left(\log_{10}2\right)^3 + \log_{10}8\log_{10}5 + \left(\log_{10}5\right)^3$  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.....

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

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

(b) independent of b dependent on a (d) dependent on b

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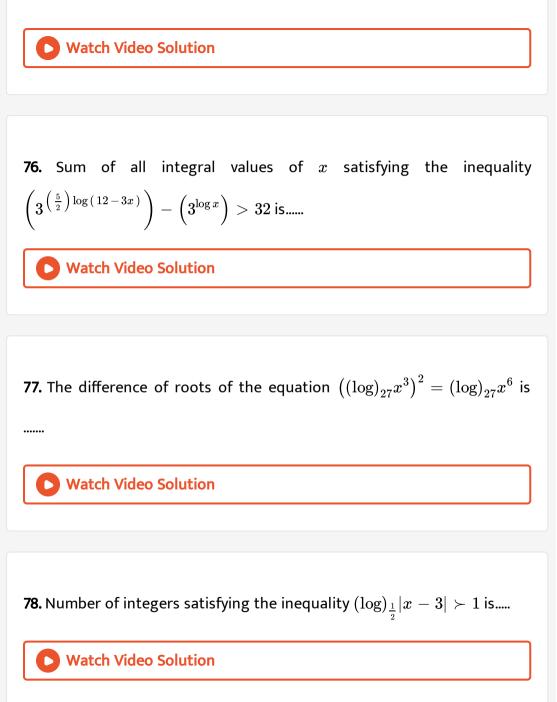
74. If 
$$(\log)_{10}5 = aand(\log)_{10}3 = b$$
, then  $(A)(\log)_{30}8 = \frac{3(1-a)}{b+1}$   
 $(B)(\log)_{40}15 = \frac{a+b}{3-2a} (C)(\log)_{243}32 = \frac{1-a}{b}$  (d) none of these

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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



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

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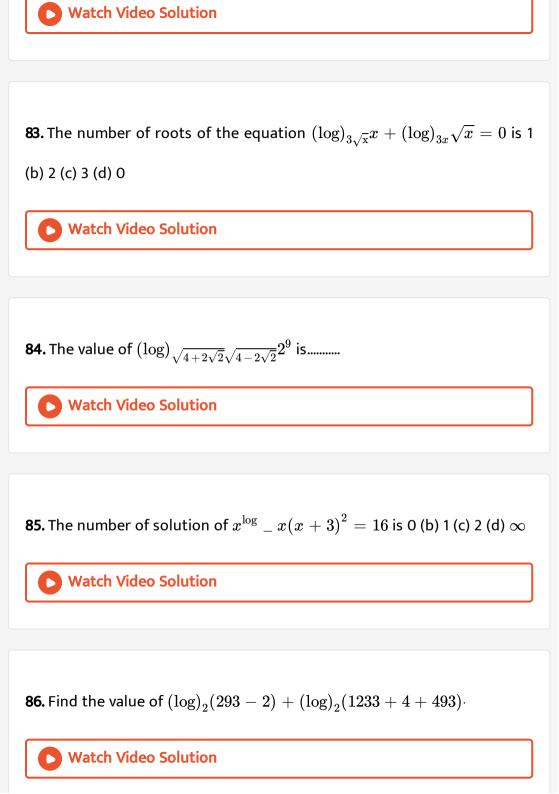
80. Number of real values of x satisfying the equation  $\log_2(x^2-x)\cdot\log_2\left(rac{x-1}{x}
ight)+(\log_2 x)^2=4$ ,is (a)0(b)2 (c)3 (d)7

