



MATHS

BOOKS - CENGAGE PUBLICATION

LOGARITHM AND ITS PROPERTIES

Illustration 1 1

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

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Illustration 1 2

1. The equation $e^{\sin x} - e^{-\sin x} - 4 = 0$ has

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Illustration 1 3

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

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Illustration 1 4

1. Solve $(1/2)^{x^2-2x} < 1/2$.

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Illustration 1 5

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

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Illustration 1 6

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

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Illustration 1 7

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

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Illustration 1 8

1. Prove that $\frac{2}{5} < \log_{10} 3 < \frac{1}{2}$.

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Illustration 1 9

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

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Illustration 1 10

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

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Illustration 1 11

1. Which of the following numbers are positive/negative : (i) $\log_{\sqrt{3}} \sqrt{2}$
(ii) $\log_3(4)$

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Illustration 1 12

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

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Illustration 1 13

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

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Illustration 1 14

1. If $\log_3 y = x$ and $\log_2 z = x$, find 72^x in terms of y and z .



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Illustration 1 15

1. If

$$\frac{x(y + z - x)}{\log x} = \frac{y(z + x - y)}{\log y} = \frac{z(x + y - z)}{\log z}, \text{ provethat } x^y y^x = z^x y^z$$

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Illustration 1 16

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

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Illustration 1 17

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



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Illustration 1 18

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



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Illustration 1 19

1. Find the number of solutions of the following equations:

$$x^{-\frac{1}{2}}(\log)_{0.5}x = 1 \quad x^2 - 4x + 3 - (\log)_2x = 0$$



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Illustration 1 20

1. Find the value of the following:

(i) $\log_{10} 2 + \log_{10} 5$

(ii) $\log_3(\sqrt{11} - \sqrt{2}) + \log_3(\sqrt{11} + \sqrt{2})$

(iii) $\log_7 35 - \log_7 5$

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Illustration 1 21

1. Find the value of $\log_2(2\sqrt[3]{9} - 2) + \log_2(12\sqrt[3]{3} + 4 + 4\sqrt[3]{9})$.

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Illustration 1 22

1. What is logarithm of $32 \cdot 4^{\frac{1}{5}}$ to the base $2\sqrt{2}$?

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Illustration 1 23

1. 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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Illustration 1 24

1. 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 $f_2(x) = (\log)_{10} x^2$
 $f_1(x) = (\log) x^2$ 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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Illustration 1 25

1. Find 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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Illustration 1 26

1. If sum $\log_2 x + \log_4 x + \log_{16} x + \log_{256} x + \dots = 6$, then find the value of x.



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Illustration 1 27

1. Suppose that a and b are positive real numbers such that $\log_{27} a + \log_9(b) = \frac{7}{2}$ and $\log_{27} b + \log_9 a = \frac{2}{3}$. Then the value of the ab equals



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Illustration 1 28

1. Solve for x: $11^{4x-5} \cdot 3^{2x} = 5^{3-x} \cdot 7^{-x}$.

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Illustration 1 29

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

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Illustration 1 30

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

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

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Illustration 1 31

1. Let $a = \log_3 20$, $b = \log_4 15$ and $c = \log_5 12$. Then find the value of

$$\frac{1}{a+1} + \frac{1}{b+1} + \frac{1}{c+1}.$$

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Illustration 1 32

1. If $\log_a(ab) = x$ then $\log_b(ab)$ is equals to

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Illustration 1 33

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

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Illustration 1 34

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

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Illustration 1 35

1. 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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Illustration 1 36

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

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Illustration 1 37

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

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Illustration 1 38

1. 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 ab .

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Illustration 1 39

1. If $y = 2^{\frac{1}{\log_x 4}}$ then prove that $x = y^2$.

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1. Find the value of $81^{(1/(\log)_5 3)} + 27^{\log 36} + 3^{\left(\frac{4}{(\log)_7 9}\right)}$

