

Algebra 2 · Sequences and Series · Worksheet

Common Core A-SSE.B.4, F-BF.A.2, F-IF.A.3 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

These 24 problems practice arithmetic and geometric sequences with explicit and recursive formulas (F-BF.A.2, F-IF.A.3), then sigma notation and finite series sums (A-SSE.B.4). Early problems are short and direct, and each one has a full worked answer.

The last six are word problems about savings, seating, a bouncing ball, raises and loans. Show every step, and check each series sum by adding a few terms by hand.

Algebra 2 Common Core: A-SSE.B.4 · F-BF.A.2 · F-IF.A.3

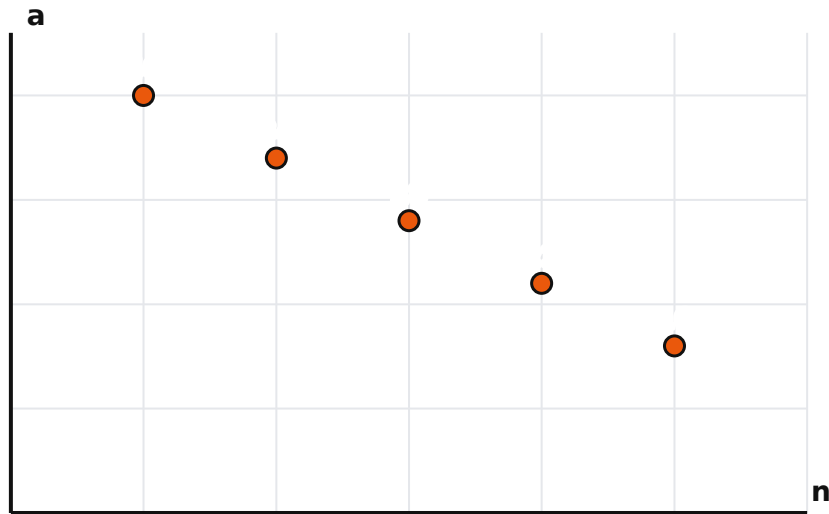
Problem 1: Arithmetic or geometric

Decide whether each sequence is arithmetic or geometric. Give the common difference or ratio.

- a. 5, 9, 13, 17
- b. 3, 6, 12, 24
- c. 20, 17, 14, 11
- d. 81, 27, 9, 3

Problem 2: Reading a graph

The graph shows the first five terms of a sequence.



Terms a_1 through a_5 .

- Decide whether the sequence is arithmetic or geometric.
- Write an explicit formula for a_n .
- Find a_{12} .

Problem 3: Explicit arithmetic rule

An arithmetic sequence has $a_1 = 7$ and common difference $d = 5$. Write an explicit formula for a_n and find a_{20} .

Problem 4: Explicit geometric rule

A geometric sequence has $a_1 = 3$ and common ratio $r = 2$. Write an explicit formula for a_n and find a_{10} .

Problem 5: Terms from a recursive rule

Write the first five terms of each sequence.

- $a_1 = 4$, $a_n = -2 \cdot a_{n-1}$
- $b_1 = 50$, $b_n = b_{n-1} - 6$

Problem 6: Writing a recursive rule

Write a recursive formula for each sequence.

- 12, 19, 26, 33
- 80, 40, 20, 10

Problem 7: How many terms

An arithmetic sequence starts 8, 13, 18 and continues with common difference 5 until its last term, 163. How many terms does it have?

Problem 8: Rule from two terms

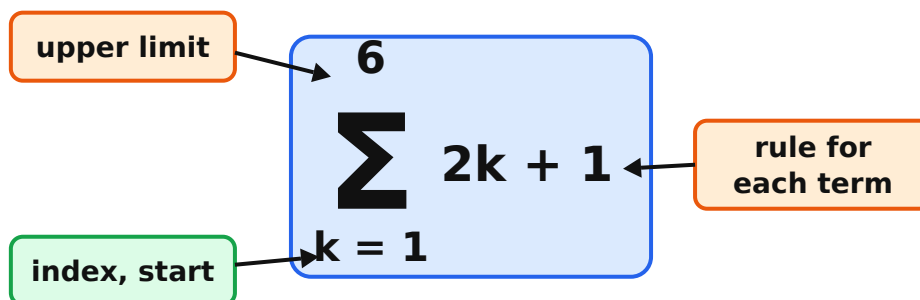
An arithmetic sequence has $a_2 = 9$ and $a_7 = 39$. Find the common difference, a_1 , and an explicit formula.

