



## MATHS

### BOOKS - ML KHANNA

### LOGARITHMS AND SURDS

#### Problem Set 1 Multiple Choice Questions

1. For  $y = \log_a x$  to be defined 'a' must be

- A. any + ive real number
- B. any number
- C.  $\geq e$
- D. any + ive real number  $\neq 1$

**Answer: D**



Watch Video Solution

2.  $\log_{5\sqrt{5}} 5$  is equal to

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

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

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

D. 2

**Answer: A**



Watch Video Solution

3. The value of  $\log_6(216\sqrt{6})$  is equal to

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

B.  $\frac{5}{2}$

C.  $\frac{7}{2}$

D.  $\frac{9}{2}$

**Answer: C**



**Watch Video Solution**

4. If  $A = \log_2 \log_2 \log_4 256 + 2 \log_{\sqrt{2}} 2$ , then A is equal to

A. 2

B. 3

C. 5

D. 7

**Answer: C**



**Watch Video Solution**

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

A.  $\left(\frac{1}{4}, \frac{1}{3}\right)$

B.  $\left(\frac{1}{3}, \frac{1}{2}\right)$

C.  $\left(\frac{1}{2}, \frac{3}{4}\right)$

D.  $\left(\frac{3}{4}, \frac{4}{5}\right)$

**Answer: B**



[Watch Video Solution](#)

6. The value of  $\log_8 128$  is equal to

A.  $\frac{7}{3}$

B. 16

C.  $\frac{3}{7}$

D. none

**Answer: A**



[Watch Video Solution](#)

7.  $\log_7 \log_7 \sqrt{7 \left( \sqrt{7\sqrt{7}} \right)} =$

A.  $3 \log_2 7$

B.  $1 - 3 \log_7 7$

C.  $1 - 3 \log_7 2$

D. none of these

**Answer: C**

 [Watch Video Solution](#)

8. The value of  $\sqrt{\left( \log_{0.5}^2 4 \right)}$  is

A.  $-2$

B.  $\sqrt{-4}$

C.  $2$

D. none of these

**Answer: C**



**Watch Video Solution**

9. The value of  $2^{\log_3 5} - 5^{\log_3 2}$  is

A. 0

B. 3

C. 5

D. 2

**Answer: A**



**Watch Video Solution**

10. The value of  $\log_9 27 - \log_{27} 9$  is

A. 0

B.  $3/2$

C.  $5/6$

D. none

**Answer: C**



[Watch Video Solution](#)

11. If  $\log_k A \cdot \log_5 k = 3$ , then  $A =$

A.  $5k^3$

B.  $k^{(3)}$

C. 125

D. 243

**Answer: C**



[Watch Video Solution](#)

12.  $\frac{\log_8 17}{\log_9 23} - \frac{\log_{2\sqrt{2}} 17}{\log_3 23} =$

A. 0

B. 1

C.  $\frac{17}{8}$

D.  $\frac{23}{17}$

**Answer: A**



**Watch Video Solution**

13. If  $p = \log_{245} 175$  and  $q = \log_{1715} 875$ , then  $\frac{1 - pq}{p - q} =$

A. 1

B. 2

C. 3



D. 5

**Answer: D**



**Watch Video Solution**

14. The value of  $\log_3 2 \log_4 3 \log_5 4 \dots \log_{15} 14 \log_{16} 15$  is

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

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

C.  $\frac{1}{4}$

D. 1

**Answer: C**



**Watch Video Solution**

15. The value of  $\log_b a \cdot \log_c b \cdot \log_a c$  is

A. 0

B.  $\log abc$

C. 1

D. 10

**Answer: C**

 [Watch Video Solution](#)

16. If  $a = \log_{24} 12$ ,  $b = \log_{36} 24$ ,  $c = \log_{48} 36$ , then  $1 + abc$  is equal to

A.  $2ac$

B.  $2bc$

C.  $2ab$

D. none of these

**Answer: B**

 [Watch Video Solution](#)

17. If  $x^a = y$ ,  $y^b = z$ ,  $z^c = x$  then,  $abc =$

A.  $xyz$

B. 2

C. 1

D. 0

**Answer: C**



[Watch Video Solution](#)

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

A. 0

B. 1

C. 2

D. 3

**Answer: B**



**Watch Video Solution**

19. the value of  $(0.05)^{\log_{\sqrt{20}}(0.1 + 0.01 + 0.001 + \dots)}$

A. 81

B.  $\frac{1}{81}$

C. 20

D.  $\frac{1}{20}$

**Answer: A**



**Watch Video Solution**

20. The value of  $(0 \cdot 16)^{\log_{2.5}\left(\frac{1}{3} + \frac{1}{3^2} + \frac{1}{3^3} + \dots + \infty\right)}$  is

A. 4

B. 3

C. 2

D. none

**Answer: A**

 [Watch Video Solution](#)

21. Evaluate:  $81^{1/\log_5 3} + 27^{\log_9 36} + 3^{4/\log_t 9}$

A. 49

B. 625

C. 216

D. 890

**Answer: D**

 [Watch Video Solution](#)

22.  $7 \log\left(\frac{16}{15}\right) + 5 \log\left(\frac{25}{24}\right) + 3 \log\left(\frac{81}{80}\right)$  is equal to

A. 0

B. 1

C.  $\log 2$

D.  $\log 3$

**Answer: C**



[Watch Video Solution](#)

23.  $\log_{10} \tan 1^\circ + \log_{10} \tan 2^\circ + \dots + \log_{10} \tan 89^\circ =$

A. 0

B. 1

C. 2

D. 3

Answer: A

 [Watch Video Solution](#)

24. If  $n = 1983!$ , then the value of expression

$$\frac{1}{\log_2 n} + \frac{1}{\log_3 n} + \frac{1}{\log_4 n} + \dots + \frac{1}{\log_{1983} n}$$
 is equal to

A.  $-1$

B.  $0$

C.  $1$

D.  $2$

Answer: C

 [Watch Video Solution](#)

25.  $\frac{1}{\log_{xy} xyz} + \frac{1}{\log_{yz} xyz} + \frac{1}{\log_{zx} xyz} =$

A. 0

B. 1

C. 2

D.  $\log_x xyz$

**Answer: C**



**Watch Video Solution**

26. If  $\frac{1}{\log_a x} + \frac{1}{\log_c x} = \frac{2}{\log_b x}$  then a, b, c, are in

A. A.P.

B. G.P.

C. H.P.

D. none of these



**Answer: B**



[Watch Video Solution](#)

27. If  $a, b, c$ , are in G.P., then  $\log_a n, \log_b n, \log_c n$  are in

A. A.P.

B. G.P.

C. H.P.

D. None

**Answer: C**



[Watch Video Solution](#)

28. If  $x^{18} = y^{21} = z^{28}$  then  $3, 3\log_y x, 3\log_z y, 7\log_x z$  are in

A. A.P.

B. G.P.

C. H.P.

D. None

**Answer: A**



[Watch Video Solution](#)

29. If  $\frac{\log a}{b-c} = \frac{\log b}{c-a} = \frac{\log c}{a-b}$  then  $a^a \cdot b^b \cdot c^c =$

A. 1

B. 2

C. -1

D. none of these

**Answer: A**



[Watch Video Solution](#)

30. If  $\frac{\log x}{b-c} = \frac{\log y}{c-a} = \frac{\log z}{a-b}$ , then  $x^a \cdot y^b \cdot z^c =$

A. a

B. abc

C. xyz

D. none of these

**Answer: C**



**Watch Video Solution**

31. If a, b, c are distinct real number different from 1 such that

$$(\log_b a \cdot \log_c a - \log_a a) + (\log_a b \cdot \log_c b \cdot \log_c b - \log_b b) + (\log_a c \cdot \log_b c - \log_c c)$$