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



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Illustration 1 42

1. If $60^a=3$ and $60^b = 5$ then $12^{\frac{1-a-b}{2(1-b)}}$ is equal to



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Illustration 1 43

1. Solve $(\log)_4 8 + (\log)_{4(x+3)} - (\log)_4(x - 1) = 2$.



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Illustration 1 44

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

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Illustration 1 45

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

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Illustration 1 46

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

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Illustration 1 47

1. Solve: $(\log)_2(4x3^x - 6) - (\log)_2(9^x - 6) = 1.$



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Illustration 1 48

1. Solve : $6((\log)_x 2 - (\log)_4 x) + 7 = 0$.



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Illustration 1 49

1. Solve: $4^{(\log)_2 \log x} = \log x - (\log x)^2 + 1$ (*baseise*).



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Illustration 1 50

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



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Illustration 1 51

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

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Illustration 1 52

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

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Illustration 1 53

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

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Illustration 1 54

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

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Illustration 1 55

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

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Illustration 1 56

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



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Illustration 1 57

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

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Illustration 1 58

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

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Illustration 1 59

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

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Illustration 1 60

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

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Illustration 1 61

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

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Illustration 1 62

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



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Illustration 1 63

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

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Illustration 1 64

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

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Illustration 1 65

1. Solve $2 \log_3 x - 4 \log_x 27 \leq 5$.

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Illustration 1 66

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

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Illustration 1 67

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

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Illustration 1 68

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





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Illustration 1 69

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



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Illustration 1 70

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



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Illustration 1 71

1. 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



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Illustration 1 72

1. 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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Illustration 1 73

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



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Illustration 1 74

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

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Illustration 1 75

1. Use the logarithm tables to find the logarithm of the following numbers 25975 (ii) 25.795

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Illustration 1 76

1. 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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Illustration 1 77

1. Evaluate $(72.3)^{\frac{1}{3}}$ if $\log 0.723 = \bar{1}.8591$.

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Illustration 1 78

1. Using logarithms, find the value of 6.45×981.4

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Illustration 1 79

1. 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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Illustration 1 80

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

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Illustration 1 81

1. In the 2001 census, the population of India was found to be 8.7×10^7 . If the population increases at the rate of 2.5% every year, what would be

the population in 2011?

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Illustration 1 82

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

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Illustration 1 83

1. If P is the number of natural numbers whose logarithms to the base 10 have the characteristic p and Q is the number of natural numbers logarithms of whose reciprocals to the base 10 have the characteristic $-q$, then find the value of $\log_{10} P - (\log)_{10} Q$.

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Illustration 1 84

1. Let L denote $\text{antilog}_{32} 0.6$ 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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Example 1 1

1. Find the number of solution of $2x^2 + 3^x + 4^x - 5^x = 0$

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Example 1 2

1. 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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Example 13

1. 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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Example 14

1. 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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Example 15

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

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Example 16

1. Solve $3^{(\log_9 x)^2 - \frac{9}{2} \log_9 x + 5} = 3\sqrt{3}$.

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Example 17

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

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Example 18

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

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Example 19

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

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Example 110

1.

Solve:

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





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Exercise 1 1

1. For $x \leq 2$, solve $x^3 3^{|x-2|} + 3^{x+1} = x^3 \cdot 3^{x-2} + 3^{|x-2|+3}$



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2. Solve $\left(\frac{1}{2}\right)^{x^6-2x^4} < 2^{(x)^2}$.



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3. Solve for x and y : $y^x = x^y$, $x = 2y$.



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4. Solve $2^{x+2} - 2^{x+3} - 2^{x+4} > 5^{x+1} - 5^{x+2}$.



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5. Solve $\left(\frac{3}{4}\right)^{6x+10-x^2} < \frac{27}{64}$.



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6. Find the number of solutions of $|x| \cdot 3^{|x|} = 1$.



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Exercise 1 2

1. Find the value of $3^{2\log_9 3}$.



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2. Find the value of $\sqrt{(\log_{0.5} 4)^2}$.



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3. If $\log_{\sqrt{8}} b = 3\frac{1}{3}$, then find the value of b .



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4. Find the value of $\log_5 \log_2 \log_3 \log_2 512$.



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5. If $\log_5 x = a$ and $\log_2 y = a$, find 100^{2a-1} in terms of x and y .



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6. Find the value of $\log_{1/3} \sqrt[4]{729} \cdot \sqrt[3]{9^{-1} \cdot 27^{-4/3}}$.



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7. Solve for x : $\log_4 \log_3 \log_2 x = 0$.



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



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9. Find number of roots of the equation $x^3 - \log_{0.5} x = 0$.



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Exercise 13

1. Write each of the following as single logarithm:

(a) $1 + \log_2 5$ (b) $2 - \log_3 7$

(c) $2 \log_{10} x + 3 \log_{10} y - 5 \log_{10} z$

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2. Prove that $\frac{2}{5} < \log_{10} 3 < \frac{1}{2}$.

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3. Prove that $\log_7 \log_7 \sqrt{7\sqrt{(7\sqrt{7})}} = 1 - 3\log_7 2$.

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4. If $\log_{10} x = y$, then find $\log_{1000} x^2$ in terms of y .

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5. If $\log_7 2 = m$, then find $\log_{49} 28$ in terms of m .

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6. Find the value of $\log_2 \left(\frac{1}{7^{\log_7 0.125}} \right)$.

