

Logarithm

1. Logarithm

Q1. The set $\{x : |1 - \log_{1/5} x| + 2 = |3 - \log_{1/5} x|\}$ is equal to

- (A) $(0, \infty)$
- (B) $[1/5, \infty)$
- (C) $[1/5, 5]$
- (D) $(0, 1/5]$

Correct Answer: **(B)**

Level: **Easy**

Tagging: **Evaluating**

Q2. If $\log_5 2$, $\log_5 (2^x + 1)$ and $\log_5 (2^x + 5/2)$ are in A.P. then

- (A) $x < 0$
- (B) $x > 1$
- (C) $x = 1$
- (D) $x \leq 2$

Correct Answer: **(C)**

Level: **Easy**

Tagging: **Applying**

Q3. If $0.3 < \log_{10} 2 < 0.30103$, then number of digits in 2^{100} cannot exceed

- (A) 31
- (B) 32
- (C) 33
- (D) 100

Correct Answer: **(A)**

Level: **Easy**

Tagging: **Evaluating**

Q4. If $\frac{\log x}{b-c} = \frac{\log y}{c-a} = \frac{\log z}{a-b}$ then which of the following are true

- (A) $xyz = 1$
- (B) $x^a y^b z^c = 1$
- (C) $x^{b+c} y^{c+a} z^{a+b} = 1$
- (D) $xyz = x^a y^b z^c$

Correct Answer: ()

Level: **Easy**

Tagging:

An equation of the form

$$2n \log_a f(x) = \log_a g(x), a > 0, a \neq 1, n \in \mathbf{N}$$

is equivalent to the system

$$f(x) > 0 \text{ and } f(x)^{2n} = g(x).$$

Solution set of the equation

$$\log(8 - 10x - 12x^2) = 3 \log(2x - 1) \text{ is}$$

Q5.

- (A) $\{1\}$
- (B) $\{3, 2\}$
- (C) $\{5\}$
- (D) \emptyset

Correct Answer: (D)

Level: **Easy**

Tagging: **Evaluating**

Q6. If $\log_3 x + \log_3 y = 2 + \log_3 2$ and $\log_3(x + y) = 2$ then

- (A) $x = 1, y = 8$
- (B) $x = 8, y = 1$
- (C) $x = 3, y = 6$
- (D) $x = 9, y = 3$

Correct Answer: (C)

Level: **Easy**

Tagging: **Evaluating**

Find the value of x which satisfies the equation

Q7. $\log(x + 5) - \log(3x + 25) = \log(x - 15) - \log 17$

- (A) 20
- (B) 50
- (C) 30
- (D) 40

Correct Answer: (A)

Level: **Moderate**

Tagging: **Evaluating**

Find $-4x$, if x satisfies

Q8. $\log_{1-x}(3) - \log_{1-x}(2) = 1/2$

- (A) 3
- (B) 5
- (C) 2

(D) 4

Correct Answer: **(B)**

Level: **Moderate**

Tagging: **Evaluating**

Solution set of

- (a) $\log_4 x - \log_2 y = 0$ and $x^2 - 5y^2 + 4 = 0$ (p) $\{(4, 4)\}$
(b) $\log_y x + \log_x y = 2.5$ and $xy = 27$ (q) $\{(1, 1), (4, 2)\}$
(c) $\log_2(x^2 + y^2) = 5$ and $2 \log_4 x + \log_2 y = 4$ (r) $\{(3, 9), (9, 3)\}$
(d) $\log_4 x + \log_4 y = 2$ and $\log_2 x (x + y) = 3$ (s) $\{(4, 8), (8, 4)\}$

Q9.

- (A) a - q, b - r, c - p, d - p
(B) a - p, b - r, c - s, d - q
(C) a - r, b - q, c - s, d - s
(D) a - q, b - p, c - s, d - r

Correct Answer: **(A)**

Level: **Moderate**

Tagging: **Evaluating**

Q10. If $\log_{30} 3 = c$, $\log_{30} 5 = d$ then the value of $\log_{30} 8$

- (A) $2(1 - c - d)$
(B) $3(1 + c + d)$
(C) $3(1 + c - d)$
(D) $3(1 - c - d)$

Correct Answer: **(D)**

Level: **Moderate**

Tagging: **Applying**

Q11. If $a = \log_{12} 18$, $b = \log_{24} 54$ then the value of $ab + 5(a - b)$ is

- (A) 0
(B) 4
(C) 1
(D) none of these

Correct Answer: **(C)**

Level: **Moderate**

Tagging: **Evaluating**

The set of all values of x satisfying

Q12. $x^{\log_x(1-x)^2} = 9$ is

- (A) a subset of \mathbf{R} containing \mathbf{N}
- (B) a subset of \mathbf{R} containing \mathbf{I}
- (C) is a finite set containing at least two elements
- (D) a finite set.

