SETS

In Mathematics, Set theory was developed by **George Cantor** (1845 – 1918).

Set: A well defined collections of objects is called a **Set.**

Well defined means that

(i) All the objects in the Set should have a common feature or property and

(ii) It should be possible to decide whether any given objects belongs to the set or not.

We usually denote a set by capital letters and the elements of a set are represented by small letters.

Ex: Set of vowels in English language V = { a, e, i, o, u }

Set of even numbers E = { 2, 4, 6, 8, ……….}

Set of odd numbers O = {1, 3, 5, 7, ………..}

Set of prime numbers P = {2, 3, 5, 7, 11, 13, …..}

Any element or object belonging to a set, then we use symbol '$\in$' (belongs to), if it is not belonging to it is denoted by the Symbol '$\notin$'(does not belongs to)

Ex: In Natural numbers Set N, $1 \in N$ and $0 \notin N$

Roaster Form: All elements are written in order by separating commas and are enclosed with in curly brackets is called Roaster form. In the form elements should not repeated.

Ex: Set of prime numbers less than 13 is p ={ 2, 3,5, 7, 11 }

Set Builder Form: In set builder form, we use a symbol x (or any other symbol y, z etc.) for the element of the set. This is following by a colon (or a vertical line), after which we write the characteristic property possessed within curly brackets.

Ex: P = { 2, 3, 5, 7, 11}. This is the set of all prime numbers less than 13. It can be represented in the set builders form as

P = { x: x is a prime numbers less than 13 }

(Or)

P= { x/x is a prime number less than 13}

Null Set: A set which does not contain any element is called the empty set or the null get or a void set .It is denoted by ϕ or { }

Ex: A = { x/ $1<x<2$, x is a natural numbers}

B= { x/ $x^2-2=0$ and x is a rational number}

Finite Set: A set is called a finite set if it is possible to count the numbers of elements in it.

Ex: A = { x ; $x\in$ N and $(x-1)(x-2)=0$} = {1,2}

B = {x; x is a day in a week} = {SUN, MON, TUS, WED, THU, FRI, SAT}

Infinite Set: A Set is called an infinite set if the number of cannot count the number of elements in it.

Ex: A = {x / $x\in$ N and x is an odd number}

= { 1, 3, 5, 7, 9 ,11 ………..}

B = { x/ x is a point on a straight line}

Cardinal Number: The number of elements in a Set is called the cardinal number of the set. If 'A' is a set them n(A) represents cardinal number.

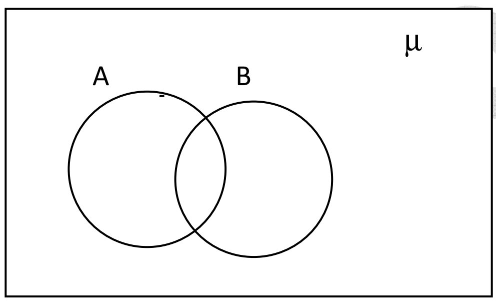
Ex: If A= {a, e, i, o, u } then n(A) =5

If B = {x; x is alter in the word INDIA}

Then n(B) = 4

N (ϕ)= 0

Universal Set: Universal Set is denoted by 'μ' or 'U' generally , universal set represented by rectangle.



Subset: If every element of a set A is also an element of set B, then the set A is said to be a subset of set B. It is represented as $A \subset B$.

Ex: If A ={4, 8,12 }; B = {2, 4, 6, 8, 10, 12, 14} then

A is a subset of B (i.e. $A\subset B$)

- Every Set is a subset of itself ($A\subset A$)
- Empty Set is a subset of every set ($\phi \subset A$)
- If $A \subset B$ and $B\subset C$ then $A\subset C$ (Transitive property)

Equal Sets: Two sets A and B are said to be 'equal' if every elements in A belongs to B and every elements in B belongs to A. If A and B are equal sets , then we write A =B .

Ex: The set of prime number less than 6, A= {2, 3, 5}

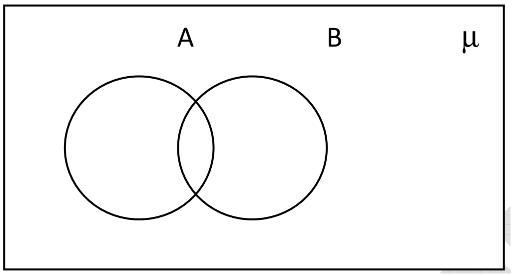
The prime factors of 30, B = {2, 3, 5 }

Since the elements of A are the same as the elements of B, therefore, A and B are equal.

