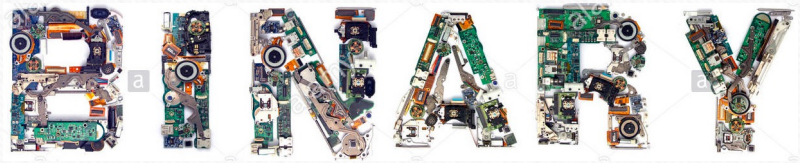
MATHEMATICAL LANGUAGE AND SYMBOLS

FOUR BASIC CONCEPTS



a collection of distinct objects forming a group.

a collection of well-defined objects, called elements or member of the set.

Denoted by { }.

A, B, C

{Element, Element, Element}

What are the different notations in sets?

To learn about sets we shall use some accepted notations for the familiar sets of numbers.

Some of the different notations used in sets are:

$\in$ Element or member

The object in a set.

$\notin$ Not element or non-member

The object is not belong to the set.

Let **B** be the set of zodiac sign.

B = {Capricorn, Leo, Virgo, Taurus, Libra}

Leo $\in$ **B**

Queen $\notin$ **B**

$S = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$

$1 \in S$

$9 \in S$

$a \notin S$

$m \notin S$

Ways to describe a Sets:

- **ROSTER/TABULAR METHOD**

– the elements in the given set are listed or enumerated, separated by a comma, inside a pair of braces.

ROSTER/TABULAR METHOD

The set V of all vowels in the English alphabet can be written as

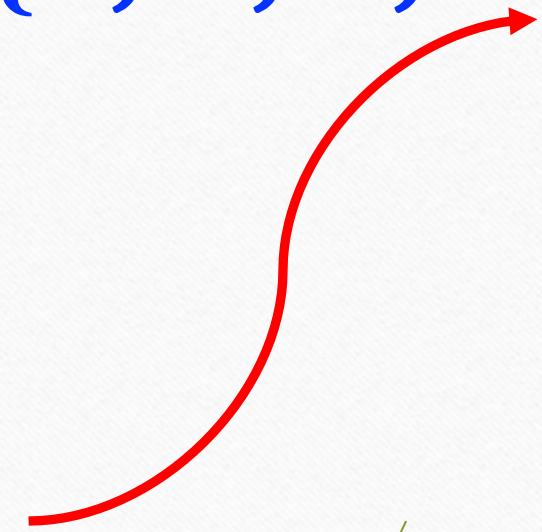
$$V = \{a, e, i, o, u\}$$

The set E of even counting numbers less than 10 can be expressed by

$$E = \{2, 4, 6, 8\}$$

ROSTER/TABULAR METHOD

The set of positive even numbers less than 100 can be denoted by $\{2, 4, 6, \ldots, 98\}$



Ellipses

Union of two sets

The union of the sets A and B is the set that contains those elements that either A or in B, or in both.

Intersection of two sets

The intersection of the sets A and B is the set that containing those elements in both A and B.

