Content 📜:

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- How to represent set 📊
- Types of sets 🧾
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- Operation of set 🔪

What Is Set ? 🦋

Set is a well-defined collection of distinct objects ,
These objects are called elements of set ,

whose elements are fixed and cannot vary .
Basically set doesn’t change from person to person .

notation :📎

- We list all elements of the set within the braces { }
- Set are denoted by capital letter (A , B , C , D …….etc) and
- Elements by lower case letter (a , b , c , d ….etc)
- If x is the member of set A then $x \in A$ (read as x belongs to A) and
- If not the $x \in A$ (read as x is not belongs to A)

How to represent set :📊

Set-builder form

Roster form🤣

- In this form we listed the elements of set within the braces { } and separated by commas (,) ..

- Roster form is also known as tabular or valid form ..

- Order of elements doesn't matter ..
  e.g. { 1 , 2 , 3 } and { 1 , 3 , 2 } are same

- Elements never repeat ..
  e.g. { 1 , 2 , 1 , 3 } is wrong until we write it as { 1 , 2 , 3 }

Examples of roster form 👇 :

{ 1 , 2 , 3 , 4 } , { … -3 , -2 , -1 , 0 … etc } , { A , L , O , Y } , { 1 } , { 0 } , { } etc ..

Set-builder form⛑️

- In this form we listed the elements of set within the braces { } and separated by colons… we use ‘:’ in the place of ‘|’ ..
- Set-builder form is also known as rule method ..
- In this form there is an variable x (this can be y , a , p etc) which represent the property of the set ..
- Set builder is in the form of { x : P(x) } .. (P is property of set }

Examples of set builder form 👇:

the set of A of all the natural numbers less than 100

A = { x : x is a natural number less than 100 }

Types of sets🧾

- Empty set🕳️
- Singleton set💁🏼‍♀️
- Finite set💰
- infinite set⏰
- Equal set⚖️
- Equivalent set🔺 🔻
- Disjoint set⚫⚫
- Subset↪️
- Superset↩️
- Power set💪🏻
- Universal set🌎

Empty set🕳️

- A set which does not contain any element is called an empty set or valid set or null set ..

- This set is denoted by { } or φ..

- If there is an element 0 in the set then this won’t come in empty set ..

Example of empty set 👇 :

A = {x : x is a leap year between 1904 and 1908 }
So A = { } or φ..
Etc..

Singleton set🙍🏼‍♀️

- A set contain only one element is called singleton set ..

Example of singleton set 👇 :

{0} , {3} , {10} ,{ 2000} etc..

Finite set💰

- A set which has no elements or defined number of elements are finite set ..

- All the empty sets are falls into the category of finite sets ..

Example of finite set 👇 :

{ 1 , 2 , 3 , 4 } , { x : x is an natural number and $4<x<7$ } etc ..

Infinite set⏰

- The set which are non terminating are infinite set ..

- Infinite setis always denoted by only three dots ..

Example of infinite set 👇:

{ 1 , 2 , 3 … } , { …-1 , 0 , 1 … } , { … -1 , 0 } etc ..

Cardinal number 🤝

The number of elements in finite set is represented by n (A) known as cardinal number ..

Equal set⚖️

- Two sets A and B are said to be equal if every element of A is also an element of B or vice Verma , that is equal set have exactly the same elements ..

Example of equal set 👇 :

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

Equivalent set 🔺 🔻

- Two finite number A and B are said to be equal if the number of elements are equal ..

- n(A) = n (B)

- All Equal sets are Equivalent set but equivalent sets need not be equal ..

Example of equivalent set 👇 :
A = { 1 , 2 , 3 }   and   B = { 5 , 9 , 15 }
Here set n(A) = n(B)

Disjoint set⚫⚫

- Two sets that have no elements in common are disjoint set ..

Example of disjoint set 👇:
A = { 1 , 2 , 3 }   and   B = { 7 , 4 , 0 }
A and B are disjoint sets ..

Subset↪️

- Let A and B are two sets and all the elements of set A are also in set B , then set A is subset of set B ..

- Subset is denoted by symbol “⊂” ..

- Every set is subset of itself ..

- The empty set is subset of every set ..

- If $A = B$ then $A \subset B$ and $B \subset A$ ..

- If A contains n elements , then A has 2^n subsets ..

