Different Types of Sequences

Let's look at other types of sequences.

3.1 Remembering Function Notation

Consider the function f given by $f(n) = 3n - 7$. This function takes an input n, multiplies it by 3, then subtracts 7 to get an output n.

Evaluate mentally.

- $f(10)$
- $f(10) - 1$
- $f(10 - 1)$
- $f(5) - f(4)$

3.2 Three Sequences

Here are the values of the first 5 terms of 3 sequences:

- A: 30, 40, 50, 60, 70, . . .
- B: 0, 5, 15, 30, 50, . . .
- C: 1, 2, 4, 8, 16, . . .

1. For each sequence, describe a way to produce a new term from the previous term.

2. If the patterns you described continue, which sequence has the second greatest value for the 10th term?
3. Which of these could be geometric sequences? Explain how you know.

3.3 Representing a Sequence

Jada and Mai are trying to decide what type of sequence this could be:

term number	value
1	2
2	6
5	18

Jada says: "I think this sequence is geometric because in the value column, each row is 3 times the previous row."

Mai says: "I don't think it is geometric. I graphed it, and it doesn't look geometric."

Do you agree with Jada or Mai? Explain or show your reasoning.

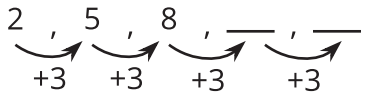
Are you ready for more?

Elena says that it's not possible to have a sequence of numbers that is *both* arithmetic and geometric. Do you agree with Elena? Explain your reasoning.

Lesson 3 Summary

Consider the sequence 2, 5, 8, . . . How would you describe how to calculate the next term from the previous term?

Each term in this sequence is 3 more than the term before it.



Here is a way to describe this sequence: the starting term is 2, and the
current term $=$ previous term $+ 3$.

This is an example of an arithmetic sequence. An **arithmetic sequence** is a sequence in which the value of each term is the value of the previous term added to a constant. If we know the constant to add, we can use it to find other terms.

For example, each term in this sequence is 3 more than the term before it. To find this constant, sometimes called the *rate of change* or *common difference*, we can subtract consecutive terms. This can also help us decide whether a sequence is arithmetic.

For example, the sequence 3, 6, 12, 24 is not an arithmetic sequence because $6 - 3 \neq 12 - 6 \neq 24 - 12$. But the sequence 100, 80, 60, 40 is arithmetic because the differences of consecutive terms are all the same: $80 - 100 = 60 - 80 = 40 - 60 = -20$. This means that the rate of change is -20 for the sequence 100, 80, 60, 40.

It is important to remember that, while the last two lessons have introduced geometric and arithmetic sequences, there are many other sequences that are neither geometric nor arithmetic.