

Logarithms

MCQ Test, Set 06

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. The logarithm of $\frac{1}{216}$ to the base 6 is
A. 3 **B.** $\frac{1}{3}$ **C.** -3 **D.** $-\frac{1}{3}$
2. If $14^x = 196$, then $x =$
A. 2 **B.** -2 **C.** $\frac{1}{2}$ **D.** 14
3. The base of a logarithm cannot be negative because
A. $(-5)^2$ is a negative number
B. $\log_5 25$ is negative
C. $(-5)^2 = 25$ and $5^2 = 25$ would make $\log_{-5} 25 = \log_5 25$
D. a negative base always gives the value 0
4. The logarithmic form of $10^{-4} = 0.0001$ is
A. $0.0001 = \log_{10}(-4)$ **B.** $-4 = \log_{0.0001} 10$ **C.** $10 = \log_{-4} 0.0001$ **D.** $-4 = \log_{10} 0.0001$
5. The exponential form of $\log_{16} \frac{1}{256} = -2$ is
A. $16 = \left(\frac{1}{256}\right)^{-2}$ **B.** $\frac{1}{256} = 16 \times (-2)$
C. $\frac{1}{256} = (-2)^{16}$ **D.** $\frac{1}{256} = 16^{-2}$
6. $2\log_{19} 19 - \log_{21} 1 =$
A. 2 **B.** 1 **C.** 0 **D.** 38
7. $\log_{10} 500 - \log_{10} 5 =$
A. 2 **B.** $\log_{10} 500 \div \log_{10} 5$
C. $\log_{10} 495$ **D.** 100
8. $\log_7 45 - \log_7 9 =$
A. $\log_7 405$ **B.** $\log_7 36$
C. $\log_7 5$ **D.** $\log_7 45 \div \log_7 9$
9. If $\log_{y^4} x^2 = k \log_y x$, then $k =$
A. -2 **B.** 8 **C.** 2 **D.** $\frac{1}{2}$

10.	$\log_{\frac{1}{6}} 36 =$	A. $-\frac{1}{2}$	B. -2	C. 2	D. $\frac{1}{2}$
11.	If $\log_5 3 = r$, then $\log_3 5 =$	A. $-\frac{1}{r}$	B. $\frac{1}{r}$	C. $-r$	D. r
12.	$\log_6 49 \cdot \log_7 6 =$	A. 2	B. 4	C. $\frac{1}{2}$	D. -2
13.	$\frac{\log 49}{\log 7} =$	A. 7	B. $\frac{1}{2}$	C. 3	D. 2
14.	$\frac{10^{\log_{10} 56}}{2^{\log_2 8}} =$	A. 5	B. 7	C. 64	D. 48
15.	$11^{\log_3 4} - 4^{\log_3 11} =$	A. 0	B. 7	C. -1	D. 1
16.	If $\log_2 x = \log_2(8 - x)$, then $x =$	A. 4	B. 8	C. -4	D. 5
17.	If $\log_2(7 - x) = 3$, then $x =$	A. 1	B. -15	C. -1	D. 7
18.	If $\log_7(x^2 + x + 1) + \log_7(x - 1) = 1$, then	A. $x = \sqrt[3]{7}$	B. $x = 2$	C. $x = \sqrt[3]{6}$	D. $x = 8$
19.	$\log_3 \log_2 \log_2 256 =$	A. 8	B. 1	C. 3	D. 0
20.	$\frac{\log 3 \sqrt[3]{3} + \log 4 \sqrt[3]{4}}{\log 12} =$	A. $\frac{3}{4}$	B. $\frac{1}{3}$	C. 1	D. $\frac{4}{3}$
21.	$\log_8 9 \cdot \log_{27} 4 =$	A. $\frac{2}{3}$	B. 1	C. $\frac{4}{9}$	D. $\frac{9}{4}$
22.	$7^{2+\log_7 2} =$	A. 98	B. 343	C. 28	D. 51
23.	If $\log(2a + b) = \log a - \log b$, then $a =$	A. $\frac{b^2}{2b-1}$	B. $\frac{b}{1-2b}$	C. $\frac{b^2}{1-2b}$	D. $\frac{2b^2}{1-b}$
24.	If $\log_{\frac{1}{x}} 27 = -3$, then	A. $x = 3$ (or) $x = -3$	B. $x = 3$	C. $x = -3$	D. $x = \frac{1}{3}$

25. On the graph of $y = \log_{\frac{1}{3}} x$, the value of y at $x = \frac{1}{27}$ is

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

B. $-\frac{1}{3}$

C. -3

D. 3

Key sheet

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

Solutions

1. The logarithm of $\frac{1}{216}$ to the base 6 is

$$\frac{1}{216} = 6^{-3}$$

$$\therefore \log_6 \frac{1}{216} = -3$$

Ans: (C) -3

2. If $14^x = 196$, then $x =$

$$14^2 = 196$$

$$\therefore \log_{14} 196 = 2$$

Ans: (A) 2

3. The base of a logarithm cannot be negative because

$$(-5)^2 = 25 \Rightarrow 2 = \log_{-5} 25 \text{ and } 5^2 = 25 \Rightarrow 2 = \log_5 25$$

So $\log_{-5} 25 = \log_5 25$, which has no meaning.

