

Section 2.6: Arithmetic Sequences

NC.M1.F-BF.1 Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.

NC.M1.F-LE.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading from a table).

Review. Complete the following. Show work!

1. If $f(x) = 3x + 2$, find:

a. $f(2)$

b. $f(-1)$

c. x if $f(x) = 29$

2. Compute the slope of the line parallel to the line that passes through the points $(-2, 5)$ and $(3, -5)$.

A **sequence** is a _____. The numbers themselves are called the _____. Often times when we are given a sequence we will be asked to find a pattern in it.

Example 1. Given the table of distance and times, is there a pattern?

Distance (m)	400	800	1200	1600	2000
Time (min:sec)	1:32	3:04	4:36	6:08	7:40

An **Arithmetic Sequence** is a numerical pattern that _____ at a _____ called the _____.

Example 2: 3, 5, 7, 9, 11, ...

Example 3: 33, 29, 25, 21, 17, ...

Application 1. Determine whether each sequence is an arithmetic sequence. Explain.

a. -4, -2, 0, 2, ...

b. $\frac{1}{2}, \frac{5}{8}, \frac{3}{4}, \frac{13}{16}, \dots$

c. -26, -22, -18, -14, ...

d. 1, 4, 9, 25, ...

In an arithmetic sequence, you can use the common difference to find the next term.

Example 4. Find the next three terms of the arithmetic sequence 15, 9, 3, -3, ...

Application 2. Find the next four terms of the arithmetic sequence 9.5, 11.0, 12.5, 14.0, ...

Each term of an arithmetic sequence can be expressed in terms of the first term a_1 and the common difference d . For the table below, use the sequence: 8, 11, 14, ...

$a_1 =$ _____ $d =$ _____

Term	Symbol	In terms of a_1 and d	Numbers
First term			
Second term			
Third term			
Fourth term			
n th term			

The n th Term of an Arithmetic Sequence

The n th term of an arithmetic sequence with first term a_1 and common difference d is given by

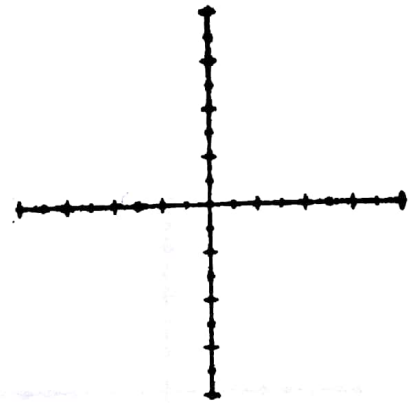
Example 5.

a. Write an equation for the n th term of the arithmetic sequence $-12, -8, -4, 0, \dots$

b. Find the 9th term of the sequence.

c. Graph the first five terms of the sequence.

n		a_n	(n, a_n)
1			
2			
3			
4			
5			



d. Which term of the sequence is 32?

Application 3. Consider the sequence: $3, -10, -23, -36, \dots$

a. Write the equation for the n th term of the sequence.

b. Find the 15th term of the sequence.

c. Which term of the sequence is 114? -114

Arithmetic Sequences and Functions. As you can see in the previous example the graph of the first five terms of the arithmetic sequence lie on a line. An arithmetic sequence is a linear function in which n is the independent variable, a_n is the dependent variable and d is the rate of change. The formula can be written as a function:

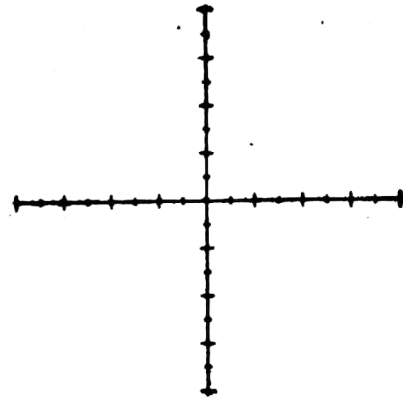
$$f(n) =$$

where n is a counting number.

Example 6. Marisol is mailing invitations to her birthday party. The arithmetic sequence 0.42, 0.84, 1.26, 1.68, ... represents the cost of postage.

a. Write a function to represent the sequence.

b. Graph the function and determine the domain.

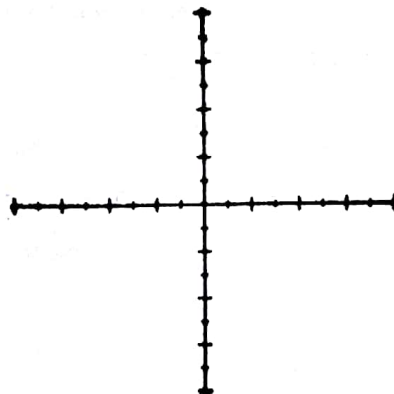


Application 4. The chart below shows the length of Martin's long jumps.

Jump	1	2	3	4
Length (ft)	8	9.5	11	12.5

a. Write a function to represent the arithmetic sequence.

b. Graph the function.



Practice.

1. Determine whether each sequence is an arithmetic sequence.

a. 18, 16, 15, 13, ...

b. 4, 9, 14, 19, ...

c. -10, -7, -4, 1, ...

d. -12.3, -9.7, -7.1, -4.5, ...

2. Find the next 3 terms of each arithmetic sequence.

a. 12, 9, 6, 3, ...

b. -2, 2, 6, 10, ...

c. 6, 12, 18, 24, ...

d. 0.02, 1.08, 2.14, 3.2, ...

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

a. 15, 13, 11, 9, ...

b. -1, -0.5, 0, 0.5, ...

c. -3, -8, -13, -18, ...

d. -2, 3, 8, 13, ...

4. Shiloh and her friends spent the day at an amusement park. In the first hour, they rode two rides. After 2 hours they had ridden 4 rides. They had ridden 6 rides after 3 hours. Write a function to represent the arithmetic sequence.

5. The table shows how Ryan is paid at his lumber yard job.

Linear feet of 2x4 planks cut	10	20	30	40	50	69	70
Amount of money \$	8	16	24	32	40	48	56

Write a function to represent Ryan's commission.