

Logarithms

MCQ Test, Set 04

Time: 30 minutes

Maximum marks: 25

Name: _____ Class: _____ Date: _____

1. There are 25 questions. Each has exactly one correct answer: choose A, B, C or D.
2. Each correct answer carries 1 mark. There is no negative marking.
3. The key sheet and worked solutions are at the end of this test.

1. $\log_{18} 324 =$

- A.** $\frac{1}{2}$ **B.** 2 **C.** 18 **D.** -2

2. The logarithm of $\frac{1}{81}$ to the base 9 is

- A.** $-\frac{1}{2}$ **B.** $\frac{1}{2}$ **C.** 2 **D.** -2

3. Which value of N makes $\log_8 N$ defined?

- A.** $N = 0$ **B.** $N = 64$ **C.** $N = -64$ **D.** $N = -8$

4. The logarithmic form of $8^{\frac{1}{3}} = 2$ is

- A.** $8 = \log_{\frac{1}{3}} 2$ **B.** $2 = \log_8 \frac{1}{3}$ **C.** $\frac{1}{3} = \log_8 2$ **D.** $\frac{1}{3} = \log_2 8$

5. The exponential form of $\log_5 625 = 4$ is

- A.** $5 = 625^4$ **B.** $625 = 5^4$ **C.** $625 = 5 \times 4$ **D.** $625 = 4^5$

6. $\log_{16} 1 + \log_{16} 16 =$

- A.** 16 **B.** 0 **C.** 2 **D.** 1

7. $\log_{14} 7 + \log_{14} 28 =$

- A.** 2 **B.** $\log_{14} 7 \times \log_{14} 28$
C. 196 **D.** $\log_{14} 35$

8. $\log_4 192 - \log_4 3 =$

- A.** $\log_4 192 \div \log_4 3$ **B.** $\log_4 189$
C. 64 **D.** 3

9. If $\log_{q^3} p^{12} = k \log_q p$, then $k =$

- A.** 36 **B.** 4 **C.** $\frac{1}{4}$ **D.** 9

10. $\log_{\frac{1}{4}} 64 =$

- A.** -3 **B.** 3 **C.** $\frac{1}{3}$ **D.** $-\frac{1}{3}$

11. $\frac{1}{\log_{64} 4} =$
A. $\frac{1}{3}$ **B.** 16 **C.** 3 **D.** -3
-
12. $\log_{10} 9 \cdot \log_{27} 10 =$
A. $\frac{3}{2}$ **B.** $\frac{2}{3}$ **C.** $-\frac{2}{3}$ **D.** $\frac{4}{3}$
-
13. $\frac{\log 8}{\log 128} =$
A. $\frac{7}{3}$ **B.** 16 **C.** $\frac{3}{7}$ **D.** $\log \frac{1}{16}$
-
14. $9^{\log_9 20} - 6^{\log_6 11} =$
A. 9 **B.** 14 **C.** 3 **D.** 31
-
15. $9^{\log_4 7} - 7^{\log_4 9} =$
A. -1 **B.** 1 **C.** 0 **D.** 2
-
16. If $\log_6(5x - 4) = \log_6(3x + 6)$, then $x =$
A. $\frac{5}{4}$ **B.** 1 **C.** 5 **D.** -5
-
17. If $\log_2 \log_3 x = 1$, then $x =$
A. 8 **B.** 9 **C.** 6 **D.** 3
-
18. If $\log_3(x + 8) - \log_3(x - 2) = 1$, then
A. $x = 7$ **B.** $x = 8$ **C.** No real x **D.** $x = -7$
-
19. $\log_5 \sqrt{125} =$
A. $\frac{3}{2}$ **B.** 3 **C.** $\frac{2}{3}$ **D.** $\frac{5}{2}$
-
20. $\log_{b^2} a \cdot \log_{a^5} b =$
A. $\frac{1}{5}$ **B.** $\frac{1}{2}$ **C.** 10 **D.** $\frac{1}{10}$
-
21. $\frac{1}{\log_2 30} + \frac{1}{\log_3 30} + \frac{1}{\log_5 30} =$
A. $\log_{30} 10$ **B.** 10 **C.** 30 **D.** 1
-
22. $8^{\log_{64} 25} =$
A. 5 **B.** 625 **C.** $\frac{25}{8}$ **D.** 25
-
23. If $\log \frac{p+q}{6} = \frac{1}{2}(\log p + \log q)$, then $p^2 + q^2 =$
A. $36pq$ **B.** $38pq$ **C.** $32pq$ **D.** $34pq$
-
24. If $\log_2 x = \log_8 125$, then $x =$
A. $\frac{125}{3}$ **B.** 125 **C.** 375 **D.** 5
-
25. On the graph of $y = \log_4 x$, the value of y at $x = 64$ is
A. $\frac{1}{3}$ **B.** $-\frac{1}{3}$ **C.** 3 **D.** -3
-

Key sheet

1. B	2. D	3. B	4. C	5. B
6. D	7. A	8. D	9. B	10. A
11. C	12. B	13. C	14. A	15. C
16. C	17. B	18. A	19. A	20. D
21. D	22. A	23. D	24. D	25. C

Solutions

1. $\log_{18} 324 =$

$$18^2 = 324$$

$$\therefore \log_{18} 324 = 2$$

Ans: (B) 2

2. The logarithm of $\frac{1}{81}$ to the base 9 is

$$\frac{1}{81} = 9^{-2}$$

$$\therefore \log_9 \frac{1}{81} = -2$$

Ans: (D) -2

3. Which value of N makes $\log_8 N$ defined?

The number must be positive: $N > 0$.

