9-3 Arithmetic Sequences

Essential Question: How can you recognize and extend an arithmetic sequence and find a given term of the sequence?

Objectives
Recognize and extend an arithmetic sequence.

Find a given term of an arithmetic sequence.

Vocabulary
sequence
term
arithmetic sequence
common difference

Why learn this?
The distance between you and a lightning strike can be approximated by using an arithmetic sequence.

During a thunderstorm, you can estimate your distance from a lightning strike by counting the number of seconds from the time you see the lightning until the time you hear the thunder.

Time (s)	Distance (mi)	
1	0.2	
2	0.4	+ 0.2
3	0.6	+ 0.2
4	0.8	+ 0.2
5	1.0	+ 0.2
6	1.2	+ 0.2
7	1.4	+ 0.2
8	1.6	+ 0.2

When you list the times and distances in order, each list forms a *sequence*. A **sequence** is a list of numbers that may form a pattern. Each number in a sequence is a **term**.

In the distance sequence, each distance is 0.2 mi greater than the previous distance. When the terms of a sequence differ by the same nonzero number d, the sequence is an **arithmetic sequence** and d is the **common difference**. The distances in the table form an arithmetic sequence with $d = 0.2$.

The variable a is often used to represent terms in a sequence. The variable a_9, read "a sub 9," is the ninth term in a sequence. To designate any term, or the nth term, in a sequence, you write a_n, where n can be any number.

To find a term in an arithmetic sequence, add d to the previous term.

Know it! Note

Finding a Term of an Arithmetic Sequence

The nth term of an arithmetic sequence with common difference d is

$$a_n = a_{n-1} + d.$$

COMMON CORE GPS **EXAMPLE 1** MCC9-12.F.BF.2

Identifying Arithmetic Sequences

Determine whether each sequence appears to be an arithmetic sequence. If so, find the common difference and the next three terms in the sequence.

A 12, 8, 4, 0, …

Step 1 Find the difference between successive terms.

12, 8, 4, 0, …
-4 -4 -4

Add −4 to each term to find the next term. The common difference is −4.

Step 2 Use the common difference to find the next 3 terms.

12, 8, 4, 0, −4, −8, −12
-4 -4 -4

$a_n = a_{n-1} + d$

The sequence appears to be an arithmetic sequence with a common difference of −4. The next 3 terms are −4, −8, −12.

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