Correct Answer: **(D)**

Level: **Moderate**

Tagging: **Applying**

If $\log_2 (3^{2x-2} + 7) = 2 + \log_2 (3^{x-1} + 1)$ then x equals

- Q13. (a) 0 (b) 1
 (c) 2 (d) none of these

- (A) a,b
- (B) a,c,d
- (C) b,c
- (D) b,c,d

Correct Answer: **(C)**

Level: **Moderate**

Tagging: **Evaluating**

An equation of the form

$$2n \log_a f(x) = \log_a g(x), \quad a > 0, \quad a \neq 1, \quad n \in \mathbf{N}$$

is equivalent to the system

$$f(x) > 0 \text{ and } f(x)^{2n} = g(x).$$

Q14. The number of solutions of $\log (2x) = 2 \log (4x - 15)$ is

- (A) 1
- (B) 2
- (C) 3
- (D) infinite

Correct Answer: **(A)**

Level: **Moderate**

Tagging: **Evaluating**

Solution of $\log_{x^2+6x+8} \log_{2x^2+2x+3} (x^2 - 2x) = 0$ is

- Q15. (a) a natural number (b) a negative integer
 (c) -1 (d) none of these

- (A) a,c
- (B) b,c
- (C) a,c,d
- (D) None

Correct Answer: **(B)**

Level: **Moderate**

Tagging: **Applying**

The set of all solutions of the equation

$$\log_3 x \log_4 x \log_5 x = \log_3 x \log_4 x + \log_4 x \log_5 x + \log_5 x \log_3 x \text{ is}$$

Q16.

- (A) $\{1\}$
- (B) $\{1, 60\}$
- (C) $\{1, 5, 10, 60\}$
- (D) none of these

Correct Answer: **(B)**

Level: **Moderate**

Tagging: **Evaluating**

An equation of the form

$$2n \log_a f(x) = \log_a g(x), a > 0, a \neq 1, n \in \mathbf{N}$$

is equivalent to the system

$$f(x) > 0 \text{ and } f(x)^{2n} = g(x).$$

Solution set of the equation $\log x = \frac{1}{2} \log (x+1)$ is

Q17.

- (A) $\left\{ \frac{1}{2} (\sqrt{5} - 1) \right\}$
- (B) $\left\{ \frac{1}{2} (\sqrt{5} + 1) \right\}$
- (C) $\left\{ \frac{1}{2}, \frac{1}{3} \right\}$
- (D) $\left\{ \frac{1}{2} (\sqrt{5} + \sqrt{7}) \right\}$

Correct Answer: **(B)**

Level: **Moderate**

Tagging: **Evaluating**

Solution set of

$$(a) \log_{0.6} \left(\log_6 \frac{x^2 + x}{x + 4} \right) < 0 \quad (p) [0, 1/3) \cup (3, 10/3]$$

$$(b) \frac{1}{5} \log_{1/25} \left(x^2 - \frac{10}{3}x + 1 \right) \leq 1 \quad (q) (-2, 1) \cup (2, \infty)$$

$$(c) \log_{x^2} (2 + x) < 1 \quad (r) (-4, -3) \cup (8, \infty) - \{-1, 0, 1\}$$

$$(d) \log_{10} \left| \frac{x-1}{2x+1} \right| < 0 \quad (s) (-\infty, -2) \cup (0, 1)$$

$$\cup (1, \infty)$$

Q18.

- (A) a - p, b - r, c - r, d - r
 (B) a - p, b - q, c - r, d - s
 (C) a - q, b - p, c - r, d - s
 (D) a - r, b - p, c - q, d - s

Correct Answer: **(D)**

Level: **Moderate**

Tagging: **Evaluating**

If x satisfies

$$\log_2 (9^{x-1} + 7) = 2 + \log_2 (3^{x-1} + 1)$$

then

Q19.

