

Logarithms

MCQ Test, Set 08

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.

1. If $7^x = \frac{1}{49}$, then $x =$

A. -2

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

D. 2

2. $\log_{15} 225 =$

A. 15

B. 2

C. -2

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

3. $\log_a 1$ is not defined when $a =$

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

B. 6

C. 1

D. 10

4. The logarithmic form of $3^{-5} = \frac{1}{243}$ is

A. $3 = \log_{-5} \frac{1}{243}$ B. $\frac{1}{243} = \log_3(-5)$ C. $-5 = \log_{\frac{1}{243}} 3$ D. $-5 = \log_3 \frac{1}{243}$

5. The exponential form of $\log_{49} 7 = \frac{1}{2}$ is

A. $7 = 49^{\frac{1}{2}}$ B. $49 = 7^{\frac{1}{2}}$ C. $7 = 49 \times \frac{1}{2}$ D. $7 = \left(\frac{1}{2}\right)^{49}$

6. $\log_{50} 50 \times \log_7 7 =$

A. 2

B. 1

C. 350

D. 0

7. $\log_{11} 6 + \log_{11} 4 =$

A. $\log_{11} 6 \times \log_{11} 4$ B. $\log_{11} 2$ C. $\log_{11} 24$ D. $\log_{11} 10$

8. $\log_2 40 + \log_2 \frac{1}{5} =$

A. $\log_2 40 \times \log_2 \frac{1}{5}$

B. 8

C. $\log_2 \frac{201}{5}$

D. 3

9. If $\log_{n^5} m^{10} = k \log_n m$, then $k =$

A. 2

B. 5

C. 50

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

10. $\log_{\frac{1}{7}} 343 =$

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

B. 3

C. -3

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

11. $\frac{1}{\log_8 3} =$
A. $\log_8 3$ **B.** $\log_3 8$ **C.** $\log_3 \frac{1}{8}$ **D.** $-\log_8 3$
-
12. $\log_{13} 64 \cdot \log_2 13 =$
A. -6 **B.** 12 **C.** 6 **D.** $\frac{1}{6}$
-
13. $\frac{\log 16}{\log 32} =$
A. $\log \frac{1}{2}$ **B.** 2 **C.** $\frac{5}{4}$ **D.** $\frac{4}{5}$
-
14. $(17^{\log_{17} 2})^3 =$
A. 8 **B.** 6 **C.** 17 **D.** 4913
-
15. $8^{\log_5 3} - 3^{\log_5 8} =$
A. -1 **B.** 1 **C.** 0 **D.** 5
-
16. If $\log_9(7x - 3) = \log_9(4x + 9)$, then $x =$
A. 2 **B.** 4 **C.** -4 **D.** $\frac{12}{11}$
-
17. If $\log_3 \log_2 x = 2$, then $x =$
A. 9 **B.** 4 **C.** 18 **D.** 512
-
18. If $\log_2(x^2 + 3x + 9) + \log_2(x - 3) = 3$, then
A. $x = \sqrt[3]{35}$ **B.** $x = 2$ **C.** $x = 35$ **D.** $x = \sqrt[3]{33}$
-
19. $\log_7 \sqrt[3]{49} =$
A. $\frac{2}{3}$ **B.** $\frac{3}{2}$ **C.** 2 **D.** $\frac{1}{3}$
-
20. If $\log_x y = t$, then $\log_{\frac{1}{y}} x^3 =$
A. $-3t$ **B.** $-\frac{1}{3t}$ **C.** $-\frac{3}{t}$ **D.** $\frac{3}{t}$
-
21. If $\log_{x^2} y \cdot \log_{\sqrt[3]{z}} x = k \log_z y$, then $k =$
A. $\frac{1}{6}$ **B.** 6 **C.** $\frac{3}{2}$ **D.** $\frac{2}{3}$
-
22. $2^{\log_5 3} - 3^{\log_5 2} + 6^{\log_6 4} =$
A. 0 **B.** 4 **C.** 3 **D.** 5
-
23. If $\frac{1}{2} \log a + \frac{1}{3} \log b = \log k$, then $k =$
A. $a^2 b^3$ **B.** $\frac{a}{2} + \frac{b}{3}$
C. $\frac{ab}{6}$ **D.** $\sqrt{a} \sqrt[3]{b}$
-
24. If $\log_x 9 = -\frac{2}{3}$, then $x =$
A. $\frac{1}{9}$ **B.** $-\frac{1}{27}$ **C.** 27 **D.** $\frac{1}{27}$
-
25. On the graph of $y = \log_5 x$, the value of y at $x = \frac{1}{5}$ is
A. 1 **B.** -1 **C.** -2 **D.** 0
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Key sheet

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

Solutions

1. If $7^x = \frac{1}{49}$, then $x =$

$$\frac{1}{49} = 7^{-2}$$

$$\therefore \log_7 \frac{1}{49} = -2$$

Ans: (A) -2

2. $\log_{15} 225 =$

$$15^2 = 225$$

$$\therefore \log_{15} 225 = 2$$

Ans: (B) 2

3. $\log_a 1$ is not defined when $a =$

The base cannot be 1.

For $a = 10, \frac{1}{2}$ or 6, $\log_a 1 = 0$; for $a = 1$ it is not defined.