Example of subset 👇:
$A = \{ 1 , 2 , 3 \}$ and $B = \{ 1 , 2 , 3 , 4 \}$
Here $A \subset B$

Implies " $\Rightarrow$ " and if and only iff " "

- $A \subset B$ if whenever $a \in A$, then $a \in B$. It is often convenient to use the symbol " $\Rightarrow$" which means implies ..
- $A \subset B$ if $a \in A \Rightarrow a \in B$
- When $A \subset B$ and $B \subset A \Leftrightarrow A = B$

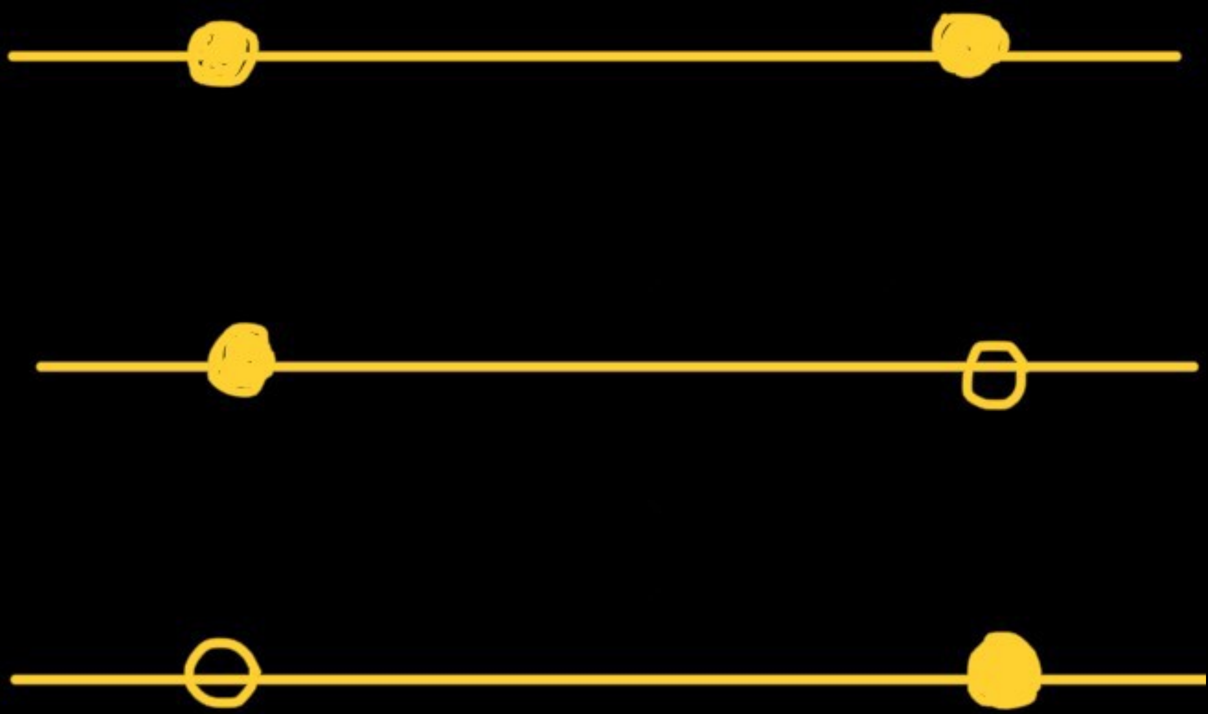
Intervals as subset of R (real number) :

- An interval is a set of all real numbers between a given pair of numbers ..
- Intervals can be different types which can include either endpoints or both endpoints or neither endpoints ..
- An endpoint of an interval is either of the two points that mark the endpoint of the line segment ..
- The interval of numbers between a and b , including a and b , is denoted [a,b] ..
- The interval of numbers between a and b , not including a and b , is denoted (a,b) ..
- The interval of numbers between a and b , not including a but including b , is denoted (a,b] ..
- The interval of numbers between a and b , not including b but including a , is denoted [a,b) ..
- The interval ‘ [ ] ‘ is closed interval ..
- The interval ‘( ) ‘ is open interval ..
- The closed intervals ‘[ ]’ means < or > and = ..
- The open intervals ‘( )’ means < or > ..

Example of closed and open intervals 👇:

</>

≤/≥



Memory tip :🤔

Open room : light
Closed room : dark

() is something like o so this will used for Open interval ..
[] is something like a closed box so this will used for closed interval ..

