ExamPath

CLASS 9 MATHEMATICS · FBISE · UNIT 2

Unit 2: Logarithms — Advanced Practice

20 multiple-choice questions Suggested time: **20 minutes** 1 mark each

Name: Date: Score: / 20

Circle one answer for each question. The answer key with explanations is on the last pages, so try every question before you check. These are practice questions, not official FBISE papers.

1. Given log 2 = 0.3010 and log 3 = 0.4771, find log 12.

(A) 0.9542
(B) 0.7781
(C) 1.3010
(D) 1.0791

2. Find x if $\log_2(x^2 - 1) = 3$.

(A) x = 9
(B) x = ±3
(C) x = 3 only
(D) x = ±√7

3. Which expression is NOT equal to log 100?

(A) 2
(B) log 10 + 10
(C) 2 log 10
(D) $\log 10^2$

4. What is $\log_{10} x \div \log_{10} y$ equal to (x, y > 0 and y ≠ 1)?

(A) $\log_{10} x - \log_{10} y$
(B) $\log_{10}(x - y)$
(C) $\log_y x$
(D) $\log_{10}(x \div y)$

5. When a number is written in scientific notation, the characteristic of its common logarithm is:

(A) the coefficient d
(B) the power of 10
(C) the mantissa
(D) the number of digits

6. Why is $\log_1 2$ undefined?

(A) Because log 2 is irrational
(B) Because 1 is negative
(C) Because 2 is a prime number
(D) Because 1 raised to any power is 1, never 2

7. If $\log_b m = x$ and $\log_b n = y$, which expression equals m ÷ n?

(A) b^{x-y}
(B) b^{x+y}
(C) b^{xy}
(D) $b^{x/y}$

8. The book writes log 0.0123 = bar-2.0899, where the bar is over the 2. What does this mean?

(A) −2 + 0.0899, so the characteristic is negative and the mantissa positive
(B) 2 + 0.0899
(C) −2 − 0.0899
(D) −2.0899, with both parts negative

9. For positive x and y, if log x = log y, what must be true?

(A) x = 1/y
(B) x + y = 10
(C) x = 10y
(D) x = y

10. Which statement about log 3 + log 4 is correct?

(A) It equals log 3 × log 4
(B) It equals log 7
(C) It equals log(4 − 3)
(D) It equals log 12

11. If $\log_{\sqrt{x}} 25 = 4$, what is x?

(A) −5
(B) 5
(C) 25
(D) ±5

12. The change of base law says $\log_b m$ equals:

(A) $\log_a b \div \log_a m$
(B) $\log_a m \times \log_a b$
(C) $\log_a m - \log_a b$
(D) $\log_a m \div \log_a b$

13. A student writes log(50 − 5) = log 50 − log 5. What is the mistake?

(A) The quotient law applies to log(50 ÷ 5), not to log(50 − 5)
(B) The base should be 5
(C) There is no mistake
(D) The law works only for addition

14. Which statement about natural logarithms is correct?

(A) Their base is the rational number 10
(B) Their base is the irrational number e ≈ 2.718
(C) ln e = 0
(D) ln 1 = 1

15. Which statement about $\log_2 15$ is correct?

(A) It is between 3 and 4
(B) It is between 2 and 3
(C) It equals 7.5
(D) It is between 4 and 5

16. Find x if log(x + 3) = log(15x − 4).

(A) 14
(B) 2
(C) 0.5
(D) 7

17. If one earthquake has a Richter magnitude 1 higher than another, its intensity is:

(A) 1/10 as large
(B) 2 times as large
(C) 10 times as large
(D) 1 unit more

18. Which result is correct?

(A) $\log_b a \times \log_a b = 1$
(B) $\log_b a \times \log_a b = ab$
(C) $\log_b a \times \log_a b = 0$
(D) $\log_b a \times \log_a b = b$

19. For $\log_b x$ to be defined, the conditions are:

(A) $b > 1$ and $x < 0$
(B) $b \neq 1$ and $x \geq 0$
(C) $b > 0$, $b \neq 1$ and $x > 0$
(D) $b > 0$ and x can be any real number

20. Which law states that $\log_b(mn) = \log_b m + \log_b n$?

(A) Quotient law
(B) Change of base law
(C) Product law
(D) Power law

Answer key

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

Explanations

1. D. 1.0791
$12 = 2^2 \times 3$. So $\log 12 = 2(0.3010) + 0.4771 = 1.0791$.

2. B. $x = \pm 3$
$2^3 = x^2 - 1$, so $x^2 = 9$ and $x = \pm 3$. Both values keep $x^2 - 1 = 8$ positive, so both work.

3. B. log 10 + 10
$\log 100 = 2$, $\log 10^2 = 2$ and $2 \log 10 = 2$. But $\log 10 + 10 = 11$.

4. C. $\log_y x$
By the change of base law, $\log_y x = \log_{10} x \div \log_{10} y$. It is not the same as the quotient law.

5. B. the power of 10
The characteristic is the integral power of 10 in $d \times 10^n$, that is n.

6. D. Because 1 raised to any power is 1, never 2
For $\log_1 2 = y$ we would need $1^y = 2$, which is impossible. So base 1 is not allowed.

7. A. b^{x-y}
$m = b^x$ and $n = b^y$. Dividing gives $b^x \div b^y = b^{x-y}$.

8. A. −2 + 0.0899, so the characteristic is negative and the mantissa positive
The bar shows that only the 2 is negative. The mantissa 0.0899 stays positive, so the value is $-2 + 0.0899$.

9. D. x = y
Equal logarithms to the same base come from equal numbers, so $x = y$.

10. D. It equals log 12
The sum of logarithms is the logarithm of the product: $\log 3 + \log 4 = \log(3 \times 4) = \log 12$.

11. B. 5
$(\sqrt{x})^4 = x^2 = 25$, so $x = 5$ or -5. A base must be positive, so $x = 5$.

12. D. $\log_a m \div \log_a b$
Divide the logarithm of m by the logarithm of the old base b, both written in the new base a.

13. A. The quotient law applies to log(50 ÷ 5), not to log(50 − 5)
The laws turn products and quotients into sums and differences. There is no law for the logarithm of a difference.

14. B. Their base is the irrational number e ≈ 2.718
Natural logarithms use base e. Also $\ln e = 1$ and $\ln 1 = 0$.

15. A. It is between 3 and 4
$2^3 = 8$ and $2^4 = 16$, and 15 lies between 8 and 16. So the logarithm lies between 3 and 4.

16. **C. 0.5**

Equal logs mean $x + 3 = 15x - 4$, so $14x = 7$ and $x = 0.5$. Both brackets equal 3.5, which is positive.

17. **C. 10 times as large**

$M = \log(I \div I_0)$ uses base 10. A rise of 1 in M multiplies the ratio $I \div I_0$ by 10.

18. **A. $\log_b a \times \log_a b = 1$**

By change of base, $\log_a b = 1 \div \log_b a$. So the product of the two is 1.

19. **C. $b > 0$, $b \neq 1$ and $x > 0$**

The base must be positive and not 1, and the number must be positive.

20. **C. Product law**

The logarithm of a product is the sum of the logarithms. This is the product law.

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