- $A \subset B$ and $B \subset A \iff A = B$ (Ant symmetric property)

Venn Diagrams: Venn-Euler diagram or Simply Venn diagram is a way of representing the relationships between sets. These diagrams consist of rectangles and closed curves usually circles.

Ex:



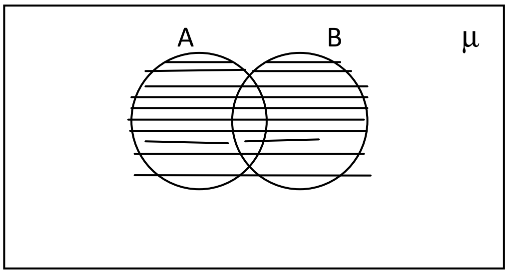
Basic operations on Sets: We know that arithmetic has operation of addition, subtraction and multiplication of numbers. Similarly in Sets, we define the operation of Union, Intersection and difference of Sets.

Union of Sets: The union of A and B is the Set which contains all the elements of A and also the elements of B and the common element being taken only once. The symbol 'U' is used to denote the union. Symbolically, we write $A \cup B$ and read as 'A' union 'B'.

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

Ex: $A = \{1, 2, 3, 4, 5\}$: $B = \{2, 4, 6, 8, 10\}$

Then $A \cup B = \{1, 2, 3, 4, 5, 6, 8, 10\}$



- $A \cup B = A$

- $A \cup \phi = A = \phi \cup A$ (identity property)

- $A \cup \mu = \mu = \mu \cup A$

- If $A \subset B$ then $A \cup B = B$

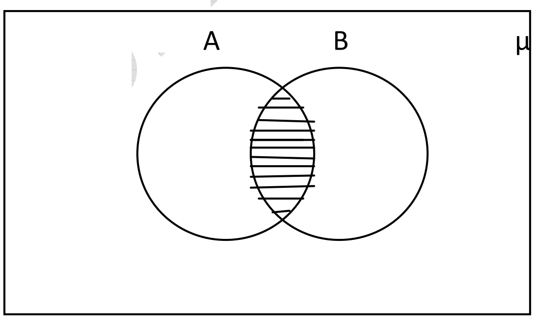
- $A \cup B = B \cup A$ (Commutative property)

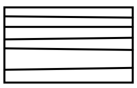
Intersection of Sets: The intersection of A and B is the Set in which the elements that are common to both A and B. The Symbol '$\cap$' is used to denote the 'intersection'. Symbolically we "$A \cap B$" and read as " A intersection B" .

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

Ex: $A = \{ 1, 2, 3, 4, 5 \}$ and $B = \{ 2, 4, 6, 8, 10\}$

Then $A \cap B = \{2, 4 \}$





Represents $A \cap B$

- $A \cap B = A$

- $A \cap \phi = \phi = \phi \cap A$

- $A \cap \mu = A = \mu \cap A$ (identity property)

- If $A \subset B$ then $A \cap B = A$

- $A \cap B = B \cap A$ (Commutative property)

Disjoint Sets: If there are no common elements in A and B. Then the Sets are Known as disjoint sets.

If A, B are disjoint sets then $A \cap B = \phi$

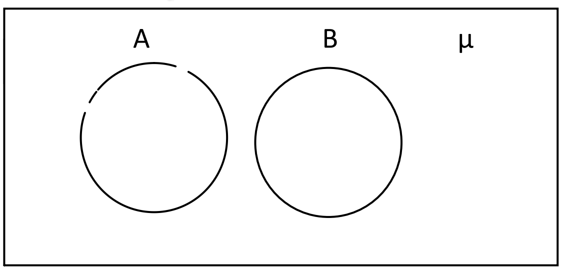
If $A \cap B = \phi$ then $n(A \cap B) = 0$

Ex: A ={ 1, 3, 5, 7, ……..} : B = { 2, 4, 6 , 8, …..}

Here A and B have no common elements

$\therefore$ A and B are called disjoint Sets.

i.e. $A \cap B = \phi$



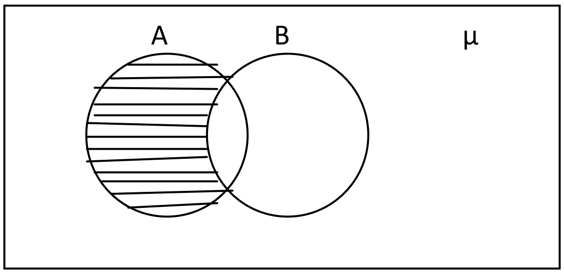
Difference of Sets: The difference of Sets A and B is the set of elements which belongs to A but do not belong to B. We denote the difference of A and B by A-B or simply “ A minus B”