Ans: (C) 1

4. The logarithmic form of $3^{-5} = \frac{1}{243}$ is

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

The power -5 is the logarithm of $\frac{1}{243}$ to the base 3.

Ans: (D) $-5 = \log_3 \frac{1}{243}$

5. The exponential form of $\log_{49} 7 = \frac{1}{2}$ is

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

$$\text{So } 7 = 49^{\frac{1}{2}}.$$

Ans: (A) $7 = 49^{\frac{1}{2}}$

6. $\log_{50} 50 \times \log_7 7 =$

$$\log_{50} 50 = 1, \log_7 7 = 1$$

$$= 1 \times 1 = 1$$

Ans: (B) 1

7. $\log_{11} 6 + \log_{11} 4 =$

$$\log_a m + \log_a n = \log_a mn$$

$$= \log_{11} 24$$

Ans: (C) $\log_{11} 24$

8. $\log_2 40 + \log_2 \frac{1}{5} =$

$$= \log_2 (40 \times \frac{1}{5}) = \log_2 8$$

$$= 3 \text{ since } 2^3 = 8$$

Ans: (D) 3

9. If $\log_{n^5} m^{10} = k \log_n m$, then $k =$

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

$$k = \frac{10}{5} = 2$$

Ans: (A) 2

10. $\log_{\frac{1}{7}} 343 =$

$$= \log_{7^{-1}} 7^3 = \frac{3}{-1} \log_7 7$$

$$= -3$$

Ans: (C) -3

11. $\frac{1}{\log_8 3} =$

$$\log_b a = \frac{1}{\log_a b}$$

$$\therefore \frac{1}{\log_8 3} = \log_3 8$$

Ans: (B) $\log_3 8$

12. $\log_{13} 64 \cdot \log_2 13 =$

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

$$= \log_2 64 = 6$$

Ans: (C) 6

13. $\frac{\log 16}{\log 32} =$

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

$$= \log_{32} 16 = \frac{4}{5}$$

Ans: (D) $\frac{4}{5}$

14. $(17^{\log_{17} 2})^3 =$

$$17^{\log_{17} 2} = 2$$

$$= 2^3 = 8$$

Ans: (A) 8

15. $8^{\log_5 3} - 3^{\log_5 8} =$

$$8^{\log_5 3} = 3^{\log_5 8}$$

So the difference is 0.

Ans: (C) 0

16. If $\log_9(7x - 3) = \log_9(4x + 9)$, then $x =$

$$\Rightarrow 7x - 3 = 4x + 9$$

$$\Rightarrow 3x = 12$$

$$\Rightarrow x = 4$$

Ans: (B) 4

17. If $\log_3 \log_2 x = 2$, then $x =$

$$\log_2 x = 3^2 = 9$$

$$\Rightarrow x = 2^9 = 512$$

Ans: (D) 512

18. If $\log_2(x^2 + 3x + 9) + \log_2(x - 3) = 3$, then

$$\log_2(x^3 - 27) = 3$$

$$x^3 = 27 + 8 = 35 \Rightarrow x = \sqrt[3]{35}$$

Ans: (A) $x = \sqrt[3]{35}$

19. $\log_7 \sqrt[3]{49} =$

$$\sqrt[3]{49} = (7^2)^{\frac{1}{3}} = 7^{\frac{2}{3}}$$

$$\therefore \log_7 7^{\frac{2}{3}} = \frac{2}{3}$$

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

20. If $\log_x y = t$, then $\log_{\frac{1}{y}} x^3 =$

$$\log_{y^{-1}} x^3 = \frac{3}{-1} \log_y x$$

$$= -3 \cdot \frac{1}{\log_x y} = -\frac{3}{t}$$

Ans: (C) $-\frac{3}{t}$

21. If $\log_{x^2} y \cdot \log_{\sqrt[3]{z}} x = k \log_z y$, then $k =$

$$\log_{x^2} y = \frac{1}{2} \log_x y, \log_{z^{\frac{1}{3}}} x = 3 \log_z x$$

$$= \frac{3}{2} \log_z y \Rightarrow k = \frac{3}{2}$$

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

22. $2^{\log_5 3} - 3^{\log_5 2} + 6^{\log_6 4} =$

$$2^{\log_5 3} = 3^{\log_5 2}, \text{ so the first two cancel}$$

$$6^{\log_6 4} = 4$$

Ans: (B) 4

23. If $\frac{1}{2} \log a + \frac{1}{3} \log b = \log k$, then $k =$

$$\log a^{\frac{1}{2}} + \log b^{\frac{1}{3}} = \log k$$

$$\Rightarrow \log \sqrt{a} \sqrt[3]{b} = \log k \Rightarrow k = \sqrt{a} \sqrt[3]{b}$$

Ans: (D) $\sqrt{a} \sqrt[3]{b}$

24. If $\log_x 9 = -\frac{2}{3}$, then $x =$

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

$$\Rightarrow x = 9^{-\frac{3}{2}} = \frac{1}{27}$$

Ans: (D) $\frac{1}{27}$

25. On the graph of $y = \log_5 x$, the value of y at $x = \frac{1}{5}$ is

$$y = \log_5 \frac{1}{5}$$

$$= -1$$

Ans: (B) -1
