

Logarithms

MCQ Test, Set 01

Time: 30 minutes

Maximum marks: 25

Name: _____ Class: _____ Date: _____

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

- $\log_2 64 =$
 A. 6 B. $\frac{1}{6}$ C. -6 D. 32
- The logarithm of $\frac{1}{9}$ to the base 3 is
 A. -2 B. 2 C. $-\frac{1}{2}$ D. $\frac{1}{2}$
- Which value of a makes $\log_a 49$ defined?
 A. $a = 1$ B. $a = -7$ C. $a = 0$ D. $a = 7$
- The logarithmic form of $2^9 = 512$ is
 A. $512 = \log_2 9$ B. $2 = \log_9 512$ C. $9 = \log_2 512$ D. $9 = \log_{512} 2$
- The exponential form of $\log_9 729 = 3$ is
 A. $729 = 9 \times 3$ B. $729 = 9^3$ C. $729 = 3^9$ D. $9 = 729^3$
- $\log_{23} 23 =$
 A. 23 B. 0 C. 1 D. -1
- $\log_4 8 + \log_4 2 =$
 A. $\log_4 10$ B. $\log_4 8 \times \log_4 2$
 C. 16 D. 2
- $\log_3 54 - \log_3 2 =$
 A. $\log_3 52$ B. 27
 C. $\log_3 54 \div \log_3 2$ D. 3
- $\log_{100} 10 =$
 A. -1 B. $\frac{1}{2}$ C. 2 D. $\frac{1}{10}$
- $\log_5 7^3 =$
 A. $\log_5 21$ B. $7 \log_5 3$ C. $(\log_5 7)^3$ D. $3 \log_5 7$
- $\log_9 4 \cdot \log_4 9 =$
 A. 1 B. 36 C. 0 D. $\frac{4}{9}$

12. $\log_7 2 \cdot \log_{16} 7 =$

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

B. $-\frac{1}{4}$

C. 4

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

13. $\frac{\log_{10} 729}{\log_{10} 27} =$

A. $\log_{10} 27$

B. 2

C. 27

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

14. $7^{\log_7 12} =$

A. 1

B. 12

C. $\log_7 12$

D. 7

15. $4^{\log_3 7} =$

A. $4^{\log_7 3}$

B. $7^{\log_4 3}$

C. $7^{\log_3 4}$

D. $3^{\log_7 4}$

16. If $\log_4(x + 5) = \log_4(2x - 1)$, then $x =$

A. -2

B. -6

C. 6

D. -4

17. If $\log_7(3x - 5) = 0$, then $x =$

A. 4

B. 2

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

D. $-\frac{4}{3}$

18. If $\log_2 x - \log_2(x + 3) = 4$, then

A. $x = \frac{16}{5}$

B. $x = -\frac{5}{16}$

C. No real x

D. $x = -\frac{16}{5}$

19. $\log_4 8 + \log_8 4 =$

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

B. $\frac{13}{6}$

C. 0

D. $\frac{5}{6}$

20. $\log_{b^3} a \cdot \log_{a^2} b =$

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

B. 6

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

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

21. $\frac{1}{\log_3 6} + \frac{1}{\log_2 6} =$

A. $\log_6 5$

B. 1

C. 6

D. 5

22. $5^{2+\log_5 3} =$

A. 75

B. 28

C. 15

D. 125

23. If $3 \log x - 2 \log y = \log k$, then $k =$

A. $\frac{x^3}{y^2}$

B. $x^3 - y^2$

C. $\frac{3x}{2y}$

D. $\frac{x^2}{y^3}$

24. If $\log_5 x = \log_{25} 81$, then $x =$

A. 81

B. 18

C. $\frac{81}{2}$

D. 9

25. On the graph of $y = \log_3 x$, the value of y at $x = \frac{1}{9}$ is

A. 2

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

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

D. -2

Key sheet

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

Solutions

1. $\log_2 64 =$

$$2^6 = 64$$

$$\therefore \log_2 64 = 6$$

Ans: (A) 6

2. The logarithm of $\frac{1}{9}$ to the base 3 is

$$\frac{1}{9} = 3^{-2}$$

$$\therefore \log_3 \frac{1}{9} = -2$$

Ans: (A) -2

3. Which value of a makes $\log_a 49$ defined?

The base must satisfy $a > 0$ and $a \neq 1$.

-7, 1 and 0 are not allowed; $a = 7$ gives $\log_7 49 = 2$.

Ans: (D) $a = 7$

4. The logarithmic form of $2^9 = 512$ is

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

The power 9 is the logarithm of 512 to the base 2.