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7. Find the value of $\left(\frac{4}{\log_2(2\sqrt{3})} + \frac{2}{\log_3(2\sqrt{3})} \right)^2$.

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

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

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10. If $\log_b n = 2$ and $\log_n 2b = 2$, then find the value of b .

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11. If $\log_2 x \times \log_3 x = \log_2 x + \log_3 x$, then find x .

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12. If $y^2 = xz$ and $a^x = b^y = c^z$, then prove that $(\log)_6 a = (\log)_c b$.

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13. Prove the following identities:

$$(a) \frac{\log_a n}{\log_{ab} n} = 1 + \log_a b \qquad (b) \log_{ab} x = \frac{\log_a x \log_b x}{\log_a x + \log_b x}.$$

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14. Compute $\log_{ab}(\sqrt[3]{a}/\sqrt{b})$ if $\log_{ab} a = 4$.

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15. If $a^x = b^y = c^z = d^w$, show that $\log_a(bcd) = x\left(\frac{1}{y} + \frac{1}{z} + \frac{1}{w}\right)$.

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16. 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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Exercise 1 4

1. Solve $\log_2(25^{x+3} - 1) = 2 + \log_2(5^{x+3} + 1)$.

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2. Solve $\log_4(2 \times 4^{x-2} - 1) + 4 = 2x$.

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3. Solve: $27^{\log_3 \sqrt[3]{x^2 - 3x + 1}} = \frac{\log_2(x - 1)}{|\log_2(x - 1)|}$.

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4. The number of solutions of $\log_4(x - 1) = \log_2(x - 3)$.

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5. Solve $\log_6 9 - \log_9 27 + \log_8 x = \log_{64} x - \log_6 4$.

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6. Solve $\log_2(2\sqrt{17 - 2x}) = 1 - \log_{1/2}(x - 1)$.



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7. Solve : $3 \log_x (4) + 2 \log_{4x} 4 + 3 \log_{16x} 4 = 0$



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8. Solve $(\log_3 x)(\log_5 9) - \log_x 25 + \log_3 2 = \log_3 54$.



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9. Solve $(x^{\log_{10} 3})^2 - (3^{\log_{10} x}) - 2 = 0$.



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10. Solve $x^{\log_4 x} = 2^{3(\log_4 x + 3)}$.



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11. Find the sum of the squares of all the real solution of the equation

$$2\log_{(2+\sqrt{3})}(\sqrt{x^2+1}+x) + \log_{(2-\sqrt{3})}(\sqrt{x^2+1}-x) = 3$$

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12. Prove that the equation $x^{\log_{\sqrt{x}}2x} = 4$ has no solution.

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Exercise 1 5

1. Solve $\log_3|x| > 2$.

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2. Solve $\log_2 \cdot \frac{x-4}{2x+5} < 1$.

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3. Solve $\log_{10}(x^2 - 2x - 2) \leq 0$.

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4. Let $f(x) = \sqrt{\log_{10} x^2}$. Find the set of all values of x for which $f(x)$ is real.

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5. Solve $2^{\log_2(x-1)} > x + 5$.

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6. Solve $\log_2|4 - 5x| > 2$.

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7. Solve $\log_{0.2} \frac{x+2}{x} \leq 1$.

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8. Solve $\log_{1/2}(x^2 - 6x + 12) \geq -2$.

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9. Solve $(0.5)^{\log_3 \log_{(1/5)} \left(x^2 - \frac{4}{5}\right)} > 1$.

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10. Find the values of x which the function $f(x) = \sqrt{\log_{1/2} \left(\frac{x-1}{x+5}\right)}$ is defined.

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11. Solve $\log_{1-x}(x-2) \geq -1$.

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12. Solve $\log_3(x+2)(x+4) + \log_{1/3}(x+2) < \frac{1}{2}\log_{\sqrt{3}}7$.

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13. Solve $(\log)_x(x^2 - 1) \leq 0$.

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Exercise 1 6

1. If $\log_{10} 2 = 0.3010$ and $\log_{10} 3 = 0.477$, then find the number of digits in the following numbers:

(a) 3^{40} (b) $2^{32} \times 5^{25}$ (c) 24^{24}



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2. If characteristic of three numbers a , b and c are 5, -3 and 2, respectively, then find the maximum number of digits in $N = abc$.



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3. There are 3 numbers a , b and c such that $\log_{10} a = 5.71$, $\log_{10} b = 6.23$ and $\log_{10} c = 7.89$. Find the number of digits before decimal in $\frac{ab^2}{c}$.



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4. Rupees 10,000 is invested at 6% interest compounded annually. How long will it take to accumulate Rs. 20,000 in the account?



