

Exponential Growth and Decay Models

Grade 9 – Algebra 1 math · Test Answer Key · Standards: F-LE.A.1a, F-LE.A.1c, F-LE.A.2, F-LE.A.3, F-IF.C.8b, F-LE.B.5

Use this answer key to score the test out of 20 points. Each solution lists where the points are earned. Award partial credit when the setup is right but the arithmetic has a slip.

Standards: F-LE.A.1a, F-LE.A.1c, F-LE.A.2, F-LE.A.3, F-IF.C.8b, F-LE.B.5 · **Level:** Grade 9 Algebra 1

Question 1 Classify and Write the Rule (2 points)

- a. Ratios $18 \div 6 = 54 \div 18 = 162 \div 54 = 3$. Exponential: **$y = 6(3)^x$** .
- b. Differences are all 7, and the value at $x = 0$ is 14. Linear: **$y = 14 + 7x$** .

Scoring: 1 point per part: correct type and equation together.

Question 2 Growth or Decay? (2 points)

- a. $0.93 < 1$, so decay. $1 - 0.93 = 0.07$: **decay of 7%**.
- b. $1.25 > 1$, so growth. $1.25 - 1 = 0.25$: **growth of 25%**.

Scoring: 1 point per part (type and rate).

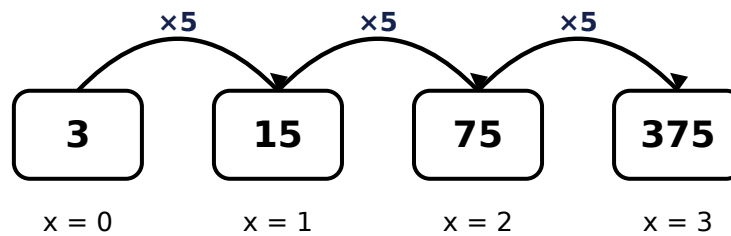
Question 3 Evaluate a Decay Function (2 points)

- a. $f(0) = 64$. $f(2) = 64(0.5625) = 36$. **64 and 36**.
- b. $f(3) = 64(0.421875) = 27$. **27**.

Scoring: 1 point for each part.

Question 4 Equation from a Graph (3 points)

- a. The y-intercept is 3, so $a = 3$. Ratio: $15 \div 3 = 75 \div 15 = 5$, so $b = 5$. **$a = 3$, $b = 5$** .
- b. **$y = 3(5)^x$** .
- c. $3(5)^3 = 3(125) = 375$.



Each step multiplies by 5.

Scoring: 1 point per part.

Question 5 Compound Interest (2 points)

$$A = 3500(1.05)^4 = 3500(1.21550625) = 4254.27...$$

\$4,254.27

Scoring: 1 point for the correct model, 1 point for the correct value.

Question 6 A Tablet Loses Value (2 points)

- a. Factor $1 - 0.15 = 0.85$: **$V = 720(0.85)^t$** .
- b. $720(0.7225) = 520.20$: **\$520.20**.

Scoring: 1 point per part.

Question 7 Two Plans Compared (3 points)

- a. $A(4) = 30 + 48 = 78$. $B(4) = 3(16) = 48$. **Plan A costs more.**
- b. $A(5) = 90$ and $B(5) = 3(32) = 96$, so Plan B is higher. At week 4 it was not ($48 < 78$).
Week 5.

Scoring: (a) 1 point. (b) 1 point for computing both values at week 5, 1 point for the conclusion.

Question 8 Interpret a Mold Model (2 points)

- a. **4 cm² is the starting area; 1.3 means the area grows by 30% each day.**
- b. $4(1.3)^3 = 4(2.197) = 8.788$, about **8.8 cm²**.

Scoring: 1 point per part.

Question 9 Line Against Curve (2 points)

$x = 9$: $f = 900$, $g = 512$ (line higher). $x = 10$: $f = 1,000$, $g = 1,024$ (curve higher).

At $x = 10$, $g(10) = 1,024 > 1,000 = f(10)$, so Mia is wrong.

Scoring: 1 point for correct values at a valid x , 1 point for the conclusion.