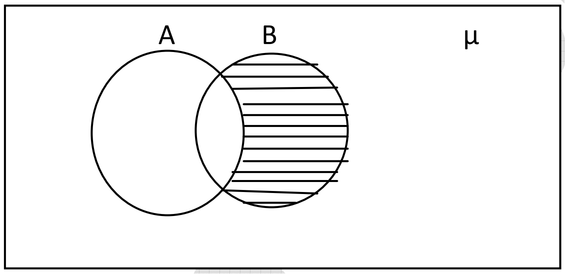
A - B = { x/ x ∈ A and x ∉ B }

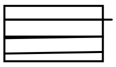
B – A = { x/ x ∈ B and x ∉ A }

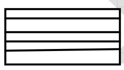
E **Ex:** If A= { 1, 2, 3, 4, 5} and B = { 4, 5, 6, 7 } then

A – B = {1, 2, 3}, B – A = { 6, 7}





 represents 'A – B'

 represents B – A

- A – B ≠ B – A
- A – B , B – A and A ∩ B are disjoint Sets.
- $n(A \cup B) = n(A) + n(B) - n(A \cap B)$
- If A, B are disjoint sets then $n(A \cup B) = n(A) + n(B)$

Essay type Questions

(1) Write the following sets in roster form. (Communication)

(i) **A = { x : x is a two digital natural number such that the sum of its digits is 8}**

(ii) **B = { x: x is a natural number and $x^2 < 40$ }**

(iii) **C = { x: x is a prime number which is a divisor of 60 }**

(iv) **D= { x: x is an integers , $x^2 = 4$}**

Solution: Set builder form:

(i). A = { x : x is a two digital natural number such that the sum of its digits is 8}

Roster form:

A = { 17, 26, 35, 44, 53, 62, 71, 80}

(ii). Set builder form:

B = { x: x is a natural number and $x^2 < 40$ }

Roster form:

B = { 1, 2 , 3, 4, 5, 6 }

(iii). Set builder form:

C = { x: x is a prime number which is a divisor of 60 }

Roster form:

C = { 2, 3, 5 }

(iv). Set builder form:

D= { x: x is an integers , $x^2 = 4$}

Roster form:

D = { -2 , 2 }

(2). Write the following sets in the sets -builders form. (Communication)

(i) A = {1, 2, 3, 4, 5} **(ii) B = { 5, 25, 125, 625 }**

(iii) C = {1, 2, 3, 6, 7, 14, 21, 42 } **(iv) D ={ 1, 4, 9, …….100 }**

Solution:

(i). Roster form:

A = {1, 2, 3, 4, 5 }

Set builder form

A = { x: x is a natural number x<6 }

(ii). Roster form:

B = { 5, 25, 125, 625 }

Set builder form:

B = {x : x is a natural number and power of 5 , x < 5 }

(Or)

B = { 5^x : $x \in N$, $x \leq 4$ }

(iii). Roster form:

C = {1, 2, 3, 6, 7, 14, 21, 42 }

Set builder form:

C = x: x is a natural number which divides 42 } (iv). Roster form:

D ={ 1, 4, 9, …….100 }

Set builder form:

D={ x: x in Square of natural number and not greater than 10 }

(or)

= { x^2 : $x \in N$, $x \leq 10$}

(3). State which of the following Sets are finite or infinite. (Reasoning proof)

(i). {x: $x \in N$ and (x-1)(x-2) = 0}

(ii). {x: $x \in N$ and x < 100 }

(iii). { x: x is a straight line which is parallel to X – Axis}

(iv). The Set of circles passing through the origin (0 ,0)

Solution:

(i). {x: $x \in N$ and (x-1)(x-2) = 0}

x can take the values 1 or 2 in the given case . The set is { 1, 2 } , Hence it is finite.

(ii). {x: $x \in N$ and x < 100 }

= { 1, 2, ……100}, The number of elements in this Set are countable . Hence it is finite.

