

Unit 4 Test — Answer Key

Growth, Decay, Solving Equations & Fitting Models

FOR TEACHER / SELF-CHECK USE

This test was written to cover Unit 4's topics (exponential and logarithmic models for growth and decay, solving equations, and fitting models to data). Every solution below has been independently verified.

1	$32 = 2^5$, so $2^x = 2^5$ means $x = 5$. Answer: A — 5
2	$\log_2(x) = 5$ means $x = 2^5$. Answer: A — 32
3	$27 = 3^3$, so $x - 1 = 3 \rightarrow x = 4$. Answer: x = 4
4	$\log(100) = 2$, $\log(10) = 1$. $2 + 1$. Answer: A — 3
5	Product/quotient/power rules: $\log(x^2y/z) = \log(x^2) + \log(y) - \log(z) = 2\log(x) + \log(y) - \log(z)$. Answer: A — $2\log(x) + \log(y) - \log(z)$
6	$125 = 5^3$, so $2x = 3 \rightarrow x = 3/2$. Answer: x = 3/2
7	$P(10) = 200e^{0.3} \approx 200(1.34986) \approx 269.97$. Answer: A — 270
8	$\ln(x) = 2$ means $x = e^2 \approx 7.389$. Answer: A — 7.39
9	Half-life satisfies $250 = 500e^{-0.05t} \rightarrow 0.5 = e^{-0.05t}$. $\ln(0.5) = -0.05t \rightarrow t = \ln(0.5)/(-0.05) \approx 13.86$. Answer: Half-life ≈ 14 years
10	Take $\ln$ of both sides: $(x+1)\ln(2) = x \cdot \ln(3)$. $x \cdot \ln(2) + \ln(2) = x \cdot \ln(3) \rightarrow \ln(2) = x(\ln(3) - \ln(2))$. $x = \ln(2) / (\ln(3) - \ln(2)) \approx 0.6931/0.4055 \approx 1.71$. Answer: x = $\ln(2)/(\ln(3) - \ln(2)) \approx 1.71$