, then abc is equal to

A. 1

B. 2

C. 3

D. none

**Answer: A**



**Watch Video Solution**

32. If  $\frac{\log x}{b-c} = \frac{\log y}{c-a} = \frac{\log z}{a-b}$  then which of the following is true :

A.  $xyz = 1$

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

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

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

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



**Watch Video Solution**

33. If  $a^2 + 4b^2 = 12ab$ , then  $\log(a + 2b)$  is

A.  $\frac{1}{2}[\log a + \log b - \log 2]$

B.  $\log \frac{a}{2} + \log \frac{b}{2} + \log 2$

C.  $\frac{1}{2}[\log a + \log b + 4 \log 2]$

D.  $\frac{1}{2}[\log a - \log b + 4 \log 2]$

**Answer: C**

 [Watch Video Solution](#)

**34.** If  $\log_{10} 2 = 0.30103$ , then  $\log_{10} 50 =$

A. 2.30103

B. 2.69897

C. 1.69897

D. 0.69897

**Answer: C**

 [Watch Video Solution](#)

35. If  $\log_{10} 3 = 0.477$ , the number of digits in  $3^{40}$  is

A. 18

B. 19

C. 20

D. 21

**Answer: C**



[Watch Video Solution](#)

36. If  $\log_{10} 2 = 0.30103$ ,  $\log_{10} 3 = 0.47712$ , the number of digits in  $3^{12} \times 2^8$  is

A. 7

B. 8

C. 9

D. 10

**Answer: C**



**Watch Video Solution**

37. If  $x = \log_3 5$ ,  $y = \log_{17} 25$  which one of the following is correct ?

A.  $x < y$

B.  $x = y$

C.  $x > y$

D. none of these

**Answer: C**



**Watch Video Solution**

38. If  $\frac{1}{\log_3 \pi} + \frac{1}{\log_4 \pi} > x$ , then  $x$  be

A. 2

B. 3

C.  $3 \cdot 5$

D.  $\pi$

**Answer: A**

 [Watch Video Solution](#)

**39.** If  $x = \log_5(1000)$  and  $y = \log_7(2058)$ , then

A.  $x > y$

B.  $x < y$

C.  $x = y$

D. none

**Answer: A**

 [Watch Video Solution](#)



40. If  $\log_{12} 27 = a$  then  $\log_6 16$  has a value (i)  $3\left(\frac{4-a}{4+a}\right)$  (ii)  $\left(\frac{3-a}{3+a}\right)$   
(iii)  $4\left(\frac{3-a}{3+a}\right)$  (iv) none of these

A.  $2 \cdot \frac{3-a}{3+a}$

B.  $3 \cdot \frac{3-a}{3+a}$

C.  $4 \cdot \frac{3-a}{3+a}$

D. none of these

**Answer: C**



**Watch Video Solution**

41.  $\log \left\{ \log_{ab} a + \frac{1}{\log_b ab} \right\} =$

A. 0

B. 1

C.  $\log ab$

D. none of these

**Answer: A**

 [Watch Video Solution](#)

42. If  $\log_a(ab) = x$ , then  $\log_b(ab)$  is equal to

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

B.  $\frac{x}{1+x}$

C.  $\frac{x}{x-1}$

D.  $\frac{x}{1-x}$

**Answer: C**

 [Watch Video Solution](#)

43. If  $\log_2(a + b) + \log_2(c + d) \geq 4$ , then the minimum value of  $a+b+c+d$  is

- A. 2
- B. 4
- C. 6
- D. 8

**Answer: D**



[Watch Video Solution](#)

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

- A.  $(2, \infty)$
- B.  $(-2, -1)$
- C.  $(1, 2)$
- D. none

**Answer: A**



**Watch Video Solution**

45.  $x^{\log_9 x} > 9$  implies

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

B.  $x \in \left(0, \frac{1}{9}\right) \cup (9, \infty)$

C.  $x > 1$

D.  $x < 2$

**Answer: B**



**Watch Video Solution**

46. If  $\log_{1/\sqrt{2}}(x - 1) > 2$  then  $x$  lies in the interval

A.  $\left(\frac{3}{2}, \infty\right)$

B.  $\left(-\infty, \frac{3}{2}\right)$

C.  $\left(\frac{3}{2}, 1\right)$

D. none of these

**Answer: B**



**Watch Video Solution**

47. The domain of the function  $\sqrt{(\log_{0.5} x)}$  is

A.  $(1, \infty)$

B.  $(0, \infty)$

C.  $(0, 1)$

D.  $(0.5, 1)$

**Answer: C**



**Watch Video Solution**

48. The number  $\log_2 7$  is

- A. an integer
- B. a rational number
- C. an irrational number
- D. a prime number

**Answer: C**

 [Watch Video Solution](#)

### Problem Set 1 True And False

1. Verify :  $3^{\sqrt{(\log_3 7)}} = 7^{\sqrt{(\log_7 3)}}$

 [Watch Video Solution](#)

2. The value of  $\frac{1}{\log_2 \pi} + \frac{1}{\log_6 \pi}$  is greater than 2 .

 [Watch Video Solution](#)

3. Prove that  $\log_2 17 \cdot \log_{1/5} 2 \cdot \log_3 \frac{1}{5} > 2$

 [Watch Video Solution](#)

4. Given that  $\log_l x$ ,  $\log_m x$  and  $\log_n x$  are in arithmetic progression, then

$$n^2 = (\ln)^{\log_l m}$$

 [Watch Video Solution](#)

5.  $e^{\ln \ln 7} = 7$

(a) True (b) False

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

7. Prove that:  $2/5 < \log_{10} 3 < 1/2$

 [Watch Video Solution](#)

8. If  $\frac{\log x}{q-r} = \frac{\log y}{r-p} = \frac{\log z}{p-q}$ , then  $x^{q+r} \cdot y^{r+p} \cdot z^{p+q} = x^p \cdot y^q \cdot z^r$

 [Watch Video Solution](#)

9. If  $\frac{x(y+z-x)}{\log x} = \frac{y(z+x-y)}{\log y} = \frac{z(x+y-z)}{\log z}$  then  
 $x^y \cdot y^x = z^y \cdot y^z = x^z \cdot z^x$

 [Watch Video Solution](#)



10. Prove that  $\frac{\log_a n}{\log_{ab} n} = 1 + \log_a b$

 [Watch Video Solution](#)

11. If  $a^2 + b^2 = 7ab$ , then  $\log \frac{1}{3}(a + b) = \frac{1}{2}[\log a + \log b]$

 [Watch Video Solution](#)

### Problem Set 1 Fill In The Blanks

1. Which is greater  $\log_2 3$  or  $\log_{1/2} 5$ ....

 [Watch Video Solution](#)

2. Which is greater  $\log_4 5$  or  $\log_{\frac{1}{16}}(1/25)$ .... .

 [Watch Video Solution](#)

3. The value of  $\frac{1}{\log_2 n} + \frac{1}{\log_3 n} + \dots + \frac{1}{\log_{43} n}$  is .....

 [Watch Video Solution](#)

4. The value of  $\frac{\log_a x \cdot \log_b x}{\log_a x + \log_b x}$  is .....

 [Watch Video Solution](#)

5. The least value of the expression  $2 \log_{10} x - \log_x 0.01$  for  $x > 1$  is .....

 [Watch Video Solution](#)

6. The value of  $2 \log x + 2 \log x^2 + 2 \log x^3 + \dots$   $n$  terms ( $x > 0$ ) is .....

 [Watch Video Solution](#)

7. If  $\frac{\log a}{y - z} = \frac{\log b}{z - x} = \frac{\log c}{x - y}$  and  $a^{y^2 + yz + z^2} b^{z^2 + zx + x^2} c^{x^2 + xy + y^2} = \dots$



