

Algebra 2 · Logarithms and Logarithmic Functions · Quiz

Common Core F-LE.A.4, F-BF.B.4a, F-IF.C.7e · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

This 10-question multiple choice quiz checks the meaning of logarithms, their graphs, properties and inverses. Pick the one correct answer for each question, then read the explanation to learn from any miss.

Algebra 2 Common Core: **F-LE.A.4 · F-BF.B.4a · F-IF.C.7e**

Questions

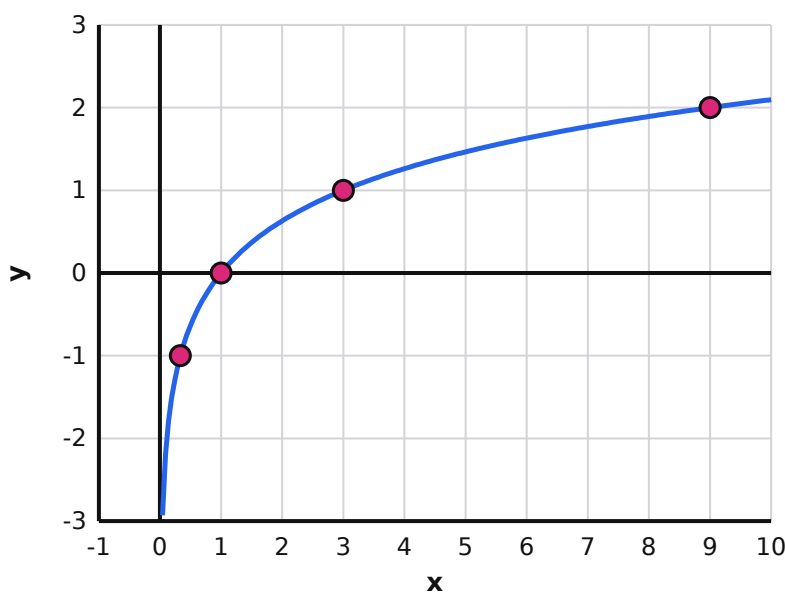
Question 1

Evaluate $\log_3 81$.

- A. 27
- B. 3
- C. 4
- D. $\frac{1}{4}$

Question 2

The graph of $y = \log_b x$ is shown and passes through (9,2). What is b ?



Graph of $y = \log_b x$ passing through (9, 2)

- A. 9
- B. 81
- C. 4.5
- D. 3

Question 3

Which equation is the logarithmic form of $5^{-2} = \frac{1}{25}$?

- A. $\log_{25} 5 = -2$
- B. $\log_5 \frac{1}{25} = -2$
- C. $\log_{-2} \frac{1}{25} = 5$
- D. $\log_5 (-2) = \frac{1}{25}$

Question 4

What is the domain of $f(x) = \log_4(x-5)$?

- A. $x < 5$
- B. $x > -5$
- C. $x \geq 5$
- D. $x > 5$

Question 5

Which expression equals $\log_2(x^3y)$?

- A. $3\log_2 x + \log_2 y$
- B. $3\log_2 x \cdot \log_2 y$
- C. $\log_2 3x + \log_2 y$
- D. $(\log_2 x)^3 + \log_2 y$

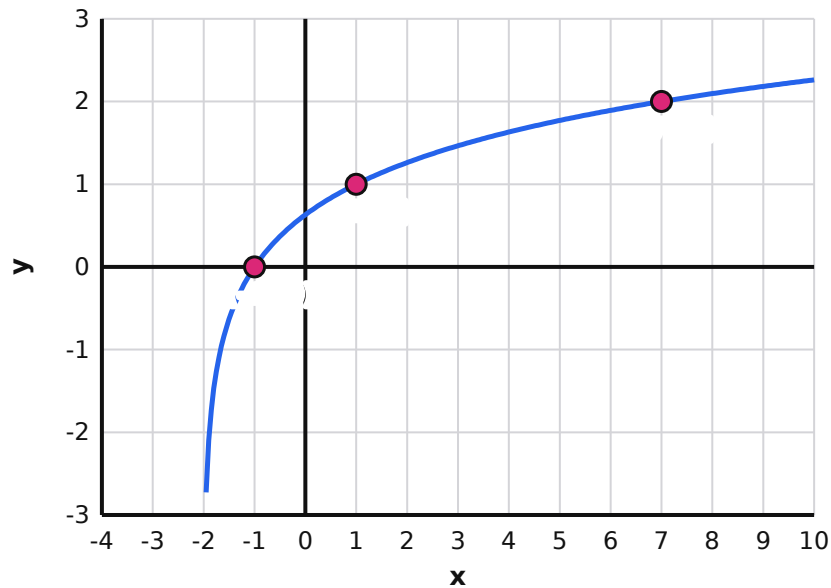
Question 6

Simplify $\log 4 + \log 25$.