Ans: (C) $(-5)^2 = 25$ and $5^2 = 25$ would make $\log_{-5} 25 = \log_5 25$

4. The logarithmic form of $10^{-4} = 0.0001$ is

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

The power -4 is the logarithm of 0.0001 to the base 10 .

Ans: (D) $-4 = \log_{10} 0.0001$

5. The exponential form of $\log_{16} \frac{1}{256} = -2$ is

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

$$\text{So } \frac{1}{256} = 16^{-2}.$$

Ans: (D) $\frac{1}{256} = 16^{-2}$

6. $2 \log_{19} 19 - \log_{21} 1 =$

$$\log_{19} 19 = 1, \log_{21} 1 = 0$$

$$= 2(1) - 0 = 2$$

Ans: (A) 2

7. $\log_{10} 500 - \log_{10} 5 =$

$$= \log_{10} \frac{500}{5} = \log_{10} 100$$

$$= 2 \text{ since } 10^2 = 100$$

Ans: (A) 2

8. $\log_7 45 - \log_7 9 =$

$$\log_a m - \log_a n = \log_a \frac{m}{n}$$

$$= \log_7 5$$

Ans: (C) $\log_7 5$

9. If $\log_{y^4} x^2 = k \log_y x$, then $k =$

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

$$k = \frac{2}{4} = \frac{1}{2}$$

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

10. $\log_{\frac{1}{6}} 36 =$

$$= \log_{6^{-1}} 6^2 = \frac{2}{-1} \log_6 6$$

$$= -2$$

Ans: (B) -2

11. If $\log_5 3 = r$, then $\log_3 5 =$

$$\log_3 5 = \frac{1}{\log_5 3} = \frac{1}{r}$$

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

12. $\log_6 49 \cdot \log_7 6 =$

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

$$= \log_7 49 = 2$$

Ans: (A) 2

13. $\frac{\log 49}{\log 7} =$

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

$$= \log_7 49 = 2$$

Ans: (D) 2

14. $\frac{10^{\log_{10} 56}}{2^{\log_2 8}} =$

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

$$= \frac{56}{8} = 7$$

Ans: (B) 7

15. $11^{\log_3 4} - 4^{\log_3 11} =$

$$11^{\log_3 4} = 4^{\log_3 11}$$

So the difference is 0.

Ans: (A) 0

16. If $\log_2 x = \log_2(8 - x)$, then $x =$

$$\Rightarrow x = 8 - x$$

$$\Rightarrow 2x = 8$$

$$\Rightarrow x = 4$$

Ans: (A) 4

17. If $\log_2(7 - x) = 3$, then $x =$

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

$$7 - x = 2^3 = 8$$

$$\Rightarrow x = -1$$

Ans: (C) -1

18. If $\log_7(x^2 + x + 1) + \log_7(x - 1) = 1$, then

$$\log_7(x^3 - 1) = 1$$

$$x^3 = 1 + 7 = 8 \Rightarrow x = 2$$

Ans: (B) $x = 2$

19. $\log_3 \log_2 \log_2 256 =$

$$\log_2 256 = 8, \log_2 8 = 3$$

$$\log_3 3 = 1$$

Ans: (B) 1

20. $\frac{\log 3 \sqrt[3]{3} + \log 4 \sqrt[3]{4}}{\log 12} =$

$$3 \sqrt[3]{3} = 3^{\frac{4}{3}}, 4 \sqrt[3]{4} = 4^{\frac{4}{3}}$$

$$= \frac{\log 12^{\frac{4}{3}}}{\log 12} = \log_{12} 12^{\frac{4}{3}} = \frac{4}{3}$$

Ans: (D) $\frac{4}{3}$

21. $\log_8 9 \cdot \log_{27} 4 =$

$$\log_{2^3} 3^2 = \frac{2}{3} \log_2 3, \log_{3^3} 2^2 = \frac{2}{3} \log_3 2$$

$$= \frac{4}{9} \log_2 3 \log_3 2 = \frac{4}{9}$$

Ans: (C) $\frac{4}{9}$

22. $7^{2+\log_7 2} =$

$$= 7^2 \times 7^{\log_7 2}$$

$$= 49 \times 2 = 98$$

Ans: (A) 98

23. If $\log(2a + b) = \log a - \log b$, then $a =$

$$2a + b = \frac{a}{b} \Rightarrow 2ab + b^2 = a$$

$$\Rightarrow a(1 - 2b) = b^2 \Rightarrow a = \frac{b^2}{1-2b}$$

Ans: (C) $\frac{b^2}{1-2b}$

24. If $\log_{\frac{1}{x}} 27 = -3$, then

$$27 = \left(\frac{1}{x}\right)^{-3} = x^3$$

$$\Rightarrow x = 3$$

Ans: (B) $x = 3$

25. On the graph of $y = \log_{\frac{1}{3}} x$, the value of y at $x = \frac{1}{27}$ is

$$\begin{aligned} y &= \log_{\frac{1}{3}} \frac{1}{27} \\ &= 3 \end{aligned}$$

Ans: (D) 3