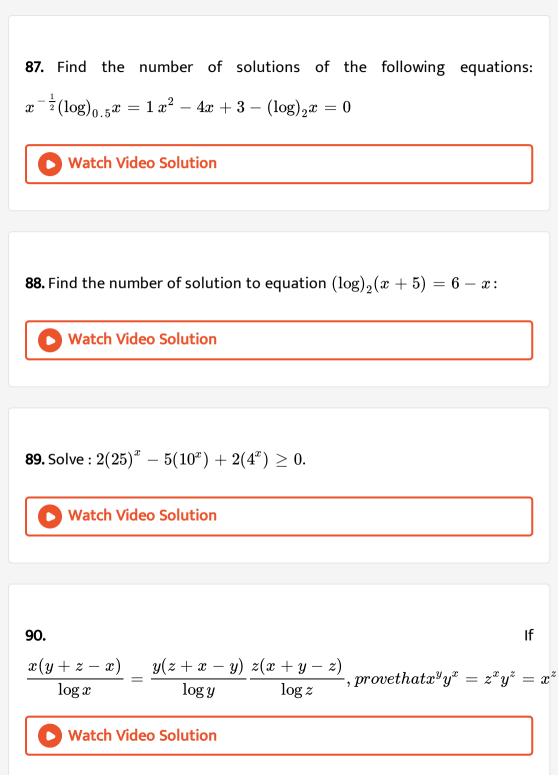
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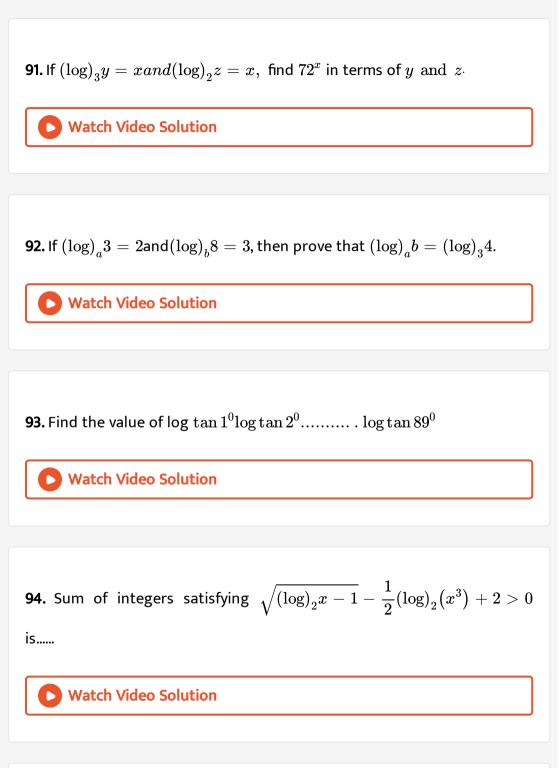
**81.** Let a>1 be a real number. Then the number of roots equation  $a^{2(\log)_2 x}=15+4x^{(\log)_2 a}$  is 2 (b) infinite (c) 0 (d) 1

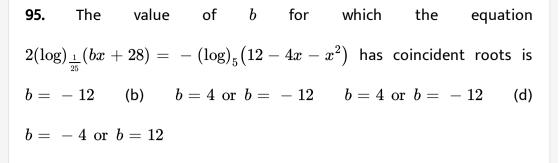
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82. Number of integers  $\leq 10$  satisfying the inequality  $2(\log)_{rac{1}{2}}(x-1) \leq rac{1}{3} - rac{1}{(\log)_{x^2-x}8}$  is.....









96. The least integer greater than  $(\log)_2(15) \cdot (\log)_{\frac{1}{6}} 2 \cdot (\log)_3 \frac{1}{6}$  is ...... Watch Video Solution 97. The reciprocal of  $\frac{2}{(\log)_4(200)^6} + \frac{3}{(\log)_5(200)^6}$  is .....

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

is.....

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

100. If xandy are real numbers such that  $2\log(2y-3x)=\log x+\log y$ 

,then find  $\frac{x}{y}$ .

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101. If 
$$\log_e\left(rac{a+b}{2}
ight)=rac{1}{2}(\log_e a+\log_e b),$$
 then find the relation

between aandb-

102. If  $2x^{\,(\log)_43}+3^{(\log)_4x}=27,\,$  then x is equal to

103. The value of  $\log ab - \log |b| = |\log a|$  (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  $rac{1}{a} - rac{1}{b}$  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

106. The number of  $N=6-\left(6(\log)_{10}2+(\log)_{10}31
ight)$  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 rational number (b) an irrational number a prime number (d) none of these

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108.

