

# 4.6

## Arithmetic Sequences

For use with Exploration 4.6

**Essential Question** How can you use an arithmetic sequence to describe a pattern?

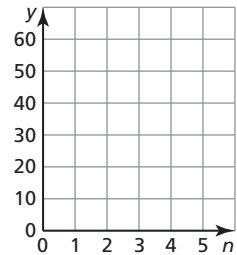
An **arithmetic sequence** is an ordered list of numbers in which the difference between each pair of consecutive **terms**, or numbers in the list, is the same.

### 1 EXPLORATION: Describing a Pattern

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

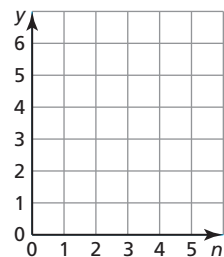
**Work with a partner.** Use the figures to complete the table. Plot the points given by your completed table. Describe the pattern of the  $y$ -values.

a.  $n = 1$        $n = 2$        $n = 3$        $n = 4$        $n = 5$



Number of stars, $n$	1	2	3	4	5
Number of sides, $y$					

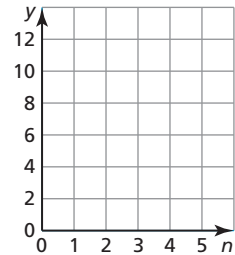
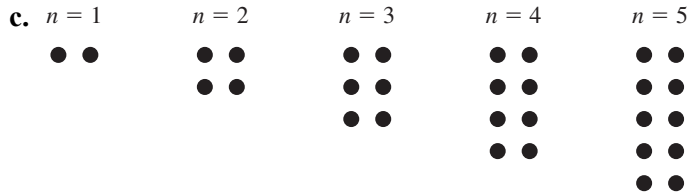
b.  $n = 1$        $n = 2$        $n = 3$        $n = 4$        $n = 5$



$n$	1	2	3	4	5
Number of circles, $y$					

**4.6 Arithmetic Sequences (continued)**

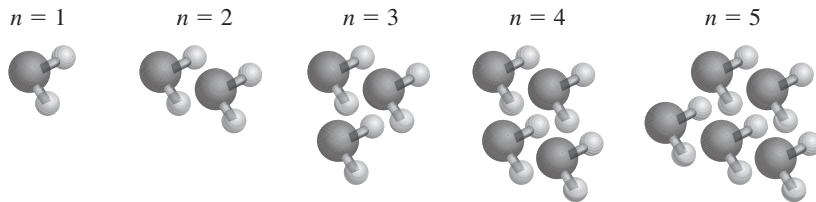
**1 EXPLORATION: Describing a Pattern (continued)**



Number of rows, $n$	1	2	3	4	5
Number of dots, $y$					

**Communicate Your Answer**

- How can you use an arithmetic sequence to describe a pattern? Give an example from real life.
  
- In chemistry, water is called  $H_2O$  because each molecule of water has two hydrogen atoms and one oxygen atom. Describe the pattern shown below. Use the pattern to determine the number of atoms in 23 molecules.



**4.6****Notetaking with Vocabulary**

For use after Lesson 4.6

In your own words, write the meaning of each vocabulary term.

sequence

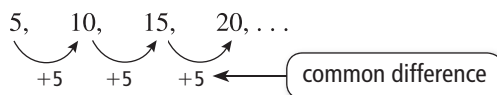
term

arithmetic sequence

common difference

**Core Concepts****Arithmetic Sequence**

In an **arithmetic sequence**, the difference between each pair of consecutive terms is the same. This difference is called the **common difference**. Each term is found by adding the common difference to the previous term.



Terms of an arithmetic sequence

**Notes:****Equation for an Arithmetic Sequence**

Let  $a_n$  be the  $n$ th term of an arithmetic sequence with first term  $a_1$  and common difference  $d$ . The  $n$ th term is given by

$$a_n = a_1 + (n - 1)d.$$

**Notes:**

**4.6** Notetaking with Vocabulary (continued)

**Extra Practice**

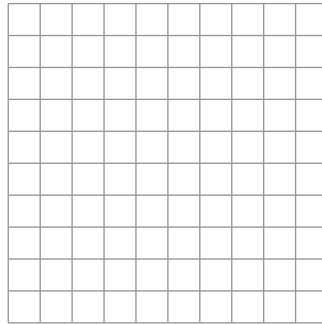
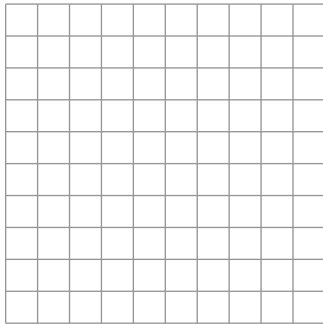
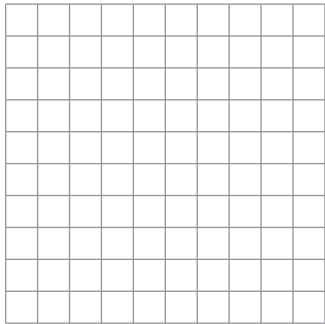
In Exercises 1–6, write the next three terms of the arithmetic sequence.