(iii). { x: x is a straight line which is parallel to X – Axis}

Infinite straight lines are parallel to X – axis

Hence, it is infinite Set

(iv). The Set of circles passing through the origin (0 ,0)

Infinite circles are passing through the origin (0, 0)

Hence it is infinite Set

(4) . Let A = {3, 4, 5, 6, 7}, and B = {1, 6, 7, 8, 9} Find

(i) . $A \cup B$ (ii) $A \cap B$ (iii) A – B (iv) B - A (Problem Solving)

Solution: Given A = {3, 4, 5, 6, 7}, B = {1, 6, 7, 8, 9}

(i) $A \cup B$ = { 3, 4, 5, 6, 7, 8, 8 }

(ii) $A \cap B$ = { 6, 7 }

(iii) A – B = { 3, 4, 5 }

(iv) B – A ={1, 8, 9 }

(5) . (i) Illustrate $A \cup B$ in Venn – diagrams where

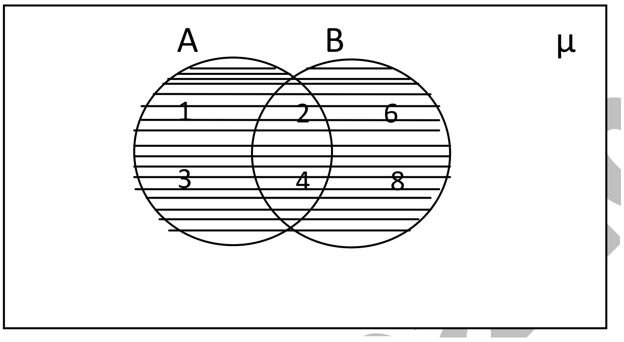
A = { 1, 2, 3, 4 } and B = { 2, 4, 6, 8 }

(ii) Illustrate in the Venn –diagrams where

A = { 1, 2, 3 } and B = { 3, 4, 5 } (visualization & representation)

Solution: (i) A = { 1, 2, 3, 4 }

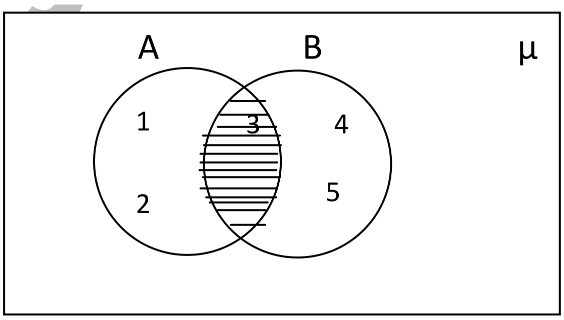
B = { 2, 4, 6, 8 }



$A \cup B$ = { 1, 2, 3, 4, 6, 8)

(iii) A = { 1, 2, 3 }

B= { 3, 4, 5 }



$A \cap B$ ={3}

(6). If $A = \{3, 4, 5, 6, 7\}$, $B = \{1, 6, 7, 8, 9\}$ then find $n(A)$, $n(B)$, $n(A \cap B)$ and $n(A \cup B)$. What do you observe ? (Reasoning Proof)

Solution:

$A = \{3, 4, 5, 6, 7\}$, $n(A) = 5$

$B = \{1, 6, 7, 8, 9\}$ $n(B) = 5$

$A \cup B = \{1, 3, 4, 5, 6, 7, 8, 9\}$ $n(A \cup B) = 8$

$A \cap B = \{6, 7\}$ $n(A \cap B) = 2$

We observer that $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

(Or)

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

(Or)

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

(7). If $A = \{x: x$ is a natural number $\}$

$B = \{x: x$ is a even natural number $\}$

$C = \{x: x$ is a odd natural number $\}$

$D = \{x: x$ is a prime number $\}$ Find $A \cap B$, $A \cap C$, $A \cap D$, $B \cap C$, $B \cap D$, $C \cap D$ (Problem solving)

Solution: $A = \{x: x$ is a natural number $\}$

$= \{1, 2, 3, 4, \ldots\ldots\}$

$B = \{ x: x \text{ is a even natural number } \}$

$= \{ 2, 4, 6, \ldots\ldots\ldots\ldots \}$

$C = \{ x: x \text{ is a odd natural number } \}$

$= \{1, 3, 5, 7, \ldots\ldots\ldots\ldots\}$

$D = \{ x: x \text{ is a prime number } \}$

$= \{ 2, 3, 5, 7, 11, 13, \ldots\ldots\ldots \}$

$A \cap B = \{ 1, 2, 3, 4, \ldots\ldots\ldots\} \cap \{ 2, 4, 6, \ldots\ldots\} = \{ 2, 4, 6, \ldots\ldots\} = B$

$A \cap C = \{ 1, 2, 3, 4, \ldots\ldots\} \cap \{ 1, 3, 5, 7, \ldots\} = \{ 1, 3, 5, 7, \ldots\} = C$

$A \cap D = \{ 1, 2, 3, 4, \ldots\ldots\} \cap \{ 2, 3, 5, 7, 11, 13, \ldots\ldots\} = \{ 2, 3, 5, 7, \ldots\} = D$

$B \cap C = \{ 2, 4, 6, \ldots\ldots\ldots\} \cap \{ 1, 3, 5, 7, \ldots\ldots\ldots\} = \{ \} = \phi$

B and C are disjoint Sets

$B \cap D = \{ 2, 4, 6, \ldots\ldots\} \cap \{ 2, 3, 5, 7, 11, 13, \ldots\ldots\} = \{ 2\}$

$C \cap D = \{ 1, 3, 5, 7, \ldots\} \cap \{ 2, 3, 5, 11, 13, \ldots\ldots\} = \{ 3, 5, 7, 11, 13, \ldots\ldots\}$

(8) . Using examples to show that $A - B$, $B - A$ and $A \cap B$ are mutually disjoint Sets .

