**Definitions:**

* A **sequence** is a list of .
* Each element of the sequence is called a .
* The first term is called the term.

An **arithmetic sequence** goes from one term to the next by always the same value. For instance,

Ex 1: 2, 5, 8, 11, 14, . . . Ex 2: 7, 3, –1, –5, . . .

**Common Difference:** The number at each stage of an arithmetic sequence. We represent it by using .

For example, find the common difference and the next term of the following sequence:

**3, 11, 19, 27, 35, . . .**

To find the common difference, I have to subtract a pair of terms. It doesn't matter which pair I pick, as long as they're right next to each other:

The difference is always 8, so ***d* = .**

To find the next term in the sequence add the common difference to the last given value.

35 + d =

We can represent the sequence in two ways- explicitly or recursively.

**Recursive Formula for Arithmetic Sequences:**

Given the following sequence, how would you get from the current term to the next term?

**7, 10, 13, 16, ……**

Use the words **Now** and **Next** to describe a relationship in the sequence.

It’s good to include what the starting value is.

You Try: Write the recursive formula using Next-Now.

**75, 87, 99, ……**

**Explicit Formula for Arithmetic Sequences:**

The explicit formula (or rule) for an arithmetic sequence is:

Using the explicit formula to represent the sequence allows us to find any term in the sequence.

**Ex:** Write the explicit formula for the sequence.

**7, 10, 13, 16, ……**

Explicit Formula:

Find the 20th term for this sequence.

**Practice:**

1. Is the sequence arithmetic? If yes, identify the common difference.−5, − 7, −9, −11, −15,...
2. Write the recursive formula for the sequence: 0.5, 1, 1.5, 2, 2.5,...
3. Write the explicit formula for the sequence: 1, 3, 5, 7, 9,...
4. Write the recursive formula for the sequence: 14, 11, 8, 5, 2,...
5. Write the explicit formula for the sequence: 65, 51, 37, 23, 9,...

**For each of the following, determine the initial term, common difference, recursive formula, and explicit formula.**

1. 14, 34, 54, 74, 94, ...

Initial term:

Common Difference:

Recursive Formula:

Explicit Formula:

1. −34, −64, −94, −124, ...

Initial term:

Common Difference:

Recursive Formula:

Explicit Formula:

1. −7, −9, −11, −13, ...

Initial term:

Common Difference:

Recursive Formula:

Explicit Formula:

1. 9, 14, 19, 24, ...

Initial term:

Common Difference:

Recursive Formula:

Explicit Formula:

**For each of the following, determine the initial term, common difference, recursive formula, and explicit formula.**

1. 4, 8, 12, 16, …
2. 27, 15, 3, -9, -21, …
3. 10, 6, 2, -2, …
4. -1, -4, -1, 2, …
5. -12, -18, -24, -30, …
6. $\frac{1}{2}, 1, \frac{3}{2}, 2, … $
7. $10.2, 10.5, 10.8, …$
8. −2, 5, 12, 19, 26, …
9. $3, 3\frac{1}{3}, 3\frac{2}{3}, 4, …$