12.1 Define and Use Sequences and Series
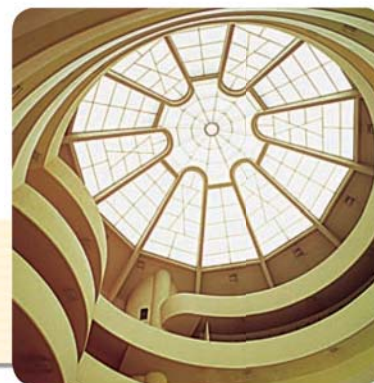
Before	You identified and wrote functions.
Now	You will recognize and write rules for number patterns.
Why?	So you can find angle measures, as in Ex. 63.

Key Vocabulary
- sequence
- terms of a sequence
- series
- summation notation
- sigma notation

KEY CONCEPT
For Your Notebook

Sequences

A **sequence** is a function whose domain is a set of consecutive integers. If a domain is not specified, it is understood that the domain starts with 1. The values in the range are called the **terms** of the sequence.

Domain: 1 2 3 4 ... n The relative position of each term

Range: a_1 a_2 a_3 a_4 ... a_n Terms of the sequence

A *finite sequence* has a limited number of terms. An *infinite sequence* continues without stopping.

Finite sequence: 2, 4, 6, 8   **Infinite sequence:** 2, 4, 6, 8, . . .

A sequence can be specified by an equation, or *rule*. For example, both sequences above can be described by the rule $a_n = 2n$ or $f(n) = 2n$.

EXAMPLE 1 Write terms of sequences

Write the first six terms of (a) $a_n = 2n + 5$ and (b) $f(n) = (-3)^{n-1}$.

Solution

a. $a_1 = 2(1) + 5 = 7$ **1st term**   b. $f(1) = (-3)^{1-1} = 1$ **1st term**

$a_2 = 2(2) + 5 = 9$ **2nd term** $f(2) = (-3)^{2-1} = -3$ **2nd term**

$a_3 = 2(3) + 5 = 11$ **3rd term** $f(3) = (-3)^{3-1} = 9$ **3rd term**

$a_4 = 2(4) + 5 = 13$ **4th term** $f(4) = (-3)^{4-1} = -27$ **4th term**

$a_5 = 2(5) + 5 = 15$ **5th term** $f(5) = (-3)^{5-1} = 81$ **5th term**

$a_6 = 2(6) + 5 = 17$ **6th term** $f(6) = (-3)^{6-1} = -243$ **6th term**

✓ **GUIDED PRACTICE** for Example 1

Write the first six terms of the sequence.

1. $a_n = n + 4$ **2.** $f(n) = (-2)^{n-1}$ **3.** $a_n = \dfrac{n}{n+1}$