

Algebra : Set Theory

Introduction

A **set** is a collection of objects, numbers or characters.

{abcdef...wxyz} {1,2,3,4,...45, 46, 47} etc.

Note how the set is enclosed in brackets {.....}

A **definite set** is one in which all its members are known.

Sets are given uppercase letters: **A, B, C**, etc.

The **elements** of sets are given lowercase letters: **a, b, c**,...etc.

An element **x** belonging to the set **A** is written:

$$x \in A$$

A **constraint bar** {...|...} is for setting a property that all members satisfy.

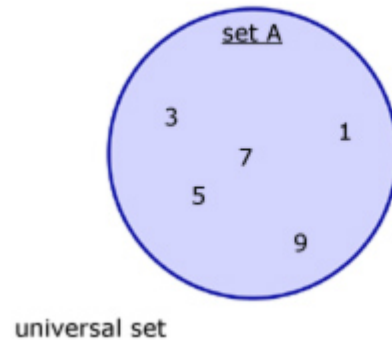
$A\{x \mid x \text{ has the colour blue}\}$ - all elements of A are blue

Common Sets

N	natural(counting)
Z	integers
Q	rational numbers
R	real numbers

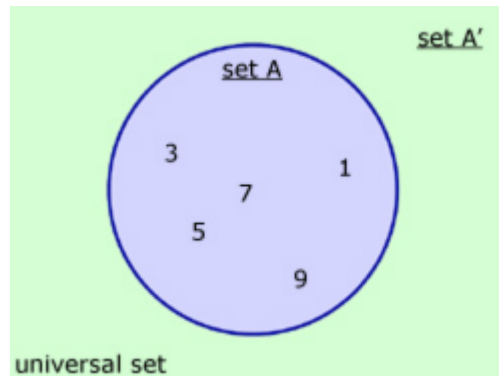
Venn Diagrams

Venn diagrams are used to visualise sets and their relations to one another.



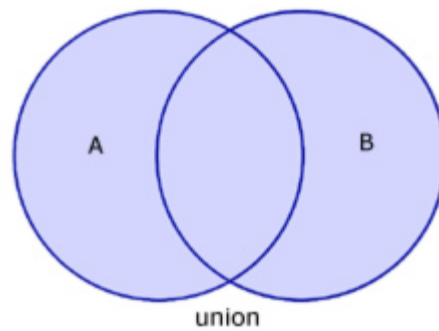
Above is a diagrammatic representation of set A. The set can be represented mathematically as: $A\{1,3,5,7,9\}$.

Note that set A(the circle) is a subset of the **Universal set**(the rectangle).



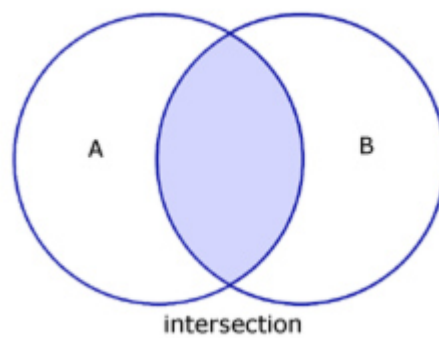
A' (A-dash) is called the **complement** of A. It contains all elements which are not members of A.

A and A' together make up the Universal set.



The **union** of sets A and B contains all of the elements from both sets.

$$A \cup B$$

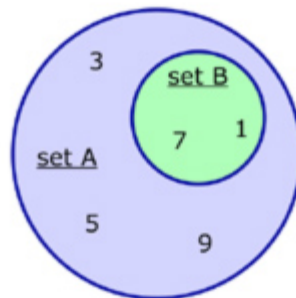


The **intersection** of sets A and B contains a particular group of elements that exist in set A and in set B.

$$A \cap B$$

Subsets

If B is a **subset** of A. Then all of the elements of B are also in A.



universal set

$$A = \{1, 3, 5, 7, 9\}$$

$$B = \{1, 7\}$$

$$\Rightarrow B \subseteq A \quad B \text{ is a subset of } A$$