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5. An initial number of bacteria presented in a culture is 10000. This number doubles every 30 minutes. How long will it take to bacteria to reach the number 100000 ?



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6. Charles Richter defined the magnitude of an earthquake to be $M = \log_{10} \left(\frac{I}{S} \right)$, where I is the intensity of the earthquake (measured by the amplitude of a seismograph reading taken 100 km from the epicentre of the earthquake) and S is the intensity of a "standard earthquake" (whose amplitude is 1 micron = 10^{-1} cm).

Each number increase on the Richter scale indicates an intensity ten times stronger. For example, an earthquake of magnitude 5. An earthquake of magnitude 7 is 100 times stronger than an earthquake of magnitude 5. An earthquake of magnitude 8 is 1000 times stronger than an earthquake of magnitude 5.

The earthquake in city A registered 8.3 on the Richter scale. In the same year, another earthquake was recorded in city B that was four times stronger. What was the magnitude of the earthquake in city B ?



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Exercises Single Correct Answer Type

1. $(\log)_4 18$ is

- A. a rational number
- B. an irrational number
- C. a prime number
- D. none of these

Answer: B



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2. The number $N = 6\log_{10} 2 + \log_{10} 31$ lies between two successive integers whose sum is equal to

A. 5

B. 7

C. 9

D. 10

Answer: B



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

A. 6601

B. 6602

C. 6603

D. 6604

Answer: C

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

A. 0

B. 1

C. 2

D. 4

Answer: C

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5. The value of $\log ab - \log|b| =$

A. $\log a$

B. $\log|a|$

C. $-\log a$

D. none of these

Answer: B



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

A. $\log b$

B. $\log a$

C. 2

D. 1

Answer: A



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7. If $\frac{a + (\log)_4 3}{a + (\log)_2 3} = \frac{a + (\log)_8 3}{a + (\log)_4 3} = b$, then $sequa < o \frac{1}{2}$ (2) $\frac{2}{3}$ (c) $\frac{1}{3}$ (d) $\frac{3}{2}$

A. $\frac{1}{2}$

B. $\frac{2}{3}$

C. $\frac{1}{3}$

D. $\frac{3}{2}$

Answer: C



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8. 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 0 (b) 1 (c) 2 (d) none of these

A. 0

B. 1

C. 2

D. none of these

Answer: A



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9. The value of $\frac{1 + 2(\log)_3 2}{(1 + (\log)_3 2)^2} + ((\log)_6 2)^2$ is

A. 2

B. 3

C. 4

D. 1

Answer: D



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10. 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) $\frac{1}{2ab-1}$

A. $\frac{1}{2a+1}$

B. $\frac{1}{2b+1}$

C. $2ab+1$

D. $\frac{1}{2ab-1}$

Answer: D



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

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. $\frac{2a + 5b - 2}{3a + b - 1}$

Answer: B



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12. There exists a natural number N which is 50 times its own logarithm to the base 10, then N is divisible by 5 (b) 7 (c) 9 (d) 11

A. 5

B. 7

C. 9

D. 11

Answer: A



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13. 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

A. 3

B. 0

C. 2

D. 1

Answer: A



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14. $(\log)_{x-1} x (\log)_{x-2} (x-1) \dots (\log)_{x-12} (x-11) = 2$, x is equal to:

A. 9

B. 16

C. 25

D. none of these

Answer: B



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15. If $f(x) = \log\left(\frac{1+x}{1-x}\right)$, then (a) $f(x_1)f(x_2) = f(x_1 + x_2)$ (b)

$f(x+2) - 2f(x+1) + f(x) = 0$ (c) $f(x) + f(x+1) = f(x^2 + x)$ (d)

$f(x_1) + f(x_2) = f\left(\frac{x_1 + x_2}{1 + x_1x_2}\right)$

A. $f(x_1) \cdot f(x_2) = f(x_1 + x_2)$

B. $f(x+2) - 2f(x+1) + f(x) = 0$

C. $f(x) + f(x+1) = f(x^2 + x)$

D. $f(x_1) + f(x_2) = f\left(\frac{x_1 + x_2}{1 + x_1x_2}\right)$

Answer: D



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16. about to only mathematics

A. $9/5$

B. 4

C. 5

D. $8/5$

Answer: A



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17. The value of $3^{(\log)_4 5} - 5^{(\log)_4 3}$ is

A. 0

B. 1

C. 2

D. none of these

Answer: A



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18. 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) $(\log)_2 3 - (\log)_3 2$ (c) $\log\left(\frac{3}{2}\right)$ (d) none of these

A. 1

B. $\log_2 3 - \log_3 2$

C. $\log(3/2)$

D. none of these

Answer: C



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19. The value of x satisfying $\sqrt{3}^{-4+2\log_{\sqrt{5}} x} = 1/9$ is