Watch Video Solution

8. If  $\frac{\log_2 x}{4} = \frac{\log_2 y}{6} = \frac{\log_2 z}{3k}$  and  $x^3 y^2 z = 1$ , then  $k = \dots$



Watch Video Solution

9. If  $\log \left\{ \frac{x+y}{3} \right\} = \frac{(\log x + \log y)}{2}$ , then  $\frac{x}{y} + \frac{y}{x} = \dots$



Watch Video Solution

## Problem Set 2 Multiple Choice Questions

1. The solution of the equation  $2^{3/\log_3 x} = 1/64$  is

A. 3

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

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

D. none

**Answer: C**



**Watch Video Solution**

2. The solution set of  $\log_2(3 - x) + \log_2(1 - x) = 3$  is

A.  $\{-1, 5\}$

B.  $\{-1\}$

C.  $\{5\}$

D.  $\phi$

**Answer: B**



**Watch Video Solution**

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

A. 3

B. 1

C. 2

D. 0

**Answer: B**

 [Watch Video Solution](#)

4. If  $x$  satisfies the inequality  $\log_{25} x^2 + (\log_5 x)^2 < 2$ , then  $x \in$

A.  $\left(\frac{1}{25}, 5\right)$

B.  $(1, 2)$

C.  $(4, 5)$

D.  $(0, 1)$

**Answer: A**

 [Watch Video Solution](#)

5. If  $\log_2 x \times \log_2 \frac{x}{16} + 4 = 0$ , then  $x =$

A. 4

B. -4

C.  $\frac{1}{4}$

D. 2

**Answer: A**



[Watch Video Solution](#)

6. If  $\log_{16} x + \log_4 x + \log_2 x = 14$ , then  $x =$

A. 16

B. 32

C. 64

D. none of these

**Answer: D**



[Watch Video Solution](#)

7. All the integral values of  $x$  for which  $7x - 3 > (x + 1)^2 > x + 3$  lie in the interval

A.  $[1, 2]$

B.  $[2, 3]$

C.  $[3, 4]$

D.  $(1, 4)$

**Answer: D**



[Watch Video Solution](#)

8. If  $\log_3 x \log_y 3 \log_2 y = 5$ , then  $x =$

A.  $3y^5$

B. 243

C. 32

D. none of these

**Answer: C**



[Watch Video Solution](#)

9. The equation  $\log_e x + \log_e (1 + x) = 0$  can be written as

A.  $x^2 + x - 1 = 0$

B.  $x^2 + x + 1 = 0$

C.  $x^2 + x - e = 0$

D.  $x^2 + x + e = 0$



**Answer: A**



[Watch Video Solution](#)

10. If  $2 \log_{16}(x^2 + x) - \log_4(x + 1) = 2$ , then  $x =$

A.  $-1$

B.  $16$

C.  $2$

D. none of these

**Answer: B**



[Watch Video Solution](#)

11. If  $2 \log(x + 1) - \log((x^2) - 1) = \log 2$ . Then  $x$  equals to :

A.  $1$

B. 0

C. 2

D. 3

**Answer: D**

 [Watch Video Solution](#)

12. If  $\log_2(a + b) + \log_2(c + d) \geq 4$ , then the minimum value of  $a+b+c+d$  is

A. 2

B. 4

C. 6

D. 8

**Answer: D**

 [Watch Video Solution](#)

13. If  $\log_x(3x^2 + 10x) = 3$ , then  $x =$

A. 0

B.  $-2$

C. 5

D. none

**Answer: C**



[Watch Video Solution](#)

14. The solution set of the equation  $\log_{1/5}(2x + 5) + \log_5(16 - x^2) \leq 1$

is

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

B.  $[-1, 4]$

C.  $[1, 4]$

D.  $\left[-\frac{5}{2}, 4\right]$

**Answer: B**

 [Watch Video Solution](#)

15. The number of solutions of the equation  $125^x + 45^x = 2.27^x$  is

A. 1

B. 2

C. 0

D. more than two

**Answer: A**

 [Watch Video Solution](#)

16. The number of solutions of  $\frac{\log 5 + \log(x^2 + 1)}{\log(x - 2)} = 2$  is

A. 1

B. 2

C. 3

D. none

**Answer: D**



**Watch Video Solution**

17. The value of ' $x$ ' satisfying the equation,

$$4^{(\log)_9 3} + 9^{(\log)_2 4} = 10^{(\log)_x 83} \text{ is } \underline{\hspace{2cm}}.$$

A. 3

B. 4

C. 2

D. 10

**Answer: D**

 [Watch Video Solution](#)

18. If  $5^{1+\log_4 x} + 5^{-\log_4 x - 1} = \frac{26}{5}$ , then  $x =$

A.  $4^0$

B.  $4^1$

C.  $4^{-1}$

D.  $4^{-2}$

**Answer: A::D**

 [Watch Video Solution](#)

19. The solution set of the equation  $x^{\log_x (1-x)^2} = 9$  is

A.  $\{-2, 4\}$

B.  $\{4\}$

C.  $\{0, -2, 4\}$

D. none of these

**Answer: B**



[Watch Video Solution](#)

20. If  $7^{\log_7(x^2 - 4x + 5)} = (x - 1)$ , then  $x$  may have values

A. (2, 3)

B. 7

C. (-2, -3)

D. (2, -3)

**Answer: A**



[Watch Video Solution](#)

21. Sum of the roots of the equation  $9^{\log_3(\log_2 x)} = \log_2 x - (\log_2 x)^2 + 1$  is equal to

- A. 2
- B. 4
- C. 6
- D. 8

**Answer: A**



[Watch Video Solution](#)

22. The equation  $5^{1+\log_5 \cos x} = 2 \cdot 5$  has

- A. no solution
- B. one solution
- C. two solutions
- D. infinite solutions



**Answer: D**



**Watch Video Solution**

23. If  $x^{\log_3 x^2 + (\log_3 x)^2 - 10} = 1/x^2$ , then  $x =$

A. 3

B. 9

C. 27

D. 81

**Answer: B**



**Watch Video Solution**

24. If  $x^{[(\log_2 x)^2 - 6 \log_2 x + 11]} = 64$ , then  $x =$

A. 2

B. 4

C. 8

D. 16

**Answer: A::B::C**



**Watch Video Solution**

25. If  $\log_3 2$ ,  $\log_3(2^x - 5)$  and  $\log_3(2^x - 7/2)$  are in arithmetic progression, then  $x =$

A. 2

B. 3

C. 4

D. none

**Answer: B**



**Watch Video Solution**

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

- A. at least one real solution
- B. exactly three real solutions
- C. exactly one irrational solution
- D. complex roots

**Answer: A::B::C**



**Watch Video Solution**

27. The value of  $x$  satisfying the equation  $|x - 1|^{\log_3 x^2 - 2 \log_x 9} = (x - 1)^7$

is

- A. 3
- B. 9
- C. 27

D. 81

**Answer: D**

 [Watch Video Solution](#)

28.  $\frac{6}{5} a^{\log_a x \log_{10} a \log_a 5} - 3^{\log_{10} (x/10)} = 9^{\log_{100} x + \log_4 2}$ , then  $x =$

A.  $10^0$

B.  $10^1$

C.  $10^2$

D. none

**Answer: C**

 [Watch Video Solution](#)

29. The equation  $x \left[ (\log_3 x)^2 - (9/2) \log_3 x + 5 \right] = 3\sqrt{3}$  has

- A. at least one real solution
- B. exactly three real solutions
- C. exactly one irrational solution
- D. none of these

**Answer: A::B::C**

 [Watch Video Solution](#)

**30.** The number of solutions the equation

$$|x + 1|^{\log_{x+1}(3+2x-x^2)} = (x - 3)|x| \text{ has is}$$

- A. only one
- B. two
- C. no
- D. more than two

**Answer: C**

 Watch Video Solution

31. The solution of the equation  $5^{\log_a x} + 5x^{\log_a 5} = 3$ , ( $a > 0$ ) is

A.  $a^{-\log_5 2}$

B.  $a^{\log_5 2}$

C.  $2^{-\log_5 a}$

D.  $2^{\log_5 a}$

Answer: A::C

 Watch Video Solution

32.  $\log_{10} x + \log_{10} x^{1/2} + \log_{10} x^{1/4} + \dots = y$  and

$$\frac{1 + 3 + 5 + \dots (2y - 1)}{4 + 7 + 10 + \dots (3y + 1)} = \frac{20}{7 \log_{10} x}, \text{ then } x =$$