- A. $\log 29$
- B. 100
- C. 4
- D. 2

Question 7

The graph of $f(x) = \log_3(x+2)$ is shown with points $(-1,0)$, $(1,1)$ and $(7,2)$. What is its vertical asymptote?



Graph with points $(-1,0)$, $(1,1)$, $(7,2)$ and asymptote $x = -2$

- A. $x = -2$
- B. $x = 2$
- C. $x = 0$
- D. $y = -2$

Question 8

Use the change of base formula to find $\log_2 12$ to the nearest thousandth.

- A. 0.279
- B. 3.585
- C. 6.000
- D. 2.485

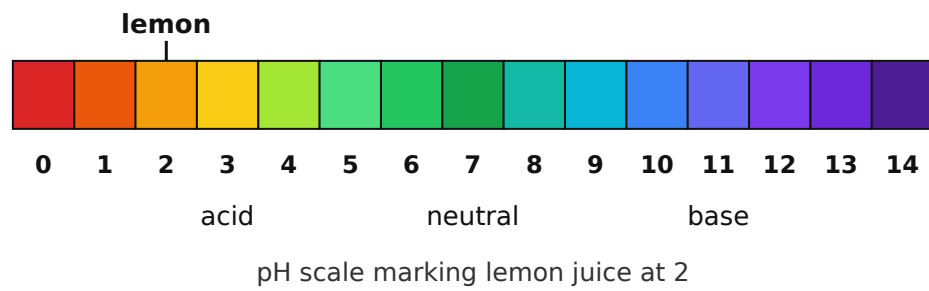
Question 9

What is the inverse of $f(x) = 2^x + 1$?

- A. $f^{-1}(x) = \log_2 x - 1$
- B. $f^{-1}(x) = \log_2(x - 1)$
- C. $f^{-1}(x) = \log_2(x + 1)$
- D. $f^{-1}(x) = \frac{1}{2^x + 1}$

Question 10

Lemon juice has $[H^+] = 10^{-2}$ mol/L. What is its pH, using $\text{pH} = -\log[H^+]$?



- A. -2
- B. 12
- C. 2
- D. 0.01

Answer key

1. **C** - $3^4 = 81$. Dividing 81 by 3 gives 27, which ignores that a logarithm is an exponent.
2. **D** - $\log_b 9 = 2$ means $b^2 = 9$, so $b = 3$. Dividing 9 by 2 confuses the exponent with a quotient.
3. **B** - The base 5 stays the base, and the exponent -2 is the value of the logarithm.
4. **D** - The argument must be positive, so $x - 5 > 0$. At $x = 5$ the argument is 0, which is not allowed.
5. **A** - A product becomes a sum and the exponent 3 comes down as a multiplier of $\log_2 x$.
6. **D** - $\log 4 + \log 25 = \log 100 = 2$. Adding the arguments (29) is a common mistake.
7. **A** - Replacing x by $x + 2$ moves the graph 2 units left, so the asymptote is $x = -2$.
8. **B** - $\frac{\ln 12}{\ln 2} \approx \frac{2.4849}{0.6931} \approx 3.585$. Inverting the quotient gives 0.279.
9. **B** - Swap to get $x = 2^y + 1$, so $2^y = x - 1$ and $y = \log_2(x - 1)$. Subtract 1 before taking the log.
10. **C** - $-\log 10^{-2} = -(-2) = 2$. Forgetting the minus sign in the formula gives -2 .

Remember:

- Standards F-LE.A.4, F-BF.B.4a and F-IF.C.7e: define logarithms, find inverses, and graph logarithmic functions.
- $\log_b x = y$ is equivalent to $b^y = x$; $\log x$ uses base 10 and $\ln x$ uses base e .
- The graph of $y = \log_b x$ has domain $x > 0$, x-intercept (1,0) and the y-axis as its vertical asymptote.
- Product, quotient and power rules: $\log_b MN = \log_b M + \log_b N$, $\log_b \frac{M}{N} = \log_b M - \log_b N$, $\log_b M^p = p \log_b M$.
- Change of base: $\log_b x = \frac{\ln x}{\ln b}$.