11-1 Study Guide and Intervention
Arithmetic Sequences

Arithmetic Sequences An **arithmetic sequence** is a sequence of numbers in which each **term** after the first term is found by adding the **common difference** to the preceding term.

*n*th Term of an Arithmetic Sequence	$a_n = a_1 + (n-1)d$, where a_1 is the first term, d is the common difference, and n is any positive integer

Example 1 Find the next four terms of the arithmetic sequence 7, 11, 15, … .

Find the common difference by subtracting two consecutive terms.

$11 - 7 = 4$ and $15 - 11 = 4$, so $d = 4$.

Now add 4 to the third term of the sequence, and then continue adding 4 until the four terms are found. The next four terms of the sequence are 19, 23, 27, and 31.

Example 2 Find the thirteenth term of the arithmetic sequence with $a_1 = 21$ and $d = -6$.

Use the formula for the *n*th term of an arithmetic sequence with $a_1 = 21$, $n = 13$, and $d = -6$.

$a_n = a_1 + (n-1)d$ Formula for *n*th term
$a_{13} = 21 + (13 - 1)(-6)$ $n = 13$, $a_1 = 21$, $d = -6$
$a_{13} = -51$ Simplify.

The thirteenth term is -51.

Example 3 Write an equation for the *n*th term of the arithmetic sequence $-14, -5, 4, 13, …$.

In this sequence $a_1 = -14$ and $d = 9$. Use the formula for a_n to write an equation.

$$a_n = a_1 + (n-1)d \qquad \text{Formula for the } n\text{th term}$$
$$= -14 + (n-1)9 \qquad a_1 = -14, d = 9$$
$$= -14 + 9n - 9 \qquad \text{Distributive Property}$$
$$= 9n - 23 \qquad \text{Simplify.}$$

Exercises

Find the next four terms of each arithmetic sequence.

1. 106, 111, 116, …   **2.** $-28, -31, -34, …$ **3.** 207, 194, 181, …

Find the first five terms of each arithmetic sequence described.

4. $a_1 = 101, d = 9$ **5.** $a_1 = -60, d = 4$ **6.** $a_1 = 210, d = -40$

Find the indicated term of each arithmetic sequence.

7. $a_1 = 4, d = 6, n = 14$ **8.** $a_1 = -4, d = -2, n = 12$

9. $a_1 = 80, d = -8, n = 21$ **10.** a_{10} for $0, -3, -6, -9, …$

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

11. 18, 25, 32, 39, …   **12.** $-110, -85, -60, -35, …$ **13.** 6.2, 8.1, 10.0, 11.9, …

11-1 Skills Practice

Arithmetic Sequences

Find the next four terms of each arithmetic sequence.

1. 7, 11, 15, …

2. $-10, -5, 0, \ldots$

3. 101, 202, 303, …

4. 15, 7, -1, …

5. $-67, -60, -53, \ldots$

6. $-12, -15, -18, \ldots$

Find the first five terms of each arithmetic sequence described.

7. $a_1 = 6, d = 9$

8. $a_1 = 27, d = 4$

9. $a_1 = -12, d = 5$

10. $a_1 = 93, d = -15$

11. $a_1 = -64, d = 11$

12. $a_1 = -47, d = -20$

Find the indicated term of each arithmetic sequence.

13. $a_1 = 2, d = 6, n = 12$

14. $a_1 = 18, d = 2, n = 8$

15. $a_1 = 23, d = 5, n = 23$

16. $a_1 = 15, d = -1, n = 25$

17. a_{31} for 34, 38, 42, …

18. a_{42} for 27, 30, 33, …

Complete the statement for each arithmetic sequence.

19. 55 is the __?__th term of 4, 7, 10, ….

20. 163 is the __?__th term of $-5, 2, 9, \ldots$.

Write an equation for the nth term of each arithmetic sequence.

21. 4, 7, 10, 13, …

22. $-1, 1, 3, 5, \ldots$

23. $-1, 3, 7, 11, \ldots$

24. 7, 2, $-3, -8, \ldots$

Find the arithmetic means in each sequence.

25. 6, __?__, __?__, __?__, 38

26. 63, __?__, __?__, __?__, 147