

A large red square with a white border, centered on a white background. Inside the square, the text "Natural Number Sequences" is written in white.

Natural Number Sequences

Natural Numbers

What are natural numbers?

0, 1, 2, 3, 4, 5, 6, 7, 8, 9 etc

Sequences

What is a **sequence**?

A **sequence** is an ordered list of numbers, and each of these numbers are called a *term*.

Ex. What is the sequence of odd natural numbers?

1, 3, 5, 7, 9, 11, 13...

What is the second term in this sequence? 3

Rank

The position of each term is called the **rank** of that term.

ex. What is the sequence of the even natural numbers?

0, 2, 4, 6, 8, 10 etc

Let's put this into a table:

Number	Rank
0	1
2	2
4	3
6	4

Notice how the rank is different from the number!

Rules/Patterns

All the sequences that we look in will have a predictable **pattern**, which we will call the **rule**.

The number that we will always start with - will be 0 or 1

Rule of Natural Numbers

The rule for the sequence of natural numbers is $t = n$.

t = the term and n = the natural number we put into the rule

What does this mean?

Let's start with $n = 0$

How do we solve for t ?

$$t = n$$

$$t =$$

$$n = 1$$

How do we solve for t ?

$$t = n$$

$$t =$$

Example 2: Rule of Even Numbers

Rule : $t = (2)(n)$

Let's start with $n = 0$

Sequence: { }

Example 3: Rule of Odd Numbers

$$t = (2)(n) + 1$$

Start with $n = 0$

Sequence: { }

Example 4

Which term t has a rank r of 3 in the sequence given by the rule:

$$t = 3r + 1$$

Example 5

State the rule of the sequence of perfect squares 0, 1, 4, 9, 16, 25... where we start with $n = 0$.

Classwork

1. Rule : $t = n + 3$

Give the first four terms of the sequence that starts with $n = 0$

2. Rule: $t = 3n - 1$

Give the first four terms of the sequence that starts with $n = 1$

3. State the rule of the sequence of odd numbers 1, 3, 5, 7... where we start with $n = 1$

4. Rule: $t = r^3 - 1$

What term t , has a rank r of 5?

5. Rule: $t = 4r$

What is the rank r of the term $t = 20$?