A.  $10^5$

B.  $10^4$

C.  $10^3$

D.  $10^2$

**Answer: A**



[Watch Video Solution](#)

33.  $\log_{(2x+3)}(6x^2 + 23x + 21)$

$= 4 - \log_{(3x+7)}(4x^2 + 12x + 9)$ , then  $x =$

A.  $-4$

B.  $-2$

C.  $-1/4$

D.  $-4$

**Answer: C**



[Watch Video Solution](#)

34. The number of solutions of the equation

$$\log_{x-3}(x^3 - 3x^2 - 4x + 8) = 3 \text{ is equal to}$$

A. 4

B. 3

C. 2

D. 1

**Answer: D**



[Watch Video Solution](#)

35. Let  $[x]$  denote the greatest integer function. The number of solutions

of the equation  $x^2 - 3x + [x] = 0$  in  $[0, 3]$  is

A. 4

B. 3

C. 2



D. 1

**Answer: C**



**Watch Video Solution**

**36.** The roots of the equation  $\log_2(x^2 - 4x + 5) = (x - 2)$  are

A. 4, 5

B. 2, -3

C. 2, 3

D. 3, 5

**Answer: C**



**Watch Video Solution**

**37.** If  $x \log_{10}(10/3) + \log_{10} 3 = \log_{10}(2 + 3^x) + x$ , then  $x =$

A. 1

B. 0

C.  $-1$

D. 2

**Answer: B**



[Watch Video Solution](#)

**38.** If  $\log_y x + \log_x y = 2$ ,  $x^2 + y = 12$ , then the values of  $x, y$  are

A. (3, 3)

B. ( - 4, - 4)

C. (4, 8)

D. (1, 11)

**Answer: A**



[Watch Video Solution](#)

39. 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**



[Watch Video Solution](#)

40. If  $2^x - 2^{x-1} = 4$ , then  $x^x$  is equal to

A. 1

B. 27

C. 256

D. none of these

**Answer: B**



[Watch Video Solution](#)

41. If  $\log_2 xy = 5$ ,  $\log_{1/2}(x/y) = 1$ , then the values of  $x, y$  are

A. (4, 8)

B. (-4, 8)

C. (4, -8)

D. (-4, -8)

**Answer: A::B**



[Watch Video Solution](#)

42. 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**



**Watch Video Solution**

43. 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 by

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

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

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

D. none of these

**Answer: B::C**



[Watch Video Solution](#)

44. The number of real solutions of the equation

$$\log(-x) = 2\log(x+1) \text{ is}$$

A. none

B. one

C. two

D. three

**Answer: B**



[Watch Video Solution](#)

45. The equation  $\frac{x^2}{1 - |x - 2|} = 1$  has

- A. one real solution
- B. two real solutions
- C. three real solutions
- D. no real solution

**Answer: D**



**Watch Video Solution**

46. The equation  $\frac{x^2}{|x - 2|} = \left| \frac{2x}{x - 2} \right| + |x|$  has solutions whose number is

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

D.  $\infty$

**Answer: D**



[Watch Video Solution](#)

**47.** The roots of the equation  $|x^2 - x - 6| = x + 2$  are

A.  $-2, 1, 4$

B.  $0, 2, 4$

C.  $0, 1, 4$

D.  $-2, 2, 4$

**Answer: D**



[Watch Video Solution](#)

**48.** The set of all real numbers  $x$  for which  $x^2 - |x + 2| + x > 0$  is



A.  $(-\infty, -2) \cup (2, \infty)$

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

C.  $(-\infty, -1) \cup (1, \infty)$

D.  $(\sqrt{2}, \infty)$

**Answer: B**

 [Watch Video Solution](#)

**49.** The number of real roots of the equation  $|x|^2 - 3|x| + 2 = 0$ , is

A. 4

B. 3

C. 2

D. 1

**Answer: A**

 [Watch Video Solution](#)

50. The sum of the roots of equation  $(x - 4)^2 - 8|x - 4| + 15 = 0$  is

A.  $-8$

B.  $16$

C.  $8$

D.  $0$

**Answer: B**



[Watch Video Solution](#)

51. Root(s) of the equation  $9x^2 - 18|x| + 5 = 0$  belonging to the domain of definition of the function  $f(x) = \log(x^2 - x - 2)$ , is (are)

A.  $-\frac{5}{3}, -\frac{1}{3}$

B.  $\frac{5}{3}, \frac{1}{3}$

C.  $-\frac{5}{3}$

D.  $-\frac{1}{3}$

**Answer: C**



**Watch Video Solution**

52. The equation  $|x - x^2 - 1| = |2x - 3 - x^2|$  has

- A. one solution
- B. two solutions
- C. no solution
- D. infinite solutions

**Answer: A**



**Watch Video Solution**

53. The sum of the real roots of the equation  $|x - 2|^2 + |x - 2| - 2 = 0$  is

A. 2

B. 3

C. 4

D. 10

**Answer: C**



[Watch Video Solution](#)

54. The product of real roots of the equation

$$|3x - 4|^2 - 3|3x - 4| + 2 = 0 \text{ is}$$

A.  $\frac{10}{9}$

B.  $\frac{20}{9}$

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

D. none of these

**Answer: B**



[Watch Video Solution](#)

55. The equation  $\sqrt{x+1} - \sqrt{x-1} = \sqrt{4x-1}$  has a. no solution b. one solution c. two solution d. more than two solutions

A. no solution

B. one solution

C. two solutions

D. more than two solutions

**Answer: A**



[Watch Video Solution](#)

56. The number of the integer solutions of  $x^2 + 9 < (x + 3)^2 < 8x + 25$  is

- A. one
- B. two
- C. three
- D. none

**Answer: D**



[Watch Video Solution](#)

57. The solution set of the inequality  $\log_x \left( \frac{x + 3}{1 - 2x} \right) > 1$  is

- A.  $0 < x < \frac{1}{2}$
- B.  $x > 3$
- C. null set

D.  $\frac{1}{2} < x < 1$

**Answer: C**



**Watch Video Solution**

**58.** The least positive integer  $x$  satisfying  $|x + 1| + |x - 4| > 7$  is

A.  $x = 5$

B.  $x = 6$

C.  $x = 7$

D.  $x = 8$

**Answer: B**



**Watch Video Solution**

**59.** Solve  $\sqrt{x + 3 - 4\sqrt{x - 1}} + \sqrt{x + 8 - 6\sqrt{x - 1}} = 1$

- A. no solution
- B. one solution
- C. two solutions
- D. more than two solutions

**Answer: D**

 [Watch Video Solution](#)

**60.** The number of values of  $x$  satisfying

$$1 + \log_5(x^2 + 1) \geq \log_5(x^2 + 4x + 1) \text{ is}$$

- A. only one
- B. two
- C. three
- D. infinitely many

**Answer: D**





Watch Video Solution

61. The number of solutions the equation

$$|x + 1|^{\log_{x+1}(3+2x-x^2)} = (x - 3)|x| \text{ has is}$$

A. only one

B. two

C. no

D. more than two

Answer: C



Watch Video Solution

62. If  $\log_5\left(6 + \frac{2}{x}\right) + \log_{(1/5)}\left(1 + \frac{x}{10}\right) \leq 1$ , then  $x$  lies in

A.  $(1 - \sqrt{5}, 1)$

B.  $(1, 1 + \sqrt{5})$

C.  $(1 - \sqrt{5}, 1 + \sqrt{5})$

D.  $(-\infty, 1 - \sqrt{5}] \cup [1 + \sqrt{5}, \infty)$

**Answer: D**



**Watch Video Solution**

63. The quadratic equations  $\Sigma \frac{(x - q)(x - r)}{(p - q)(p - r)} - 1 = 0$  or  $\Sigma \frac{(x - q)(x - r)}{(p - q)(p - r)} p^2 - x^2 = 0$  have

