EXPRESSWALA ACADEMY

Logarithms

MCQ Test, Set 02

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. If $4^x = 1024$, then $x =$

A. $\frac{1}{5}$ **B.** -5 **C.** 256 **D.** 5

2. $\log_5 \frac{1}{25} =$

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

3. $\log_a N$ is defined only when

A. $a > 0, a \neq 1, N > 0$ **B.** $a > 0, N > 0$

C. $a \geq 0, a \neq 1, N > 0$ **D.** $a \neq 1, N \neq 0$

4. The logarithmic form of $4^{-2} = \frac{1}{16}$ is

A. $4 = \log_{-2} \frac{1}{16}$ **B.** $-2 = \log_4 \frac{1}{16}$

C. $-2 = \log_{\frac{1}{16}} 4$ **D.** $\frac{1}{16} = \log_4(-2)$

5. The exponential form of $\log_2 \frac{1}{128} = -7$ is

A. $\frac{1}{128} = 2^{-7}$ **B.** $\frac{1}{128} = 2 \times (-7)$

C. $2 = (\frac{1}{128})^{-7}$ **D.** $\frac{1}{128} = (-7)^2$

6. $\log_{\frac{2}{9}} 1 =$

A. 1 **B.** $\frac{2}{9}$ **C.** 0 **D.** $\frac{9}{2}$

7. $\log_2 7 + \log_2 3 =$

A. $\log_2 10$ **B.** $\log_2 21$

C. $\log_2 7 \times \log_2 3$ **D.** $\log_2 4$

8. $\log_2 160 - \log_2 5 =$

A. $\log_2 160 \div \log_2 5$ **B.** 32

C. $\log_2 155$ **D.** 5

9. If $\log_{b^2} a^6 = k \log_b a$, then $k =$

A. 3 **B.** 12 **C.** $\frac{1}{3}$ **D.** 4

10. $\log_{\frac{1}{2}} 32 =$

A. -5 **B.** $\frac{1}{5}$ **C.** 5 **D.** $-\frac{1}{5}$

11. If $\log_2 11 = q$, then $\log_{11} 2 =$

A. $-q$ **B.** $-\frac{1}{q}$ **C.** q **D.** $\frac{1}{q}$

12. $\log_5 2 \cdot \log_9 5 \cdot \log_8 9 =$

A. 3 **B.** $\frac{4}{3}$ **C.** $\frac{1}{3}$ **D.** $-\frac{1}{3}$

13. $\frac{\log 4096}{\log 64} =$

A. $\frac{1}{2}$ **B.** 2 **C.** 3 **D.** 64

14. $5^{\log_5 4} + 2^{\log_2 9} =$

A. 36 **B.** 7 **C.** 13 **D.** 11

15. $5^{\log_6 2} - 2^{\log_6 5} =$

A. 3 **B.** 0 **C.** 1 **D.** -1

16. If $\log_5 \sqrt{x} = \log_5 9$, then $x =$

A. 18 **B.** 81 **C.** 9 **D.** 729

17. If $\log_4(5x + 1) = 1$, then $x =$

A. 1 **B.** $-\frac{1}{5}$ **C.** 0 **D.** $\frac{3}{5}$

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

A. $x = 2$ (or) $x = -4$ **B.** $x = 2$ **C.** $x = 4$ **D.** $x = -4$

19. $\log_2 \log_3 81 =$

A. $\frac{1}{2}$ **B.** 4 **C.** 2 **D.** 1

20. If $\log_a b = p$, then $\log_{\frac{1}{b}} a =$

A. $-\frac{1}{p}$ **B.** $\frac{1}{p}$ **C.** p **D.** $-p$

21. If $\log_{\sqrt{x}} y \cdot \log_{\sqrt[5]{z}} x = k \log_z y$, then $k =$

A. $\frac{1}{10}$ **B.** 7 **C.** 10 **D.** $\frac{5}{2}$

22. $3^{-3+\log_{11} 1} =$

A. $\frac{1}{9}$ **B.** 27 **C.** $\frac{1}{27}$ **D.** -9

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

A. $\frac{b}{1-b}$ **B.** $\frac{b}{b-1}$ **C.** $\frac{b^2}{b-1}$ **D.** $\frac{b-1}{b}$

24. If $\log_x 8 = -\frac{3}{2}$, then $x =$

A. 4 **B.** $-\frac{1}{4}$ **C.** $\frac{1}{8}$ **D.** $\frac{1}{4}$

25. On the graph of $y = \log_{\frac{1}{2}} x$, the value of y at $x = 8$ is

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

Key sheet

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

Solutions

1. If $4^x = 1024$, then $x =$

$4^5 = 1024$

$\therefore \log_4 1024 = 5$

Ans: (D) 5

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2. $\log_5 \frac{1}{25} =$

$\frac{1}{25} = 5^{-2}$

$\therefore \log_5 \frac{1}{25} = -2$

Ans: (D) -2

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3. $\log_a N$ is defined only when

$a^x = N \Leftrightarrow x = \log_a N$ where $a > 0$, $a \neq 1$, $N > 0$.