1. 1, 8, 15, 22, ...      2. 20, 14, 8, 2, ...      3. 12, 21, 30, 39, ...

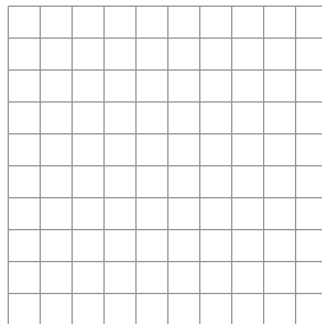
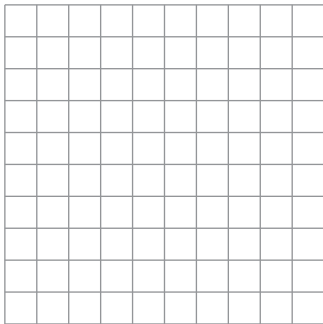
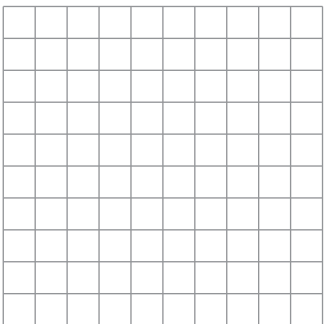
4. 5, 12, 19, 26, ...      5. 3, 7, 11, 15, ...      6. 2, 14, 26, 38, ...

In Exercises 7–12, graph the arithmetic sequence.

7. 1, 3, 5, 7, ...      8. 9, 6, 3, 0, ...      9.  $\frac{15}{2}, \frac{13}{2}, \frac{11}{2}, \frac{9}{2}, \dots$

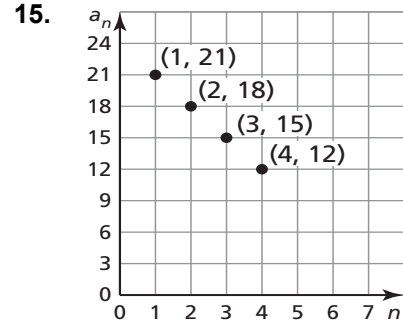
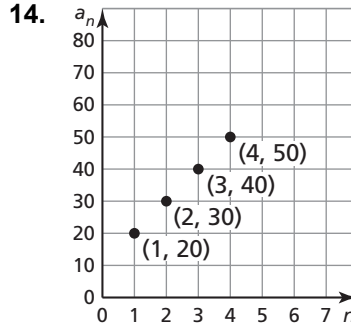
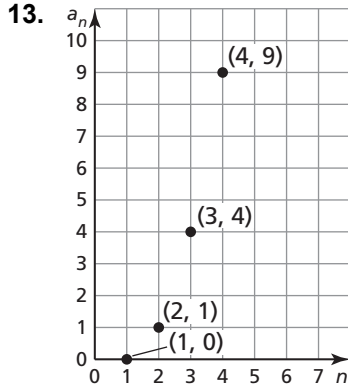


10. 1, 2.5, 4, 5.5, ...      11. 1, 4, 7, 10, ...      12.  $\frac{1}{4}, \frac{5}{4}, \frac{9}{4}, \frac{13}{4}, \dots$



**4.6** Notetaking with Vocabulary (continued)

In Exercises 13–15, determine whether the graph represents an arithmetic sequence. Explain.



In Exercises 16–21, write an equation for the  $n$ th term of the arithmetic sequence. Then find  $a_{10}$ .

**16.**  $-5.4, -6.6, -7.8, -9.0, \dots$

**17.**  $43, 38, 33, 28, \dots$

**18.**  $6, 10, 14, 18, \dots$

**19.**  $-11, -9, -7, -5, \dots$

**20.**  $34, 37, 40, 43, \dots$

**21.**  $\frac{9}{4}, \frac{7}{4}, \frac{5}{4}, \frac{3}{4}, \dots$

**22.** In an auditorium, the first row of seats has 30 seats. Each row behind the first row has 4 more seats than the row in front of it. How many seats are in the 25th row?