

1. Generating sequences

Use these rules to generate the first 5 terms of each sequence.

Add 5 to the previous term, start with 2.

2, 7, 12, 17, 22, ...

Double the previous term, start with 1.

1, 2, 4, 8, 16, ...

Half the previous term and then add 4. Start with 80.

80, 44, 26, 17, 12.5, ...

If the last term is even, halve it.

If the last term is odd, subtract 1 and double. Start with 24.

24, 12, 6, 3, 4, ...

Year 8 - Sequences

3. Special sequences

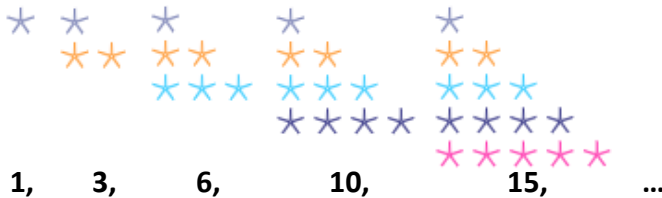
Here is a sequence: 1, 1, 2, 3, 4, 8, ...

The term-to-term rule is:

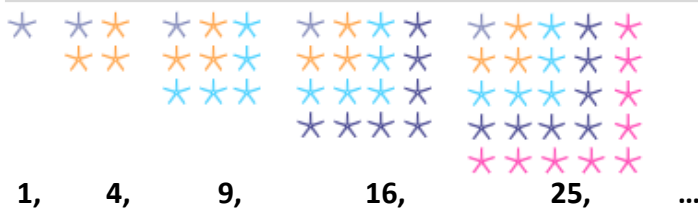
add the last two terms to get the next one

This sequence is called the **Fibonacci sequence**.

A sequence may come from a pattern.



This sequence is called the **triangular numbers**.



This sequence is called the **square numbers**.

2. Linear sequences

Look at the sequence:

3, 5, 7, 9, 11, ...
+2 +2 +2 +2

Each number in the sequence is called a **term**.

A sequence is **linear** if there is a **common difference** between consecutive terms.

The difference between two consecutive terms is always 2.

In this sequence the **common difference** is 2.

B. Generating linear sequences

A sequence has an nth term of $3n + 1$.

Find the first 5 terms:

$$\begin{array}{ll} 1\text{st} = 3 \times 1 + 1 = 4 & 4\text{th} = 3 \times 4 + 1 = 13 \\ 2\text{nd} = 3 \times 2 + 1 = 7 & 5\text{th} = 3 \times 5 + 1 = 16 \\ 3\text{rd} = 3 \times 3 + 1 = 10 & \end{array}$$

4, 7, 10, 13, 16, ...

Notice that the sequence goes up in 3s.

The **3** in the formula represents the **common difference** between terms.

C. Finding the nth term of linear sequences

Find the nth term of this sequence

Step 1: find the common difference

The difference between consecutive terms is **4**.

Step 2: Compare to the first 5 multiples of 4.

Multiples of 4 ($4n$):

4, 8, 12, 16, 20, ...
+1 ↶ +1 ↶ +1 ↶ +1 ↶ +1 ↶

Our sequence:

5, 9, 13, 17, 21, ...

So, the nth term formula is $4n + 1$

Find the nth term of this sequence

Step 1: find the common difference

The difference between consecutive terms is **7**.

Step 2: Compare the sequence to the first 5 multiples of 7.

Multiples of 7 ($7n$):

7, 14, 21, 28, 35, ...
-5 ↶ -5 ↶ -5 ↶ -5 ↶ -5 ↶

Our sequence:

2, 9, 16, 23, 30, ...

So, the nth term formula is $7n - 5$