A. two solutions

B. one solution

C. no solution

D. infinite solutions

**Answer: D**



**Watch Video Solution**

64. The number of solutions of the equation  $\sqrt[3]{(1+x)} + \sqrt[3]{(8-x)} = 3$  is equal to

- A. two
- B. one
- C. zero
- D. none of these

**Answer: A**



[Watch Video Solution](#)

65. The number of solutions of the equation  $2^x + 2^{x-1} + 2^{x-2} = 5^x + 5^{x-1} + 5^{x-2}$  is equal to

- A. 1
- B. 2
- C. 3

D. none of these

**Answer: A**



[Watch Video Solution](#)

66. The number of solutions of the equation  $2x^{\log_{10} x} + 3x^{\log_{10} (1/x)} = 5$

is

A. 1

B. 2

C. 3

D. none of these

**Answer: C**



[Watch Video Solution](#)

67. The system of equation  $|x - 1| + 3y = 4$ ,  $x - |y - 1| = 2$  has

- A. no solution
- B. a unique solution
- C. two solutions
- D. more than two solutions

**Answer: B**



[Watch Video Solution](#)

68. The roots of the equation  $2^{x+2}27^{x/(x-1)} = 9$  are given by

- A.  $1 - \log_2 3$ ,  $2$
- B.  $\log_2(2/3)$ ,  $1$
- C.  $2$ ,  $-2$
- D.  $-2$ ,  $1 - \frac{\log 3}{\log 2}$

**Answer: D**



**Watch Video Solution**

69. 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.  $\log 3 - \log 2$

**Answer: C::D**



**Watch Video Solution**

70. If  $(7 - 4\sqrt{3})^{x^2 - 4x + 3} + (7 + 4\sqrt{3})^{x^2 - 4x + 3} = 14$ , then the value of  $x$  is given by

A. 2

B.  $2 - \sqrt{2}$

C.  $2 + \sqrt{2}$

D. none of these

**Answer: A::B::C**

 [Watch Video Solution](#)

71. If  $(5 + 2\sqrt{6})^{x^2-3} + (5 - 2\sqrt{6})^{x^2-3} = 10$ , then  $x =$

A.  $\pm 2$

B.  $\pm \sqrt{2}$

C.  $\pm 2, \pm \sqrt{2}$

D.  $2, \sqrt{2}$

**Answer: C**

 [Watch Video Solution](#)

72. The roots of the equation  $(p + \sqrt{q})^{x^2 - 15} + (p - \sqrt{q})^{x^2 - 15} = 2p$ ,

where  $p^2 - q = 1$ , are

A.  $\pm 2, \pm \sqrt{3}$

B.  $\pm 4, \pm \sqrt{14}$

C.  $\pm 3, \pm \sqrt{5}$

D.  $\pm 6, \pm \sqrt{20}$

**Answer: B**

 [Watch Video Solution](#)

## Problem Set 2 True And False

1. Equations  $\log_2 x(x - 1) = 1$  and  $\log_2 x + \log_2(x - 1) = 1$

 [Watch Video Solution](#)



## Problem Set 2 Fill In The Blanks

1. The solution of the equation  $5x^{\log_2 3} + 3^{\log_2 x} = 162$  is

 [Watch Video Solution](#)

2. The value of  $a$  for which the equation  $\left(\sqrt{a + \sqrt{a^2 - 1}}\right)^x + \left(\sqrt{a - \sqrt{a^2 - 1}}\right)^x = 2a$  has only two solutions is .....

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

4. If  $\log_{10} \log_{10} \log_{10} x = 0$ , then  $x = \dots\dots$



 [Watch Video Solution](#)

5. If  $\log_{10} \left[ 98 + \sqrt{(x^3 - x^2 - 12x + 36)} \right] = 2$  and  $x$  is real then  $x = \dots$

 [Watch Video Solution](#)

6. If  $a > 0$ ,  $2\log_x a + \log_{ax} a + 3\log_{a^2x} a = 0$  then  $x =$

 [Watch Video Solution](#)

7. If  $\log_5 x + \log_x 5 = \frac{5}{2}$ , then  $x = \dots$

 [Watch Video Solution](#)

8. If  $5^{\log 10^x} = 50 - x^{\log_{10} 5}$ , then  $x = \dots$

 [Watch Video Solution](#)

9. If  $3^{x-1} + 5^{x-1} = 34$ , then  $x = \dots$

 [Watch Video Solution](#)

10. If  $\log_2 x + \log_4 y + \log_4 z = 2$ ,

$\log_3 y + \log_9 z + \log_9 x = 2$ ,

$\log_4 z + \log_{16} x + \log_{16} y = 2$ ,

then  $x = \dots\dots\dots$ ,  $y = \dots\dots\dots$  and  $z = \dots\dots\dots$

 [Watch Video Solution](#)

11. If  $x^{2/3} [(\log_2 x)^2 + \log_2 x - 5/4] = \sqrt{2}$ , then  $x = \dots\dots\dots$

 [Watch Video Solution](#)

12. The solution of  $\log_7 \log_5 \left( \sqrt{x+5} + \sqrt{x} \right) = 0$  is  $\dots\dots$

 [Watch Video Solution](#)

13. Solve  $|x^2 + 4x + 3| + 2x + 5 = 0$ .



Watch Video Solution

14. If  $(15 + 4\sqrt{14})^t + (15 - 4\sqrt{14})^t = 30$  where  $t = x^2 - 2|x|$ , then the value of  $x = \dots\dots\dots$



Watch Video Solution

### Problem Set 3 Multiple Choice Questions

1.  $16^{\log_4 5}$  equals

A. 5

B. 16

C. 25

D. none of these

**Answer: C**



[Watch Video Solution](#)

2.  $\ln ab - \ln|b| =$

A.  $\ln a$

B.  $\ln|a|$

C.  $-\ln a$

D. none of these

**Answer: B**



[Watch Video Solution](#)

3.  $e^{\ln \ln 7} = 7$

(a) True (b) False



[Watch Video Solution](#)

4. Verify :  $3^{\sqrt{(\log_3 7)}} = 7^{\sqrt{(\log_7 3)}}$

 [Watch Video Solution](#)

5.  $\log_5 5 \log_4 9 \log_3 2$  simplifies to

A. 2

B. 1

C. 5

D. none of these

**Answer: B**

 [Watch Video Solution](#)

6. The value of  $\frac{1}{\log_2 \pi} + \frac{1}{\log_6 \pi}$  is greater than 2 .

(a) True (b) False



Watch Video Solution

7. The value of  $\log_b a \cdot \log_c b \cdot \log_a c$  is

A. 0

B.  $\log abc$

C. 1

D. 10

Answer: C



Watch Video Solution

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

A. 0

B. 1

C. 2

D. 3

**Answer: B**



[Watch Video Solution](#)

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

A.  $(2, \infty)$

B.  $(-2, -1)$

C.  $(1, 2)$

D. none of these

**Answer: A**



[Watch Video Solution](#)



10. The equation  $\log_e x + \log_e(1 + x) = 0$  can be written as

A.  $x^1 + x - 1 = 0$

B.  $x^2 + x + 1 = 0$

C.  $x^2 + x - e = 0$

D.  $x^2 + x + e = 0$

**Answer: A**



**Watch Video Solution**

11. Which of the correct order for a given number  $\alpha$  in increasing order

A.  $\log_2 \alpha, \log_3 \alpha, \log_e \alpha, \log_{10} \alpha$

B.  $\log_{10} \alpha, \log_3 \alpha, \log_e \alpha, \log_2 \alpha$

C.  $\log_{10} \alpha, \log_2 \alpha, \log_e \alpha, \log_3 \alpha$

D.  $\log_3 \alpha, \log_e \alpha, \log_2 \alpha, \log_1 \alpha$

**Answer: B**



**Watch Video Solution**

12. If  $a^2 + 4b^2 = 12 ab$ , then  $\log(a + 2b)$  is

A.  $\frac{1}{2}(\log a + \log b - \log 2)$

B.  $\log \frac{a}{2} + \log \frac{b}{2} + \log 2$

C.  $\frac{1}{2}(\log a + \log b + 4 \log 2)$

D.  $\frac{1}{2}(\log a - \log b + 4 \log 2)$

**Answer: C**



**Watch Video Solution**

13. If  $\log_2(a + b) + \log_2(c + d) \geq 4$ , then the minimum value of  $a+b+c+d$  is

- A. 2
- B. 4
- C. 6
- D. 8

**Answer: D**



[Watch Video Solution](#)

