

UNIT 10 *Logic and Venn Diagrams* Introduction to SIM

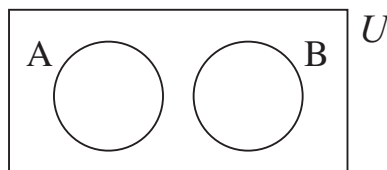
Learning objectives

This unit introduces the concept of logic that underpins all mathematics and is used in the important topic of sets. After completing this unit of STUDENT INSTRUCTIONAL MATERIAL (SIM) you should

- understand how to use logic tables to solve problems (*Note: this topic is not examined in CXC CSEC examinations*)
- be able to illustrate sets by using Venn diagrams
- understand the concept and notation for intersections, unions and complements of sets
- be able to find and illustrate subsets.

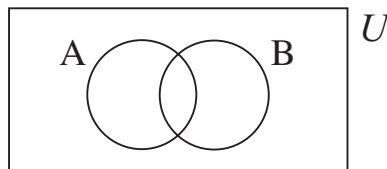
Key points and principles

- Read statements carefully to make sure you have understood exactly what is meant.
- Be careful when illustrating sets of the universal set that is being used.
- Appreciate that the *empty set* exists but that it has no members.
- Sets that do not intersect can be illustrated as

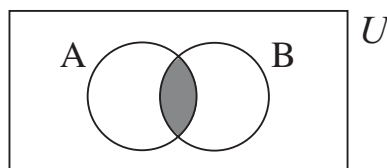


Facts to remember

Two sets, A and B, can be illustrated in a Venn diagram as below:

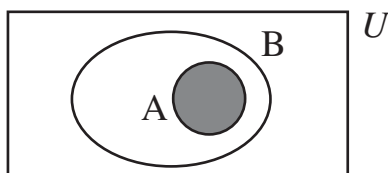


The *intersection* is shaded below:

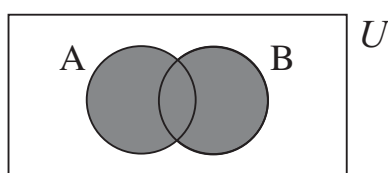


UNIT 10 *Logic and Venn Diagrams* Introduction to SIM

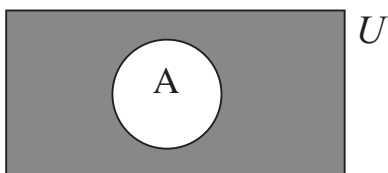
A is a *subset* of B if all members of A are contained in B; this is denoted by $A \subset B$.



The *union* is shaded below:



The *complement* is shaded below:

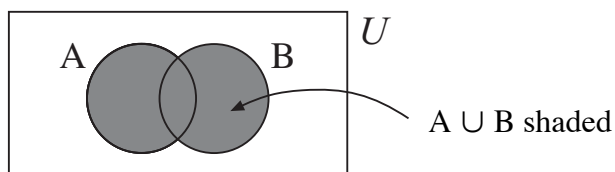


Glossary of terms

The *universal set*, U (or ξ), is the total set of members being considered.

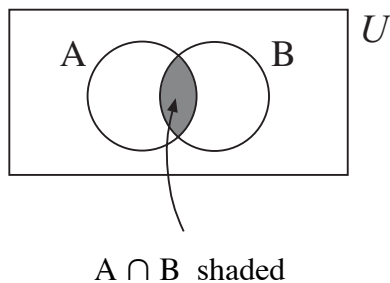
The *empty set* is denoted by $\emptyset$ or $\{ \}$.

The *union* of two sets, A and B, consists of members that are in set A or set B or in both. The union is denoted by $A \cup B$.

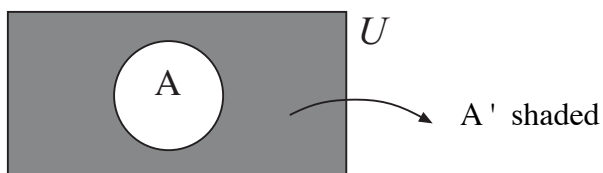


UNIT 10 *Logic and Venn Diagrams* Introduction to SIM

The *intersection* of two sets, A and B, consists of members that are in both set A and set B; it is denoted by $A \cap B$.



The *complement*, A' , of a set, A, is all members of the universal set not in A.



e.g. If $A = \{1, 2, 3\}$ and $B = \{3, 4, 5\}$ and $U = \{1, 2, \dots, 9\}$

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

$A \cap B = \{3\}$

$A' = \{4, 5, 6, 7, 8, 9\}$