

Logarithms

MCQ Test, Set 10

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.

- $\log_{10} \frac{1}{1000} =$
A. $-\frac{1}{3}$ **B.** $\frac{1}{3}$ **C.** 3 **D.** -3
- The logarithm of 729 to the base 3 is
A. 6 **B.** 243 **C.** $\frac{1}{6}$ **D.** -6
- The base a in $\log_a N$ must satisfy
A. $a < 0$ or $a > 1$ **B.** $a > 0$ and $a \neq 1$ **C.** $a \neq 0$ only **D.** $a > 1$ only
- The logarithmic form of $7^4 = 2401$ is
A. $2401 = \log_7 4$ **B.** $7 = \log_4 2401$ **C.** $4 = \log_{2401} 7$ **D.** $4 = \log_7 2401$
- The exponential form of $\log_{125} 25 = \frac{2}{3}$ is
A. $25 = 125^{\frac{2}{3}}$ **B.** $125 = 25^{\frac{2}{3}}$
C. $25 = 125 \times \frac{2}{3}$ **D.** $25 = (\frac{2}{3})^{125}$
- $\frac{\log_9 1}{\log_9 9} =$
A. $\frac{1}{9}$ **B.** 0 **C.** 1 **D.** 9
- $\log_6 18 + \log_6 12 =$
A. 3 **B.** 216
C. $\log_6 18 \times \log_6 12$ **D.** $\log_6 30$
- $\log_9 18 - \log_9 2 =$
A. $\log_9 16$ **B.** 9
C. $\log_9 18 \div \log_9 2$ **D.** 1
- $\log_{64} 16 =$
A. $\frac{3}{2}$ **B.** -2 **C.** $\frac{2}{3}$ **D.** $\frac{1}{4}$
- $\log_{\frac{1}{10}} 10000 =$
A. $\frac{1}{4}$ **B.** -4 **C.** $-\frac{1}{4}$ **D.** 4

11.	If $\log_{10} 7 = m$, then $\log_7 10 =$			
	A. m	B. $\frac{1}{m}$	C. $-\frac{1}{m}$	D. $-m$
12.	$\log_{11} 25 \cdot \log_{125} 11 =$			
	A. $\frac{3}{2}$	B. $\frac{4}{3}$	C. $-\frac{2}{3}$	D. $\frac{2}{3}$
13.	$\frac{\log 121}{\log 1331} =$			
	A. $\frac{2}{3}$	B. $\frac{3}{2}$	C. $\log \frac{1}{11}$	D. 11
14.	$8^{\log_8 \frac{1}{4}} \times 5^{\log_5 12} =$			
	A. 40	B. 48	C. 3	D. $\frac{1}{48}$
15.	$13^{\log_2 9} - 9^{\log_2 13} =$			
	A. 1	B. 4	C. -1	D. 0
16.	If $\log_{12}(2x + 9) = \log_{12}(5x)$, then $x =$			
	A. -3	B. $-\frac{9}{7}$	C. 4	D. 3
17.	If $\log_5(3x + 4) = 2$, then $x =$			
	A. 2	B. $\frac{29}{3}$	C. 7	D. $-\frac{4}{3}$
18.	If $\log_5(x + 13) - \log_5(x - 1) = 1$, then			
	A. No real x	B. $x = \frac{11}{2}$	C. $x = -\frac{9}{2}$	D. $x = \frac{9}{2}$
19.	$\log_2 \log_4 256 =$			
	A. 4	B. 8	C. 2	D. 1
20.	$\frac{1}{\log_{49} 7} + \frac{1}{\log_{343} 7} =$			
	A. 6	B. 5	C. $\frac{5}{6}$	D. $\frac{1}{5}$
21.	$\frac{1}{1+\log_2 15} + \frac{1}{1+\log_3 10} + \frac{1}{1+\log_5 6} =$			
	A. 1	B. 0	C. $\frac{1}{3}$	D. 3
22.	$3^{-1+\log_3 12} =$			
	A. 36	B. 11	C. 4	D. -12
23.	If $2 \log a + \log b - 3 \log c = \log k$, then $k =$			
	A. $\frac{2ab}{3c}$	B. $a^2 + b - c^3$	C. $\frac{a^2b}{c^3}$	D. a^2bc^3
24.	If $\log_x 32 = \frac{5}{3}$, then $x =$			
	A. -8	B. 8	C. $\frac{1}{8}$	D. $\frac{1}{32}$
25.	On the graph of $y = \log_{\frac{1}{4}} x$, the value of y at $x = 16$ is			
	A. -2	B. 2	C. $\frac{1}{2}$	D. $-\frac{1}{2}$

Key sheet

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

Solutions

1. $\log_{10} \frac{1}{1000} =$

$$\frac{1}{1000} = 10^{-3}$$

$$\therefore \log_{10} \frac{1}{1000} = -3$$

Ans: (D) -3

2. The logarithm of 729 to the base 3 is

$$3^6 = 729$$

$$\therefore \log_3 729 = 6$$

Ans: (A) 6

3. The base a in $\log_a N$ must satisfy

$a = 0$, $a = 1$ and negative a all lead to results with no meaning.

