



India's Number 1 Education App

MATHS

BOOKS - CENGAGE MATHS (ENGLISH)

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. Solve $e^{\sin x} - e^{-\sin x} - 4 = 0$.



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Illustration 1 3

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



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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 16

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



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Illustration 17

1. Find the value of $\log_{2\sqrt{3}} 1728$.



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Illustration 18

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



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Illustration 19

1. Arrange $\log_2 5$, $\log_{0.5} 5$, $\log_7 5$, $\log_3 5$ in decreasing order.



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Illustration 10

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



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Illustration 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 $\log \tan 1^\circ \log \tan 2^\circ \dots \log \tan 89^\circ$.



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



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Illustration 1 16

1. Suppose $x; y; z > 0$ and are not equal to 1 and $\log x + \log y + \log z = 0$. Find the value of $x^{\frac{1}{\log y}} + \frac{1}{\log z} \times y^{\frac{1}{\log z}} + \frac{1}{\log x} \times z^{\frac{1}{\log x}} + \frac{1}{\log y}$ (base 10)



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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 $32\sqrt[5]{4}$ 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 133

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



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Illustration 134

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



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Illustration 135

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 136

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 137

1. If $x = \log_{2a} a$, $y = \log_{3a} 2a$ and $z = \log_{4a} 3a$ then prove that
 $xyz + 1 = 2yz$



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Illustration 138

1. If $\log_a a \cdot \log_c a + \log_c b \cdot \log_a b + \log_a c \cdot \log_b c = 3$ (where a, b, c are different positive real numbers) then find the value of abc .



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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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Illustration 1 40

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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Illustration 1 41

1. Prove that $\frac{2^{\log_{2^{1/4}} x} - 3^{\log_{27} (x^2+1)^3} - 2x}{7^{4 \log_{49} x} - x - 1} > 0, \forall x \in (0, \infty).$



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Illustration 142

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 143

1. Solve $\log_4(8) + \log_4(x + 3) - \log_4(x - 1) = 2$



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Illustration 144

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



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Illustration 145

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



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Illustration 146

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



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Illustration 147

1. Solve $\log_2(4 \times 3^x - 6) - \log_2(9^x - 6) = 1$.



Illustration 148

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



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Illustration 149

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



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Illustration 150

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 $\frac{1}{4}x^{\log_2 \sqrt{x}} = (2 \cdot x^{\log_2 x})^{\frac{1}{4}}$.



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Illustration 1 53

1. Solve $|x - 1|^{(\log_{10} x)^2 - \log_{10} x^2} = |x - 1|^3$



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



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

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



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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 174

- Find the mantissa of the logarithm of the number 0.002359



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Illustration 175

- Use the logarithm tables to find the logarithm of the following numbers
(i) 25975 (ii) 25.795



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Illustration 176

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 $\log 0.723 = 1.8591$.



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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 $3^{12}x2^8$.



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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 182

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 183

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 184

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 11

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



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Example 12

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 $\log_a(a/b) + \log_a(b/a)$.



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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 1 5

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



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Example 1 6

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



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Example 1 7

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 10

1.

Solve:

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



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Exercise 11

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



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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 positive real numbers such that $2\log(2y - 3x) = \log x + \log y$, then find the value of $\frac{x}{y}$.



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9. 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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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:

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

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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 $\left(\frac{1}{49}\right)^{1+\log_7 2} + 5^{-\log_{(1/5)}(7)}$.



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Exercise 14

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. Solve $\log_4(x - 1) = \log_2(x - 3)$.



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



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

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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 "standed 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 then 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 (a) 6601 (b) 6602 (c) 6603 (d) 6604

A. 6601

B. 6602

C. 6603

D. 6604

Answer: C



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4. If $(21 \cdot 4)^a = (0 \cdot 00214)^b = 100$, then the value of $\frac{1}{a} - \frac{1}{b}$ is
0 (b) 1 (c)
2 (d) 4

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 find the value of b

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
(a) 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 $\left(1 + 2 \frac{\log_3 2}{(1 + (\log_3 2))^2} + ((\log_6 2)^2)\right)$ is
(a) 2 (b) 3 (c) 4 (d) 1

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

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. $\log_{x-1} x \cdot \log_{x-2}(x-1) \cdot \dots \cdot \log_{x-12}(x-11) = 2$, 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. $f(x_1) \cdot f(x_2) = f(x_1 + x_2)$
- B. $f(x+2) - 2f(x+1) + f(x) = 0$
- C. $f(x) + f(x+1) = f(x^2 + x)$
- D. $f(x_1) + f(x_2) = f\left(\frac{x_1 + x_2}{1 + x_1 x_2}\right)$

Answer: D



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16. If $a^4b^5 = 1$ then the value of $\log_a(a^5b^4)$ equals

- 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 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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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

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

$$\sqrt[3]{5^{\log_5 5^{\log_5 5^{\log_5 5^{\log_5 \left(\frac{x}{2}\right)}}}}} = 3, \text{ is}$$

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 odd integer (b) prime number 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. $4^{\log_9 3} + 9^{\log_2 4} = 10^{\log_x 83}$, then x is equal to

A. 2

B. 3

C. 10

D. 30

Answer: C



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

A. all the roots are positive real numbers.

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

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

D. 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. 2

B. $65/8$

C. $37/6$

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 $x =$ (a) 4 (b) 3 (c) 2 (d)