Only $N = 64$ is positive; $\log_8 64 = 2$.

Ans: (B) $N = 64$

4. The logarithmic form of $8^{\frac{1}{3}} = 2$ is

$$a^x = N \Leftrightarrow x = \log_a N$$

The power $\frac{1}{3}$ is the logarithm of 2 to the base 8.

Ans: (C) $\frac{1}{3} = \log_8 2$

5. The exponential form of $\log_5 625 = 4$ is

$$\log_a N = x \Leftrightarrow N = a^x$$

So $625 = 5^4$.

Ans: (B) $625 = 5^4$

6. $\log_{16} 1 + \log_{16} 16 =$

$$\log_{16} 1 = 0, \log_{16} 16 = 1$$

$$= 0 + 1 = 1$$

Ans: (D) 1

7. $\log_{14} 7 + \log_{14} 28 =$

$$= \log_{14}(7 \times 28) = \log_{14} 196$$

$$= 2 \text{ since } 14^2 = 196$$

Ans: (A) 2

8. $\log_4 192 - \log_4 3 =$

$$= \log_4 \frac{192}{3} = \log_4 64$$

$$= 3 \text{ since } 4^3 = 64$$

Ans: (D) 3

9. If $\log_{q^3} p^{12} = k \log_q p$, then $k =$

$$\log_{b^n} a^m = \frac{m}{n} \log_b a$$

$$k = \frac{12}{3} = 4$$

Ans: (B) 4

10. $\log_{\frac{1}{4}} 64 =$

$$= \log_{4^{-1}} 4^3 = \frac{3}{-1} \log_4 4$$

$$= -3$$

Ans: (A) -3

11. $\frac{1}{\log_{64} 4} =$

$$= \log_4 64 = \log_4 4^3$$

$$= 3$$

Ans: (C) 3

12. $\log_{10} 9 \cdot \log_{27} 10 =$

$$\log_b a \cdot \log_c b = \log_c a$$

$$= \log_{27} 9 = \frac{2}{3}$$

Ans: (B) $\frac{2}{3}$

13. $\frac{\log 8}{\log 128} =$

$$\frac{\log a}{\log b} = \log_b a$$

$$= \log_{128} 8 = \frac{3}{7}$$

Ans: (C) $\frac{3}{7}$

14. $9^{\log_9 20} - 6^{\log_6 11} =$

$$a^{\log_a N} = N$$

$$= 20 - 11 = 9$$

Ans: (A) 9

15. $9^{\log_4 7} - 7^{\log_4 9} =$

$$9^{\log_4 7} = 7^{\log_4 9}$$

So the difference is 0.

Ans: (C) 0

16. If $\log_6(5x - 4) = \log_6(3x + 6)$, then $x =$

$$\Rightarrow 5x - 4 = 3x + 6$$

$$\Rightarrow 2x = 10$$

$$\Rightarrow x = 5$$

Ans: (C) 5

17. If $\log_2 \log_3 x = 1$, then $x =$

$$\log_3 x = 2^1 = 2$$

$$\Rightarrow x = 3^2 = 9$$

Ans: (B) 9

18. If $\log_3(x+8) - \log_3(x-2) = 1$, then

$$\Rightarrow \log_3 \frac{x+8}{x-2} = 1$$

$$\Rightarrow \frac{x+8}{x-2} = 3$$

$$\Rightarrow x+8 = 3x-6$$

$$\Rightarrow x = 7$$

For $x = 7$ both logarithms are defined.

Ans: (A) $x = 7$

19. $\log_5 \sqrt{125} =$

$$\sqrt{125} = (5^3)^{\frac{1}{2}} = 5^{\frac{3}{2}}$$

$$\therefore \log_5 5^{\frac{3}{2}} = \frac{3}{2}$$

Ans: (A) $\frac{3}{2}$

20. $\log_{b^2} a \cdot \log_{a^5} b =$

$$= \frac{1}{2} \log_b a \cdot \frac{1}{5} \log_a b$$

$$= \frac{1}{10} \cdot \log_b a \log_a b = \frac{1}{10}(1) = \frac{1}{10}$$

Ans: (D) $\frac{1}{10}$

21. $\frac{1}{\log_2 30} + \frac{1}{\log_3 30} + \frac{1}{\log_5 30} =$

$$\frac{1}{\log_b 30} = \log_{30} b$$

$$= \log_{30}(2 \times 3 \times 5) = \log_{30} 30 = 1$$

Ans: (D) 1

22. $8^{\log_{64} 25} =$

$$\log_{64} 25 = \log_{8^2} 5^2 = \log_8 5$$

$$= 8^{\log_8 5} = 5$$

Ans: (A) 5

23. If $\log \frac{p+q}{6} = \frac{1}{2}(\log p + \log q)$, then $p^2 + q^2 =$

$$\frac{p+q}{6} = \sqrt{pq} \Rightarrow (p+q)^2 = 36pq$$

$$\Rightarrow p^2 + 2pq + q^2 = 36pq \Rightarrow p^2 + q^2 = 34pq$$

Ans: (D) $34pq$

24. If $\log_2 x = \log_8 125$, then $x =$

$$\log_8 125 = \log_{2^3} 5^3 = \frac{3}{3} \log_2 5 = \log_2 5$$

$$\log_2 x = \log_2 5 \Rightarrow x = 5$$

Ans: (D) 5

25. On the graph of $y = \log_4 x$, the value of y at $x = 64$ is

$$y = \log_4 64$$

$$= 3$$

Ans: (C) 3