14. If  $7^{(\log_7(x^2 - 4x + 5))} = x - 1$  then  $x$  may have values



[Watch Video Solution](#)

15. The value of

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

A. 4

B. 5

C. 0

D. 6

Answer: A



Watch Video Solution

## Problem Set 4

1. Take factors outside the radical sign

$$(i) \sqrt[3]{54(1 - \sqrt{5})^3} \quad (ii) \sqrt[5]{(5 - \sqrt{5})^7}$$

$$(iii) \sqrt{8\frac{8}{63}} \quad (iv) \sqrt{11\frac{11}{120}}$$



Watch Video Solution

2. Which of the given numbers is greatest ?

$$6\sqrt[3]{5}, \sqrt[3]{2}, 2\sqrt[3]{130}, \sqrt[3]{900}.$$



Watch Video Solution

3. Evaluate the expression

$$(i) 4x^3 + 2x^2 - 8x + 7 \text{ for } x = \frac{1}{2}(\sqrt{3} + 1)$$

$$(ii) 3x^2 + 4xy - 3y^2 \text{ for } x = \frac{\sqrt{5} + \sqrt{2}}{\sqrt{(5)} - \sqrt{(2)}}, y = \frac{\sqrt{5} - \sqrt{2}}{\sqrt{(5)} + \sqrt{(2)}}$$

$$(iii) x^2 + xy + y^2 \text{ for } x = \frac{\sqrt{3} - \sqrt{2}}{\sqrt{(3)} + \sqrt{(2)}}, y = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{(3)} - \sqrt{(2)}}.$$



Watch Video Solution

4. If  $x = \frac{2ab}{b^2 + 1}$  then value of  $\frac{\sqrt{a+x} + \sqrt{a-x}}{\sqrt{a+x} - \sqrt{a-x}}$  is



Watch Video Solution

5. If  $x = \frac{\sqrt{a+2b} + \sqrt{a-2b}}{\sqrt{a+2b} - \sqrt{a-2b}}$ , then find the value of  $bx^2 - ax + b$ .

 [Watch Video Solution](#)

6. Express as an equivalent fraction with rational denominator.

$$\frac{8\sqrt{3} - 3\sqrt{5}}{9\sqrt{(3)} - 4\sqrt{(5)}}$$

 [Watch Video Solution](#)

7. Express as an equivalent fraction with rational denominator.

$$\frac{11}{2 + \sqrt{(3)} + \sqrt{(5)}}$$

 [Watch Video Solution](#)

8. Express as an equivalent fraction with rational denominator.

$$\frac{\sqrt{10} + \sqrt{5} - \sqrt{3}}{\sqrt{(3)} + \sqrt{(10)} - \sqrt{(5)}}$$



 [Watch Video Solution](#)

9. Simplify 
$$\frac{(\sqrt{3} + \sqrt{5})(\sqrt{5} + \sqrt{2})}{\sqrt{2} + \sqrt{3} + \sqrt{5}}$$

 [Watch Video Solution](#)

10. Express as an equivalent fraction with rational denominator.

$$\frac{1}{2 - \sqrt{(2)} + \sqrt{(3)} - \sqrt{(6)}}$$

 [Watch Video Solution](#)

11. Express as an equivalent fraction with rational denominator.

$$\frac{1}{\sqrt{(10)} + \sqrt{(14)} + \sqrt{(15)} + \sqrt{(21)}}$$

 [Watch Video Solution](#)

12. Express as an equivalent fraction with rational denominator.

$$\frac{15}{\sqrt{(10)} + \sqrt{(20)} + \sqrt{(40)} - \sqrt{(5)} - \sqrt{(80)}}$$

Simplify

 [Watch Video Solution](#)

13. Express as an equivalent fraction with rational denominator.

$$(i) (3 + \sqrt{6}) (5\sqrt{(3)} + 2\sqrt{(12)} - \sqrt{(32)} - \sqrt{(50)})$$

$$(ii) \sqrt{\frac{6 + 2\sqrt{3}}{33 - 19\sqrt{(3)}}}$$

 [Watch Video Solution](#)

14. Express as an equivalent fraction with rational denominator.

$$\frac{\sqrt{2}(\sqrt{3} + 1)(2 - \sqrt{3})}{[\sqrt{(2)} - 1][3\sqrt{(3)} - 5][2 + \sqrt{(2)}]}$$

 [Watch Video Solution](#)



15. Express as an equivalent fraction with rational denominator.

$$\frac{[\sqrt{45} - \sqrt{20}] [\sqrt{12} + \sqrt{75}] \sqrt{3}}{\sqrt{(5)} + \sqrt{(180)}}$$



Watch Video Solution

16.  $\frac{12}{3 + \sqrt{5} + 2\sqrt{2}}$  is equal to

A.  $1 - \sqrt{5} + \sqrt{2} + \sqrt{10}$

B.  $1 + \sqrt{5} + \sqrt{2} - \sqrt{10}$

C.  $1 + \sqrt{5} - \sqrt{2} + \sqrt{10}$

D.  $1 - \sqrt{5} - \sqrt{2} + \sqrt{10}$

Answer: (b)



Watch Video Solution

17. Prove the following identities.

$$\frac{(a+2)^2(a-3) + (a^2-4)\sqrt{a^2-9}}{(a-2)^2(a+3) + (a^2-4)\sqrt{(a^2-9)}} = \frac{(a+2)\sqrt{a-3}}{(a-2)\sqrt{(a+3)}} \quad (a \geq 3).$$



Watch Video Solution

18. Prove the following identities.

$$\frac{n^3 - 3n + (n^2 - 1)\sqrt{n^2 - 4} - 2}{n^3 - 3n + (n^2 - 1)\sqrt{(n^2 - 4)} + 2} = \frac{(n+1)\sqrt{n-2}}{(n-1)\sqrt{(n+2)}}$$



Watch Video Solution

19. Express with rational denominator :

$$\frac{4}{\sqrt[3]{(9)} - \sqrt[3]{3} + 1}$$



Watch Video Solution

20. Express with rational denominator :

$$\frac{\sqrt{8} + \sqrt[3]{4}}{\sqrt{(8)} - \sqrt[3]{(4)}}$$



Watch Video Solution

21. Find the square root of

(A)  $8 + 2\sqrt{15}$ ,

(B)  $49 + 20\sqrt{6}$



Watch Video Solution

22. Find the square root of

(A)  $6 - \sqrt{35}$

(B)  $5\sqrt{6} + 12$ .



Watch Video Solution

23. Find the square root of

$$\sqrt{27} + \sqrt{15}.$$

 [Watch Video Solution](#)

24. Find the square root of

$$\sqrt{18} - \sqrt{16}.$$

 [Watch Video Solution](#)

25. Find the square root of

$$\sqrt{32} - \sqrt{24}.$$

 [Watch Video Solution](#)

26. Find the square root of

$$(i) \frac{2 + \sqrt{3}}{2}, (ii) 12 - \sqrt{68 + 48\sqrt{2}}.$$



Watch Video Solution

27. Find the square root of

$$2x - 1 + 2\sqrt{x^2 - x - 6}.$$



Watch Video Solution

28. Find the square root of

$$a + x + \sqrt{2ax + x^2}.$$



Watch Video Solution

29. Find the square root of

$$(i) \left(\frac{3}{2}\right)(x - 1) + \sqrt{2x^2 - 7x - 4}$$

$$(ii) 1 - x + \sqrt{22x - 15 - 8x^2}.$$



Watch Video Solution

30. Find the square root of

$$1 + a^2 + \sqrt{1 + a^2 + a^4}$$

 [Watch Video Solution](#)

31. Find the square root of

$$x + y + z + 2\sqrt{xz + yz}.$$

 [Watch Video Solution](#)

32. Show that the expression

$$\sqrt{2} \left[ 2x + \sqrt{(x^2 - y^2)} \right] \left[ \sqrt{x - \sqrt{(x^2 - y^2)}} \right] \text{ can be simplified to } \sqrt{(x + y)^3} - \sqrt{(x - y)^3}$$

 [Watch Video Solution](#)

33. Show that the square to  $(\sqrt{26 - 15}) / (5\sqrt{2} - \sqrt{38 - 5\sqrt{3}})$  is a rational number.



Watch Video Solution

34. Simplify the following to a rational number

$$\frac{[4 + \sqrt{15}]^{3/2} + [4 - \sqrt{15}]^{3/2}}{[6 + \sqrt{(35)}]^{3/2} - [6 - \sqrt{(35)}]^{3/2}}$$



Watch Video Solution

35. Simplify

(a)  $\sqrt{9 - 6a + a^2} + \sqrt{9 + 6a + a^2}$  if  $a < -3$ .