- (A) $x \in \mathcal{Q}$
 (B) $x \in \{x \in \mathcal{Q} : x < 0\}$
 (C) $x \in \mathbf{N}$
 (D) $x \in \mathbf{N}_e$ (set of even natural numbers)

Correct Answer: **()**

Level: **Moderate**

Tagging: **Evaluating**

If a, b, c are consecutive positive integers and

Q20. $\log (1 + ac) = 2K$ then the value of K is

- (A) $\log b$
 (B) $\log a$
 (C) 2
 (D) 1

Correct Answer: **(A)**

Level: **Moderate**

Tagging: **Evaluating**

Q21. If $x^{(\log_2 x)^2 - 6 \log_2 x + 11} = 64$ then x is equal to

- (A) 2
- (B) 4
- (C) 8
- (D) 16

Correct Answer: ()

Level: **Moderate**

Tagging: **Evaluating**

Q22. If $\frac{\log_2 (4x^2 - x - 1)}{\log_2 (x^2 + 1)} > 1$ then x lies in the interval

- (A) $(-\infty, -2/3)$
- (B) $(1, \infty)$
- (C) $(-2/3, 0)$
- (D) none of these

Correct Answer: ()

Level: **Moderate**

Tagging: **Evaluating**

An equation of the form

$$2n \log_a f(x) = \log_a g(x), \quad a > 0, \quad a \neq 1, \quad n \in \mathbf{N}$$

is equivalent to the system

$$f(x) > 0 \text{ and } f(x)^{2n} = g(x).$$

Solution set of

$$\frac{1}{2} \log_3 (x+1) - \log_9 (1-x) = \log_9 (2x+3) \quad \text{is}$$

Q23.

- (A) $\left\{ \frac{1}{2}(\sqrt{5} - 1) \right\}$
- (B) $\left\{ \frac{1}{2}(\sqrt{5} + 1) \right\}$
- (C) $\left\{ \frac{1}{2}, \frac{1}{3} \right\}$
- (D) none of these

Correct Answer: (A)

Level: **Moderate**

Tagging: **Applying**

If $\log_a bc = x$, $\log_b ca = y$, $\log_c ab = z$ then the value

of $\frac{1}{x+1} + \frac{1}{y+1} + \frac{1}{z+1}$ is

Q24.

- (A) 1
- (B) 2
- (C) 3
- (D) 0

Correct Answer: **(A)**

Level: **Moderate**

Tagging: **Applying**

Find the value of x which satisfy the equation

Q25. $\log_2 (x^2 - 3) - \log_2 (6x - 10) + 1 = 0$

- (A) 2
- (B) 4
- (C) 1
- (D) 3

Correct Answer: **(A)**

Level: **Moderate**

Tagging: **Evaluating**

Find the value of x which satisfy the equation

Q26. $3^{\log_5 (x-7)} = \log_5 (125)$

- (A) 12
- (B) 24
- (C) 10
- (D) 6

Correct Answer: **(A)**

Level: **Moderate**

Tagging: **Evaluating**

Find the value of x which satisfies

Q27. $\log_{x+1} (x^2 - 3x + 1) = 1$

- (A) 3
- (B) 2
- (C) 4
- (D) 1

Correct Answer: **(C)**

Level: **Moderate**

Tagging: **Applying**

An equation of the form

$$2n \log_a f(x) = \log_a g(x), \quad a > 0, \quad a \neq 1, \quad n \in \mathbf{N}$$

is equivalent to the system

$$f(x) > 0 \text{ and } f(x)^{2n} = g(x).$$

Solution set of the equation

Q28. $\log_{10}(x-9) + 2 \log_{10} \sqrt{2x-1} = 2$ is

- (A) $\{1\}$
- (B) $\{13\}$
- (C) $\{1/2\}$
- (D) \emptyset

Correct Answer: **(B)**

Level: **Moderate**

Tagging: **Applying**

$x^{\log_5 x} > 5$ implies

- Q29. (a) $x \in (0, \infty)$ (b) $x \in (0, 1/5) \cup (5, \infty)$
 (c) $x \in (1, \infty)$ (d) $x \in (1, 2)$

- (A) b
- (B) c,d
- (C) a,b
- (D) a,b,d

Correct Answer: **(A)**

Level: **Moderate**

Tagging: **Applying**

If $\log x^2 - \log 2x = 3 \log 3 - \log 6$ then x equals

- Q30. (a) 9 (b) 3 (c) 4 (d) 5

- (A) a,c
- (B) b
- (C) a
- (D) d

Correct Answer: **(C)**

Level: **Moderate**

Tagging: **Evaluating**