Ans: (A) $a > 0$, $a \neq 1$, $N > 0$

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4. The logarithmic form of $4^{-2} = \frac{1}{16}$ is

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

The power -2 is the logarithm of $\frac{1}{16}$ to the base 4.

Ans: (B) $-2 = \log_4 \frac{1}{16}$

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5. The exponential form of $\log_2 \frac{1}{128} = -7$ is

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

So $\frac{1}{128} = 2^{-7}$.

Ans: (A) $\frac{1}{128} = 2^{-7}$

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6. $\log_{\frac{2}{9}} 1 =$

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

This holds for the base $\frac{2}{9}$ too.

Ans: (C) 0

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7. $\log_2 7 + \log_2 3 =$

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

$= \log_2 21$

Ans: (B) $\log_2 21$

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8. $\log_2 160 - \log_2 5 =$

$= \log_2 \frac{160}{5} = \log_2 32$

$= 5$ since $2^5 = 32$

Ans: (D) 5

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9. If $\log_{b^2} a^6 = k \log_b a$, then $k =$

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

$k = \frac{6}{2} = 3$

Ans: (A) 3

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10. $\log_{\frac{1}{2}} 32 =$

$= \log_{2^{-1}} 2^5 = \frac{5}{-1} \log_2 2$

$= -5$

Ans: (A) -5

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11. If $\log_2 11 = q$, then $\log_{11} 2 =$

$\log_{11} 2 = \frac{1}{\log_2 11} = \frac{1}{q}$

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

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12. $\log_5 2 \cdot \log_9 5 \cdot \log_8 9 =$

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

$= \log_8 2 = \frac{1}{3}$

Ans: (C) $\frac{1}{3}$

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13. $\frac{\log 4096}{\log 64} =$

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

$= \log_{64} 4096 = 2$

Ans: (B) 2

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14. $5^{\log_5 4} + 2^{\log_2 9} =$

$a^{\log_a N} = N$

$= 4 + 9 = 13$

Ans: (C) 13

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15. $5^{\log_6 2} - 2^{\log_6 5} =$

$5^{\log_6 2} = 2^{\log_6 5}$

So the difference is 0.

Ans: (B) 0

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16. If $\log_5 \sqrt{x} = \log_5 9$, then $x =$

$\Rightarrow \sqrt{x} = 9$

$\Rightarrow x = 9^2 = 81$

Ans: (B) 81

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17. If $\log_4(5x+1)=1$, then $x=$

$\log_a a = 1$

$5x+1=4$

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

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

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

$\Rightarrow \log_2 x(x+2)=3$

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

$\Rightarrow x^2+2x-8=0$

$\Rightarrow (x-2)(x+4)=0$

$\Rightarrow x=2$ (or) $x=-4$

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

$\therefore x=2$

Ans: (B) $x=2$

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19. $\log_2\log_3 81=$

$\log_3 81=4$

$\log_2 4=2$

Ans: (C) 2

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20. If $\log_a b=p$, then $\log_{\frac{1}{b}} a=$

$\log_{b^{-1}} a=-\log_b a$

$=-\frac{1}{\log_a b}=-\frac{1}{p}$

Ans: (A) $-\frac{1}{p}$

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21. If $\log_{\sqrt{x}} y\cdot\log_{\sqrt[5]{z}} x=k\log_z y$, then $k=$

$\log_{x^{\frac{1}{2}}} y=2\log_x y,\ \log_{z^{\frac{1}{5}}} x=5\log_z x$

$=10\log_x y\log_z x=10\log_z y\Rightarrow k=10$

Ans: (C) 10

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22. $3^{-3+\log_{11}1}=$

$\log_{11}1=0$

$=3^{-3}=\frac{1}{3^3}=\frac{1}{27}$

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

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

$\log(a+b)=\log ab\Rightarrow a+b=ab$

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

Ans: (B) $\frac{b}{b-1}$

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24. If $\log_x 8 = -\frac{3}{2}$, then $x =$

$8 = x^{-\frac{3}{2}}$

$\Rightarrow x = 8^{-\frac{2}{3}} = \frac{1}{4}$

Ans: (D) $\frac{1}{4}$

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25. On the graph of $y = \log_{\frac{1}{2}} x$, the value of y at $x = 8$ is

$y = \log_{\frac{1}{2}} 8$

$= -3$

Ans: (A) -3