

Arithmetic and Geometric Sequences as Functions

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

Name: _____ Date: _____ Class: _____

These problems train recognizing arithmetic and geometric sequences, finding the common difference or ratio, and writing recursive and explicit formulas (F-BF.A.2). Sequences are treated as functions on the counting numbers (F-IF.A.3). The last six problems model situations such as savings, seating, social media, depreciation, toothpick patterns and a bouncing ball (F-LE.A.2).

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

Problem 1 Common difference (easy)

Find the common difference of 7, 13, 19, 25, ... and the next term.

Problem 2 Common ratio (easy)

Find the common ratio of 6, 30, 150, 750, ... and the next term.

Problem 3 List an arithmetic sequence (easy)

Write the first five terms when $a_1 = 12$ and $d = -4$.

Problem 4 List a geometric sequence (easy)

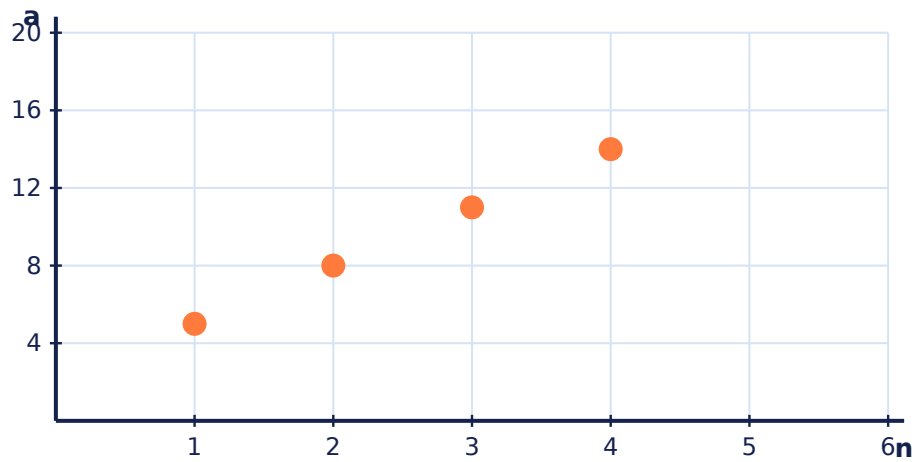
Write the first four terms when $a_1 = 2$ and $r = 5$.

Problem 5 Classify sequences (easy)

Sort each list into arithmetic, geometric, or neither: (a) 4, 9, 16, 25 (b) 24, 12, 6, 3 (c) 11, 8, 5, 2.

Problem 6 Formula from a graph (medium)

Four dots on the graph begin an arithmetic sequence. Find a formula for the n th term, then compute a_{20} .



The first four terms of a sequence.

Problem 7 Explicit arithmetic formula (medium)

Give a rule for the n th term of 15, 11, 7, 3, ... and evaluate a_{12} .

Problem 8 Explicit geometric formula (medium)

Give a rule for the n th term of 6, 18, 54, ... and evaluate a_6 .

Problem 9 Recursive to explicit (medium)

A sequence has $a_1 = 9$ and $a_n = a_{n-1} + 5$. List the first five terms and write an explicit formula.

Problem 10 Recursive geometric (medium)

For the sequence 80, 40, 20, 10, ... write a recursive formula and find a_8 .

Problem 11 Which term equals 128? (medium)

In the arithmetic sequence 8, 14, 20, ... which term equals 128?

Problem 12 Two terms of an arithmetic sequence (medium)

