**Natural Numbers** - Common counting numbers.

**Prime Number** - A natural number greater than 1 which has only 1 and itself as factors.

**Composite Number** - A natural number greater than 1 which has more factors than 1 and itself.

**Whole Numbers** - The set of Natural Numbers with the number 0 adjoined.

**Integers** - Whole Numbers with their opposites (negative numbers) adjoined.

**Rational Numbers** - All numbers which can be written as fractions.

**Irrational Numbers** - All numbers which cannot be written as fractions.

**Real Numbers** - The set of Rational Numbers with the set of Irrational Numbers adjoined.

**Complex Number** - A number which can be written in the form a + bi where a and b are real numbers and i is the square root of -1.

|  |  |
| --- | --- |
| **Type of Number** | **Example** |
| Natural Numbers | N=1,2,3,4,... |
| Prime Number | P=2,3,5,7,11,13,17,… |
| Composite Number | 4,6,8,9,10,12,... |
| Whole Numbers | W=0,1,2,3,4,… |
| Integers | Z=…,−3,−2,−1,0,1,2,3,… |
| Rational Numbers | Q=−12,0.33333…,52,1110,…,… |
| Irrational Numbers | F=...,π,2–√,0.121221222... |
| Real Numbers | R=...,−3,−1,0,15,1.1,2–√,2,3,π,… |
| Complex Number | C=...,−3+2i,0,1+3i,… |

Diagram, schematic

Description automatically generated

**Permutation**: A permutation is an arrangement in a definite order of several objects taken some or all at a time. Let us take 10 numbers: 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. The number of different 4-digit-PIN which can be formed using these 10 numbers is 5040. P(10,4) = 5040.

**Formula: nPr=n!/(n−r)!**

**Combination**: A combination is all about grouping. The number of different groups which can be formed from the available things can be calculated using [combinations](https://www.cuemath.com/data/combinations/). Let us try to understand this with a simple example. A team of 2 is formed from 5 students(William, James, Noah, Logan, and Oliver). This the combination of 'r' persons from the available 'n' persons is given as nCr=n!r!.(n−r)!nCr=n!r!.(n−r)! The combinations can happen in the following 10 ways by which the team of 2 could be formed.

* William James
* William Noah
* William Logan
* William Oliver
* James Noah
* James Logan
* James Oliver
* Logan Noah
* Logan Oliver
* Oliver Noah

This is a simple example of combinations. C(5,2) = 10.

Use combination when order does not matter.

**Recursion:**

A picture containing icon

Description automatically generated

**Simplification:**

Diagram

Description automatically generated with medium confidence

**We can write generic function for this (recurrence relation to find the factorial)**A picture containing Word

Description automatically generated

**If we keep doing this, will go infinite loop. To break this, we should have Base case.**

Icon

Description automatically generated with medium confidence

**Mathematical Def:**

Graphical user interface

Description automatically generated

Diagram, timeline

Description automatically generated

Timeline

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