

Logarithms

MCQ Test, Set 03

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. The logarithm of 216 to the base 6 is

- A. 3 B. $\frac{1}{3}$ C. 36 D. -3

2. If $7^x = 343$, then $x =$

- A. 49 B. $\frac{1}{3}$ C. 3 D. -3

3. Which of the following logarithms of 5 is not defined?

- A. $\log_1 5$ B. $\log_{25} 5$ C. $\log_5 5$ D. $\log_{\frac{1}{5}} 5$

4. The logarithmic form of $19^2 = 361$ is

- A. $2 = \log_{19} 361$ B. $361 = \log_{19} 2$ C. $2 = \log_{361} 19$ D. $19 = \log_2 361$

5. The exponential form of $\log_{64} 4 = \frac{1}{3}$ is

- A. $64 = 4^{\frac{1}{3}}$ B. $4 = 64^{\frac{1}{3}}$
C. $4 = 64 \times \frac{1}{3}$ D. $4 = \left(\frac{1}{3}\right)^{64}$

6. $5 \log_8 8 + 3 \log_8 1 =$

- A. 5 B. 3 C. 15 D. 8

7. $\log_9 27 + \log_9 3 =$

- A. 2 B. $\log_9 27 \times \log_9 3$
C. $\log_9 30$ D. 81

8. $\log_5 36 - \log_5 4 =$

- A. $\log_5 144$ B. $\log_5 9$
C. $\log_5 32$ D. $\log_5 36 \div \log_5 4$

9. $\log_{49} 343 =$

- A. 7 B. 1 C. $\frac{3}{2}$ D. $\frac{2}{3}$

10. $\log_3 10^4 =$

- A. $10 \log_3 4$ B. $(\log_3 10)^4$ C. $\log_3 40$ D. $4 \log_3 10$

11.	$\frac{1}{\log_6 5} =$	A. $-\log_6 5$	B. $\log_5 \frac{1}{6}$	C. $\log_6 5$	D. $\log_5 6$
12.	$\log_3 125 \cdot \log_5 3 =$	A. -3	B. 3	C. $\frac{1}{3}$	D. 6
13.	$\frac{\log_{10} 6561}{\log_{10} 9} =$	A. 729	B. $\log_{10} 729$	C. 4	D. $\frac{1}{4}$
14.	$3^{\log_3 6} \times 4^{\log_4 5} =$	A. 11	B. 12	C. 30	D. 20
15.	$2^{\log_5 6} =$	A. $5^{\log_6 2}$	B. $6^{\log_5 2}$	C. $2^{\log_6 5}$	D. $6^{\log_2 5}$
16.	If $\log_3(3x + 1) = \log_3 19$, then $x =$	A. -6	B. 7	C. $\frac{20}{3}$	D. 6
17.	If $\log_3(2x - 1) = 2$, then $x =$	A. 4	B. $\frac{1}{2}$	C. 5	D. $\frac{7}{2}$
18.	If $\log_5 x + \log_5(x + 4) = 1$, then	A. $x = -5$	B. $x = 5$	C. $x = 1$ (or) $x = -5$	D. $x = 1$
19.	$\log_{0.2} 0.0016 =$	A. -4	B. 4	C. $\frac{1}{4}$	D. 8
20.	$\frac{\log 2\sqrt{2} + \log 5\sqrt{5}}{\log 10} =$	A. $\frac{2}{3}$	B. $\frac{1}{2}$	C. 1	D. $\frac{3}{2}$
21.	$\log_2 9 \cdot \log_3 4 =$	A. 6	B. 2	C. 1	D. 4
22.	$9^{\log_3 4} =$	A. 4	B. 2	C. 16	D. 8
23.	If $x^2 + y^2 = 34xy$, then $2\log(x + y) =$	A. $\log x + \log y + 2\log 6$	B. $\log x + \log y + \log 34$	C. $\log x + \log y + 2\log 17$	D. $\log x + \log y + 2\log 4$
24.	If $\log_{\frac{1}{x}} 25 = -2$, then	A. $x = \frac{1}{5}$	B. $x = 5$	C. $x = -5$	D. $x = 5$ (or) $x = -5$

25. The graph of $y = \log_{\frac{2}{3}} x$

A. is a straight line

C. passes through $(0, 1)$

B. rises from left to right

D. falls from left to right

Key sheet

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

Solutions

1. The logarithm of 216 to the base 6 is

$$6^3 = 216$$

$$\therefore \log_6 216 = 3$$

Ans: (A) 3

2. If $7^x = 343$, then $x =$

$$7^3 = 343$$

$$\therefore \log_7 343 = 3$$

Ans: (C) 3

3. Which of the following logarithms of 5 is not defined?

The base cannot be 1: $1^x = 1$ for every x , never 5.

So $\log_1 5$ is not defined.

Ans: (A) $\log_1 5$

4. The logarithmic form of $19^2 = 361$ is

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

The power 2 is the logarithm of 361 to the base 19.