Problem 9: Geometric from two terms

A geometric sequence of positive numbers has $a_2 = 12$ and $a_5 = 324$. Find r , a_1 , and a_8 .

Problem 10: Evaluating sigma notation

Evaluate $\sum_{k=1}^6 (2k+1)$.



$$= 3 + 5 + 7 + 9 + 11 + 13$$

The sum starts at $k = 1$ and stops at $k = 6$.

Problem 11: Geometric sigma

Evaluate $\sum_{k=1}^4 2 \cdot 3^{k-1}$.

Problem 12: Writing sigma notation

Write each series in sigma notation.

a. $6+10+14+18+22$

b. $3+6+12+24+48+96$

Problem 13: Arithmetic series sum

Find the sum of the arithmetic series that starts $4+9+14$ and continues with common

difference 5 until the last term, 99.

Problem 14: Geometric series sum

Find the sum of the first 8 terms of the geometric series $5+10+20+40$ that continues with ratio 2.

Problem 15: Ratio less than 1

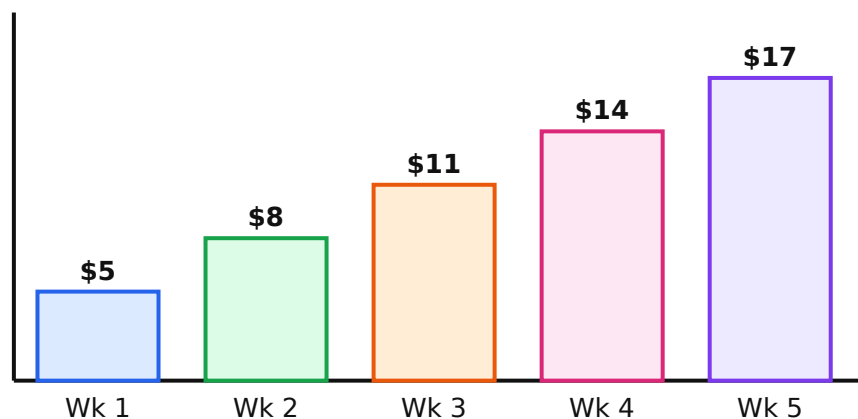
Find the sum of the first 6 terms of the geometric series $81+27+9+3$ that continues with ratio $\frac{1}{3}$.

Problem 16: Finding the number of terms

An arithmetic series has $a_1 = 2$ and $d = 3$. How many terms must be added to reach a sum of 155?

Problem 17: Weekly savings

Maya saves \$5 in week 1. Each week after that she saves \$3 more than the week before.

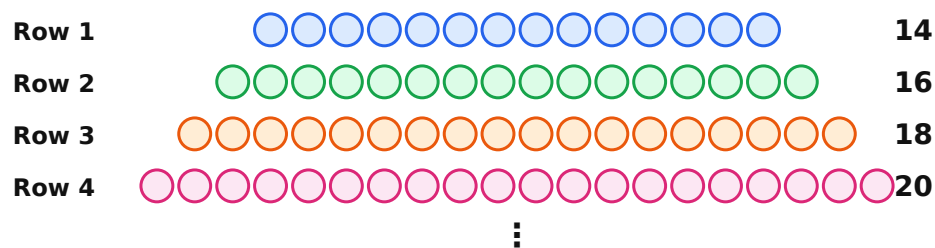


Savings for the first five weeks.

- How much does she save in week 12?
- How much has she saved in total after 12 weeks?

Problem 18: Theater seating

A school theater has 18 rows. Row 1 has 14 seats and each row has 2 more seats than the row in front of it.