Solve:

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

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

### 110.

$$rac{(\log)_a N}{(\log)_c N} = rac{(\log)_a N - (\log)_b N}{(\log)_b N - (\log)_c N}, where N > 0 and N 
eq 1, a, b, c > 0$$

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  $\neq 1), ext{ then find the value of } abc\cdot$ 

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

lf

113. Let  $a=(\log)_3(\log)_32$ . An integer k satisfying  $1<2^{-k+3^{(-a)}}<2,$ 

must be less than ......

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

$$\begin{array}{ll} \text{116.} \quad \text{If} \quad f(x) = \log \biggl( \frac{1+x}{1-x} \biggr), then \quad (\textbf{a}) f(x_1) f(x) = f(x_1+x_2) \quad (\textbf{b}) \\ f(x+2) - 2f(x+1) + f(x) = 0 \ (\textbf{c}) f(x) + f(x+1) = f \bigl( x^2+x \bigr) \ (\textbf{d}) \\ f(x_1) + f(x_2) = f \biggl( \frac{x_1+x_2}{1+x_1x_2} \biggr) \end{array}$$

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)  $\frac{3}{2}$ 

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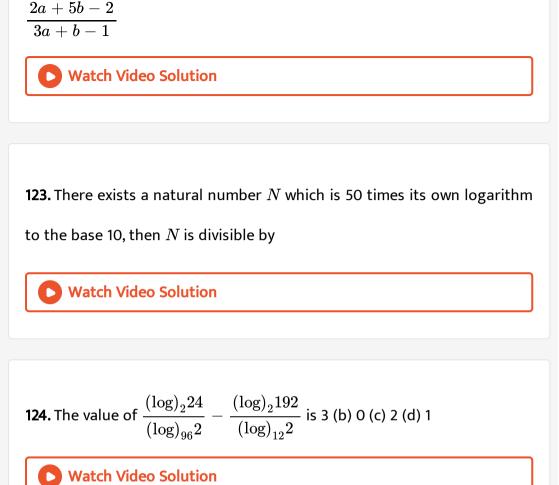
120. The value of 
$$rac{1+2(\log)_3 2}{ig(1+(\log)_3 2ig)^2}+ig((\log)_6 2ig)^2$$
 is 2 (b) 3 (c) 4 (d) 1

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121. If 
$$(\log)_4 5 = aand (\log)_5 6 = b$$
, 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  $(\log)_{10}2 = a$ ,  $(\log)_{10}3 = bthen(\log)_{0.72}(9.6)$  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)



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

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



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

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

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)  $\frac{2(\log)_2 3}{2(\log)_2 3 - 1}$ 

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



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

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

133. The least value of the expression  $2(\log)_{10}x - (\log)_x(0.01)$ . for x>1

is (a)10 (b)2 (c) -0.01 (d)4

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

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  $\ln(a+c), \ln(a-c), \ln(a-2b+c)$  are in  $A\dot{P}$ ; then  $a, b, c, are \in A\dot{P}$  (b)  $a^2, b^2, c^2are \in A\dot{P}$  a, b, c are in  $G\dot{P}$  (d) a, b, c are in  $H\dot{P}$ .

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

138. Which of the following numbers are positive/negative?  $(\log)_2 7$  (ii)

$$(\log)_{0.2}3$$
 (iii)  $(\log)_{1/3}\left(rac{1}{5}
ight)(\log)_43$  (v)  $(\log)_2ig((\log)_29ig)$ 

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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 
$$x^{(\log)_y x} = 2andy^{(\log)_x y} = 16$$

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

**142.** If  $a \ge b > 1$ , 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 : 
$$3^{(\log_9 x)} imes 2 = 3\sqrt{3}$$

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

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

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



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

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



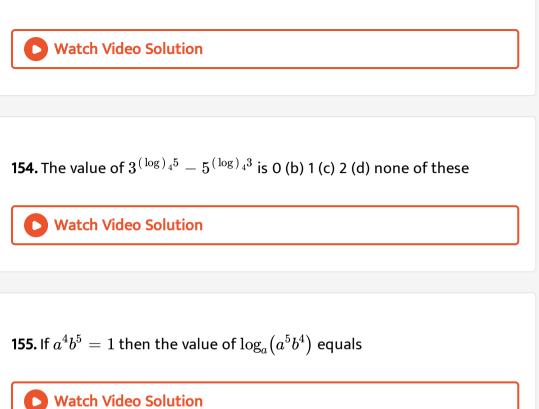
151. If 
$$(\log)_{10}\left[rac{1}{2^x+x-1}
ight]=xig[(\log)_{10}5-1ig]$$
 , then  $x=$  4 (b) 3 (c) 2 (d) 1

