

Logarithms: The Inverse of Exponents

Grade 11 – Algebra 2 math · Test · Standards: F-LE.A.4, F-BF.B.4a, F-IF.C.7e

Name: _____ Date: _____ Class: _____

This 45-minute test covers converting forms, evaluating logarithms, graphs, expanding and condensing, change of base, and scale applications. A scientific calculator is allowed. Show every step of the work for full credit.

Standards: F-LE.A.4, F-BF.B.4a, F-IF.C.7e · **Level:** Grade 11 Algebra 2

Time: 45 minutes · 9 questions · Total: 20 points · Calculator: as allowed by your teacher

Question 1 Convert between forms (2 points)

- a. Write $7^2 = 49$ in logarithmic form. (1 point)
- b. Write $\log_{10} 0.01 = -2$ in exponential form. (1 point)

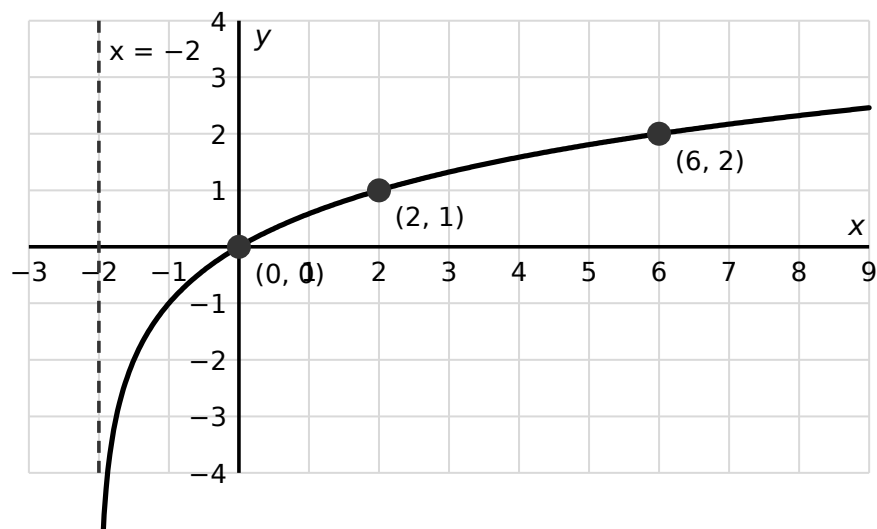
Question 2 Evaluate logarithms (3 points)

Evaluate each logarithm without a calculator.

- a. $\log_4 64$ (1 point)
- b. $\log_9 3$ (1 point)
- c. $\ln e^7 + \log 1000$ (1 point)

Question 3 Read a logarithmic graph (3 points)

The graph shows a function of the form $y = \log_2(x + 2) - 1$.



Graph for Question 3.

- State the equation of the vertical asymptote. (1 point)
- State the domain. (1 point)
- Verify algebraically that (6, 2) lies on the graph. (1 point)

Question 4 Expand a logarithm (2 points)

Expand $\log_2\left(\frac{8p^7}{q}\right)$ completely.

Question 5 Condense and simplify (2 points)

Write $\log_6 12 + \log_6 3$ as a single logarithm and evaluate it.

Question 6 Change of base (2 points)

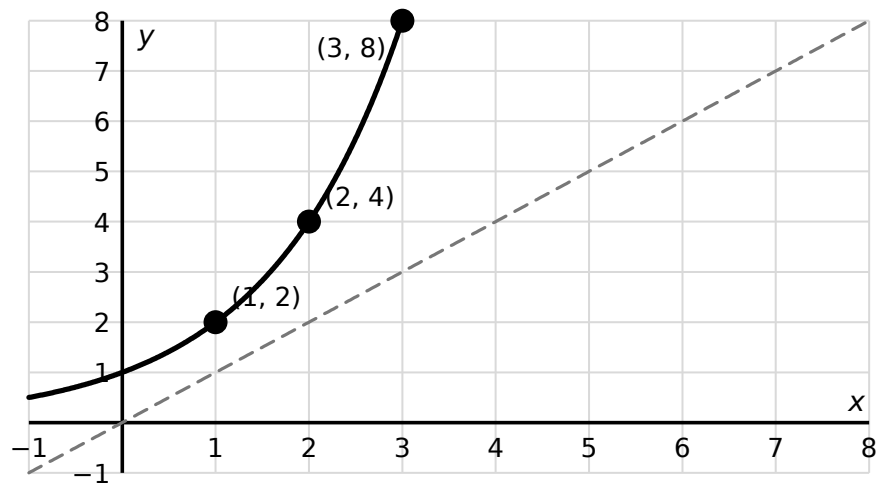
Approximate $\log_7 90$ to the nearest hundredth.

Question 7 pH of a solution (2 points)

A solution has $[H^+] = 4 \times 10^{-9}$ moles per liter. Find its pH to the nearest hundredth. Is it acidic or basic?

Question 8 Inverse from a graph (2 points)

The graph shows $y = 2^x$. Write the coordinates of three points on the inverse function and its equation.



Graph for Question 8.

Question 9 Decibels (2 points)

Use $L = 10 \log(I/I_0)$ with $I_0 = 10^{-12} \text{ W/m}^2$. Find L for $I = 8 \times 10^{-6} \text{ W/m}^2$, to the nearest tenth.