

Algebra 2 · Exponential Functions and the Number e · Test

Common Core F-IF.C.8b, F-LE.A.4, F-LE.B.5 · mathovore.fr

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

This test covers Algebra 2 exponential models: growth and decay with percent rates, compound interest with the number e, half-life, doubling time, and solving with logarithms (F-IF.C.8b, F-LE.A.4, F-LE.B.5). Eight questions are worth 20 points in total. A scientific calculator is allowed.

Test information

- **Grade:** Algebra 2
- **Chapter:** Exponential Functions and the Number e
- **Common Core:** F-IF.C.8b, F-LE.A.4, F-LE.B.5
- **Time:** 45 minutes
- **Total:** 20 points (Question 1: 2 pts; Question 2: 2 pts; Question 3: 2 pts; Question 4: 3 pts; Question 5: 3 pts; Question 6: 2 pts; Question 7: 3 pts; Question 8: 3 pts)

Question 1: Growth model (2 points)

The population of a city is modeled by $P(t) = 18000(1.045)^t$, where t is in years.

- State the initial population and the yearly percent growth. (1 point)
- Find the population after 8 years, to the nearest whole number. (1 point)

Question 2: Compound interest (2 points)

Jamal invests \$2,400 at 3.2% interest compounded monthly for 5 years.

- Write the balance formula. (1 point)
- Find the balance to the nearest cent. (1 point)

Question 3: Continuous versus yearly (2 points)

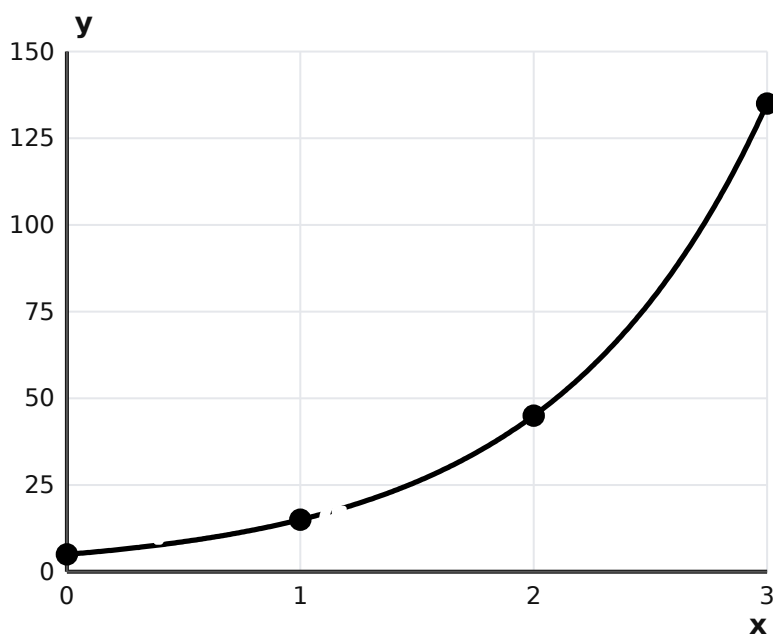
Mei invests \$1,800 at 4.5% for 12 years.

- Find the balance with continuous compounding. (1 point)

- b. Find the balance with yearly compounding and how much less it is. (1 point)

Question 4: Model from a graph (3 points)

The graph of $f(x) = a \cdot b^x$ is shown.