(Reasoning proof)

Solution:

Let $A = \{ 1, 2, 3, 4, 5 \}$, $B = \{ 4, 5, 6, 7 \}$

$A \cap B = \{ 4, 5 \}$

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

$B - A = \{ 6, 7 \}$

We observe that the Sets $A \cap B$, $A - B$, $B - A$ are mutually disjoint Sets.

Short Answer Questions

(1) Match roster forms with the Set builder form. (Connection)

(1) { 2, 3 }	(a) { x: x is a positive integer and is a divisor of 18}
(2) { 0 }	(b) {x: x is an integer and $x^2 - 9 = 0$}
(3) {1, 2, 3, 6, 9, 18 }	(c) { x: x is an integer and x+1 = 1}
(4) { 3, -3 }	(d) { x: x is prime number and advisor of 6 }

Answers: (1) d (2) c (3) a (4) b

(2) State which of the following Sets are empty and which are not ? (Reasoning proof)

(i) A = { x: x^2 = 4 and 3x = 9 }

(ii) Sets of even prime numbers

(iii) B = { x: x^2 -2 = 0 and x is a rational number}

(iv) Set of odd numbers divisible by 2

Solution:

(i) A = { x: x^2 = 4 and 3x = 9 }

Solution of $x^2 = 4$ are $x = \pm 2$ and 3x = 9 is x =3

There is no real number satisfies both equation $x^2 = 4$ and 3x = 4

$\therefore$ A = { x: x^2 = 4 and 3x =9 } is an empty Set.

(ii) Sets of even prime numbers

2 is a only even prime number

$\therefore$ Hence given Set is not empty set.

(iii). $B = \{ x: x^2 - 2 = 0$ and x is a rational number$\}$

The solution of $x^2 - 2 = 0$ is $x = \pm \sqrt{2}$, but

$-\sqrt{2}$, $\sqrt{2}$ are not rational numbers.

$\therefore$ $B = \{ x: x^2 - 2 = 0$ and x is a rational number$\}$ is an empty set.

(iv). Set of odd numbers divisible by 2

Set of odd number = { 1, 3, 5, 7 ……..}

Odd number are not divisible by 2

$\therefore$ Given Set is an empty Set.

(3) Let A be the Set of prime numbers less than 6 and P the Set of prime factors of 30. Check if A and P are equal . (Reasoning Proof)

Solution: The Set of Prime number less than 6 , A ={ 2, 3, 5}

The Prime factors of 30, P = { 2, 3, 5 }

Since the element of A are the same as the elements of P , $\therefore$ A and P are equal.

(4) List all the subsets of the Set A = { 1, 4, 9, 16} (Communication)

Solution: We know that empty set(ϕ) and itself (A) are the subsets of every set.

$\therefore$ All the subsets of the set A = { 1, 4, 9, 16 }

Are ϕ , { 1} , {4}, {9}, {16}

{1, 4 }, {1, 9}, {1, 16}, {4, 9}, {4,16}, {9, 16}

$\{1, 4, 9\}, \{1, 4, 16\}, \{1,9, 16\}$, $\{4, 9, 16\}$ and $\{1, 4, 9, 16\}$

Total number of subsets of the set $A = \{1, 4, 9, 16\}$ are 16

Note: If $n(A) = n$ then the total number of Subsets are 2^n

Here for $A = \{ 1,4, 9, 16 \}$, $n(A) = 4$

$\therefore$ Total number of subsets of $A = 2^4 = 16$

(5) If $A = \{ 1, 2, 3\ 4\}$; $B = \{ 1, 2, 3, 4, 5, 6, 7, 8\}$ then find $A \cup B$, $A \cap B$.