Superset↩️

- Let A and B are two sets and all the elements of set B are also in the set A , then B is the superset of A ..

- Superset is denoted by symbol “⊃” ..

- Every set is superset of itself ..

- Every set is superset of empty set ..

Example of superset 👇 :
A = { 1 , 2 , 3 } and B = { 1 , 2 , 3 , 4 }

B ⊃ A

Power set💪🏻

- The set of all subsets of the given set is known as power set of A ..
- This is denoted by P(A) ..
- If set A has n elements , then it's power set P(A) ..

Example of power set :
let set A = { 1 , 2 , 3 }
then P(A) = φ , { 1 } , { 2 } , { 3 } , { 1 , 2 } , { 2 , 3 } , { 1 , 3 } , { 1 , 2 , 3 }

Universal set🌎

- The set containing all elements of other sets including its own elements ..

- This can be finite or infinite ..

- All the sets are subset of universal set ..

- This is denoted by symbol U ..

Example of universal set 👇 :
The set of real numbers is a universal set of integers, rational numbers , irrational numbers ..

Question time📜

The number of elements in the Power set P(S) of the set S=[[Φ],1,[2,3]] is
A. 4
B. 8
C. 2
D. None of these

Let S be an infinite set and S1, S2, S3, ..., Sn be sets such that S1 ∪S2 ∪ S3∪....Sn = S then

A. atleast one of the sets Si is a finite set
B. notmorethanoneofthesetSicanbeinfinite
C. atleast one of the sets Si is an infinite set
D. none of these

IfAbeafinitesetofsizen,thennumberofelementsinthepowersetofAxA

A. 2
B. 22
C. (2)
D. none of these

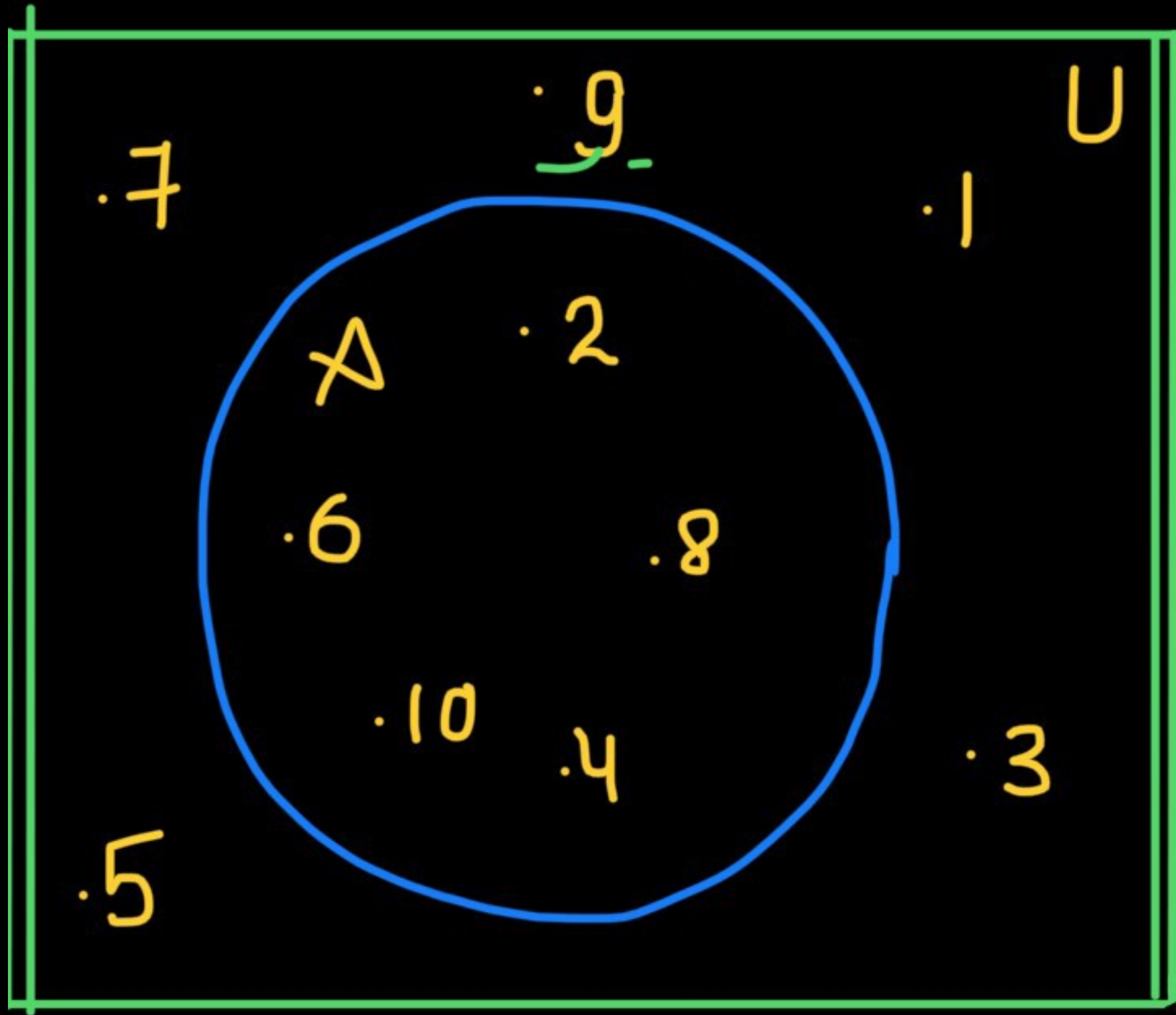
Number of subsets of a set of order three is
A. 3
B. 6
C. 8
D. 9

