

Algebra 1 - Arithmetic and Geometric Sequences

- Test Answer Key

Common Core F-IF.A.3, F-BF.A.1a, F-BF.A.2, F-LE.A.2 · maths-pdf.fr/en/

Grade the sequences test with this key. Every question lists the points available and how to split them between method and result. Students who show clear work should receive partial credit, even if the final answer is not correct. The test totals 20 points in all.

Algebra 1 · Common Core State Standards: **F-IF.A.3, F-BF.A.1a, F-BF.A.2, F-LE.A.2**

Question 1 - Next term [2 pts]

a) The ratio is 5, so the sequence is geometric. Next: $250 \cdot 5 = 1250$.

b) The difference is -6, so the sequence is arithmetic. Next: $12 - 6 = 6$.

a) 1250, geometric; b) 6, arithmetic

Scoring: 1 point for each part (type and term).

Question 2 - Explicit rule [2 pts]

The difference is 4: $a_n = 6 + (n-1)(4) = 4n + 2$.

$$a_{15} = 4(15) + 2 = 62.$$

$$a_n = 4n + 2; \mathbf{62}$$

Scoring: 1 point for the rule; 1 point for the 15th term.

Question 3 - Recursive rule [2 pts]

The first term is 100 and each term is 10 less than the previous.

$$a_1 = 100, a_n = a_{n-1} - 10$$

Scoring: 1 point for the first term; 1 point for the recursive step.

Question 4 - Geometric rule [2 pts]

The ratio is 3: $a_n = 2 \cdot 3^{n-1}$.

$$a_5 = 2 \cdot 3^4 = 162.$$

$$a_n = 2 \cdot 3^{n-1}; \mathbf{162}$$

Scoring: 1 point for the rule; 1 point for the fifth term.

Question 5 - Two terms given [2 pts]

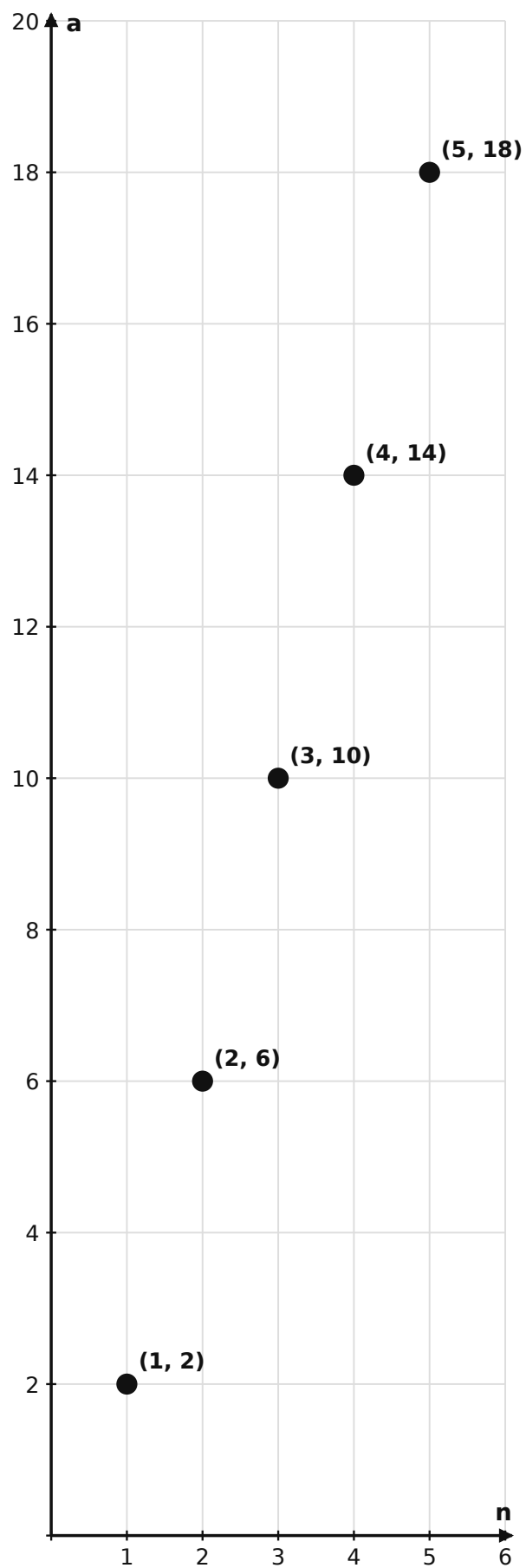
Three steps from term 2 to term 5: $d = \frac{18-9}{3} = 3$.

$$a_1 = 9 - 3 = 6, \text{ so } a_n = 6 + (n-1)(3) = 3n + 3.$$

$$a_n = 3n + 3$$

Scoring: 1 point for the common difference; 1 point for the rule.

Question 6 - Rule from a graph [2 pts]



Points of $a_n = 4n - 2$.

The terms are 2, 6, 10, 14 with $d = 4$.

$$a_n = 2 + (n-1)(4) = 4n - 2.$$

$$a_n = 4n - 2$$

Scoring: 1 point for reading d ; 1 point for the rule.

Question 7 - Savings plan [3 pts]

a) $a_n = 20 + (n-1)(8) = 8n + 12$.

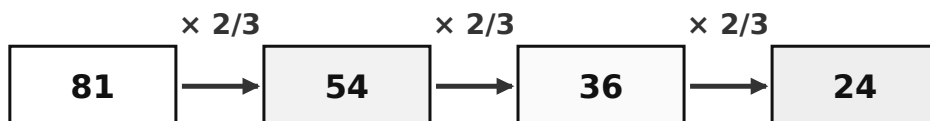
b) $8(10) + 12 = 92$.

c) Solve $8n + 12 > 150$: $8n > 138$, so $n > 17.25$. Check: week 17 gives \$148, and week 18 gives \$156.

$$a_n = 8n + 12; \text{ \$92; week 18}$$

Scoring: 1 point per part.

Question 8 - Bounce heights [3 pts]



Each bounce is two thirds of the one before.

a) $\frac{54}{81} = \frac{2}{3}$ and $\frac{36}{54} = \frac{2}{3}$.

b) $a_n = 81\left(\frac{2}{3}\right)^{n-1}$.

c) $a_4 = 81 \cdot \frac{8}{27} = 24$.

$$r = \frac{2}{3}; a_n = 81\left(\frac{2}{3}\right)^{n-1}; \text{ 24 inches}$$

Scoring: 1 point per part.

Question 9 - Compare sequences [2 pts]

A is arithmetic with $d = 5$: $a_6 = 5(6) = 30$. B is geometric with $r = 2$: $b_6 = 5 \cdot 2^5 = 160$.

30 and 160; B grows faster

Scoring: 1 point for both terms; 1 point for the conclusion.

Total
20 points