Extension
Use after Lesson 5.3

Relate Arithmetic Sequences to Linear Functions

TEKS A.1.D, A.3.B; 8.5.B

GOAL Identify, graph, and write the general form of arithmetic sequences.

Key Vocabulary
- sequence
- arithmetic sequence
- common difference

A **sequence** is an ordered list of numbers. The numbers in a sequence are called *terms*. In an **arithmetic sequence**, the difference between consecutive terms is constant. The constant difference is called the **common difference**.

An arithmetic sequence has the form $a_1, a_1 + d, a_1 + 2d, \ldots$ where a_1 is the first term and d is the common difference. For instance, if $a_1 = 2$ and $d = 6$, then the sequence $2, 2 + 6, 2 + 2(6), \ldots$ or $2, 8, 14, \ldots$ is arithmetic.

EXAMPLE 1 Identify an arithmetic sequence

Tell whether the sequence is arithmetic. If it is, find the next two terms.

a. $-4, 1, 6, 11, 16, \ldots$

b. $3, 5, 9, 15, 23, \ldots$

Solution

a. The first term is $a_1 = -4$. Find the differences of consecutive terms.

$a_2 - a_1 = 1 - (-4) = 5$ $\qquad$ $a_3 - a_2 = 6 - 1 = 5$

$a_4 - a_3 = 11 - 6 = 5$ $\qquad$ $a_5 - a_4 = 16 - 11 = 5$

▶ Because the terms have a common difference ($d = 5$), the sequence is arithmetic. The next two terms are $a_6 = 21$ and $a_7 = 26$.

b. The first term is $a_1 = 3$. Find the differences of consecutive terms.

$a_2 - a_1 = 5 - 3 = 2$ $\qquad$ $a_3 - a_2 = 9 - 5 = 4$

$a_4 - a_3 = 15 - 9 = 6$ $\qquad$ $a_5 - a_4 = 23 - 15 = 8$

▶ There is no common difference, so the sequence is not arithmetic.

GRAPHING A SEQUENCE To graph a sequence, let a term's position number in the sequence be the x-value. The term is the corresponding y-value.

EXAMPLE 2 Graph a sequence

Graph the sequence $-4, 1, 6, 11, 16, \ldots$.

Make a table pairing each term with its position number.

Position, x	1	2	3	4	5
Term, y	-4	1	6	11	16

Plot the pairs in the table as points in a coordinate plane.