

Exponential Models: Growth, Decay, and Interest

Grade 11 – Algebra 2 math · Test · Standards: F-IF.C.8b, F-LE.A.4, F-LE.B.5

Name: _____ Date: _____ Class: _____

This test covers exponential growth and decay, compound interest, continuous compounding, half-life, and doubling time. A calculator is allowed. Show the formula, the substituted values, and the result with units, rounding money to the nearest cent. The test is worth 20 points.

Standards: F-IF.C.8b, F-LE.A.4, F-LE.B.5 · **Level:** Grade 11 Algebra 2

Time: 45 minutes · 8 questions · Total: 20 points · Calculator: as allowed by your teacher

Question 1 Reading a model (2 points)

A stock fund's value is modeled by $f(t) = 640(0.92)^t$, with t in years.

- State the initial value and the percent change per year. (1 point)
- Find $f(4)$ to the nearest cent. (1 point)

Question 2 Compound interest (3 points)

A deposit of \$3,200 earns 3.8% compounded quarterly. Write the model and find the balance after 9 years.

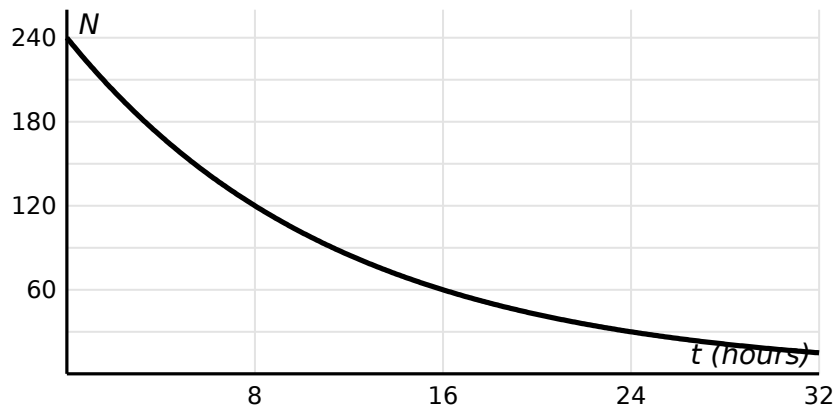
Question 3 Continuous compounding (3 points)

A deposit of \$5,000 earns 4% interest.

- Find the balance after 12 years with continuous compounding. (2 points)
- How much more is that than with annual compounding? (1 point)

Question 4 Half-life (3 points)

A 240-gram sample has a half-life of 8 hours. The graph is shown.



Decay of the sample.

- Write the model $N(t)$. (1 point)
- How many grams remain after 24 hours? (1 point)
- How many grams remain after 4 hours, to the nearest tenth? (1 point)

Question 5 Doubling followers (3 points)

A club's social media account has 1,800 followers and the count doubles every 4 days.

- Write a model for the number of followers after t days. (1 point)
- Find the number of followers after 12 days. (1 point)
- Find the number after 2 days, to the nearest follower. (1 point)

Question 6 Interpreting parameters (2 points)

A leased truck's value is $V(t) = 28,000(0.85)^t$ dollars after t years. State the meaning of 28,000 and of 0.85, and find the value after 2 years.

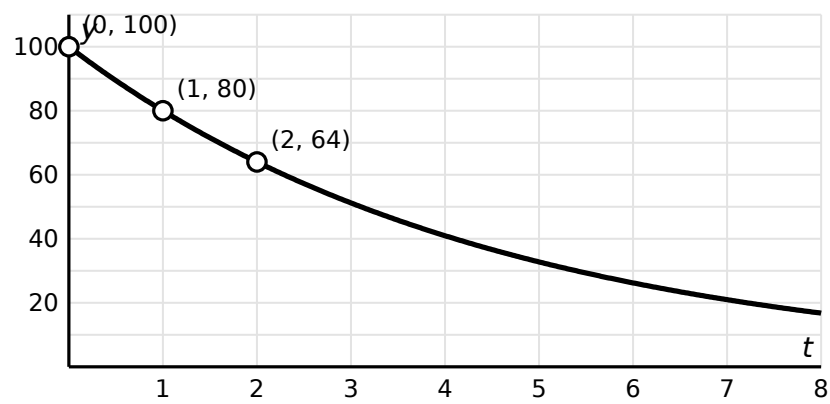
Question 7 Model from a table (2 points)

A savings balance is shown in the table. Decide whether the growth is exponential, state the percent growth per year, and write the model.

t (years)	0	1	2	3
Balance (dollars)	250	275	302.50	332.75

Question 8 Decay from a graph (2 points)

The graph of an exponential decay function $y = a \cdot b^t$ is shown.



A decay graph.

- Write the equation. (1 point)
- Find y when $t = 3$. (1 point)