A. 2

B. 3

C. 4

D. none of these

Answer: D



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20. The value of x satisfying the equation

$$3\sqrt{5}^{\log_5 \left((\log_5 (\log_5 \log_5 \left(\frac{x}{2} \right))) \right)} = 55 \quad 1 \text{ (b) } 3 \text{ (c) } 18 \text{ (d) } 54$$

A. 1

B. 3

C. 18

D. 54

Answer: D



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

A. odd integer

B. prime number

C. composite number

D. irrational

Answer: B



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22. If $\log_y x + \log_x y = 2$, $x^2 + y = 12$, then the value of xy is

A. 9

B. 12

C. 15

D. 21

Answer: A



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23. সমাধান করো : $4^{\log_9 3} + 9^{\log_2 4} = 10^{\log_x 83}$ ।

A. a.2

B. b.3

C. c.10

D. d.30

Answer: C



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24. Solve $(x + 1)^{\log_{10}(x+1)} = 100(x + 1)$

A. 1.all the roots are positive real numbers.

B. 2.all the roots lie in the interval (0, 100)

C. 3.all the roots lie in the interval [-1, 99]

D. 4.none of these

Answer: C



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25. If $\log_2 x + \log_x 2 = \frac{10}{3} = \log_2 y + \log_y 2$ and $x \neq y$, then $x + y =$

A. a.2

B. b.65/8

C. c.37/6

D. d.none of these

Answer: D



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

1

A. 4

B. 3

C. 2

D. 1

Answer: D



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27. If $(\log)_3 \{5 + 4(\log)_3(x - 1)\} = 2$, then x is equal to

A. 2

B. 4

C. 8

D. 16

Answer: B



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28. If $2x^{(\log)_4 3} + 3^{(\log)_4 x} = 27$, then x is equal to 2 (b) 4 (c) 8 (d) 16

A. 2

B. 4

C. 8

D. 16

Answer: D



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29. The 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

Answer: D



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30. The value of b for which the equation

$2(\log)_{\frac{1}{25}}(bx + 28) = -(\log)_5(12 - 4x - x^2)$ has coincident roots is

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

$b = -4$ or $b = 12$

A. $b = -12$

B. $b = 4$

C. $b = 4$ or $b = -12$

D. $b = -4$ or $b = 12$

Answer: C



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31. If the equation $2^x(1 - 2^x) + 4^y = 2^y$ 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) $x(\log)_2(2^x + 1)$

A. $x \log_2(1 - 2^x)$

B. $x + \log_2(1 - 2^x)$

C. $\log_2(1 - 2^x)$

D. $x \log_2(2^x + 1)$

Answer: B



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32. Solve the equation $x^{\log_x (x+3)^2} = 16$

A. 0

B. 1

C. 2

D. ∞

Answer: A



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33. The product of roots of the equation $\frac{\log_8(8/x^2)}{(\log_8 x)^2} = 3$ is

A. 1

B. $1/2$

C. $1/3$

D. $1/4$

Answer: D



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34. 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 how many real number S contains?

- A. 2
- B. infinite
- C. 0
- D. 1

Answer: D

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35. The number of roots of the equation $(\log)_{3\sqrt{x}} x + (\log)_{3x} \sqrt{x} = 0$ is

- A. 1
- B. 2

C. 3

D. 0

Answer: B



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36. The set of all x satisfying the equation

$$x^{\log_3 x} - 3x^2 + ((\log_3 x)^2 - 10) = \frac{1}{x^2}$$

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

A. $\{1, 9\}$

B. $\{1, 9, 1/81\}$

C. $\{1, 4, 1/81\}$

D. $\{9, 1/81\}$

Answer: D



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37. Number of real values of x satisfying the equation

$$(\log)_2(x^2 - x)(\log)_2\left(\frac{x-1}{x}\right) + ((\log)_2 x)^2 = 4, \text{ is } 0 \text{ (b) } 2 \text{ (c) } 3 \text{ (d) } 7$$

A. 0

B. 2

C. 3

D. 7

Answer: B



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38. If $xy^2 = 4$ and $\log_3(\log_2 x) + \log_{1/3}(\log_{1/2} y) = 1$, then x equals

A. 4

B. 8

C. 16

D. 64

Answer: D



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

A. $x_1 = 2x_2$

B. $x_1 = x_2^2$

C. $2x_1 = x_2^2$

D. $x_1^2 = x_2^3$

Answer: B



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40. 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 2 (b) 1 (c) 4 (d) none of these