(b)  $\frac{1}{\sqrt{[x + 2\sqrt{(x-1)}]}} + \frac{1}{\sqrt{[x - 2\sqrt{(x-1)}]}}$  if  $1 < x < 2$ .



Watch Video Solution

36. Show that  $\frac{\sqrt{7}}{\sqrt{[16 + 6\sqrt{(7)}]} - \sqrt{[16 - 6\sqrt{(7)}]}}$  is a rational number.



Watch Video Solution

37. Express  $\frac{4 + 3\sqrt{3}}{[7 + 4\sqrt{(3)}]}$  in the form  $A + \sqrt{B}$ , where A and B are integers.

 [Watch Video Solution](#)

38. Evaluate  $(97 + 56\sqrt{3})^{1/4}$ .

 [Watch Video Solution](#)

39. Given  $\sqrt{5} = 2.23607$ , find the value of

$$\frac{10\sqrt{2}}{\sqrt{(18)} - \sqrt{[3 + \sqrt{(5)}]}} - \frac{\sqrt{10} + \sqrt{18}}{\sqrt{(8)} + \sqrt{[3 - \sqrt{(5)}]}}$$

 [Watch Video Solution](#)

40. If  $ax = \frac{2pq}{1 + q^2}$ , find the value of  $\frac{\sqrt{(p/a) + x} + \sqrt{(p/a) - x}}{\sqrt{[(p/a) + x]} - \sqrt{[(p/a) - x]}}$





Watch Video Solution

41. If  $x = a \left( \frac{m^2 + n^2}{2mn} \right)^{1/2}$ ,  $a, m, n > 0$ ,  $m > n$ , find the value of  $\left[ \frac{(x^2 + a^2)^{1/2} + (x^2 - a^2)^{1/2}}{(x^2 + a^2)^{1/2} - (x^2 - a^2)^{1/2}} \right]$



Watch Video Solution

42. If  $x = \frac{\sqrt{7} - \sqrt{5}}{\sqrt{(7)} + \sqrt{(5)}}$ ,  $y = \frac{\sqrt{7} + \sqrt{5}}{\sqrt{(7)} - \sqrt{(5)}}$  find the value of  $x^3 + y^3$ .



Watch Video Solution

43. If  $\sqrt{3} = 1.732$ , find the value of  $\frac{\sqrt{26 - 15\sqrt{(3)}}}{5\sqrt{(2)} - \sqrt{[38 + 5\sqrt{(3)}]}}$ .



View Text Solution

44. Find the square root of :  $21 - 4\sqrt{5} + 8\sqrt{3} - 4\sqrt{15}$ .

 [Watch Video Solution](#)

45. Find the square root of :  $5 - \sqrt{10} - \sqrt{15} + \sqrt{6}$ .

 [Watch Video Solution](#)

46. Square root of  $6 + \sqrt{12} - \sqrt{24} - \sqrt{8}$  is

 [Watch Video Solution](#)

47. Find the square root of :

$21 + 3\sqrt{8} - 6\sqrt{3} - 6\sqrt{7} - \sqrt{24} - \sqrt{56} + 2\sqrt{21}$ .

 [Watch Video Solution](#)

48. The value of  $\sqrt{6 + 2\sqrt{3} + 2\sqrt{2} + 2\sqrt{6}} - \frac{1}{\sqrt{5 - 2\sqrt{6}}}$  is

 [Watch Video Solution](#)

49. Prove that  $\sqrt{10 + \sqrt{(24)} + \sqrt{(40)} + \sqrt{(60)}} = \sqrt{2} + \sqrt{3} + \sqrt{5}$ .

 [Watch Video Solution](#)

50. Without extracting the roots, determine which is greater  $\sqrt{11} - \sqrt{5}$  or  $\sqrt{19} - \sqrt{13}$ .

 [Watch Video Solution](#)

51. Prove that for  $x \geq 1$ , the expression  $\sqrt{x + 2\sqrt{(x - 1)}} + \sqrt{x - 2\sqrt{(x - 1)}}$  is equal to 2 if  $x \leq 2$ , and to  $2\sqrt{x - 1}$  if  $x > 2$ .

 [Watch Video Solution](#)

52. Find the cube root of  $72 - 32\sqrt{5}$



Watch Video Solution

53. Find the real cube root of

$$99 - 70\sqrt{2}.$$



Watch Video Solution

54. Find the real cube root of

$$9\sqrt{3} + 11\sqrt{2}.$$



View Text Solution

55. Find the real cube root of

$$38\sqrt{14} - 100\sqrt{2}.$$



Watch Video Solution

56. If  $\sqrt[3]{3} = 1.732$ , find the value of  $(26 + 15\sqrt[3]{3})^{2/3} - (26 + 15\sqrt[3]{3})^{-2/3}$



Watch Video Solution

57. Prove (i)  $\sqrt[3]{20 + 14\sqrt{(2)}} + \sqrt[3]{20 - 14\sqrt{(2)}} = 4$

(ii)  $\left\{6 + \sqrt{\frac{847}{27}}\right\}^{1/3} + \left\{6 - \sqrt{\frac{847}{27}}\right\}^{1/3} = 3$



Watch Video Solution

58. Let  $u_n = \frac{1}{\sqrt{(5)}} \left[ \left( \frac{1 + \sqrt{5}}{2} \right)^n - \left( \frac{1 - \sqrt{5}}{2} \right)^n \right]$

( $n = 0, 1, 2, 3, \dots$ ), prove that  $u_{n+1} = u_n + u_{n-1}$  ( $n \geq 1$ ).



Watch Video Solution

59. If  $x = \left[ -\frac{q}{2} + \sqrt{\frac{q^2}{4} + \frac{p^3}{27}} \right]^{1/3} + \left[ -\frac{q}{2} - \sqrt{\frac{q^2}{4} + \frac{p^3}{27}} \right]^{1/3}$ ,

prove that  $x^3 + px + q = 0$ .

 [Watch Video Solution](#)

60. Prove that  $\sqrt[3]{2}$  cannot be expressed in the form  $p + \sqrt{q}$  where  $p$  and  $q$  are rational ( $q > 0$  and is not a perfect square).

