

Algebra 1 - Arithmetic and Geometric Sequences - Answer Key

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

This answer key explains every problem on the sequences worksheet. Final answers are in bold, and the lines above them show how each result was found. Use it to correct mistakes and to look for patterns in the errors you make most often.

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

Exercise 1 - Next terms

The common difference is $13 - 8 = 5$.

Next terms: $23 + 5 = 28$, $28 + 5 = 33$, $33 + 5 = 38$.

28, 33, 38

Exercise 2 - Arithmetic or geometric?

Differences: 3, 6, 12 (not constant). Ratios: $\frac{6}{3} = 2$, $\frac{12}{6} = 2$, $\frac{24}{12} = 2$ (constant).

Geometric, ratio 2

Exercise 3 - Common difference

$33 - 40 = -7$, $26 - 33 = -7$, $19 - 26 = -7$.

$d = -7$

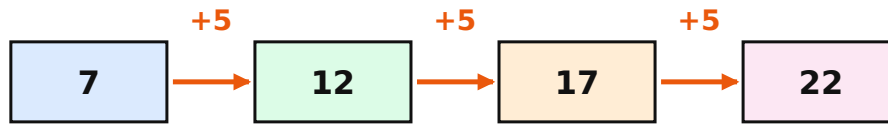
Exercise 4 - Common ratio

$\frac{3000}{2500} = 1.2$, $\frac{3600}{3000} = 1.2$, $\frac{4320}{3600} = 1.2$.

Next decade: $4320 \cdot 1.2 = 5184$.

$r = 1.2$; **5,184 people**

Exercise 5 - Explicit rule



Common difference 5.

The common difference is 5 and $a_1 = 7$.

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

$$a_n = 5n + 2$$

Exercise 6 - A distant term

The rule is $a_n = 4 + (n-1)(3) = 3n + 1$.

$$a_{20} = 3(20) + 1 = 61.$$

61

Exercise 7 - Recursive rule

The common difference is $6 - 10 = -4$.

$$a_1 = 10, a_n = a_{n-1} - 4$$

Exercise 8 - Geometric explicit rule

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

$$a_6 = 3 \cdot 2^5 = 3 \cdot 32 = 96.$$

$$a_n = 3 \cdot 2^{n-1}; \mathbf{96}$$

Exercise 9 - Fractional ratio

The ratio is $\frac{27}{81} = \frac{1}{3}$.

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

$$a_5 = 81 \cdot \frac{1}{81} = 1.$$

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

Exercise 10 - Which term?

The rule is $a_n = 5n$. Solve $5n = 95$: $n = 19$.

The 19th term

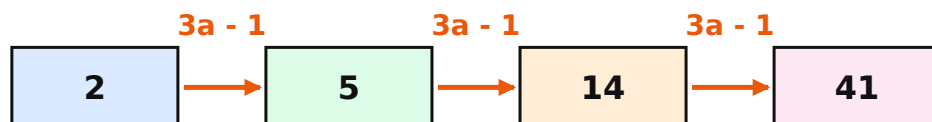
Exercise 11 - Two terms given

From term 2 to term 6 is 4 steps: $d = \frac{21-5}{4} = 4$.

Then $a_1 = 5 - 4 = 1$, so $a_n = 1 + (n-1)(4) = 4n - 3$.

$$d = 4; a_n = 4n - 3$$

Exercise 12 - Evaluate a recursive rule



Applying the rule three times.

$$a_2 = 3(2) - 1 = 5, a_3 = 3(5) - 1 = 14, a_4 = 3(14) - 1 = 41.$$

41

Exercise 13 - Is 100 in the sequence?

The rule is $a_n = 5n + 2$. Solve $5n + 2 = 100$: $5n = 98$, so $n = 19.6$.

The position must be a whole number.

No

Exercise 14 - Graph of a sequence

The terms are 5, 8, 11, 14, so $d=3$ and $a_1=5$.

$$a_n = 5 + (n-1)(3) = 3n + 2.$$

$$a_n = 3n + 2$$

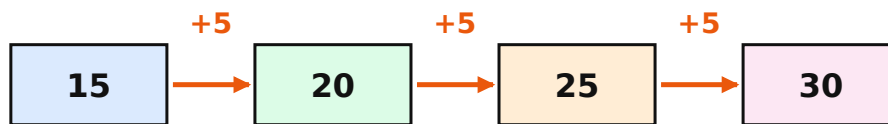
Exercise 15 - Pattern of squares

The differences are 2, so $a_n = 5 + (n-1)(2) = 2n + 3$.

$$a_{10} = 2(10) + 3 = 23.$$

$$a_n = 2n + 3; \text{ 23 squares}$$

Exercise 16 - Weekly savings



Weeks 1 to 4.

$$a_n = 15 + (n-1)(5) = 5n + 10.$$

Week 12: $5(12) + 10 = 70$. Solve $5n + 10 = 100$: $n = 18$.

$$a_n = 5n + 10; \text{ \$70; week 18}$$

Exercise 17 - Bouncing ball

The ratio is $\frac{1}{2}$.

$$a_n = 64 \left(\frac{1}{2}\right)^{n-1}. a_5 = 64 \cdot \frac{1}{16} = 4.$$

$$a_n = 64 \left(\frac{1}{2}\right)^{n-1}; \text{ 4 ft}$$

Exercise 18 - Bacteria growth

$a_n = 250 \cdot 2^{n-1}$. After 5 hours is term 6.

$$a_6 = 250 \cdot 2^5 = 250 \cdot 32 = 8000.$$

$$a_n = 250 \cdot 2^{n-1}; \text{ 8,000 bacteria}$$

Exercise 19 - Stadium seats

$$a_n = 20 + (n-1)(2) = 2n + 18.$$

Row 25: $2(25) + 18 = 68$. Solve $2n + 18 = 100$: $n = 41$.

$$a_n = 2n + 18; \text{ 68 seats; row 41}$$

Exercise 20 - Yearly raise

A 5% raise multiplies by 1.05: $a_n = 40000(1.05)^{n-1}$.

$$a_4 = 40000(1.05)^3 = 40000(1.157625) = 46305.$$

$$a_n = 40000(1.05)^{n-1}; \text{ \$46,305}$$

Exercise 21 - Two pay plans

Plan A is arithmetic: $a_n = 3n - 1$. Plan B is geometric: $b_n = 2^{n-1}$.

Compare: day 4 is \$11 versus \$8, day 5 is \$14 versus \$16.

$$a_n = 3n - 1; b_n = 2^{n-1}; \text{ day 5}$$