

Rational Numbers we define rational numbers to be

$$\mathbb{Q} = \left\{ \frac{p}{q} : p, q \in \mathbb{Z}, q \neq 0 \right\}$$

Rational numbers are closed under addition, subtraction, multiplication and division.

Irrational Numbers

Irrational = { Infinite, non-repeating decimals }
 It is impossible to write down the irrational numbers.

we use special symbols as $\pi, \sqrt{2}$ etc.

Real Numbers

represented by the symbol \mathbb{R}

Real Numbers include natural numbers, integers, rational and irrational

Set Operations (E-3)

* VENN DIAGRAMS

A venn diagram is an illustration that uses circles to show the relationships among things or finite groups of things.

Circles that overlap have a commonality while circles that do not overlap do not share those traits.

Operations in Sets

Union If 2 sets A and B are given, the union of A and B is equal to the sets that contains all the elements present in set A and set B.

$$A \cup B = \{x : x \in A \text{ or } x \in B\}.$$

where x is the element present in both sets A and B.

Intersection If 2 sets A and B are given, then the intersection of A and B is the subset of universal set U, which consists of elements common to both A and B. It is denoted by the symbol ' \cap '.

$$A \cap B = \{x : x \in A \text{ and } x \in B\}.$$

Difference If there are 2 sets A and B, then the difference of 2 sets A and B is equal to the set which consists of the elements present in A but not in B. It is represented by $A - B$.

* The symmetric difference of set A with respect to set B is the set of elements which are either of sets A and B, but not in their intersection.

This is denoted as $A \Delta B$ or $A \oplus B$.

Using set notation, we can also denote this as $(A \cup B) - (A \cap B) = A \Delta B$.

Subset Set A is said to be a subset of Set B if all the elements of Set A are also present in Set B.

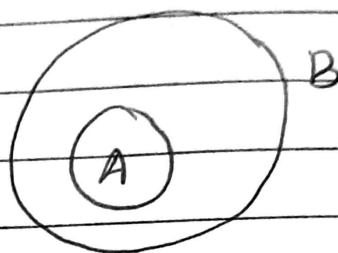
In other words, set A is contained inside Set B.

It is represented as $A \subset B$

They can be proper or improper

subset: Set A is said to be the subset of set B if all the elements of set A are also present in set B.

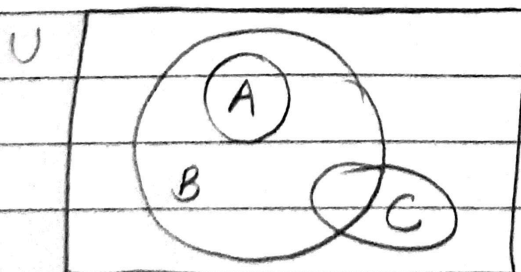
Set A is contained inside set B
It is represented as $A \subseteq B$



Subset
 ↙ Proper ↘ Improper

Proper subset: Set A is a proper subset of B if $A \subseteq B$ and $A \neq B$
It is written as $A \subset B$

Improper subset: The symbol \subseteq is used to describe an improper subset in which the subset and set are equal



$$A = \{1, 2, 3\}$$

$$B = \{1, 2, 3, 4, 5\}$$

$$C = \{2, 8\}$$

A is a proper subset of B $A \subset B$

C is not a subset of B $C \not\subseteq B$

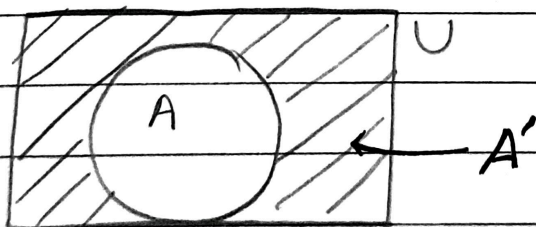
Power Set For a particular set A , a collection of all subsets of set A is called the power set of A .

$$P(A) = \{x : x \subseteq A\}$$

Universal sets (L-4)

Universal set : A universal set is a set which contains all the elements or objects of other sets, including its own elements. It is denoted by the symbol ' U '.

Complement The complement of a set is the set that includes all the elements of the universal set that are not present in the given set.



complement is denoted by dash ('')