

Operations on Sets

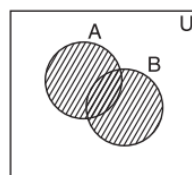
1. Union of Sets: Let A and B be any two sets. The union of A and B is the set of all those elements which are either in A or in B or in both A and B.

It is denoted by $A \cup B$.

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

The union of sets A and B is represented by Venn diagram. The shaded portion represents $A \cup B$. For example:

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

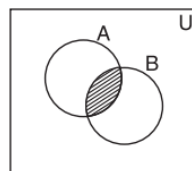


2. Intersection of Sets: Let A and B be any two sets. The intersection of A and B is the set of all those elements which belong to both A and B.

It is denoted by $A \cap B$.

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

The intersection of set A and B is represented by Venn diagram. The shaded portion represents $A \cap B$.

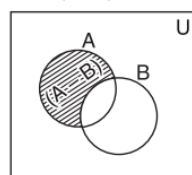
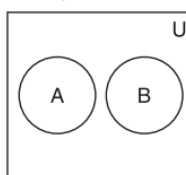


For example: Let $A = \{1, 2, 3, 4, 5\}$ and $B = \{2, 5, 7, 9\}$, then $A \cap B = \{2, 5\}$

3. Disjoint Sets: Two sets A and B are said to be disjoint sets if they have no common element *i.e.*, $A \cap B = \phi$.

For example: Let $A = \{2, 4, 6, 8, 10\}$
and $B = \{1, 3, 5, 7, 9\}$,

then $A \cap B = \phi$. Hence A and B are disjoint sets.



4. Difference of Sets: Let A and B be any two sets. The difference $A - B$ is the set of all those elements of A which do not belong to B.

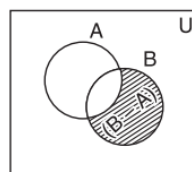
$$\therefore A - B = \{x : x \in A \text{ and } x \notin B\}$$

The difference of set A and B is represented by Venn diagram. The shaded portion represents $A - B$.

Similarly $B - A = \{x : x \in B \text{ and } x \notin A\}$. The difference between set B and A is represented by Venn diagram. The shaded portion represents $B - A$.

For example:

Let $A = \{1, 2, 3, 4, 5\}$ and $B = \{3, 5, 7, 9\}$,
then $A - B = \{1, 2, 4\}$ and $B - A = \{7, 9\}$



5. Symmetric difference of two sets: Let A and B be any two sets. The symmetric difference of A and B is the set $(A - B) \cup (B - A)$.

Symmetric difference of A and B is denoted by $A \Delta B$.

The symmetric difference of A and B is represented by Venn diagram. The shaded portion represents

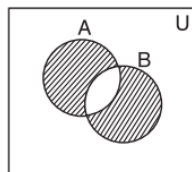
$$A \Delta B = (A - B) \cup (B - A)$$

For example:

Let $A = \{1, 2, 3, 4\}$ and $B = \{3, 4, 5, 6\}$

Now $A - B = \{1, 2\}$ and $B - A = \{5, 6\}$

$$\therefore A \Delta B = (A - B) \cup (B - A) = \{1, 2, 5, 6\}$$



Algebra of Operations

1. Commutative Laws

(i) $A \cup B = B \cup A$

(ii) $A \cap B = B \cap A$

2. Associative Laws

(i) $(A \cup B) \cup C = A \cup (B \cup C)$

(ii) $(A \cap B) \cap C = A \cap (B \cap C)$

3. Identity Laws

(i) $A \cup \phi = A$

(ii) $A \cap \phi = \phi$

4. Idempotent Laws

(i) $A \cup A = A$

(ii) $A \cap A = A$

5. Distributive Laws

(i) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

(ii) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$