

Logarithms

MCQ Test, Set 07

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.

- $\log_3 243 =$
A. 5 **B.** 81 **C.** -5 **D.** $\frac{1}{5}$
- The logarithm of $\frac{1}{64}$ to the base 4 is
A. -3 **B.** 3 **C.** $\frac{1}{3}$ **D.** $-\frac{1}{3}$
- Which logarithm of 81 is defined?
A. $\log_{-9} 81$ **B.** $\log_1 81$ **C.** $\log_9 81$ **D.** $\log_0 81$
- The logarithmic form of $6^4 = 1296$ is
A. $4 = \log_{1296} 6$ **B.** $1296 = \log_6 4$ **C.** $4 = \log_6 1296$ **D.** $6 = \log_4 1296$
- The exponential form of $\log_{0.1} 0.01 = 2$ is
A. $0.01 = 2^{0.1}$ **B.** $0.1 = 0.01^2$ **C.** $0.01 = 0.1 \times 2$ **D.** $0.01 = 0.1^2$
- $\log_a 1 = 0$ is true because
A. $a^1 = a$ **B.** $1^a = 1$ **C.** $a^0 = 1$ **D.** $0^a = 0$
- $\log_{10} 40 + \log_{10} 25 =$
A. 1000 **B.** $\log_{10} 65$
C. 3 **D.** $\log_{10} 40 \times \log_{10} 25$
- $\log_6 72 - \log_6 2 =$
A. 2 **B.** 36
C. $\log_6 72 \div \log_6 2$ **D.** $\log_6 70$
- $\log_{343} 2401 =$
A. 1 **B.** 7 **C.** $\frac{3}{4}$ **D.** $\frac{4}{3}$
- $\log_{11} 2^7 =$
A. $2 \log_{11} 7$ **B.** $\log_{11} 14$ **C.** $7 \log_{11} 2$ **D.** $(\log_{11} 2)^7$
- $\frac{1}{\log_{400} 20} =$
A. 2 **B.** -2 **C.** 20 **D.** $\frac{1}{2}$

12. $\log_3 81 \cdot \log_7 3 \cdot \log_9 7 =$

A. 2

B. 3

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

D. -2

13. $\frac{\log_{10} 1024}{\log_{10} 32} =$

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

B. 2

C. 32

D. $\log_{10} 32$

14. $3 \times 6^{\log_6 5} =$

A. 5

B. 18

C. 90

D. 15

15. $7^{\log_2 5} =$

A. $2^{\log_5 7}$

B. $5^{\log_2 7}$

C. $5^{\log_7 2}$

D. $7^{\log_5 2}$

16. If $\log_8(4x + 3) = \log_8 23$, then $x =$

A. -5

B. 5

C. 6

D. $\frac{13}{2}$

17. If $\log_{12}(x + 5) = 0$, then $x =$

A. -5

B. 6

C. -4

D. 7

18. If $\log_4 x - \log_4(x + 1) = 1$, then

A. $x = \frac{4}{3}$

B. No real x

C. $x = -\frac{3}{4}$

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

19. $\log_{0.3} 0.027 =$

A. -3

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

C. 9

D. 3

20. $\log_{b^4} a^3 \cdot \log_{a^2} b =$

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

B. $\frac{8}{3}$

C. $\frac{3}{4}$

D. $\frac{3}{8}$

21. $\frac{1}{\log_4 144} + \frac{1}{\log_3 144} =$

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

B. 7

C. $\log_{144} 7$

D. 144

22. $3^{\log_9 49} =$

A. 7

B. $\sqrt{7}$

C. 49

D. $\frac{49}{9}$

23. If $2 \log(x - y) = \log x + \log y + 2 \log 2$, then $x^2 + y^2 =$

A. $2xy$

B. $6xy$

C. $8xy$

D. $4xy$

24. If $\log_7 x = \log_{49} 36$, then $x =$

A. 12

B. 6

C. 18

D. 36

25. The graph of $y = \log_8 x$

A. falls from left to right

B. lies only below the x-axis

C. cuts the y-axis at (0, 1)

D. rises from left to right

Key sheet

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

Solutions

1. $\log_3 243 =$

$$3^5 = 243$$

$$\therefore \log_3 243 = 5$$

Ans: (A) 5

2. The logarithm of $\frac{1}{64}$ to the base 4 is

$$\frac{1}{64} = 4^{-3}$$

$$\therefore \log_4 \frac{1}{64} = -3$$

Ans: (A) -3

3. Which logarithm of 81 is defined?

The base must be positive and not 1.

Only $\log_9 81$ qualifies: $9^2 = 81$, so it equals 2.

Ans: (C) $\log_9 81$

4. The logarithmic form of $6^4 = 1296$ is

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

The power 4 is the logarithm of 1296 to the base 6.