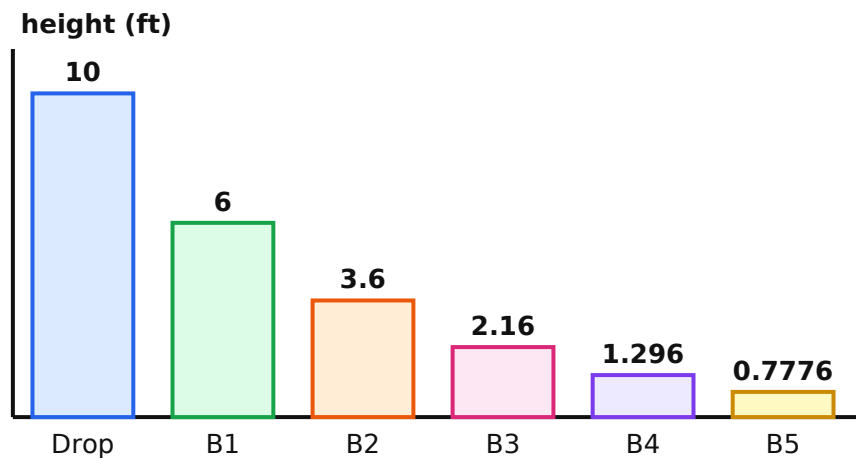


The first four rows.

- How many seats are in row 18?
- How many seats are in the theater?

Problem 19: Bouncing ball

Jamal drops a ball from a height of 10 feet. After each bounce, the ball rises to 60% of the height of the previous bounce.

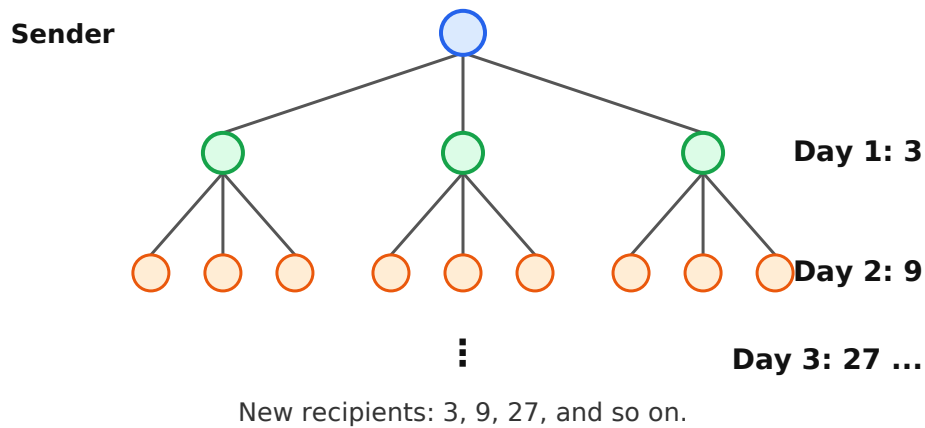


Heights of the drop and the first five bounces.

- Write an explicit formula for the height of bounce n .
- Find the height of the fifth bounce.
- Find the sum of the first five bounce heights.

Problem 20: Chain email

Noah emails a joke to 3 friends on day 1. On each following day, every person who got the joke the day before forwards it to 3 new people.



- How many people receive the joke on day 7?
- How many people have received it in total by the end of day 7?

Problem 21: Raises over ten years

Aisha starts a job at \$42,000 per year and receives a 3% raise at the start of each year after the first. Round to the nearest cent.

- Find her salary in year 10.
- Find her total earnings over the first 10 years.

Problem 22: Savings account

Priya deposits \$200 at the end of every month into an account that earns 0.5% interest per month. Find the balance right after her 12th deposit.

Problem 23: Car loan

Diego pays \$300 per month for 36 months to repay a car loan at 0.5% interest per month. The amount borrowed equals the value today of all 36 payments, where a payment made k months from now is worth $300(1.005)^{-k}$ today.

- Find the amount he borrowed.
- Find the total interest he pays.

Problem 24: Mortgage payment

Mei takes out a \$150,000 mortgage for 15 years at 6% annual interest, which is 0.5% per month. The loan amount equals the value today of all 180 equal monthly payments M .

- Write the loan amount as a geometric series sum in terms of M , then find M to the nearest cent.
- Find the total amount paid over 15 years and the total interest.