What do you notice about the results? (Problem solving)

Solution: Given $A = \{ 1, 2, 3, 4\}$

$B = \{ 1, 2, 3, 4, 5, 6, 7, 8 \}$

$A \cup B = \{ 1, 2, 3, 4 \} \cup \{ 1, 2, 3, 4, 5, 6, 7, 8 \} = \{ 1, 2, 3, 4 , 5, 6, 7, 8 \} = B$

$A \cap B = \{1, 2, 3, 4 \} \cap \{ 1, 2, 3, 4, 5, 6, 7, 8 \} = \{ 1, 2, 3, 4\} = A$

We observe that if $A \subset B$ then $A \cup B = B$, $A \cap B = A$

(6) **If $A = \{ 2, 3, 5 \}$, find $A \cup \phi$, $\phi \cup A$ and $A \cap \phi$, $\phi \cap A$ and compare.**

(Problem Solving)

Solution: Given $A = \{ 2, 3, 5 \}$, $\phi = \{ \ \}$

$A \cup \phi = \{ 2, 3, 5 \} \cup \{ \ \} = \{ 2, 3, 5 \} = A$

$\phi \cup A = \{ \ \} \cup \{ 2, 3, 5 \} = \{2, 3, 5 \} = A$

$\therefore A \cup \phi = \phi \cup A = \phi$

$A \cap \phi = \{ 2, 3, 5 \} \cap \{ \ \} = \{ \ \} = \phi$

$\phi \cap A = \{\ \} \cap \{2, 3,5\} = \{\ \} = \phi$

$\therefore A \cap \phi = \phi \cap A = A \cap B$

(7) **If A = { 2, 4, 6, 8 , 10 } , B = { 3, 6, 9, 12, 15 } then find A – B and B – A . Are they equal? Are they disjoint Sets. (Problem solving)**

Solution: Given A = { 2, 4, 6, 8, 10} , B = { 3,6, 9, 12, 15 }

A – B = { 2, 4, 8, 10},

B – A = {3, 6, 9, 12, 15}

We observer that A –B ≠ B – A and A – B , B – A are disjoint Sets.

(8) Illustrate A – B and B – A in Venn – diagrams.

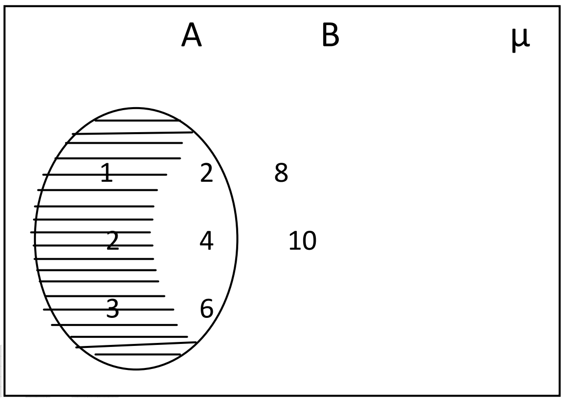
where A = { 1,2, 3, 4, 5, 6} and B = { 2, 4, 6, 8, 10}

(Visualization &Representation)

Solution: Given A = { 1,2, 3, 4, 5, 6} ; B = { 2, 4, 6, 8, 10}

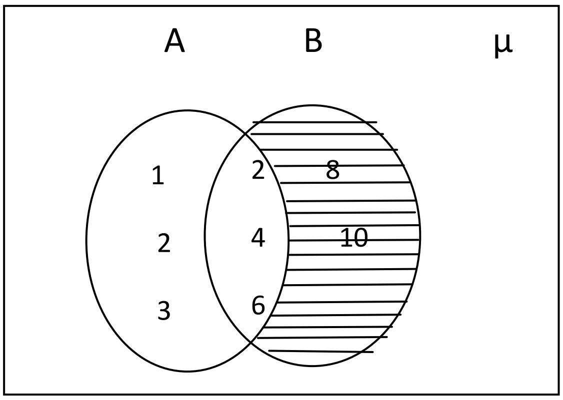
A –B = {1,3, 5} , B – A = { 8, 10 }

The Venn diagram of A – B



A – B = { 1,2, 3}

The Venn diagram of B – A



B – A = {8, 10}

Very Short Answer Questions

(1) Give example for a set (communication)

Solution: A = { 2, 3, 5, 7, 11} = { x: x is a prime number less than 13}

(2) Given example for an infinite and finite set (communication)

Solution: A = { x: x is a multiple of 7}

= { 7, 14 , 21, 28, ...}

B = { x : x is a multiple of 4 between 17 and 61 which are divisible by 7}

= { 28, 56 } is a finite set

(3) Given example for an empty set and a non – empty set

Solution: A = { x: 1<x< 2 , x is a natural number } = { } is an empty set .

B = { x: x$\in$N , x< 5 and x>7 } = { 1, 2, 3, 4, 8, 9 , ...}

Is a non – empty set.

(4) Show that the sets A and B are equal.