A. 2

B. 1

C. 4

D. none of these

Answer: A



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41. $x^{(\log)_5 x} > 5$ implies $x \in (0, \infty)$ (b) $[2, 2.5]$ (c) $(2, 2.5)$ (d) $(0, 2.5)$

A. $x \in (0, \infty)$

B. $x \in (0, 1/5) \cup (5, \infty)$

C. $x \in (1, \infty)$

D. $x \in (1, 2)$

Answer: B



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

A. $S = \{1\}$

B. $S = Z$

C. $S = N$

D. none of these

Answer: A



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43. 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) $(0, 2.5)$

A. $[2.5, \infty)$

B. $[2, 2.5)$

C. $(2, 2.5)$

D. $(0, 2.5)$

Answer: B



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44. 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) $(-1, \infty)$ $\left(0, (\log)_2\left(\frac{4}{3}\right) \cup (1, \infty)\right)$

A. $(1, \infty)$

B. $(0, \log_2(4/3))$

C. $(-1, \infty)$

D. $(0, \log_2(4/3)) \cup (1, \infty)$

Answer: D



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

A. 4

B. 8

C. 16

D. 32

Answer: C



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46. Which of the following is a solution of

$$(\log x) \left(\frac{5}{2} - \frac{1}{x} \right) > \left(\frac{5}{2} - \frac{1}{x} \right) ?$$

A. $\left(\frac{2}{5}, \frac{1}{2} \right)$

B. (1, 2)

C. $\left(\frac{2}{5}, 1\right)$

D. none of these

Answer: A :: B



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47. The solution set of the inequality

$(\log)_{10}(x^2 - 16) \leq (\log)_{10}(4x - 11)$ is (a) $(4, \infty)$ (b) $(4, 5)$ (c) $\left(\frac{11}{4}, \infty\right)$ (d)

$\left(\frac{11}{4}, 5\right)$

A. $(4, \infty)$

B. $(4, 5]$

C. $(11/4, \infty)$

D. $\left(\frac{11}{4}, 5\right)$

Answer: B



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

A. $(-4, -3)$

B. $(-3, 4) \cup (8, \infty)$

C. $(-3, \infty)$

D. $(-4, -3) \cup (8, \infty)$

Answer: D



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49. Which of the following is not the solution of

$(\log)_3(x^2 - 2) < (\log)_3\left(\frac{3}{2}|x| - 1\right)$ is $(\sqrt{2}, 2)$ (b) $(-2, -\sqrt{2})$

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

A. $(-\sqrt{2}, 2)$

B. $(-2, -\sqrt{2})$

C. $(-\sqrt{2}, 2)$

D. none of these

Answer: C



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

A. $(2, \infty)$

B. $\left(2, \frac{1 + \sqrt{21}}{2}\right)$

C. $\left(\frac{1 - \sqrt{21}}{2}, \frac{1 + \sqrt{21}}{2}\right)$

D. $\left(\frac{1 + \sqrt{21}}{2}, \infty\right)$

Answer: D



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Multiple Correct Answers Type

1. For $a > 0, \neq 1$, the roots of the equation $(\log)_{ax} a + (\log)_x a^2 + (\log)_{a^2x} a^3 = 0$ are given

A. $a^{-4/3}$

B. $a^{-3/4}$

C. a

D. $a^{-1/2}$

Answer: A::D

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

A. 1

B. 2

C. $-\log_{10}(250)$

D. $\log_{10} 4 - 3$

Answer: B::C::D

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

A. $xyz = 1$

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

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

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

Answer: A::B::C::D



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4. 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

Answer: B::C



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5. If $p, q \in N$ satisfy the equation $x^{\sqrt{x}} = (\sqrt{x})^x$, then

A. $p+q=5$

B. $|p - q| = 4$

C. $pq=4$

D. if $\log_q p$ is defined, then $\log_p q$ is not and vice versa

Answer: A::C::D



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6. Which of the following, when simplified, reduces to unity?

A. $\log_{10} 5 \cdot \log_{10} 20 + (\log_{10} 2)^2$

B. $\frac{2 \log 2 + \log 3}{\log 48 - \log 4}$

C. $-\log_5 \log_3 \sqrt{\sqrt[5]{9}}$

D. $\frac{1}{6} \log_{\sqrt{3}/2} \left(\frac{64}{27} \right)$

Answer: A::B::C



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

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.

