

Algebra 1 · Exponential Growth and Decay · Test Answer Key

Common Core F-LE.A.1a, F-LE.A.1c, F-LE.A.2, F-LE.A.3, F-IF.C.8b, F-LE.B.5 · mathovore.fr

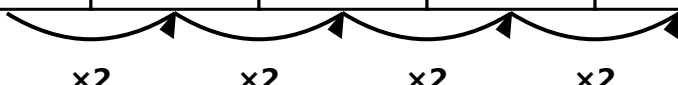
Worked solutions and scoring guides for all eight questions, 20 points in total. Award each point separately. Accept any correct equivalent form, such as 1.25 for a quarterly rate written as a decimal, as long as the work is clear.

Algebra 1 Common Core: F-LE.A.1a · F-LE.A.1c · F-LE.A.2 · F-LE.A.3 · F-IF.C.8b · F-LE.B.5

Question 1: Table to equation (2 points)

- a. $6 \div 3 = 2$, $12 \div 6 = 2$: the factor is **2**.
b. $a = 3$ (the value at $x = 0$) and $b = 2$: $y = 3(2)^x$.

x	0	1	2	3	4
y	3	6	12	24	48


Each y is multiplied by 2.

Scoring: 1 point for the factor 2, 1 point for the equation with $a = 3$.

Question 2: Classify tables (2 points)

- a. The differences are all 5: **linear**.
b. The ratios are all $12 \div 4 = 3$: **exponential** with factor 3.

Scoring: 1 point for each correct classification with a valid reason.

Question 3: Growth and decay rates (2 points)

- a. Start 1500, **6% growth** per year.
b. Start 60, **25% decay** per year ($1 - 0.75 = 0.25$).

Scoring: 1 point for each part, both the starting value and the percent with growth or decay.

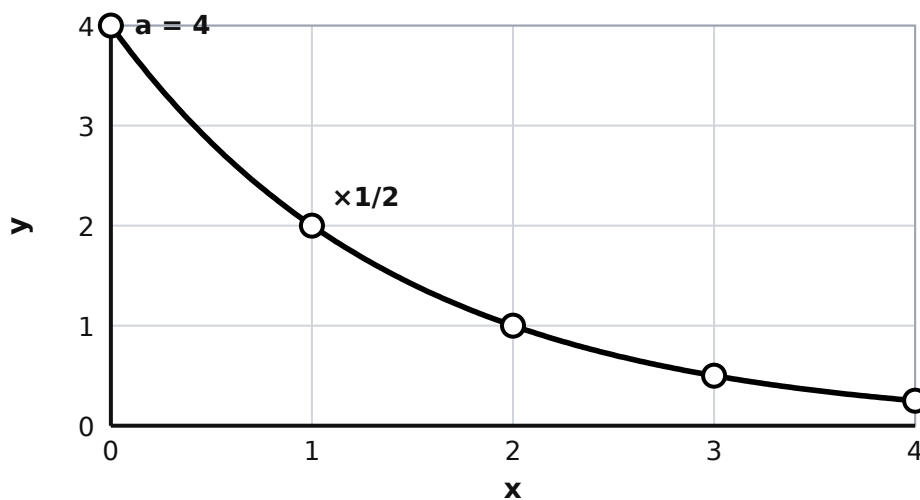
Question 4: Write and use exponential models (3 points)

- a. $P(t) = 8000(1.025)^t$
- b. $8000(1.025)^{10} = 8000 \times 1.2801 \approx 10,241$ people.
- c. $V(t) = 18000(0.88)^t$

Scoring: 1 point for each part. In (a) and (c), 0 points if the factor is 2.5 or 12 or 0.12.

Question 5: Reading an exponential graph (3 points)

- a. $a = 4$ (the y -intercept) and $b = 2 \div 4 = \frac{1}{2}$.
- b. $y = 4\left(\frac{1}{2}\right)^x$. Check: $4\left(\frac{1}{2}\right)^2 = 1$.
- c. y decreases and gets closer and closer to 0 but never reaches it.



Starting value 4, factor 1/2.

Scoring: 1 point for a and b, 1 point for the equation, 1 point for describing decay toward 0 without reaching it.

Question 6: Compound interest (3 points)

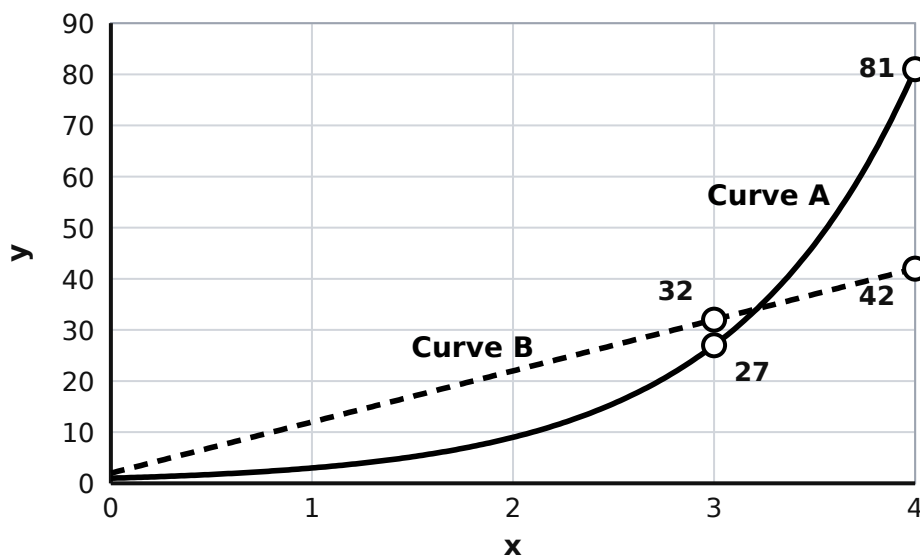
- a. $P = 3000, r = 0.04, n = 4, t = 2: A = 3000\left(1 + \frac{0.04}{4}\right)^8 = 3000(1.01)^8$.
- b. $1.01^8 \approx 1.082857$, so $A \approx \$3,248.57$.
- c. $3248.57 - 3000 = \$248.57$.

Scoring: 1 point for correct substitution ($n = 4$, exponent 8), 1 point for the balance, 1 point for the interest.

Question 7: Exponential versus linear (3 points)

- a. **Curve A:** it curves upward and multiplies by 3 for each step in x ; Curve B is a straight line that adds 10 each step.

- b. $x=3$: $32 > 27$. $x=4$: $81 > 42$. The first whole number is $x=4$.
- c. Each step adds 10 to the line, but each step multiplies Curve A by 3, adding at least $2 \cdot 3^4 = 162$ at the next step. The gap only widens.



At $x = 4$ Curve A is above Curve B.

Scoring: 1 point for Curve A with a reason, 1 point for $x = 4$ with both values shown, 1 point for an explanation that compares constant addition with multiplication.

Question 8: Interpret a model (2 points)

- a. 1200 is the number of subscribers at launch ($t=0$). 1.15 means the count grows to 115% each month, a **15% increase per month**.
- b. $1200(1.15)^3 = 1200 \times 1.520875 = 1,825$ subscribers.

Scoring: 1 point for both meanings, 1 point for 1,825.

Total
20 points