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(b) 3 (c) 18 (d) 54

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





## 156.

If

$$(\log)_2 x + (\log)_x 2 = rac{10}{3} = (\log)_2 y + (\log)_y 2 and x 
eq y, thex + y = -2$$

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

**157.** If  $(x + 1)^{(\log)_{10}(x+1)} = 100(x + 1)$ , then all the roots are positive real numbers all the roots lie in the interval (0,100) all the roots lie in the interval [-1,99] none of these

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

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



161. Find the value of 
$$\left(rac{1}{49}
ight)^{1+\,(\log)_{\,7}2}+5^{-1\,(\log)}\left(rac{1}{5}
ight)^{\,(\,7\,)}$$

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

if 
$$1$$

٥



163. Prove that 
$$rac{2^{(\log)_2rac{1}{4}x}-3^{\log}-(27)ig(x^2+1ig)^3-2x>}{7^{4\,(\log)_{49}x}-x-1}0$$

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

**165.** Which of the following pairs of expression are defined for the same set of values of x?  $f_1(x) = 2(\log)_2 x and f_2(x) = (\log)_{10} x^2$  $f_1(x) = (\log)_{\times}^2 and f_2(x) = 2$  $f_1(x) = (\log)_{10}(x-2) + (\log)_{10}(x-3)and f_{2(x)} = (\log)_{10}(x-2)(x-3)$ 

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

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

**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  
 $\frac{1}{x^{\log y}} + \frac{1}{(\log z)} \frac{1}{y^{\log z}} + \frac{1}{(\log x)} \frac{1}{z^{\log x}} + \frac{1}{(\log y)}$   
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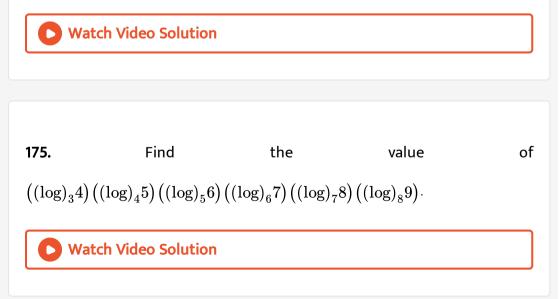
172. If  $y^2 = xz$  and  $a^x = b^y = c^z$ , then prove that  $(\log)_a b = (\log)_b c$ 



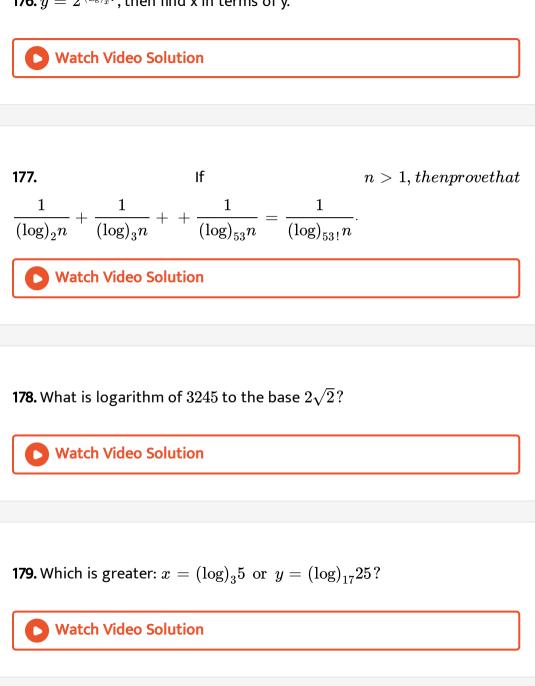
173. Simplify: 
$$rac{1}{1+(\log)_a bc} + rac{1}{1+(\log)_b ca} + rac{1}{1+(\log)_c ab}$$

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



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



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

1/4