A = { x: x is a letter in the word " ASSASSINATION"}

B= { x: x is a letter in the word "STATION" } (Reasoning proof)

Solution: In roster form A and B can be written as

A = { A, S, I , N, T, O }

B= {A, S, I, N, T, O }

So , the elements of A and B are same

$\therefore$ A, B are equal Sets.

(5) A = { quadrilaterals } , B = { Square , rectangle, trapezium, rhombus}

State whether $A \subset B$ or $B \subset A$. Justify your answer.

Solution: Given A ={ quadrilaterals }

B = { Square , rectangle, trapezium, rhombus}

All quadrilaterals need not be square or rectangle or trapezium or rhombus.

Hence $A \not\subset B$

Square, rectangle ,trapezium and rhombus are quadrilaterals.

Hence **$B \subset A$**.

(6) If A = { 5, 6, 7, 8 } and B = { 7, 8, 9, 10} then find $n(A\cap B)$ and $n(A\cup B)$ (Problem solving)

Solution : Given A = { 5, 6, 7, 8 }

B = { 7, 8, 9, 10}

$A\cap B = \{7, 8\}$ $A\cup B = \{ 5, 6, 7, 8, 9, 10 \}$

$n(A\cap B) = 2$ $n(A\cup B) = 6$

(7) **If A = { 1, 2, 3, 4 } ; B = { 1, 2, 3, 5, 6 } then find $A\cap B$ and $B\cap A$. Are they equal? (Problem Solving)**

Solution: Given A = { 1, 2, 3, 4 }

B = { 1, 2, 3, 5, 6 }

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

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

We observe that $A\cap B = B\cap A$

(8). Write the set builder form of $A \cup B$, $A \cap B$ and $A - B$ (communication)

Solution:

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

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

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

(9). **Give example for disjoint sets. (Communication)**

Solution:

The Set of even number and the Set of odd number are disjoint sets,

Note: If $A \cap B = \phi$ then A, B are disjoint sets.

Object Type Question

(1) The symbol for a universal Set ……….. .. **[ ]**

(A) μ (B) ϕ (C) ⊂ (D) ∩

(2) If A = {a, b, c } ,the number of subsets of A is ………… **[ ]**

(A) 3 (B) 6 (C) 8 (D) 12

(3) Which of the following sets are equal ………….. **[ ]**

(A) A = { 1, -1} ,B = {1^2 , $(-1)^2$} (B) A = { 0, a } , B = {b ,0}

(C) A = { 2, 4, 6 } , B = { 1, 3, 5 } (D) A= {1,4,9} , B = { 1^1, 2^2 , 3^2}

(4) Which of the following Set is not null Set ? ………… **[ ]**

(A) {x: 1<x<2, x is a natural number }

(B) {x: x^2 -2 = 0 and x ∈ Q}

(C) {x: x^2 = 4 , x is odd}

(D) { x: x is a prime number divisible by 2}

(5) which of the following Set is not infinite ? .... **[ ]**

(A) { 1, 2, 3, ……….100} (B) {x: x^2 is positive , x∈ z}

(c) {x: x ∈ n, x is prime} (D) { 3, 5, 7, 9 ………}

(6) Which of the following set is not finite …………….. [ ]

(A) $\{ x : x \in N , x< 5 \text{ and } x> 7\}$ (B) { x: x is even prime }

(C) { x: x is a factor of 42 } (D) { x: x is a multiple of 3 , x< 40}

(7) The set builder form of $A \cap B$ is …….. [ ]

(A) $\{x: x \in A \text{ and } x \notin B \}$ (B) $\{ x: x \in A \text{ or } x \in B \}$

(C) $\{ x: x \in A \text{ and } x \in B\}$ (D) $\{x: x \in B \text{ and } x \notin A\}$

(8) For ever set A , $A \cap \phi =$ .... [ ]

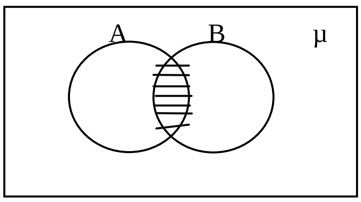
(A) A (B) ϕ (C) μ (D) 0

(9). Two Sets A and B are said to be disjoint if ……….. [ ]

(A) $A - B = \phi$ (B) $A \cup B = \phi$ (C) $A \cap B = B \cap A$ (D) $A \cap B = \phi$

(10) The Shaded region in the adjacent figure is …………. [ ]

(A) $A - B$ (B) $B - A$ (C) $A \cap B$ (D) $A \cup B$



(11) A = { x : x is a circle in a give plane} is …………. [ ]