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 4 (b) 3 (c) 8 (d)

$$(\log)_2 16$$

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

A. 2

B. 4

C. 8

D. 16

Answer: D



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29. The equation

$\log_4(2 - x) + \log_{0.25}(2 + x) = \log_4(1 - x) + \log_{0.25}(2x + 1)$ 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 values of b for which the equation

$$2 \log_{\frac{1}{25}}(bx + 28) = 1 \log_5(12 - 4x - x^2)$$
 has coincident roots is/are

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 $x(\log_2(1 - 2^x))$ (b)
 $x + (\log_2(1 - 2^x))$ (c) $x(\log_2(2^x + 1))$

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. The number of solution of $x^{\log_x(x+3)^2} = 16$ is

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

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

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

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 $e^2x^{\ln x} = x^3$ with $x_1 > x_2$, then $x_1 = 2x_2$ (b) $x_1 = x_2$ (c) $2x_1 = x_2$ (d) $x_1 = x_2$

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) $(0, 1/5) \cup (5, \infty)$ (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 $S = \left\{ x \in N : 2 + (\log)_2 \sqrt{x+1} > 1 - (\log)_{\frac{1}{2}} \sqrt{4-x^2} \right\}$, then

(a) $S = \{1\}$ (b) $S = Z$ (c) $S = N$ (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 $S = \left\{ x \in R : ((\log)_{0.6} 0.216)(\log)_5(5-2x) \leq 0 \right\}$, then S is equal to (2, 5, ∞) (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. The solution set of inequality

$$\frac{1}{2^x - 1} > \frac{1}{1 - 2^{x-1}}$$
 is

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 $x + y$

A. 4

B. 8

C. 16

D. 32

Answer: C



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46. Which of the following is not the solution

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

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 $(4, \infty)$ (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
 $(-4, -3)$ (b) $(-3, 4) \cup (8, \infty)$ (c) $(-3, \infty)$ (d) $(-4, -3) \cup (8, \infty)$

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

Answer: D



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Multiple Correct Answers Type

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

(a) $a^{-\frac{4}{3}}$ (b) $a^{-\frac{3}{4}}$ (c) a (d) $a^{-\frac{1}{2}}$

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

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

C. a

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

Answer: A::D



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2. 6/ The real solutions of the equation $2^{x+2} \cdot 5^{6-x} = 10^{x^2}$ is

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) $x^{b+c} y^{c+b} z^{a+b} = 1$ (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
(b) $1/5$
(c) 5 (d) none of these

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?

$$(\log)_{10} 5 \cdot \log_{10} 20 + ((\log)_{10} 2)^2 \cdot (c) - (\log)_5 (\log)_3 \sqrt{5\sqrt{9}} \frac{1}{6} (\log)_{\frac{\sqrt{3}}{2}} \left(\frac{64}{27} \right)$$

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

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

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

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 $\log_{x+1}(x - 0.5) = \log_{x-0.5}(x + 1)$ 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 set of real values of x satisfying the equation

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

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

B. $a = 3$

C. $x = 15$

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 $n = 1$

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

Answer: A::D



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15. if $\log_{10} 5 = a$ and $\log_{10} 3 = b$ then:

$$\text{A. } \log_{30} 8 = \frac{3(1 - a)}{b + 1}$$

$$\text{B. } \log_{40} 15 = \frac{a + b}{3 - 2a}$$

$$\text{C. } \log_{243} 32 = \frac{1 - a}{b}$$

D. none 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

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

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 x 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. $2\sqrt[3]{256}$)

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. 1

B. 2

C. $2^{\log_a b}$

D. $2^{\log_b a}$

Answer: B



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

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 $x^{\log_{10} x} = 100 x$ 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 $7^{\log_2 (x^2 - 4x + 5)} = (x - 1)$ is	r. 3
d. Number of integers satisfying $\log_2 (\sqrt{x} - 2 (\log_{1/4} x)^2 - 1 > 0$ 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 $(\log_{10} 2)^3 + \log_{10} 8 \cdot \log_{10} 5 + (\log_{10} 5)^3$ is _____.



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3. If $\log_4 A = \log_6 B = \log_9(A + B)$, then $[4(B/A)]$ (where $[\cdot]$ represents the greatest integer function) equals _____.



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4. Integral value of x which satisfies the equation
 $= \log_6 54 + (\log)_x 16 = (\log)_{\sqrt{2}} x - (\log)_{36} \left(\frac{4}{9}\right)$ 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 $(\log_{27} x^3)^2 = \log_{27x^6}$ is _____.



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7. Sum of integral values of x satisfying the inequality $3^{\left(\frac{5}{2}\right) \log_3(12 - 3x)} - 3^{\log_2(x)} > 32$



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8. The least integer greater than $\log_2 15 \cdot \log_{1/62} \log_3 1/6$ 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 $\sqrt{\log_2 x - 1} - 1/2 \log_2(x^3) + 2 > 0$ is _____.



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11. Number of integers satisfying the inequality $\log_{1/2}|x - 3| > -1$ is _____.



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12. Number of integers ≤ 10 satisfying the inequality $2 \log_{1/2}(x - 1) \leq \frac{1}{3} - \frac{1}{\log_{x^2-x} 8}$ 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. if $x + \log_{10}(1 + 2^x) = x \log_{10} 5 + \log_{10} 6$ then x



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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

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

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20. The value of $\left((\log_2 9)^2 \right)^{\frac{1}{\log_2(\log_2 9)}} \times \left(\sqrt{7} \right)^{\frac{1}{\log_4 7}}$ 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 In
 $(2x)^{\ln 2} = (3y)^{\ln 3}$ and $3^{\ln x} = 2^{\ln y}$ Then x_0 is

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

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

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

D. 6

Answer: C



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