

Lesson 3.1.2: Recursive Formulas for Sequences

Targets:

1. I understand the difference between a recursive formula and an explicit formula.
2. I understand how to read a recursive formula and an explicit formula.
3. I understand how to write a recursive formula and an explicit formula.

Warm Up:

Consider Amy's sequence: 5, 8, 11, 14, 17...

1. What is the next number in the sequence?
2. Write a formula for Amy's sequence.
3. Explain how each part of the formula relates to the sequence.

Vocab

Write a definition for the following terms. Use the formula from the warm up as an example for each term below.

1. Explicit Formula
 - a. Definition:
 - b. Example:
2. Recursive Formula
 - a. Definitions:
 - b. Example:

Practice 1

Amy, in a playful mood, asked you: What would happen if we change the "+" sign in your formula to a "-" sign? To a "×" sign? To a "÷" sign?

1. What sequence does $A(n+1) = A(n) - 3$ for $n \geq 1$ and $A(1) = 5$ generate?
2. What sequence does $A(n+1) = A(n) \cdot 3$ for $n \geq 1$ and $A(1) = 5$ generate?
3. What sequence does $A(n+1) = A(n) \div 3$ for $n \geq 1$ and $A(1) = 5$ generate?

Practice 2

Ben made up a recursive formula and used it to generate a sequence. Here is his formula:

$$B(n+1) = B(n) + 5 \text{ where } B(1) = 21$$

1. What does $B(3)$ mean? What is $B(3)$?
2. What does $2B(7) + 6$ mean? What is $2B(7) + 6$?
3. What does $B(n+1) - B(n)$ mean? What is $B(n+1) - B(n)$?
4. What does $B(9) - B(8)$ mean? What is $B(9) - B(8)$?

Practice 3

Consider a sequence given by the formula $a_n = a_{n-1} - 5$, where $a_1 = 12$ and $n \geq 1$.

1. List the first five terms of the sequence.
2. Write an explicit formula.
3. Find a_6 and a_{100} of the sequence.

Practice 4

For each sequence below, an explicit formula is given.

- Write the first 5 terms of each sequence.
- Then, write a recursive formula for the sequence.

1.) $a_n = 2n + 10$ for $n \geq 1$

2.) $a_n = \left(\frac{1}{2}\right)^{n-1}$ for $n \geq 1$