Answer: A::B::C::D



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8. The number of solutions of the equation

$$\log_{x+1}(x - 0.5) = \log_{x-0.5}(x + 1) \text{ is}$$

- A. two real solutions
- B. no prime solution
- C. one integral solution
- D. no irrational solution

Answer: B::C::D

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9. The equation $\sqrt{1 + \log_x \sqrt{27} \log_3 x} + 1 = 0$ has

- A. no integral solution
- B. one irrational solution
- C. two real solutions
- D. no prime solution

Answer: A::D

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10. If $\log_{1/2}(4 - x) \geq \log_{1/2} 2 - \log_{1/2}(x - 1)$, then x belongs to

A. $(1, 2]$

B. $[3, 4)$

C. $(1, 3]$

D. $[1, 4)$

Answer: A::B



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11. If the equation $x^{\log_a x^2} = \frac{x^{k-2}}{a^k}$, $a \neq 0$ has exactly one solution for x , then the value of k is/are

A. $6 + 4\sqrt{2}$

B. $2 + 6\sqrt{3}$

C. $6 - 4\sqrt{2}$

$$D. 2 - 6\sqrt{3}$$

Answer: A::C



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12. The value of x satisfying

$$|x - 1|^{\log_3 x^2 - 2 \log_x 9} = (x - 1)^7 \text{ is}$$

A. $\frac{1}{\sqrt{3}}$

B. 1

C. 2

D. 81

Answer: C::D



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13. If $x = 9$ is one of the solutions of

$$\log_e(x^2 + 15a^2) - \log_e(a - 2) = \log_e\left(\frac{8ax}{a - 2}\right), \text{ then}$$

A. $1.a = \frac{3}{5}$

B. $2.a = 3$

C. $3.x = 15$

D. $x = 2$

Answer: B



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14. In which of the following, $m > n$ ($m, n \in R$)?

A. $m = (\log_2 5)^2$ and $n = \log_2 20$

B. $m = \log_{10} 2$ and $n = \log_{10} \sqrt[3]{10}$

C. $m = \log_{10} 5 \cdot \log_{10} 20$ and $n = 1$

$$D. m = \log_{1/2} \left(\frac{1}{3} \right) \text{ and } n = \log_{1/3} \left(\frac{1}{2} \right)$$

Answer: A::D



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

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. all of these

Answer: A::B::C



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16. The value of $\frac{6a^{\log_e b}(\log_{a^2} b)(\log_{b^2} a)}{e^{\log_e a \cdot \log_e b}}$ is (a) independent of a (b) independent of b (c) dependent on a (d) dependent on b

A. independent of a

B. independent of b

C. dependent on a

D. dependent on b

Answer: A:B



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17. The inequality $\sqrt{x^{(\log)_2 \sqrt{x}}} \geq 2$ is satisfied (a) by only one value of x (b) $x \in \left(0, \left(\frac{1}{4}\right)\right)$ (c) $x \in [4, \infty)$ (d) $x \in (1, 2)$

A. only one value of x

B. $x \in \left(0, \frac{1}{4}\right]$

C. $x \in [4, \infty)$

D. $x \in (1, 2)$

Answer: B::C



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18. 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. $\frac{2\log_2 3}{2\log_2 3 - 1}$

Answer: A::B::C



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Linked Comprehension Type

1. Consider the system of equations

$$\log_3(\log_2 x) + \log_{1/3}(\log_{1/2} y) = 1 \text{ and } xy^2 = 9.$$

The value of $1/y$ lies in the interval

- A. (200, 300)
- B. (400, 500)
- C. (700, 800)
- D. none of these

Answer: C

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2. Consider the system of equations

$$\log_3(\log_2 x) + \log_{1/3}(\log_{1/2} y) = 1 \text{ and } xy^2 = 9.$$

The value of $1/y$ lies in the interval

- A. (5, 7)
- B. (7, 10)

C. (11, 15)

D. (25, 30)

Answer: B



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3. Consider equations $x^{\log_y x} = 2$ and $y^{\log_x y} = 16$.

The value of x is (a) $2^{\sqrt[3]{2}}$ (b) $2^{\sqrt[3]{4}}$ (c) $2^{\sqrt[3]{64}}$ (d) $2^{\sqrt[3]{256}}$

A. $2^{\sqrt[3]{2}}$

B. $2^{\sqrt[3]{4}}$

C. $2^{\sqrt[3]{64}}$

D. $2^{\sqrt[3]{256}}$

Answer: B



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

A. $2^{\sqrt[3]{2}}$

B. $2^{\sqrt[3]{4}}$

C. $2^{\sqrt[3]{128}}$

D. $2^{\sqrt[3]{16}}$

Answer: D



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5.2 $\left(\sqrt{\log_a (ab)^{1/4} + \log_b (ab)^{1/4}} - \sqrt{\log_a \left(\frac{b}{a}\right)^{1/4} + \log_b \left(\frac{a}{b}\right)^{1/4}} \right) \sqrt{\log_a (b)} =$

