

Algebra 2: Exponential & Logarithmic Functions



Use the matching sheet ID when checking answers.

Part A: Logarithmic & Exponential Equations. Solve each problem by applying fundamental algebraic logarithmic properties.

1. Evaluate the exact numerical value of the logarithm: $\log_2(64)$

Answer: B. 6

By definition: $\log_2(64) = x \iff 2^x = 64$. Since $2^6 = 64$, $x = 6$.

2. Solve for x in the exponential equation: $3^{(2x - 1)} = 27$

Answer: B. $x = 2$

Express both sides with base 3: $27 = 3^3$. Therefore: $3^{(2x - 1)} = 3^3 \implies 2x - 1 = 3 \implies 2x = 4 \implies x = 2$.

3. A biological bacterial colony begins with 500 cells and doubles every 3 hours according to $N(t) = 500 \cdot 2^{(t / 3)}$. What is the total population after 12 hours?

Answer: B. 8,000 cells

Number of doubling periods = $12 / 3 = 4$. $N(12) = 500 \times 2^4 = 500 \times 16 = 8,000$ cells.

Part B: Logarithmic Properties Fluency. Complete each logarithmic identity with the correct numerical value or power.

1. For any positive real base $b \neq 1$, the logarithm of 1 is always $\log_b(1) = 0$ because $b^0 = 1$.

2. In common logarithms (base 10), $\log(10) = 1$ and $\log(1000) = 3$.

3. Using the power rule of logarithms: $\log_2(8) = \log_2(2^3) = 3 \cdot \log_2(2) = 3$.

4. If $\log(x) = 2$ in base 10, then the value of x is $10^2 = 100$.