 [Watch Video Solution](#)

61. Rationalize the denominator of

$$\frac{1}{\sqrt{(a)} + \sqrt{(b)} + \sqrt{(c)} + \sqrt{(d)} + \sqrt{(b')} + \sqrt{(c')}} \text{ if } \frac{a}{d} = \frac{b}{b'} = \frac{c}{c'}.$$

 [Watch Video Solution](#)

62. If  $\frac{A}{a} = \frac{B}{b} = \frac{C}{c} = \frac{D}{d}$  then prove that

$$\sqrt{Aa} + \sqrt{Bb} + \sqrt{Cc} + \sqrt{Dd} = \sqrt{(a + b + c + d)(A + B + C + D)}$$

 [Watch Video Solution](#)

### Problem Set 5 Multiple Choice Questions

1.  $\sqrt{3 + \sqrt{5}}$  is equal to

A.  $\sqrt{5} + 1$

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

C.  $\frac{\sqrt{5} + 1}{\sqrt{2}}$

D.  $(\sqrt{5} + 1)(2)$

**Answer: C**

 [Watch Video Solution](#)

2.  $\sqrt{10 + \sqrt{(24)} + \sqrt{(40)} + \sqrt{(60)}}$  is equal to

A.  $\sqrt{2} + \sqrt{3} - \sqrt{5}$

B.  $\sqrt{2} + \sqrt{3} + \sqrt{5}$

C.  $\sqrt{2} - \sqrt{3} + \sqrt{5}$

D.  $2 + \sqrt{3} + \sqrt{5}$

**Answer: B**

 [Watch Video Solution](#)

3.  $\sqrt[3]{20 + 14\sqrt{2}} + \sqrt[3]{20 - 14\sqrt{2}} = 4$ . (a) true (b) false

 [Watch Video Solution](#)

4. Differentiate  $\sqrt{x^2 - \sqrt{(x^2 - 4)}}$

 [Watch Video Solution](#)



5. If  $p = \sqrt{7} - \sqrt{5}$  and  $q = \sqrt{13} - \sqrt{11}$ , then

A.  $p > q$

B.  $p < q$

C.  $p = q$

D. none of these

**Answer: A**



[Watch Video Solution](#)

6. If  $x = 2 + 2^{2/3} + 2^{2/3}$ , then the value of  $x^3 - 6^2 + 6x$  is 3 b. 2 c. 1 d.

-2

A. 3

B. 2

C. 1

D. none of these

**Answer: B**

 [Watch Video Solution](#)

7.  $\frac{12}{3 + \sqrt{5} + 2\sqrt{2}}$  is equal to

A.  $1 - \sqrt{5} + \sqrt{2} + \sqrt{10}$

B.  $1 + \sqrt{5} + \sqrt{2} - \sqrt{10}$

C.  $1 + \sqrt{5} - \sqrt{2} + \sqrt{10}$

D.  $1 - \sqrt{5} - \sqrt{2} + \sqrt{10}$

**Answer: B**

 [Watch Video Solution](#)

8. If  $\sqrt{5} = 2.236$  and  $\sqrt{10} = 3.162$ , then the value of

$\frac{15}{\sqrt{10} + \sqrt{20} + \sqrt{40} - \sqrt{5} - \sqrt{80}}$  is

A.  $\sqrt{5}(5 + \sqrt{2})$

B.  $\sqrt{5}(2 + \sqrt{2})$

C.  $\sqrt{5}(1 + \sqrt{2})$

D.  $\sqrt{5}(3 + \sqrt{2})$

**Answer: C**

 [Watch Video Solution](#)

9.  $\sqrt[3]{\sqrt{2}-1} = \sqrt[3]{\frac{1}{9}} - \sqrt[3]{\frac{2}{9}} + \sqrt[3]{\frac{4}{9}}$ .

(a) true (b) false

 [View Text Solution](#)

10. The difference

$\sqrt{|40\sqrt{2} - 57|} - \sqrt{40\sqrt{2} + 57}$  is an integer.

(a) true (b) false

 [View Text Solution](#)

## Self Assessment Test

1. What is logarithm of 3245 to the base  $2\sqrt{2}$ ?

A. 3.6

B. 4.6

C. 5

D. 5.6

**Answer: A**



Watch Video Solution

2. If  $\log_7 2 = m$  then  $\log_{49} 28$  is equal to

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

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

C.  $2(1 + 2m)$

D.  $(1 + m)$

**Answer: B**

 [Watch Video Solution](#)

3. Let  $(x_0, y_0)$  be the solution of the following equations:

$(2x)^{1n2} = (3y)^{1n3} \quad 3^{1nx} = 2^{1ny}$  The  $x_0$  is  $\frac{1}{6}$  (b)  $\frac{1}{3}$  (c)  $\frac{1}{2}$  (d) 6

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

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

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

D. 6

**Answer: C**

 [Watch Video Solution](#)

4. If  $A = \log_2 \log_4 256 + 2 \log_{\sqrt{2}} .2$ , then A is equal to

A. 2

B. 4

C. 5

D. 6

**Answer: C**



[Watch Video Solution](#)

5. The value of  $\left( \frac{1}{\log_3 12} + \frac{1}{\log_4 12} \right)$  is

A. 2

B. 0

C. 1

D. 2

**Answer: C**



**Watch Video Solution**

6. If  $\frac{\log x}{b - c} = \frac{\log y}{c - a} = \frac{\log z}{a - b}$ . Then which of the following is true

A.  $xyz = 1$

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

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

D. all are true

**Answer: D**



**Watch Video Solution**

7.1 If  $\log_3 x + \log_3 y = 2 + \log_3 2$  and  $\log_3(x + y) = 2$  Then

A.  $x = 1, y = 8$

B.  $x = 9, y = 3$

C.  $x = 3, y = 6$

D. none of these

**Answer: C**



**Watch Video Solution**

8. The value of  $\frac{\log_3 5 \times \log_{25} 27 \times \log_{49} 7}{\log_{81} 3}$  is

A. 2

B. 1

C. 6

D. 3

**Answer: D**



**Watch Video Solution**



9. In a right angled triangle the sides are  $a, b$  and  $c$  with  $c$  hypotenuse and

$x - b \neq 1$ ,  $c + b \neq 1$ . Then the value of

$(\log_{c+b} a + \log_{c-b} a) / 2 \log_{c+b} a \times \log_{c-a} a$  will be

A. 2

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

C. -1

D. 1

**Answer: D**



[Watch Video Solution](#)

10. The value of  $\log_3 4 \cdot \log_4 5 \cdot \log_5 6 \cdot \log_6 7 \cdot \log_7 8 \cdot \log_8 9$  is

A. 3

B. 2

C. 4

Answer: B

 Watch Video Solution

## Miscellaneous Exercise

### List-A

- (a) The number of solutions of the equation  $\log_4 (x-1) = \log_2 (x-3)$  is
- (b) If  $4^{\log_9 3} + 9^{\log_2 4} = \log^{\log_x 83}$ , then  $x =$

### List-B

1. only one
2.  $\pm 2 \pm \sqrt{2}$

1.

(c) If  $\log_{10} \left[ \frac{1}{2^x + x - 1} \right] = x [\log_{10} 5 - 1]$ , then  $x =$

3. 1

(d) The sum of the roots of the equation  $(x-4)^2 + 8|x-4| + 15 = 0$  is

4. 10

(e) If  $x \in R$ , then the roots of the equation

$$(5 + 2\sqrt{6})x^2 - 3 + (5 - 2\sqrt{6})x^2 - 1 = 10$$
 are ...

5. 16

 View Text Solution

## 2. Match the following List-A to List-B

### List-A

- (a)  $x^2 - 6x + 9 > 0 \Rightarrow x \in$
- (b)  $x^2 - 3x - 4 < 0 \Rightarrow x \in$
- (c)  $2x^2 - 6x + 9 > 0 \Rightarrow x \in$
- (d)  $-3x^2 + 4x - 5 > 0 \Rightarrow x \in$

### List-B

1.  $(-1, 4)$
2.  $\phi$
3.  $R - \{3\}$
4.  $R$



Watch Video Solution

### 3. Match the following List-A to List-B

- | List-A                                                                            | List-B |
|-----------------------------------------------------------------------------------|--------|
| (a) $\log_2 \log_2 \log_4 256 + 2 \log_{\sqrt{2}} 2$                              | 1. 2   |
| (b) $\frac{1}{\log_{xy} xyz} + \frac{1}{\log_{yz} xyz} + \frac{1}{\log_{zx} xyz}$ | 2. 890 |
| (c) If $\frac{1}{\log_3 \pi} + \frac{1}{\log_4 \pi} > x$ , then $x =$             | 3. 5   |
| (d) $81^{1/\log_3 3} + 27^{\log_3 36} + 3^{4/\log_3 9}$                           | 4. 2   |



Watch Video Solution