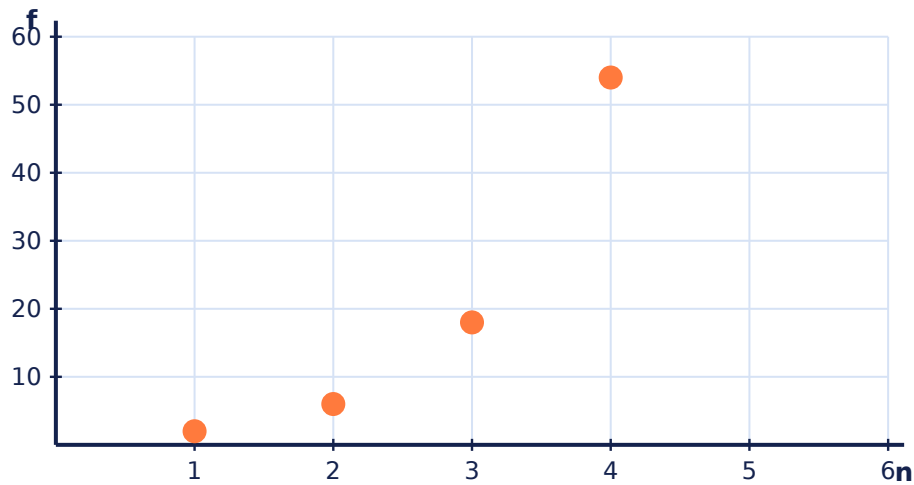
Two terms of an arithmetic sequence are known: $a_3 = 17$ and $a_7 = 37$. Determine d , a_1 and a rule for the n th term.

Problem 13 Two terms of a geometric sequence (medium)

In a geometric sequence, $a_2 = 12$ and $a_5 = 324$. Determine r and a_1 .

Problem 14 Sequence as a function (medium)

The dots on the graph are the opening values of $f(n)$. Identify the common ratio, write the rule for $f(n)$ and compute $f(5)$.



The first four terms of a sequence.

Problem 15 Weekly savings (hard)

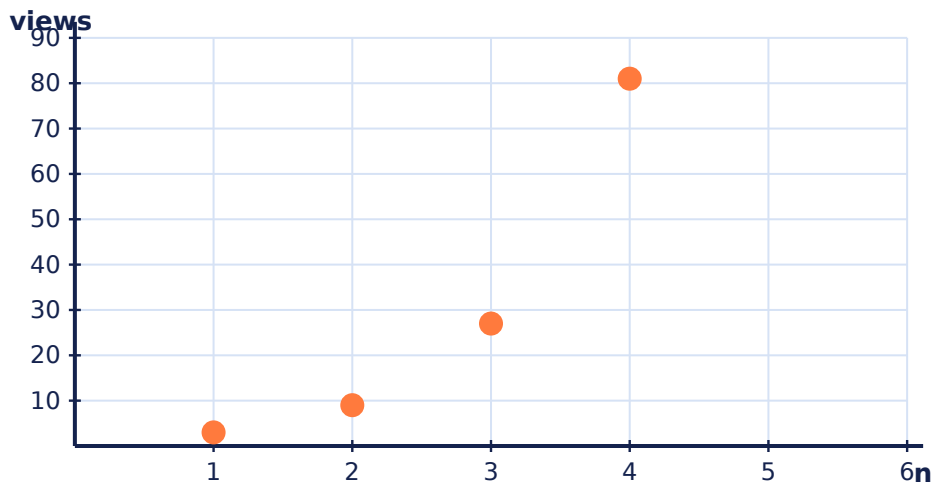
Mia saves \$15 in week 1 and adds \$8 more each week than the week before, so she saves \$15, \$23, \$31, ... in successive weeks. Write a formula for week n and find the first week she saves more than \$150.

Problem 16 Stadium rows (hard)

Row 1 of a section has 22 seats and every later row has 3 more than the one in front. Count the seats in row 30 and name the row with 70 seats.

Problem 17 Viral video views (hard)

A video gets 3 views on day 1, and the number of views triples each day. Write a formula for day n , find the views on day 7 and the first day with more than 10,000 views.



Number of views on days 1 to 4.

Problem 18 Two depreciation models (hard)

A car is worth \$18,000 in year 1. Model A loses 20% of its value each year. Model B loses \$2,500 each year. Compare the values in year 4 and write a recursive formula for Model A.

Problem 19 Toothpick squares (hard)

Toothpicks build a row of squares. Write a formula for the toothpicks needed for n squares, then find the count for 25 squares and the number of squares made from 100 toothpicks.



Row of 3 squares built from toothpicks
Squares in a row, neighbors share one toothpick.

Problem 20 Bouncing ball (hard)

A ball is dropped from 160 inches. Each bounce reaches 75% of the previous height. Write a formula for the height after bounce n , find the height after bounce 5 to the nearest hundredth, and the first bounce lower than 20 inches.