

Name: _____

Date: _____

Sequences, Day 1!

13, 17, 21, 25, 29

Do Now:

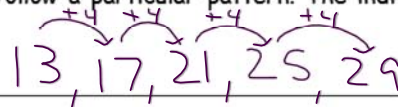
Arrange the following numbers in order from least to greatest: 17, 29, 21, 13, 25

Do you notice a pattern? +4 each time (increase by 4)

What is a sequence?

A **sequence** is a set of numbers that follow a particular pattern. The individual elements in a sequence are called **terms**.

List the sequence from the Do Now:



- What is the pattern? add 4
- Which number is the fourth term? 25

Term Number (position)	1	2	3	4	5
Term	13	17	21	25	29

$f(x) = y$
 $f(1) = 13$

Sequences are functions

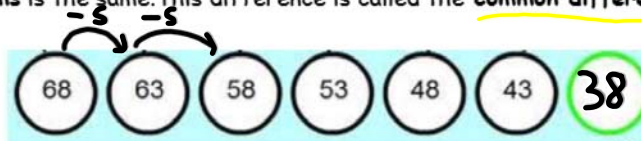
- Whose **domain** is the set of natural numbers (1, 2, 3, 4, ...).
- Whose **range** consists of the terms of the sequence.
- That can be expressed in **subscript** or **function** notation.

a_1 $f(1)$

Term Number	Term	Subscript Notation	Function Notation
1	13	a_1	$f(1)$
2	17	a_2	$f(2)$
3	21	a_3	$f(3)$
4	25	a_4	$f(4)$
5	29	a_5	$f(5)$
6		a_6	$f(6)$
n		a_n	$f(n)$

What is an Arithmetic Sequence?

An **arithmetic sequence** is an ordered list of numbers in which the difference between each pair of consecutive **terms** is the same. This difference is called the **common difference (d)** and it is a **constant value**.



To find the common difference: Take any term and subtract the previous term.

- The common difference in this example is -5.

To find the next term: Add the common difference to the previous term.

- The next term in this example is 38.

$43 + (-5) = 43 - 5 = 38$

if the numbers (or terms) are decreasing, the common diff. must be negative

Let's take a look at some sequences...is there a common difference?

(2) -2, -5, -8, -11,...

(3) 16, 12, 9, 8, 4, 2,...

(4) $\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, 1, \frac{5}{4}, \dots$ ^{25 k}

Yes **(-3)**

No! There is NO pattern.

Yes **($\frac{1}{4}$)**

Writing Arithmetic Sequences as Functions

You can use the first term and the common difference to write a function rule that describes an arithmetic sequence.

Let's take another look at the sequence from the Do Now. How can we find the 75th term of the sequence?

Common difference

13, 17, 21, 25, 29

$a_1 = 13$ $d = 4$

First term

mystery value

Term # n	Term a_n	Written in terms of a_1 and d	Term
1	a_1	a_1	13
2	a_2	$a_1 + d$	$13 + 4 = 17$
3	a_3	$a_1 + d + d \rightarrow a_1 + 2d$	$13 + 2(4) = 21$
4	a_4	$a_1 + d + d + d \rightarrow a_1 + 3d$	$13 + 3(4) = 25$
n	a_n	$a_1 + d(n-1)$	

The Explicit Formula to find the n th term of an arithmetic sequence:

Subscript Notation $a_n = a_1 + d(n-1)$

Function Notation $a(n) = a(1) + d(n-1)$

Use the explicit formula (function rule) from the Do Now to determine the 75th term of the sequence.

P ✓
E ✓
M ✓
D
A
S

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

$$a_{75} = 13 + 4(75 - 1)$$

$$a_{75} = 13 + 4(74) \quad \text{must come 1st}$$

$$a_{75} = 13 + 296$$

$$a_{75} = 309$$