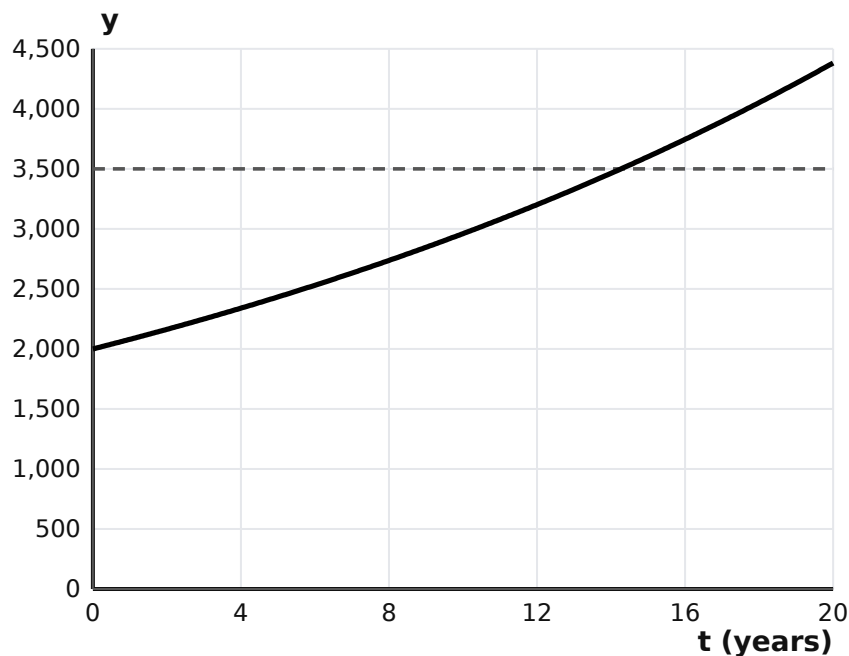


The graph of an exponential function f .

- Find a and b . (1 point)
- Write the equation. (1 point)
- Find $f(4)$. (1 point)

Question 5: Solve for time (3 points)

An account follows $A(t) = 2000(1.04)^t$ dollars after t years.



The balance $A(t) = 2000(1.04)^t$ and the line $A = 3,500$.

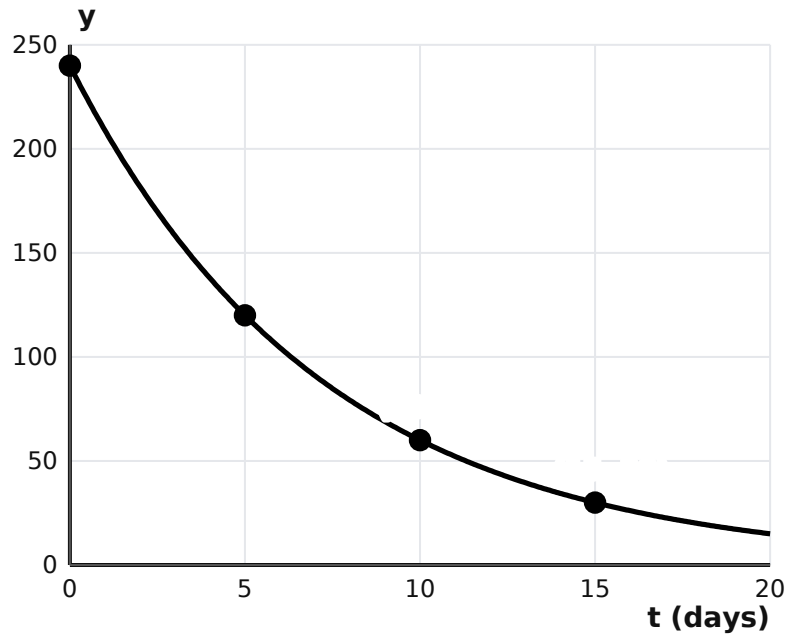
- Solve $2000(1.04)^t = 3500$ exactly. (1 point)
- Give the solution to the nearest hundredth. (1 point)
- After how many full years does the balance first exceed \$3,500? Justify. (1 point)

Question 6: Doubling time (2 points)

An investment grows by 6% each year. Find its doubling time to the nearest hundredth of a year.

Question 7: Half-life (3 points)

The graph shows the mass of a radioactive sample.



Mass of a radioactive sample, in mg.

- Read the half-life from the graph. (1 point)
- Write a model for the mass $A(t)$ after t days. (1 point)
- Find the mass after 12 days, to the nearest tenth of a mg. (1 point)

Question 8: Equivalent forms (3 points)

A quantity follows $f(t) = 500(1.12)^t$ with t in years.

- State the yearly percent growth rate. (1 point)
- Write an equivalent form $500e^{kt}$ and give k to four decimal places. (1 point)
- Find the equivalent monthly growth rate as a percent, to the nearest hundredth. (1 point)