Ans: (A) $2 = \log_{19} 361$

5. The exponential form of $\log_{64} 4 = \frac{1}{3}$ is

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

$$\text{So } 4 = 64^{\frac{1}{3}}.$$

Ans: (B) $4 = 64^{\frac{1}{3}}$

6. $5 \log_8 8 + 3 \log_8 1 =$

$$\log_8 8 = 1, \log_8 1 = 0$$

$$= 5(1) + 3(0) = 5$$

Ans: (A) 5

7. $\log_9 27 + \log_9 3 =$

$$= \log_9 (27 \times 3) = \log_9 81$$

$$= 2 \text{ since } 9^2 = 81$$

Ans: (A) 2

8. $\log_5 36 - \log_5 4 =$

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

$$= \log_5 9$$

Ans: (B) $\log_5 9$

9. $\log_{49} 343 =$
 $= \log_{7^2} 7^3 = \frac{3}{2} \log_7 7$
 $= \frac{3}{2}$
Ans: (C) $\frac{3}{2}$

10. $\log_3 10^4 =$
 $\log_b a^m = m \log_b a$
 $\therefore \log_3 10^4 = 4 \log_3 10$
Ans: (D) $4 \log_3 10$

11. $\frac{1}{\log_6 5} =$
 $\log_b a = \frac{1}{\log_a b}$
 $\therefore \frac{1}{\log_6 5} = \log_5 6$
Ans: (D) $\log_5 6$

12. $\log_3 125 \cdot \log_5 3 =$
 $\log_b a \cdot \log_c b = \log_c a$
 $= \log_5 125 = 3$
Ans: (B) 3

13. $\frac{\log_{10} 6561}{\log_{10} 9} =$
 $\frac{\log a}{\log b} = \log_b a$
 $= \log_9 6561 = 4$
Ans: (C) 4

14. $3^{\log_3 6} \times 4^{\log_4 5} =$
 $a^{\log_a N} = N$
 $= 6 \times 5 = 30$
Ans: (C) 30

15. $2^{\log_5 6} =$
 $a^{\log_c b} = b^{\log_c a}$: the base and the number inside the log change places.
 $\therefore 2^{\log_5 6} = 6^{\log_5 2}$
Ans: (B) $6^{\log_5 2}$

16. If $\log_3(3x + 1) = \log_3 19$, then $x =$
 $\Rightarrow 3x + 1 = 19$
 $\Rightarrow 3x = 18$
 $\Rightarrow x = 6$
Ans: (D) 6

17. If $\log_3(2x - 1) = 2$, then $x =$

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

$$2x - 1 = 3^2 = 9$$

$$\Rightarrow x = 5$$

Ans: (C) 5

18. If $\log_5 x + \log_5(x + 4) = 1$, then

$$\Rightarrow \log_5 x(x + 4) = 1$$

$$\Rightarrow x^2 + 4x = 5$$

$$\Rightarrow x^2 + 4x - 5 = 0$$

$$\Rightarrow (x - 1)(x + 5) = 0$$

$$\Rightarrow x = 1 \text{ (or) } x = -5$$

$x = -5$ is rejected: the log of a negative number is not defined.

$$\therefore x = 1$$

Ans: (D) $x = 1$

19. $\log_{0.2} 0.0016 =$

$$0.0016 = (0.2)^4$$

$$\therefore \log_{0.2}(0.2)^4 = 4$$

Ans: (B) 4

20. $\frac{\log 2\sqrt{2} + \log 5\sqrt{5}}{\log 10} =$

$$2\sqrt{2} \times 5\sqrt{5} = (2 \times 5)^{\frac{3}{2}} = 10^{\frac{3}{2}}$$

$$= \log_{10} 10^{\frac{3}{2}} = \frac{3}{2}$$

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

21. $\log_2 9 \cdot \log_3 4 =$

$$\log_2 9 = 2 \log_2 3, \log_3 4 = 2 \log_3 2$$

$$= 4 \log_2 3 \cdot \log_3 2 = 4(1) = 4$$

Ans: (D) 4

22. $9^{\log_3 4} =$

$$9^{\log_3 4} = (3^{\log_3 4})^2$$

$$= 4^2 = 16$$

Ans: (C) 16

23. If $x^2 + y^2 = 34xy$, then $2 \log(x + y) =$

$$(x + y)^2 = x^2 + y^2 + 2xy = 36xy$$

$$2 \log(x + y) = \log 36xy = 2 \log 6 + \log x + \log y$$

Ans: (A) $\log x + \log y + 2 \log 6$

24. If $\log_{\frac{1}{x}} 25 = -2$, then

$$25 = \left(\frac{1}{x}\right)^{-2} = x^2$$

$\Rightarrow x = 5$ (the negative value is rejected: the base must be positive)

Ans: (B) $x = 5$

25. The graph of $y = \log_{\frac{2}{3}} x$

The base $\frac{2}{3}$ is between 0 and 1.

For $0 < a < 1$ the graph of $\log_a x$ falls from left to right.

Ans: (D) falls from left to right