A. a.1

B. b.2

C. c. $2^{\log_a b}$

D. d. $2^{\log_b a}$

Answer: B



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$$6.2 \left(\sqrt{\log_a (ab)^{1/4} + \log_b (ab)^{1/4}} - \sqrt{\log_a \left(\frac{b}{a}\right)^{1/4} + \log_b \left(\frac{a}{b}\right)^{1/4}} \right) \sqrt{\log_a (b)} =$$

A. 1

B. 2

C. $2^{\log_a b}$

D. $2^{\log_b a}$

Answer: C



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Matrix Match Type

1. Match the following List I to List II

| List I | List II |
|--|---------|
| a. The smallest integer greater than $\frac{1}{\log_3 \pi} + \frac{1}{\log_4 \pi}$ is | p. 10 |
| b. Let $3^a = 4$, $4^b = 5$, $5^c = 6$, $6^d = 7$, $7^e = 8$, and $8^f = 9$. Then the value of the product $(abcdef)$ is | q. 3 |
| c. Characteristic of the logarithm of 2008 to the base 2 is | r. 1 |
| d. If $\log_2(\log_2(\log_3 x)) = \log_2(\log_3(\log_2 y)) = 0$, then the value of $(x - y)$ is | s. 2 |



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2. Match the following List I to List II

| List I | List II |
|---|---------------|
| a. $2^{\log_{(2\sqrt{2})} 15}$ is | p. rational |
| b. $\sqrt[3]{\left(5^{1/\log_7 5} + \frac{1}{\sqrt{(-\log_{10} 0.1)}}\right)}$ is | q. irrational |
| c. $\log_3 5 \cdot \log_{25} 27$ is | r. composite |
| d. Product of roots of equation $x^{\log_{10} x} = 100x$ is | s. prime |



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| List I | List II |
|---|---------|
| a. The value of $\log_2 \log_2 \log_4 256 - \log_{\sqrt{2}} 4$ is | p. 1 |
| b. If $\log_3 (5x - 2) - 2 \log_3 \sqrt{3x + 1} = 1 - \log_3 4$, then $x =$ | q. 6 |
| c. Product of roots of the equation $7x^2 + x^2 - 4x - 5 = (x - 1)$ is | r. 3 |
| d. Number of integers satisfying $\log_2 (\sqrt{x} - 2) (\log_3 x)^2 - 1 > 0$ are | s. 5 |

3.

- A. $a \ b \ c \ d$
 $s \ p \ q \ r$
- B. $a \ b \ c \ d$
 $s \ p \ q \ r$
- C. $a \ b \ c \ d$
 $q \ r \ p \ s$
- D. $a \ b \ c \ d$
 $r \ p \ q \ s$

Answer: A



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Numerical Value Type

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

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3. If $(\log)_4 A = (\log)_6 B = (\log)_9 (A + B)$, then $[4(B/A)]$ (where $[]$ represents the greatest integer function) equals

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4. Integral value of x which satisfies the equation

$$\log_6 54 + \log_x 16 = (\log)_{\sqrt{2}} x - (\log)_{36} \left(\frac{4}{9} \right) \text{ is}$$

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5. If $a = \log_{245} 175$ and $b = \log_{1715} 875$, then the value of $\frac{1-ab}{a-b}$ is _____.

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

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7. Sum of integral values of x satisfying the inequality $3\left(\frac{5}{2}\right)^{\log_3(12-3x)} - 3^{\log_3(x)} > 32$

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

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

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

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

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12. 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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13. The value of $\left(\sqrt{3 + 2\sqrt{2}} + \sqrt{3 - 2\sqrt{2}}\right)^{2^9}$ is _____.

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

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16. The value of x satisfying

$$x + \log_{10}(1 + 2^x) = x \log_{10} 5 + \log_{10} 6$$
 is

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

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19. The value of

$$6 + \log_{3/2} \left(\frac{1}{3\sqrt{2}} \sqrt{4 - \frac{1}{3\sqrt{2}} \sqrt{4 - \frac{1}{3\sqrt{2}} \sqrt{4 - \frac{1}{3\sqrt{2}} \dots}}} \right) \text{ is } \dots\dots\dots$$

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20. The value of $\left((\log_2 9)^2\right)^{\frac{1}{\log_2 (\log_2 9)}} \times (\sqrt{7})^{\frac{1}{\log_4 7}}$ is _____.



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Jee Main

1. The equation $e^{\sin x} - e^{-\sin x} - 4 = 0$ has

- A. infinite number of real roots
- B. no real roots
- C. exactly one real root
- D. exactly four real roots

Answer: B



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Jee Advanced

1. 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

A. $\frac{1}{6}$

B. $\frac{1}{3}$

C. $\frac{1}{2}$

D. 6

Answer: C



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