

**FUNCTIONS** Notice that the points plotted in Example 2 appear to lie on a line. In fact, an arithmetic sequence is a linear function. You can think of the common difference  $d$  as the slope and  $(1, a_1)$  as a point on the graph of the function. An equation in point-slope form for the function is  $a_n - a_1 = d(n - 1)$ . This equation can be rewritten as  $a_n = a_1 + (n - 1)d$ .

### KEY CONCEPT

*For Your Notebook*

#### Rule for an Arithmetic Sequence

The  $n$ th term of an arithmetic sequence with first term  $a_1$  and common difference  $d$  is given by  $a_n = a_1 + (n - 1)d$ .

### EXAMPLE 3 Write a rule for the $n$ th term of a sequence

Write a rule for the  $n$ th term of the sequence  $-4, 1, 6, 11, 16, \dots$ .  
Find  $a_{100}$ .

#### Solution

The first term of the sequence is  $a_1 = -4$ , and the common difference is  $d = 5$ .

$$a_n = a_1 + (n - 1)d \quad \text{Write general rule for an arithmetic sequence.}$$

$$a_n = -4 + (n - 1)5 \quad \text{Substitute } -4 \text{ for } a_1 \text{ and } 5 \text{ for } d.$$

Find  $a_{100}$  by substituting 100 for  $n$ .

$$a_n = -4 + (n - 1)5 \quad \text{Write the rule for the sequence.}$$

$$a_{100} = -4 + (100 - 1)5 \quad \text{Substitute } 100 \text{ for } n.$$

$$a_{100} = 491 \quad \text{Evaluate.}$$

## PRACTICE

#### EXAMPLE 1

on p. 309  
for Exs. 1–3

Tell whether the sequence is arithmetic. If it is, find the next two terms.  
If it is not, explain why not.

1.  $17, 14, 11, 8, 5, \dots$

2.  $1, 4, 16, 64, 256, \dots$

3.  $-8, -15, -22, -29, -36, \dots$

#### EXAMPLE 2

on p. 309  
for Exs. 4–9

Graph the sequence.

4.  $1, 4, 7, 11, 14, \dots$

5.  $4, -3, -10, -17, -24, \dots$

6.  $5, -1, -7, -13, -19, \dots$

7.  $2, 3\frac{1}{2}, 5, 6\frac{1}{2}, 8, \dots$

8.  $0, 2, 4, 6, 8, \dots$

9.  $-3, -4, -5, -6, -7, \dots$

#### EXAMPLE 3

on p. 310  
for Exs. 10–15

Write a rule for the  $n$ th term of the sequence. Find  $a_{100}$ .

10.  $-12, -5, 2, 9, 16, \dots$

11.  $51, 72, 93, 114, 135, \dots$

12.  $0.25, -0.75, -1.75, -2.75, \dots$

13.  $\frac{1}{4}, \frac{3}{8}, \frac{1}{2}, \frac{5}{8}, \frac{3}{4}, \dots$

14.  $0, -5, -10, -15, -20, \dots$

15.  $1, 1\frac{1}{3}, 1\frac{2}{3}, 2, 2\frac{1}{3}, \dots$

16. **REASONING** For an arithmetic sequence with a first term of  $a_1$  and a common difference of  $d$ , show that  $a_{n+1} - a_n = d$ .