

**4-7 Study Guide and Intervention** *(continued)***Arithmetic Sequences**

**Write Arithmetic Sequences** You can use the common difference of an arithmetic sequence to find the next term of the sequence. Each term after the first term is found by adding the preceding term and the common difference.

<b>Terms of an Arithmetic Sequence</b>	If $a_1$ is the first term of an arithmetic sequence with common difference $d$ , then the sequence is $a_1, a_1 + d, a_1 + 2d, a_1 + 3d, \dots$
<b><math>n</math>th Term of an Arithmetic Sequence</b>	$a_n = a_1 + (n - 1)d$

**Example 1** Find the next three terms of the arithmetic sequence 28, 32, 36, 40, ...

Find the common difference by subtracting successive terms.

$$\begin{array}{cccc} 28 & 32 & 36 & 40 \\ \downarrow & \downarrow & \downarrow & \\ +4 & +4 & +4 & \end{array}$$

The common difference is 4.

Add 4 to the last given term, 40, to get the next term. Continue adding 4 until the next three terms are found.

$$\begin{array}{cccc} 40 & 44 & 48 & 52 \\ \downarrow & \downarrow & \downarrow & \\ +4 & +4 & +4 & \end{array}$$

The next three terms are 44, 48, 52.

**Example 2** Write an equation for the  $n$ th term of the sequence 12, 15, 18, 21, ...

In this sequence,  $a_1$  is 12. Find the common difference.

$$\begin{array}{cccc} 12 & 15 & 18 & 21 \\ \downarrow & \downarrow & \downarrow & \\ +3 & +3 & +3 & \end{array}$$

The common difference is 3.

Use the formula for the  $n$ th term to write an equation.

$$a_n = a_1 + (n - 1)d \quad \text{Formula for the } n\text{th term}$$

$$a_n = 12 + (n - 1)3 \quad a_1 = 12, d = 3$$

$$a_n = 12 + 3n - 3 \quad \text{Distributive Property}$$

$$a_n = 3n + 9 \quad \text{Simplify.}$$

The equation for the  $n$ th term is  $a_n = 3n + 9$ .

**Exercises**

**Find the next three terms of each arithmetic sequence.**

1. 9, 13, 17, 21, 25, ...

2. 4, 0, -4, -8, -12, ...

3. 29, 35, 41, 47, ...

4. -10, -5, 0, 5, ...

5. 2.5, 5, 7.5, 10, ...

6. 3.1, 4.1, 5.1, 6.1, ...

**Find the  $n$ th term of each arithmetic sequence described.**

7.  $a_1 = 6, d = 3, n = 10$

8.  $a_1 = -2, d = -3, n = 8$

9.  $a_1 = 1, d = -5, n = 20$

10.  $a_1 = -3, d = -2, n = 50$

11.  $a_1 = -12, d = 4, n = 20$

12.  $a_1 = 1, d = \frac{1}{2}, n = 11$

**Write an equation for the  $n$ th term of the arithmetic sequence.**

13. 1, 3, 5, 7, ...

14. -1, -4, -7, -10, ...

15. -4, -9, -14, -19, ...