$\therefore a > 0$, $a \neq 1$ (a base like $\frac{1}{2}$ is allowed).

Ans: (B) $a > 0$ and $a \neq 1$

4. The logarithmic form of $7^4 = 2401$ is

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

The power 4 is the logarithm of 2401 to the base 7.

Ans: (D) $4 = \log_7 2401$

5. The exponential form of $\log_{125} 25 = \frac{2}{3}$ is

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

$$\text{So } 25 = 125^{\frac{2}{3}}.$$

Ans: (A) $25 = 125^{\frac{2}{3}}$

6. $\frac{\log_9 1}{\log_9 9} =$

$$\log_9 1 = 0, \log_9 9 = 1$$

$$= \frac{0}{1} = 0$$

Ans: (B) 0

7. $\log_6 18 + \log_6 12 =$

$$= \log_6 (18 \times 12) = \log_6 216$$

$$= 3 \text{ since } 6^3 = 216$$

Ans: (A) 3

8. $\log_9 18 - \log_9 2 =$

$$= \log_9 \frac{18}{2} = \log_9 9$$

$$= 1 \text{ since } 9^1 = 9$$

Ans: (D) 1

9. $\log_{64} 16 =$

$$= \log_{2^6} 2^4 = \frac{4}{6} \log_2 2$$

$$= \frac{2}{3}$$

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

10. $\log_{\frac{1}{10}} 10000 =$

$$= \log_{10^{-1}} 10^4 = \frac{4}{-1} \log_{10} 10$$

$$= -4$$

Ans: (B) -4

11. If $\log_{10} 7 = m$, then $\log_7 10 =$

$$\log_7 10 = \frac{1}{\log_{10} 7} = \frac{1}{m}$$

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

12. $\log_{11} 25 \cdot \log_{125} 11 =$

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

$$= \log_{125} 25 = \frac{2}{3}$$

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

13. $\frac{\log 121}{\log 1331} =$

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

$$= \log_{1331} 121 = \frac{2}{3}$$

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

14. $8^{\log_8 \frac{1}{4}} \times 5^{\log_5 12} =$

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

$$= \frac{1}{4} \times 12 = 3$$

Ans: (C) 3

15. $13^{\log_2 9} - 9^{\log_2 13} =$

$$13^{\log_2 9} = 9^{\log_2 13}$$

So the difference is 0.

Ans: (D) 0

16. If $\log_{12}(2x + 9) = \log_{12}(5x)$, then $x =$

$$\Rightarrow 2x + 9 = 5x$$

$$\Rightarrow 3x = 9$$

$$\Rightarrow x = 3$$

Ans: (D) 3

17. If $\log_5(3x + 4) = 2$, then $x =$

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

$$3x + 4 = 5^2 = 25$$

$$\Rightarrow x = 7$$

Ans: (C) 7

18. If $\log_5(x + 13) - \log_5(x - 1) = 1$, then

$$\Rightarrow \log_5 \frac{x+13}{x-1} = 1$$

$$\Rightarrow \frac{x+13}{x-1} = 5$$

$$\Rightarrow x + 13 = 5x - 5$$

$$\Rightarrow x = \frac{9}{2}$$

For $x = \frac{9}{2}$ both logarithms are defined.

Ans: (D) $x = \frac{9}{2}$

19. $\log_2 \log_4 256 =$

$$\log_4 256 = \log_4 4^4 = 4$$

$$\log_2 4 = 2$$

Ans: (C) 2

20. $\frac{1}{\log_{49} 7} + \frac{1}{\log_{343} 7} =$

$$= \log_7 49 + \log_7 343$$

$$= 2 + 3 = 5$$

Ans: (B) 5

21. $\frac{1}{1+\log_2 15} + \frac{1}{1+\log_3 10} + \frac{1}{1+\log_5 6} =$

$$1 + \log_2 15 = \log_2 2 + \log_2 15 = \log_2 30, \text{ and so on}$$

$$= \log_{30} 2 + \log_{30} 3 + \log_{30} 5 = \log_{30} 30 = 1$$

Ans: (A) 1

22. $3^{-1+\log_3 12} =$

$$= 3^{-1} \times 3^{\log_3 12}$$

$$= \frac{1}{3} \times 12 = 4$$

Ans: (C) 4

23. If $2 \log a + \log b - 3 \log c = \log k$, then $k =$

$$\log a^2 + \log b - \log c^3 = \log k$$

$$\Rightarrow \log \frac{a^2 b}{c^3} = \log k \Rightarrow k = \frac{a^2 b}{c^3}$$

Ans: (C) $\frac{a^2 b}{c^3}$

24. If $\log_x 32 = \frac{5}{3}$, then $x =$

$$32 = x^{\frac{5}{3}}$$

$$\Rightarrow x = 32^{\frac{3}{5}} = 8$$

Ans: (B) 8

25. On the graph of $y = \log_{\frac{1}{4}} x$, the value of y at $x = 16$ is

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

$$= -2$$

Ans: (A) -2
