

Arithmetic and Geometric Sequences as Functions

Grade 9 – Algebra 1 math · Test Answer Key · Standards: F-IF.A.3, F-BF.A.2, F-LE.A.2

Use this answer key to score the test. Accept an equivalent formula such as $a_n = 3n + 1$ or $a_n = 4 + 3(n - 1)$, and award a method point when the common difference or ratio is correct.

Standards: F-IF.A.3, F-BF.A.2, F-LE.A.2 · **Level:** Grade 9 Algebra 1

Question 1 Classify the sequences (2 points)

(a) Constant difference $16 - 9 = 7$: **arithmetic, $d = 7$** .

(b) Constant ratio $20 \div 5 = 4$: **geometric, $r = 4$** .

Scoring: 1 point per part.

Question 2 Recursive terms (2 points)

-4 , then $-4 + 9 = 5$, $5 + 9 = 14$, $14 + 9 = 23$, $23 + 9 = 32$.

$-4, 5, 14, 23, 32$

Scoring: 1 point for the method, 1 point for all five terms.

Question 3 Explicit arithmetic (2 points)

$d = -4$, $a_1 = 21$: $a_n = 21 - 4(n - 1) = 25 - 4n$.

$a_{15} = 25 - 60 = -35$.

$a_n = 25 - 4n$; $a_{15} = -35$

Scoring: 1 point for the formula, 1 point for a_{15} .

Question 4 Explicit geometric (2 points)

$r = -6 \div 2 = -3$ and $a_1 = 2$, so $a_n = 2(-3)^{n-1}$.

$a_6 = 2(-3)^5 = 2(-243) = -486$.

$$a_n = 2(-3)^{n-1}; a_6 = -486$$

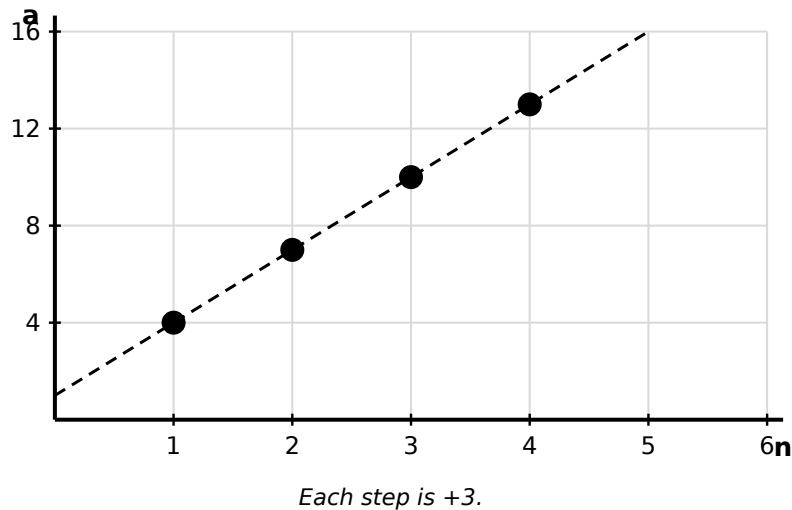
Scoring: 1 point for the formula, 1 point for a_6 .

Question 5 Sequence graph (3 points)

(a) The points rise by 3 each step: arithmetic with $d = 3$.

(b) $a_n = 4 + 3(n - 1) = 3n + 1$.

(c) $a_{30} = 3(30) + 1 = 91$.



$$a_n = 3n + 1; a_{30} = 91$$

Scoring: 1 point per part.

Question 6 Two known terms (3 points)

(a) $d = (58 - 23) \div (9 - 4) = 35 \div 5 = 7$.

(b) $a_1 = 23 - 3(7) = 2$.

(c) $a_n = 2 + 7(n - 1) = 7n - 5$.

Check: $a_4 = 23$ and $a_9 = 58$.

$$d = 7; a_1 = 2; a_n = 7n - 5$$

Scoring: 1 point per part.

Question 7 Growing fund (3 points)

(a) $r = 1.05$.

(b) $a_4 = 2,400(1.05)^3 = 2,400(1.157625) = 2,778.30$.

(c) $a_1 = 2,400$ and $a_n = 1.05 \cdot a_{n-1}$.

$r = 1.05$; \$2,778.30

Scoring: 1 point per part.

Question 8 Theater seating (3 points)

(a) $a_1 = 18$ and $d = 4$, so $a_n = 18 + 4(n - 1) = 4n + 14$.

(b) $a_{20} = 4(20) + 14 = 94$.

(c) $4n + 14 = 70$ gives $4n = 56$ and $n = 14$.

$a_n = 4n + 14$; 94 seats; row 14

Scoring: 1 point per part.