Superset :-

If set A is a subset of set B and all the elements of set B are the elements of set A, then A is a superset of set B. It is denoted by $A \supset B$.

Ex: If set $A = \{1, 2, 3, 4\}$ is a subset of $B = \{1, 2, 3, 4\}$ then A is superset of B.

Universal Set :-

A set which contain all the sets relevant to a certain condition is called

universal set. It is the set of all possible values.

Ex: If $A = \{1, 2, 3\}$ and $B = \{2, 3, 4, 5\}$ then universal set here will be:

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

Operations on sets :-

In set theory, the operations of the sets are varried when two or more sets combined to form a single set under some of the given conditions.

The basic operations on sets are:

* Union of sets
* Intersection
* A complement of a set
* cartesian product of sets.
* set difference.

Basically, we work on operations more on union and intersection of sets using venn diagrams.

Union of sets:

If set A and set B are two sets, then

A union B is the set that contains all the elements of set A and set B. It is denoted by $A \cup B$.

Ex: set $A = \{1, 2, 3\}$ and $B = \{4, 5, 6\}$ then A union B is

ie, $A \cup B = \{1, 2, 3, 4, 5, 6\}$

Intersection of sets:

If set A and set B are two sets, then A intersection B is the set that contains only the common elements between set A and set B.

It is denoted by $A \cap B$.

Ex:

Set $A = \{1, 2, 3\}$ and $B = \{4, 5, 6\}$, then A intersection B is

i.e, $A \cap B = \{\ \}$ (or) ϕ

Because A and B do not have any elements in common, so ~~they~~ their intersection will give null set.

Complement of sets:

The complement of any set, say A, is the set of all elements in the universal set that are not in set A. It is denoted by A'.

Properties of complement sets:-

1) $A \cup A' = U$

2) $A \cap A' = \phi$

3) Law of double complement:

$$(A')' = A$$

4) Law of empty/null set (ϕ) and universal set (U):

$$\phi' = U \text{ and } U' = \phi$$

Cartesian product of sets:-

If set A and set B are two sets then the cartesian product of set A and set B is a set of all ordered pairs (a, b), such that a is element of A and b is element of B. It is denoted by $A \times B$.

We can represent it in set-builder form, such as:

$$A \times B = \{(a, b) : a \in A \text{ and } b \in B\}$$

Ex: Set $A = \{1, 2, 3\}$ and

$B = \{Bat, Ball\}$, then;

$$A \times B = \{(1, Bat), (1, Ball), (2, Bat), (2, Ball), (3, Bat), (3, Ball)\}.$$

Difference of Sets:

If Set A and set B

are two sets, then set A difference set B is a set which as elements of A but no elements of B. It is denoted as $A - B$.

Ex:

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

$A - B = \{1\}$.

Sets Formulas:-

Some of the most important set formulas are:

For any three sets A, B & C

* $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

If $A \cap B = \phi$, then

* $n(A \cup B) = n(A) + n(B)$
* $n(A-B) + n(A \cap B) = n(A)$
* $n(B-A) + n(A \cap B) = n(B)$
* $n(A-B) + n(A \cap B) + n(B-A) = n(A \cup B)$

* $n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(C \cap A) + n(A \cap B \cap C)$.

Properties of sets:

Commutative property:

* $A \cup B = B \cup A$
* $A \cap B = B \cap A$

Associative property:

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

Distributive property:

* $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
* $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$.

Demorgan's law:

* Law of union: $(A \cup B)' = A' \cap B'$
* Law of intersection: $(A \cap B)' = A' \cup B'$

Complement law:

* $A \cup A' = A' \cup A = U$
* $A \cap A' = \phi$

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Idempotent law and law of null and universal set:

* $A \cup A = A$
* $A \cap A = A$
* $\phi' = U$
* $\phi = U'$

~~Ex:~~

1.2 Operations on Sets

1.2 A Defn:

If A and B are sets, then $A \cup B$ is the set of all elements in either A or B.

That is, $A \cup B = \{x / x \in A \text{ or } x \in B\}$.

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Ex:

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

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

1.2 B Defn:

If A and B are sets, then $A \cap B$ is the set of all elements in both A and B.

That is, $A \cap B = \{x / x \in A \text{ and } x \in B\}$

Ex:

(i) Let $A = \{a, b, c\}$ and $B = \{b, c, d\}$

then $A \cap B = \{b, c\}$.

(ii) Let $A = \{1, 2, 3\}$ & $B = \{3, 4, 5\}$

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