Ans: (C) $9 = \log_2 512$

5. The exponential form of $\log_9 729 = 3$ is

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

$$\text{So } 729 = 9^3.$$

Ans: (B) $729 = 9^3$

6. $\log_{23} 23 =$

$$\log_a a = 1 \text{ because } a^1 = a$$

Ans: (C) 1

7. $\log_4 8 + \log_4 2 =$

$$= \log_4 (8 \times 2) = \log_4 16$$

$$= 2 \text{ since } 4^2 = 16$$

Ans: (D) 2

8. $\log_3 54 - \log_3 2 =$

$$= \log_3 \frac{54}{2} = \log_3 27$$

$$= 3 \text{ since } 3^3 = 27$$

Ans: (D) 3

9. $\log_{100} 10 =$

$$= \log_{10^2} 10^1 = \frac{1}{2} \log_{10} 10$$

$$= \frac{1}{2}$$

Ans: (B) $\frac{1}{2}$

10. $\log_5 7^3 =$

$$\log_b a^m = m \log_b a$$

$$\therefore \log_5 7^3 = 3 \log_5 7$$

Ans: (D) $3 \log_5 7$

11. $\log_9 4 \cdot \log_4 9 =$

$$\log_b a \cdot \log_a b = 1$$

So the product is 1.

Ans: (A) 1

12. $\log_7 2 \cdot \log_{16} 7 =$

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

$$= \log_{16} 2 = \frac{1}{4}$$

Ans: (A) $\frac{1}{4}$

13. $\frac{\log_{10} 729}{\log_{10} 27} =$

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

$$= \log_{27} 729 = 2$$

Ans: (B) 2

14. $7^{\log_7 12} =$

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

So the value is 12.

Ans: (B) 12

15. $4^{\log_3 7} =$

$a^{\log_c b} = b^{\log_c a}$: the base and the number inside the log change places.

$$\therefore 4^{\log_3 7} = 7^{\log_3 4}$$

Ans: (C) $7^{\log_3 4}$

16. If $\log_4(x + 5) = \log_4(2x - 1)$, then $x =$

$$\Rightarrow x + 5 = 2x - 1$$

$$\Rightarrow x = 6$$

$$\Rightarrow x = 6$$

Ans: (C) 6

17. If $\log_7(3x - 5) = 0$, then $x =$

$$\log_a 1 = 0$$

$$3x - 5 = 1$$

$$\Rightarrow x = 2$$

Ans: (B) 2

18. If $\log_2 x - \log_2(x + 3) = 4$, then

$$\Rightarrow \log_2 \frac{x}{x+3} = 4$$

$$\Rightarrow \frac{x}{x+3} = 2^4 = 16$$

$$\Rightarrow x = 16x + 48$$

$$\Rightarrow x = -\frac{16}{5}$$

For $x = -\frac{16}{5}$, $\log_2 x$ is not defined.

$\therefore$ there is no real x .

Ans: (C) No real x

19. $\log_4 8 + \log_8 4 =$

$$= \frac{3}{2} + \frac{2}{3} \text{ (writing both numbers as powers of 2)}$$

$$= \frac{13}{6}$$

Ans: (B) $\frac{13}{6}$

20. $\log_{b^3} a \cdot \log_{a^2} b =$

$$= \frac{1}{3} \log_b a \cdot \frac{1}{2} \log_a b$$

$$= \frac{1}{6} \cdot \log_b a \log_a b = \frac{1}{6}(1) = \frac{1}{6}$$

Ans: (C) $\frac{1}{6}$

21. $\frac{1}{\log_3 6} + \frac{1}{\log_2 6} =$

$$\frac{1}{\log_b 6} = \log_6 b$$

$$= \log_6(3 \times 2) = \log_6 6 = 1$$

Ans: (B) 1

22. $5^{2+\log_5 3} =$

$$= 5^2 \times 5^{\log_5 3}$$

$$= 25 \times 3 = 75$$

Ans: (A) 75

23. If $3 \log x - 2 \log y = \log k$, then $k =$

$$\log x^3 - \log y^2 = \log k$$

$$\Rightarrow \log \frac{x^3}{y^2} = \log k \Rightarrow k = \frac{x^3}{y^2}$$

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

24. If $\log_5 x = \log_{25} 81$, then $x =$

$$\log_{25} 81 = \log_{5^2} 9^2 = \frac{2}{2} \log_5 9 = \log_5 9$$

$$\log_5 x = \log_5 9 \Rightarrow x = 9$$

Ans: (D) 9

25. On the graph of $y = \log_3 x$, the value of y at $x = \frac{1}{9}$ is

$$y = \log_3 \frac{1}{9}$$

$$= -2$$

Ans: (D) -2
