

Logarithms

MCQ Test, Set 05

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 $10^x = 10000$, then $x =$

A. 1000

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

C. 4

D. -4

2. $\log_{12} 144 =$

A. -2

B. 12

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

D. 2

3. The base of a logarithm cannot be 1 because

A. 1 is not a prime number

B. $\log_1 1 = 1$ alwaysC. $1^2 = 1$ and $1^6 = 1$ would give $2 = 6$ D. 1^x is negative for some x

4. The logarithmic form of $25^{\frac{3}{2}} = 125$ is

A. $\frac{3}{2} = \log_{125} 25$ B. $25 = \log_{\frac{3}{2}} 125$ C. $\frac{3}{2} = \log_{25} 125$ D. $125 = \log_{25} \frac{3}{2}$

5. The exponential form of $\log_{81} 27 = \frac{3}{4}$ is

A. $27 = 81^{\frac{3}{4}}$ B. $27 = (\frac{3}{4})^{81}$ C. $81 = 27^{\frac{3}{4}}$ D. $27 = 81 \times \frac{3}{4}$

6. $\log_{0.3} 0.3 - \log_{0.3} 1 =$

A. 1

B. 0.3

C. 0

D. -1

7. $\log_3 8 + \log_3 5 =$

A. $\log_3 13$ B. $\log_3 3$ C. $\log_3 8 \times \log_3 5$ D. $\log_3 40$

8. $\log_8 16 + \log_8 32 =$

A. $\log_8 48$ B. $\log_8 16 \times \log_8 32$

C. 512

D. 3

9. $\log_{32} 8 =$

A. $\frac{3}{5}$ B. $\frac{1}{4}$ C. $\frac{5}{3}$

D. -2

10. $\log_2 9^5 =$
A. $(\log_2 9)^5$ **B.** $5 \log_2 9$ **C.** $\log_2 45$ **D.** $9 \log_2 5$
-
11. $\log_{13} 6 \cdot \log_6 13 =$
A. $\frac{6}{13}$ **B.** 78 **C.** 1 **D.** 0
-
12. $\log_q p \cdot \log_r q \cdot \log_t r =$
A. $\log_t pqr$ **B.** $\log_p t$ **C.** $\log_t p$ **D.** $\log_{pqr} t$
-
13. $\frac{\log_{10} 1000}{\log_{10} 100} =$
A. $\frac{3}{2}$ **B.** $\frac{2}{3}$ **C.** 10 **D.** $\log_{10} 10$
-
14. $15^{\log_{15} \frac{4}{7}} =$
A. $\log_{15} \frac{4}{7}$ **B.** $\frac{4}{7}$ **C.** $\frac{7}{4}$ **D.** 15
-
15. $3^{\log_{10} 8} =$
A. $8^{\log_3 10}$ **B.** $8^{\log_{10} 3}$ **C.** $10^{\log_8 3}$ **D.** $3^{\log_8 10}$
-
16. If $\log_{11} \sqrt[3]{x} = \log_{11} 3$, then $x =$
A. 27 **B.** 3 **C.** 9 **D.** 81
-
17. If $\log_6(4x - 2) = 1$, then $x =$
A. 1 **B.** $\frac{1}{2}$ **C.** $\frac{3}{4}$ **D.** 2
-
18. If $\log_{10} x + \log_{10}(x - 21) = 2$, then
A. $x = 25$ (or) $x = -4$ **B.** $x = -4$ **C.** $x = 25$ **D.** $x = 4$
-
19. $\log_{16} 64 - \log_{64} 16 =$
A. $\frac{5}{6}$ **B.** $\frac{3}{2}$ **C.** $\frac{13}{6}$ **D.** 0
-
20. If $\log_m n = q$, then $\log_{n^2} m =$
A. $\frac{q}{2}$ **B.** $2q$ **C.** $\frac{2}{q}$ **D.** $\frac{1}{2q}$
-
21. If $\log_{\sqrt[3]{p}} q \cdot \log_{\sqrt{r}} p = k \log_r q$, then $k =$
A. $\frac{3}{2}$ **B.** 6 **C.** 5 **D.** $\frac{1}{6}$
-
22. $100^{\log_{10} 3} =$
A. 3 **B.** 9 **C.** 300 **D.** 30
-
23. If $c^3 - b^3 = 64$, then $\log_4(c - b) + \log_4(c^2 + cb + b^2) =$
A. 2 **B.** 64 **C.** 16 **D.** 3
-
24. If $\log_x 125 = \frac{3}{2}$, then $x =$
A. 25 **B.** $\frac{1}{25}$ **C.** -25 **D.** $\frac{1}{125}$
-

25. The graph of $y = \log_7 x$ cuts the x-axis where $x =$

A. 7

B. 1

C. $\frac{1}{7}$

D. 0

Key sheet

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

Solutions

1. If $10^x = 10000$, then $x =$

$$10^4 = 10000$$

$$\therefore \log_{10} 10000 = 4$$

Ans: (C) 4

2. $\log_{12} 144 =$

$$12^2 = 144$$

$$\therefore \log_{12} 144 = 2$$

Ans: (D) 2

3. The base of a logarithm cannot be 1 because

$$1^2 = 1 \Rightarrow 2 = \log_1 1, 1^6 = 1 \Rightarrow 6 = \log_1 1$$

So $2 = 6$, which has no meaning.