(A) Null Set (B) Finite Set (C) Infinite Set (D) Universal Set

(12) n (A $\cup$ B) = ... **[ ]**

(A) n(A) + n(B) (B) n(A) + n(B) – n(A$\cap$B)

(C) n(A) - n(B) (D) n (A) + n (B) + n(A$\cap$B)

(13) **If A is subset of B, then A – B = …………** **[ ]**

(A) ϕ (B) A (C) B (D) A$\cap$B

(14) If A = { 1, 2, 3, 4, 5 } then the cardinal number of A is ………….. **[ ]**

(A) 2^5 (B) 5 (C) 4 (D) 5^2

(15) A = { 2, 4, 6, 8, 10 } , B = { 1, 2, 3, 4, 5} then B – A = ………. **[ ]**

(A) { 6, 8, 10 } (B) {1,3,5} (C) { 2, 4 } (D) All the above

(16) Which Statement is true ……………… **[ ]**

(A) A – B , B – A are disjoint sets

(B) A – B , A$\cap$B are disjoint sets

(C) A$\cap$B B –A are disjoint sets

(D) All the above

(17) A $\subset$ B then A$\cap$B = ... **[ ]**

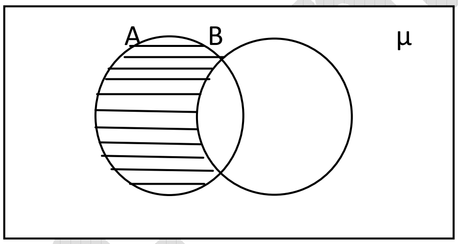
(A) A (B) B (C) ϕ (D) A $\cup$ B

(18) **A $\subset$ B then A $\cup$ B = ………………..** [ ]

(A) A (B) B (C) ϕ (D) A$\cap$B

(19) **The shaded region in the adjacent figure represents …………** [ ]

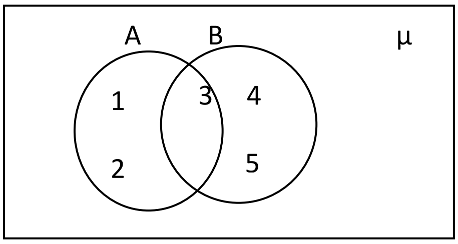
(A) A – B (B) B – A (C) A$\cap$B (D) A $\cup$ B



(20) From the figure ………….. [ ]

(A) A –B = { 1, 2,} (B) A$\cap$B = { 3 }

(C) B – A = { 4, 5 } (D) All the above



Key:

1.A **2.** C **3.** D **4.** D **5.** A **6.** A **7.** C **8.** B **9.** D **10.** C

11. C **12.** B **13.** A **14.** B **15.** B **16.** D **17.** A **18.** B **19.** A **20.** D

Fill in the Blanks

(1) The Symbol for null set = ϕ

(2) Roster form of $\{x : x \in N, 9 \le x \le 16\}$ is = **$\{9, 10, 11, 12, 13, 14, 15, 16\}$**

(3) If $A \subset B$ and $B \subset A$ then **$A = B$**

(4) If $A \subset B$ and $B \subset C$ then = **$A \subset C$**

(5) $A \cup \phi =$ **A**

(6) The Set theory was developed by = **George cantor**

(7) If $n(A) = 7$, $n(B) = 8$, $n(A \cap B) = 5$ then $n(A \cup B) =$ 10

(8) A set is a **Well defined** collection of objects.

(9) Every set is **Subset** of itself.

(10) The number of elements in a set is called the **cardinal number** of the set.

(11) $A = \{2, 4, 6, \ldots\}$, $B = \{1, 3, 5, \ldots\}$ then $n(A \cap B) =$ 0

(12) A and B are disjoint sets then $A - B =$ **A**

(13) If $A \cup B = A \cap B$ then **$A = B$**

(14) $A = \{x : x^2 = 4 \text{ and } 3x = 9\}$ is a **null set**

(15) $A = \{2, 5, 6, 8\}$ and $B = \{5, 7, 9, 1\}$ then $A \cup B =$ $\{1, 2, 5, 6, 7, 8, 9\}$.

(16) If $A \subset B$, $n(A) = 3$, $n(B) = 5$, then $n(A \cap B) =$

(17) If $A \subset B$, $n(A) = 3$, $n(B) = 5$, then $n(A \cup B) =$ __

ϕ

(19) $A = \{1, 2, 3, 4\}$ and $B = \{2, 4, 6, 8\}$ then $B - A =$ **$\{6, 8\}$**

(20) Set builder form of $A \cup B$ is = **$\{x : x \in A \text{ or } x \in B\}$**