

State the pattern for each set.

- 3, 6, 9, 12, 15, 18, 21, 24, ...
- 25, 20, 15, 10, 5, 0, -5, -10, ...
- -21, 3, 27, 51, 75, 99, 123, ...



## Unit 8: Recursive Functions

8.1

# ARITHMETIC SEQUENCES

# Definition: Arithmetic Sequence

A sequence in which there is a **common difference (d)** between consecutive terms.

$$-26, -21, -16, -11, -6, \dots$$

$d = 5$

Is the given sequence arithmetic? If so, identify the common difference.

2, 4, 8, 16, ...

4, 6, 12, 18, 24, ...

2, 5, 7, 12, ...

48, 45, 42, 39, ...

1, 4, 9, 16, ...

10, 20, 30, 40, ...

# Arithmetic Sequence Formula

The 1<sup>st</sup> term in the sequence.

The common difference.

$$a_n = a_1 + (n - 1) \cdot d$$

The “nth” term in the sequence.

ex.  $a_5$  is the 5<sup>th</sup> term.

The same as the  $n$  in  $a_n$ .

If you’re looking for the 5<sup>th</sup> term in the sequence,  $n = 5$ .

## Example 1:

$$a_n = a_1 + (n - 1) \cdot d$$

Given the sequence -4, 5, 14, 23, 32, 41, 50,...,  
find the 14<sup>th</sup> term.

Example 2:

$$a_n = a_1 + (n - 1) \cdot d$$

Given the sequence 6, 10, 14, 18, 22, 26,..., find the 17<sup>th</sup> term.



## Example 3:

$$a_n = a_1 + (n - 1) \cdot d$$

Given the sequence 81, 80.5, 80, 79.5, 79, ..., find the 9<sup>th</sup> term.

Example 4:

$$a_n = a_1 + (n - 1) \cdot d$$

Given the sequence 79, 75, 71, 67, 63,..., find the term that has a value of -169.

## Example 5:

$$a_n = a_1 + (n - 1) \cdot d$$

Given the sequence 4,7,10,13,..., find the term that has a value of 301.

Try this!

Write a formula for the following sequences.

a) 1, 7, 13, 19, ...

b) The first term is 3 and the common difference is -21

c) The second term is 8 and the common difference is 3

d)  $x+10$ ,  $x+7$ ,  $x+4$ ,  $x+1$ , ...

**Determine if the sequence is arithmetic. If it is, find the common difference. Write the formula for each sequence.**

1) 35, 32, 29, 26, ...

Find  $a_{15}$

3) -34, -64, -94, -124, ...

Find the 34th  
term

5) -7, -9, -11, -13, ...

Find the term that has the  
value of -91

2) -3, -23, -43, -63, ...

Find

$a_{10}$

4) -30, -40, -50, -60, ...

Find the 21st  
term

6) 9, 14, 19, 24, ...

Find the term that  
has the  
value of 59

## Recursive Formula for Arithmetic Sequences

- Each term in an arithmetic sequence can be obtained recursively from its preceding term by adding  $d$ :

$$a_n = a_{n-1} + d \text{ (for all } n \geq 2)$$









