



Algebra, Been there –Done that is a newsletter that links algebra to previously learned concepts and skills or outside experiences

When you skipped counted as a child, you were introduced to arithmetic sequences.

Skip counting is a form of an Arithmetic Sequence

Examples A: 2, 4, 6, 8, ...
10, 20, 30, 40, ... are all very recognizable patterns. These next two represent a slight variation to the first two examples.

Rate of Change – Common Difference

Examples B: 2, 12, 22, 32, ... → adding 10
10, 13, 16, 19, ... → adding 3

Arithmetic Sequence

All of these examples fit the definition of an Arithmetic Sequence. An **arithmetic sequence** is a sequence in which every term after the first term is found by adding a constant – called the common difference (d).

a_n – nth term
 a_1 – 1st term
 d – common difference

To find the nth term of an arithmetic sequence, we find how many times we add the constant to the first term. So the first example under **Example B**, to find the 6th term of the sequence, we found we added 10 five times to the first term – which is 2.

Generally, what we found was we added the constant to the first term one less time than the term we were looking. So, looking for the 6th term, we added 10 five times.

Mathematically, we have $a_6 = 2 + (6-1)10$
The 6th term of the sequence 52. What would be the 101st term?

Formula for nth term

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

Adding the constant ONE less time than the term $(n - 1)$ looking being looked for.

$$a_{101} = 2 + (101 - 1)10$$

$$a_{101} = 2 + (100)10 = 1002$$

I can write the formula for the nth term using function notation by substituting values for a_1 , d , and rewriting a_n as $f(n)$, then simplifying.

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

Common Difference
Rate of Change
Slope

$$f(n) = 2 + (n - 1)10$$

$$f(n) = 2 + 10n - 10$$

$$f(n) = -8 + 10n \quad \text{or} \quad f(n) = 10n - 8$$

Arithmetic Sequences can be described as Linear Functions

Please take note that the common difference in an arithmetic sequence is the rate of change, the slope. $f(n) = 10n - 8$ is in the Slope Intercept Form of a Line and the slope is 10 - the same as the common difference.

By using this formula, to find the 101st term, we merely substitute 101 in to the function.

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$$f(n) = 10n - 8$$

$$f(101) = 10(101) - 8$$

$$f(101) = 1002$$

Just as we got before