

# Arithmetic Sequences

## Writing an Explicit Equation from a Recursive Equation

A sequence is represented by the recursive equation  $a_n = a_{n-1} - 5$ , with a first term of 6. Write an explicit equation to represent this sequence.

For an explicit equation, you need the common difference ( $d = -5$ ) and the first term ( $a_1 = 6$ ) and put it into the equation  $a(n) = a_1 + d(n - 1)$ .

$$a(n) = 6 + -5(n - 1) \text{ Now simplify.}$$

## Example #1

A sequence is represented by the recursive equation  $a_n = a_{n-1} + 4$ , with a first term of  $-8$ . Write an explicit equation to represent this sequence.

## Writing a Recursive Equation from an Explicit Equation

A sequence is represented by the explicit equation  $a(n) = 2n - 3$ . Write a recursive equation to represent this sequence.

For a recursive equation, you need the common difference ( $d = 2$ ) and the first term. In order to find the first term, put a 1 in for  $n$  and solve.

$$a(1) = 2(1) - 3 \rightarrow a(1) = 2 - 3 = -1 \rightarrow a(1) = -1.$$

Recursive Equation:  $a_1 = -1$   $a_n = a_{n-1} + 2$

## Example #1

A sequence is represented by the explicit equation  $a(n) = -3n + 7$ . Write a recursive equation to represent this sequence.

## Example #2

A sequence is represented by the explicit equation  $a(n) = \frac{1}{4}n + 8$ . Write a recursive equation to represent this sequence.

# Arithmetic Sequences

## Guided Practice

1. What is the 4<sup>th</sup> term in the sequence modeled by the recursive formula  $a_n = (a_{n-1}) + 10$ , if the first term is 5?

2. A sequence is shown.  $-20, -17, -14, -11, -8, \dots$ . Write an explicit equation that could be used to determine the value of the  $n$ th term in the sequence.

3. A school auditorium has 36 seats in the first row, 42 seats in the second row, 48 seats in the third row, and so on. How many seats are in the twentieth row?

4. An arithmetic sequence has a first term of 11 and has a common difference of  $-2$ . What is the 18<sup>th</sup> term in the sequence?

5. An arithmetic sequence has a 4<sup>th</sup> term of 8 and a 7<sup>th</sup> term of 17. What is the 1<sup>st</sup> term in this sequence?

6. The recursive formula  $a_n = a_{n-1} - 5$  has a starting value of 3. Write the explicit equation for this formula.

Write the recursive and explicit equation for each of the sequences below.

7.  $-8, -5, -2, 1, \dots$

Explicit: \_\_\_\_\_

Recursive: \_\_\_\_\_

8.  $7, 3, -1, -5, \dots$

Explicit: \_\_\_\_\_

Recursive: \_\_\_\_\_

9.  $20, 27, 34, 41, \dots$

Explicit: \_\_\_\_\_

Recursive: \_\_\_\_\_

10.  $25, 17, 9, 1, \dots$

Explicit: \_\_\_\_\_

Recursive: \_\_\_\_\_