ROSTER/TABULAR METHOD

N Set of Natural numbers

$\{1, 2, 3\ldots\}$

W Set of Whole numbers

$\{0, 1, 2, 3\ldots\}$

ROSTER/TABULAR METHOD

I or Z — Set of integers

$\{\ldots -3, -2, -1, 0, 1, 2, 3\ldots\}$

Z^+ — Set of positive integers

$\{1, 2, 3\ldots\}$

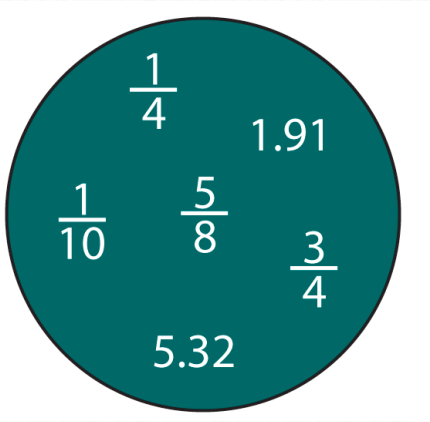
ROSTER/TABULAR METHOD

Q Set of all rational numbers

Examples of Rational Number

$$\frac{5}{7}, -\frac{9}{11}$$

Q^+ Set of positive rational numbers



ROSTER/TABULAR METHOD

$\mathbb{R}$ Set of all Real Numbers

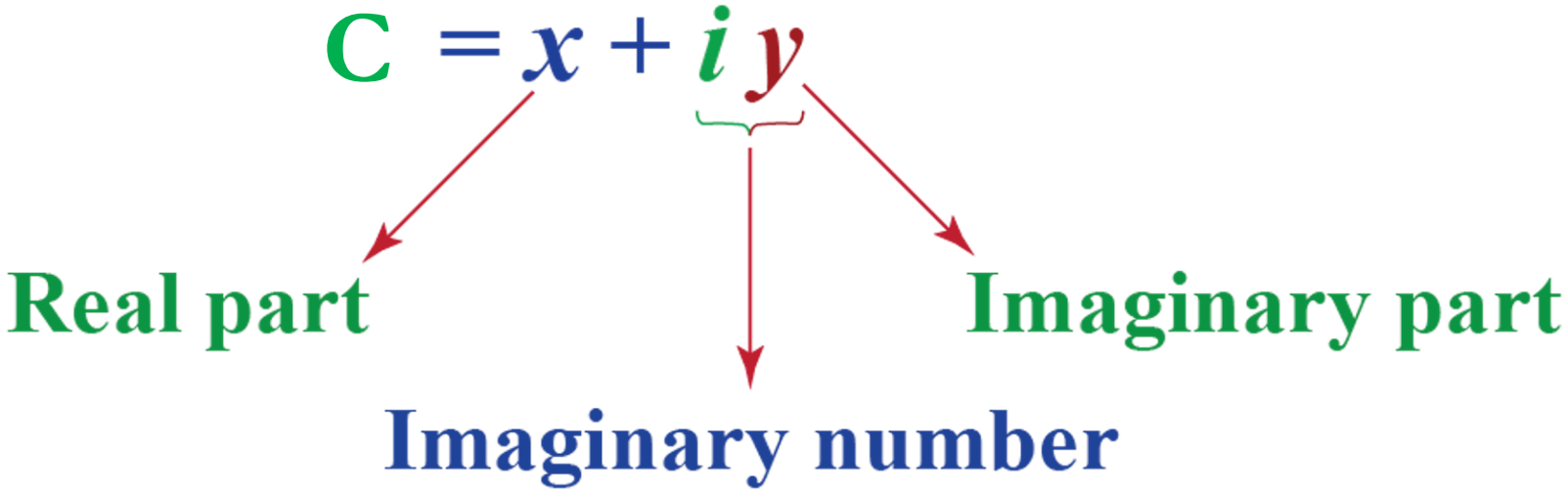
Most numbers used in mathematics.

$\mathbb{R}^+$ Set of all Positive Real Numbers

$\mathbb{C}$ Set of all Complex Numbers

Complex Number

$$C = x + iy$$



Ways to describe a Sets:

- **RULE/DESCRIPTIVE METHOD**

– the common characteristic of the elements are defined. This method uses set builder notation where x is used to represent any element of the given set.

Rule/Descriptive Method

$$\{x \mid x \text{ is an even number } \leq 10\}$$

"Such that"

Ways to describe a Sets:

Interval Notation

Recall the notation for intervals of real numbers. When a and b are real numbers with a < b, we write

$$[a, b] = \{x \in R \mid a \leq x \leq b\}$$

$$[a, b) = \{x \in R \mid a \leq x < b\}$$

$$(a, b] = \{x \in R \mid a < x \leq b\}$$

$$(a, b) = \{x \in R \mid a < x < b\}$$

Ways to describe a Sets:

Interval Notation

e.g.

$(3, 9]$ $\{3.1, 3.5, 4.2, 5.8, 6.9, 9\}$

$[4, 8)$ $\{4.2, 4.5, 5.2, 5.9, 7.1, 8\}$

Ways to describe a Sets:

Interval Notation

Note:

$[a, b]$ is called the closed interval from a to b and

(a, b) is called the open interval from a to b

Cardinality refers to the number of elements in a set.

$|A|$ or $n(A)$ represents the cardinality of **Set** A.

Finite Set

are sets which either has no elements or has elements which could all be possibly listed down (countable).

Infinite Sets

are sets whose elements cannot be listed (Unlimited).

The Null Set or the set with no elements. In symbol, ∅ or { }

Equality of Sets:

Let A and B be sets. If both A and B have the same elements then, $A = B$

Statement of Sets

Statement form:

Roaster form:

Set Builder form:

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e.g.

1. Solved example using the three methods of representation of a set:

   The set of integers lying between -2 and 3.

These are the different notations in sets generally required while solving various types of problems on sets.

Note:

(i) The pair of curly braces { } denotes a set. The elements of set are written inside a pair of curly braces separated by commas.

(ii) The set is always represented by a captial letter such as: A, B, C, ...

(iii) If the elements of the sets are alphabets then these elements are written in small letters.

(iv) The elements of a set may be written in any order.

These are the different notations in sets generally required while solving various types of problems on sets.

Note:

(v) The elements of a set must not be repeated.

(vi) The Greek letter Epsilon " $\in$ " is used for the words "belongs to", "is an element of".

Therefore, $x \in A$ will be read as x belong to set A or x is an element of the set A.

(vii) The symbol " $\notin$ " stands for "does not belongs to" also for "is not an element of".

Therefore, $x \notin A$ will be read as x does not belong to set A or x is not an element of the set A.


Thank
you