Ans: (C) $1^2 = 1$ and $1^6 = 1$ would give $2 = 6$

4. The logarithmic form of $25^{\frac{3}{2}} = 125$ is

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

The power $\frac{3}{2}$ is the logarithm of 125 to the base 25.

Ans: (C) $\frac{3}{2} = \log_{25} 125$

5. The exponential form of $\log_{81} 27 = \frac{3}{4}$ is

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

$$\text{So } 27 = 81^{\frac{3}{4}}.$$

Ans: (A) $27 = 81^{\frac{3}{4}}$

6. $\log_{0.3} 0.3 - \log_{0.3} 1 =$

$$\log_{0.3} 0.3 = 1, \log_{0.3} 1 = 0$$

$$= 1 - 0 = 1$$

Ans: (A) 1

7. $\log_3 8 + \log_3 5 =$

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

$$= \log_3 40$$

Ans: (D) $\log_3 40$

8. $\log_8 16 + \log_8 32 =$

$$= \log_8 (16 \times 32) = \log_8 512$$

$$= 3 \text{ since } 8^3 = 512$$

Ans: (D) 3

9. $\log_{32} 8 =$

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

$$= \frac{3}{5}$$

Ans: (A) $\frac{3}{5}$

10. $\log_2 9^5 =$

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

$$\therefore \log_2 9^5 = 5 \log_2 9$$

Ans: (B) $5 \log_2 9$

11. $\log_{13} 6 \cdot \log_6 13 =$

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

So the product is 1.

Ans: (C) 1

12. $\log_q p \cdot \log_r q \cdot \log_t r =$

$$\log_q p \cdot \log_r q = \log_r p$$

$$\log_r p \cdot \log_t r = \log_t p$$

Ans: (C) $\log_t p$

13. $\frac{\log_{10} 1000}{\log_{10} 100} =$

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

$$= \log_{100} 1000 = \frac{3}{2}$$

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

14. $15^{\log_{15} \frac{4}{7}} =$

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

So the value is $\frac{4}{7}$.

Ans: (B) $\frac{4}{7}$

15. $3^{\log_{10} 8} =$

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

$$\therefore 3^{\log_{10} 8} = 8^{\log_{10} 3}$$

Ans: (B) $8^{\log_{10} 3}$

16. If $\log_{11} \sqrt[3]{x} = \log_{11} 3$, then $x =$

$$\Rightarrow \sqrt[3]{x} = 3$$

$$\Rightarrow x = 3^3 = 27$$

Ans: (A) 27

17. If $\log_6(4x - 2) = 1$, then $x =$

$$\log_a a = 1$$

$$4x - 2 = 6$$

$$\Rightarrow x = 2$$

Ans: (D) 2

18. If $\log_{10} x + \log_{10}(x - 21) = 2$, then

$$\Rightarrow \log_{10} x(x - 21) = 2$$

$$\Rightarrow x^2 - 21x = 10^2 = 100$$

$$\Rightarrow x^2 - 21x - 100 = 0$$

$$\Rightarrow (x + 4)(x - 25) = 0$$

$$\Rightarrow x = -4 \text{ (or) } x = 25$$

$x = -4$ is rejected: the log of a negative number is not defined.

$$\therefore x = 25$$

Ans: (C) $x = 25$

19. $\log_{16} 64 - \log_{64} 16 =$

$$= \frac{6}{4} - \frac{4}{6} \text{ (writing both numbers as powers of 2)}$$

$$= \frac{5}{6}$$

Ans: (A) $\frac{5}{6}$

20. If $\log_m n = q$, then $\log_{n^2} m =$

$$\log_{n^2} m = \frac{1}{2} \log_n m$$

$$= \frac{1}{2} \cdot \frac{1}{\log_m n} = \frac{1}{2q}$$

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

21. If $\log_{\sqrt[3]{p}} q \cdot \log_{\sqrt{r}} p = k \log_r q$, then $k =$

$$\log_{p^{\frac{1}{3}}} q = 3 \log_p q, \log_{r^{\frac{1}{2}}} p = 2 \log_r p$$

$$= 6 \log_p q \log_r p = 6 \log_r q \Rightarrow k = 6$$

Ans: (B) 6

22. $100^{\log_{10} 3} =$

$$100^{\log_{10} 3} = (10^{\log_{10} 3})^2$$

$$= 3^2 = 9$$

Ans: (B) 9

23. If $c^3 - b^3 = 64$, then $\log_4(c - b) + \log_4(c^2 + cb + b^2) =$

$$= \log_4(c^3 - b^3) = \log_4 64$$

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

Ans: (D) 3

24. If $\log_x 125 = \frac{3}{2}$, then $x =$

$$125 = x^{\frac{3}{2}}$$

$$\Rightarrow x = 125^{\frac{2}{3}} = 25$$

Ans: (A) 25

25. The graph of $y = \log_7 x$ cuts the x-axis where $x =$

$$y = 0 \Rightarrow \log_7 x = 0$$

$$\Rightarrow x = 7^0 = 1$$

Ans: (B) 1
