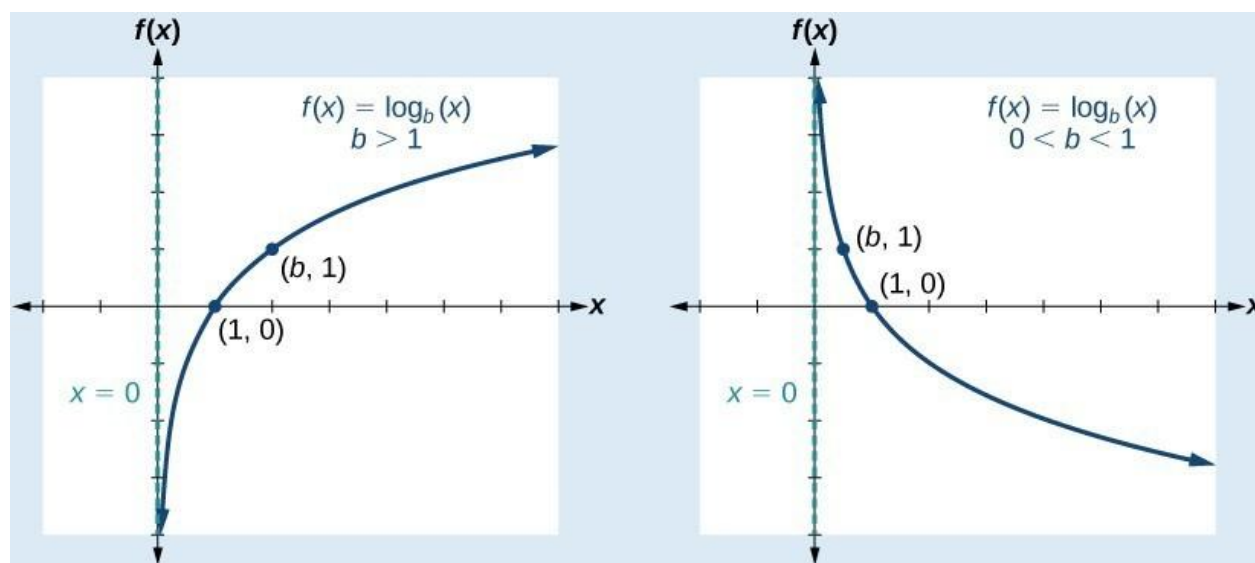


- *1. $\log_a x > 0 \Leftrightarrow (x > 1, a > 1) \text{ or } (0 < x < 1, 0 < a < 1)$
2. $\log_a x < 0 \Leftrightarrow (x > 1, 0 < a < 1) \text{ or } (0 < x < 1, a > 1)$
3. If $a > 1$ then $x > y \Leftrightarrow \log_a x > \log_a y$
4. If $0 < a < 1$ then $x > y \Leftrightarrow \log_a x < \log_a y$
5. If $a > 1$ then $x > a \Leftrightarrow \log_a x > 1$
6. If $0 < a < 1$ then $x > a \Leftrightarrow 0 < \log_a x < 1$
7. If $a > 1$ and $\log_a x > m$ then $x > a^m$
8. If $0 < a < 1$ and $\log_a x > m$ then $x < a^m$

Graph of logarithmic function:

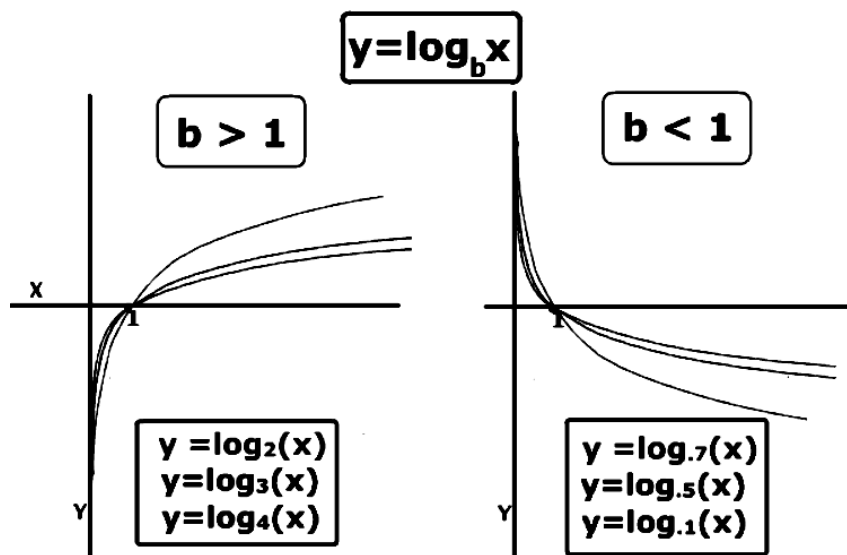
i) $b > 1$

ii) $0 < b < 1$



iii) Different bases (all > 1)

iv) Different bases (all < 1)



CPP:

1. Solve for x, $\log_{10} \sqrt{5-x} + \log_{10} 2 = \log_{10} (x+3)$
2. Solve for x, $5\sqrt{\log_2 x} + 2\log_2 \left(\frac{1}{\sqrt{x}}\right) = 6$
3. Solve for x, $x + \log_{10} (1+2^x) = x\log_{10} 5 + \log_{10} 6$
4. Simplify: $\log_{10} \left[1 - \left\{ 1 - (1-x^2)^{-1} \right\}^{-1} \right]^{-\frac{1}{2}}$
5. Solve for x, $10 + 6\log_2 (x-2) = 2^4$
6. Solve for x, $x^{1-\frac{3}{2}\log x^2} = \frac{1}{\sqrt[3]{100}}$
7. Solve the simultaneous equations
 $\log_9 x - \log_3 y = 0$ and $x^2 - 14y^2 = 32$
8. Solve the simultaneous equations
 $3(\log_y x + \log_x y) = 10$ and $xy = 16$
9. If $\log_{12} m = a$, $\log_{18} m = b$ then find the value of $\frac{a-2b}{b-2a}$
10. If $\frac{\log x}{\ell+m-2n} = \frac{\log y}{m+n-2\ell} = \frac{\log z}{n+\ell-2m}$ then find the value of xyz
11. Find the value of $\log_{729} \left(9^{\frac{5}{2} + \frac{7}{2}} \right) + \log_{729} \left(27^{\frac{9}{3} + \frac{11}{3} + \frac{13}{3}} \right) + \log_{729} \left(81^{\frac{15}{4} + \frac{17}{4} + \frac{19}{4} + \frac{21}{4}} \right) + \log_{729} \left(243^{\frac{23}{5} + \frac{25}{5} + \frac{27}{5} + \frac{29}{5} + \frac{31}{5}} \right)$
12. Find the value x, if $\log_e 2 \log_x 625 = \log_{10} 16 \log_e 10$
13. Solve for x, $\log \left(\frac{4x+5}{6-5x} \right) < -1$
14. Solve for x, $\log_{0.2} \left(\frac{x+2}{x} \right) \leq 1$
15. Solve for x, $\log_{10} (x^2 - 16) \leq \log_{10} (4x - 11)$
16. Solve for x, $\log_{1/5} (2x^2 + 5x + 1) < 0$
17. Solve for x, $\log_{1/2} (x+1) > \log_2 (2-x)$
18. Solve for x, $(\log 100x)^2 + (\log 10x)^2 + \log x \leq 14$

Objective Type Questions:

19. The value of x satisfying $\log_3 (5x-2) - 2\log_3 \sqrt{3x+1} = 1 - \log_3 4$
(A) 2 (B) 1 (C) 3 (D) 4
20. If $S = \{x \in \mathbb{R} : (\log_{0.6} 0.216)\log_5 (5-2x) \leq 0\}$ then S is equal to
(A) [2.5, ∞) (B) [2, 2.5) (C) (2, 2.5) (D) (0, 2.5)
21. If $\frac{1}{\log_2 \pi} + \frac{1}{\log_6 \pi} > x$, x is
(A) 2 (B) 3 (C) 1 (D) 3

22. If $|1 - \log_{1/5} x| + 2 = |3 - \log_{1/5} x|$, x is
 (A) 2 (B) 5 (C) 1 (D) 3
23. If $\log_x 2 + \log_{(x^2)} 2 > 1$, then x lies
 (A) $(1, 2\sqrt{2})$ (B) $(2\sqrt{2}, \infty)$ (C) $(2, \infty) - \{2\sqrt{2}\}$ (D) $(2\sqrt{2}, 5)$
24. If $[\log_{10} x] = 1$ then x lies in
 (A) $[10, 100)$ (B) $(10, 20)$ (C) $(100, \infty)$ (D) None of these
25. If $0.3 < \log_{10} 2 < 0.30103$, then number of digits in 2^{100} cannot exceed
 (A) 30 (B) 31 (C) 32 (D) 33
26. The solution set of $\log_x \left(\frac{15}{1-2x} \right) < -2$ is
 (A) $\left(\frac{1}{2}, \infty \right)$ (B) $\left(\frac{1}{2}, 5 \right)$ (C) $\left(\frac{1}{5}, \frac{1}{2} \right)$ (D) None of these
27. The solution set of $\log_2 |4 - 5x| > 2$ is
 (A) $(8/5, \infty)$ (B) $(4/5, 8/5)$ (C) $(-\infty, 0) \cup (8/5, \infty)$ (D) None of these
28. The value of x, if $x = 25^{\left(\frac{1}{2} + \log_{1/5} 27 + \log_{125} 81 \right)}$
 (A) $\frac{4}{81}$ (B) 1 (C) Rational number (D) An irrational number
29. If $\frac{\log_{1/2} x}{b-c} = \frac{\log_{1/2} y}{c-a} = \frac{\log_{1/2} z}{a-b}$ then the value of $x^a \cdot y^b \cdot z^c$ is
 (A) $\frac{1}{2}$ (B) xyz (C) $\left(\frac{1}{2} \right)^{abc}$ (D) 1
30. If $xy^2 = 4$ and $\log_3 (\log_2 x) + \log_{1/3} (\log_{1/2} y) = 1$ then x is equal to
 (A) 4 (B) 8 (C) 16 (D) 64

KEY

- | | | |
|---|---|--|
| 1. x = 1 | 2. x = 16 or x = 512 | 3. x = 1 |
| 4. $\log_{10} x$ | 5. x = 4 | 6. x = 100 or $\frac{1}{\sqrt{10}}$ |
| 7. x = 16, y = 4 | 8. y = 2, x = 8 or x = 2, y = 8 | 9. $\log_3 2$ |
| 10. 1 | 11. 42 | 12. x = 5 |
| 13. $\frac{1}{2} < x < 1$ | 14. $x \in \left(-\infty, \frac{-5}{2} \right] \cup (0, \infty)$ | 15. $x \in (4, 5)$ |
| 16. $x \in \left(-\infty, \frac{-5}{2} \right) \cup (0, \infty)$ | 17. $x \in \left(-1, \frac{1-\sqrt{5}}{2} \right) \cup \left(\frac{1+\sqrt{5}}{2}, 2 \right)$ | 18. $x \in \left[\frac{1}{\sqrt{10}}, 10 \right]$ |
| 19. B | 20. B | 21. A |
| 22. B | 23. A | 24. A |
| 25. B | 26. C | 27. C |
| 28. D | 29. D | 30. D |