Ans: (C) $4 = \log_6 1296$

5. The exponential form of $\log_{0.1} 0.01 = 2$ is

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

$$\text{So } 0.01 = 0.1^2.$$

Ans: (D) $0.01 = 0.1^2$

6. $\log_a 1 = 0$ is true because

$$a^0 = 1 \Rightarrow 0 = \log_a 1$$

(for $a > 0, a \neq 1$)

Ans: (C) $a^0 = 1$

7. $\log_{10} 40 + \log_{10} 25 =$

$$= \log_{10} (40 \times 25) = \log_{10} 1000$$

$$= 3 \text{ since } 10^3 = 1000$$

Ans: (C) 3

8. $\log_6 72 - \log_6 2 =$

$$= \log_6 \frac{72}{2} = \log_6 36$$

$$= 2 \text{ since } 6^2 = 36$$

Ans: (A) 2

9. $\log_{343} 2401 =$
 $= \log_{7^3} 7^4 = \frac{4}{3} \log_7 7$
 $= \frac{4}{3}$
Ans: (D) $\frac{4}{3}$

10. $\log_{11} 2^7 =$
 $\log_b a^m = m \log_b a$
 $\therefore \log_{11} 2^7 = 7 \log_{11} 2$
Ans: (C) $7 \log_{11} 2$

11. $\frac{1}{\log_{400} 20} =$
 $= \log_{20} 400 = \log_{20} 20^2$
 $= 2$
Ans: (A) 2

12. $\log_3 81 \cdot \log_7 3 \cdot \log_9 7 =$
 $\log_b a \cdot \log_c b \cdot \log_d c = \log_d a$
 $= \log_9 81 = 2$
Ans: (A) 2

13. $\frac{\log_{10} 1024}{\log_{10} 32} =$
 $\frac{\log a}{\log b} = \log_b a$
 $= \log_{32} 1024 = 2$
Ans: (B) 2

14. $3 \times 6^{\log_6 5} =$
 $6^{\log_6 5} = 5$
 $= 3 \times 5 = 15$
Ans: (D) 15

15. $7^{\log_2 5} =$
 $a^{\log_c b} = b^{\log_c a}$: the base and the number inside the log change places.
 $\therefore 7^{\log_2 5} = 5^{\log_2 7}$
Ans: (B) $5^{\log_2 7}$

16. If $\log_8(4x + 3) = \log_8 23$, then $x =$
 $\Rightarrow 4x + 3 = 23$
 $\Rightarrow 4x = 20$
 $\Rightarrow x = 5$
Ans: (B) 5

17. If $\log_{12}(x + 5) = 0$, then $x =$

$$\log_a 1 = 0$$

$$x + 5 = 1$$

$$\Rightarrow x = -4$$

Ans: (C) -4

18. If $\log_4 x - \log_4(x + 1) = 1$, then

$$\Rightarrow \log_4 \frac{x}{x+1} = 1$$

$$\Rightarrow \frac{x}{x+1} = 4$$

$$\Rightarrow x = 4x + 4$$

$$\Rightarrow x = -\frac{4}{3}$$

For $x = -\frac{4}{3}$, $\log_4 x$ is not defined.

$\therefore$ there is no real x .

Ans: (B) No real x

19. $\log_{0.3} 0.027 =$

$$0.027 = (0.3)^3$$

$$\therefore \log_{0.3}(0.3)^3 = 3$$

Ans: (D) 3

20. $\log_{b^4} a^3 \cdot \log_{a^2} b =$

$$= \frac{3}{4} \log_b a \cdot \frac{1}{2} \log_a b$$

$$= \frac{3}{8} \cdot \log_b a \log_a b = \frac{3}{8}(1) = \frac{3}{8}$$

Ans: (D) $\frac{3}{8}$

21. $\frac{1}{\log_4 144} + \frac{1}{\log_3 144} =$

$$\frac{1}{\log_b 144} = \log_{144} b$$

$$= \log_{144}(4 \times 3) = \log_{144} 12 = \frac{1}{2}$$

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

22. $3^{\log_9 49} =$

$$\log_9 49 = \log_{3^2} 7^2 = \log_3 7$$

$$= 3^{\log_3 7} = 7$$

Ans: (A) 7

23. If $2 \log(x - y) = \log x + \log y + 2 \log 2$, then $x^2 + y^2 =$

$$\log(x - y)^2 = \log 4xy \Rightarrow (x - y)^2 = 4xy$$

$$\Rightarrow x^2 - 2xy + y^2 = 4xy \Rightarrow x^2 + y^2 = 6xy$$

Ans: (B) $6xy$

24. If $\log_7 x = \log_{49} 36$, then $x =$

$$\log_{49} 36 = \log_{7^2} 6^2 = \frac{2}{2} \log_7 6 = \log_7 6$$

$$\log_7 x = \log_7 6 \Rightarrow x = 6$$

Ans: (B) 6

25. The graph of $y = \log_8 x$

The base 8 is more than 1.

For $a > 1$ the graph of $\log_a x$ rises from left to right.

Ans: (D) rises from left to right