Venn diagram📈

- Venn diagram is introduced by John Venn ..
- Venn diagram is also called set diagram or logic diagram ..
- The universal set (U) is represent by a closed rectangle ..
- This rectangle consists all the sets ..
- The sets and subsets are shown by using circle or oval shapes ..
- The elements inside the U are shown by a dot (•) ..
- Venn diagram shows the relation between the sets of (natural numbers and integers) etc ..

- Venn diagram show the operations of sets like :- intersection of sets , union of sets and difference of sets (we will discuss about it on another topic) ..

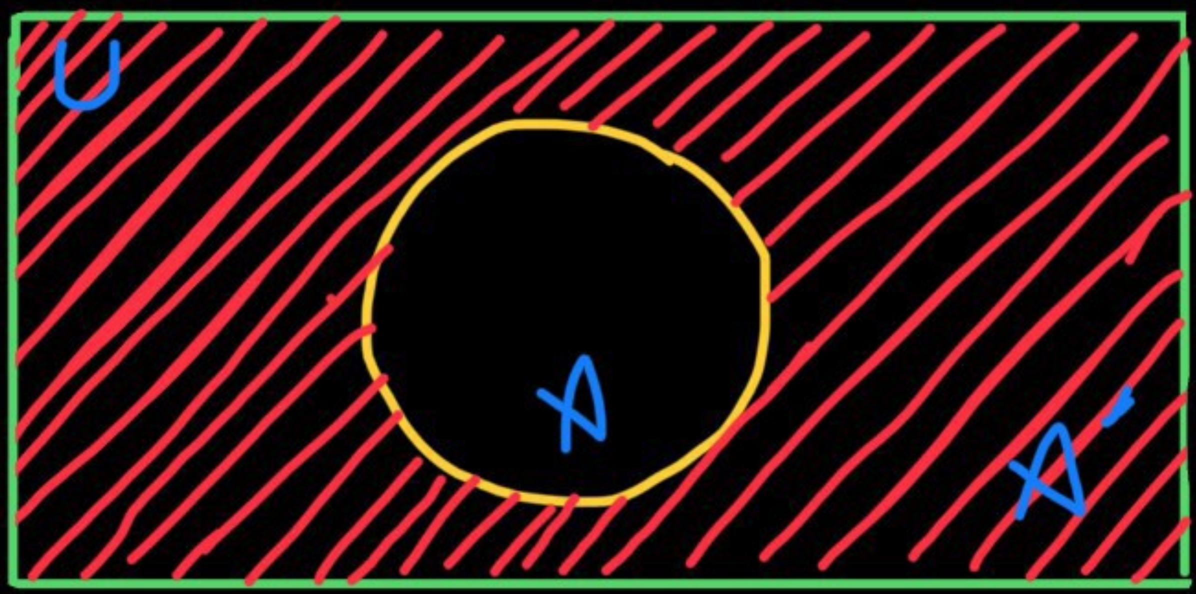
Venn diagram :


U
A
9
7
1
2
6
8
10
4
3
5

Operations of sets🔪

- Complement of set
- Intersection of set
- Union of set
- Difference of set

Complement of set🤮


U
A
A'

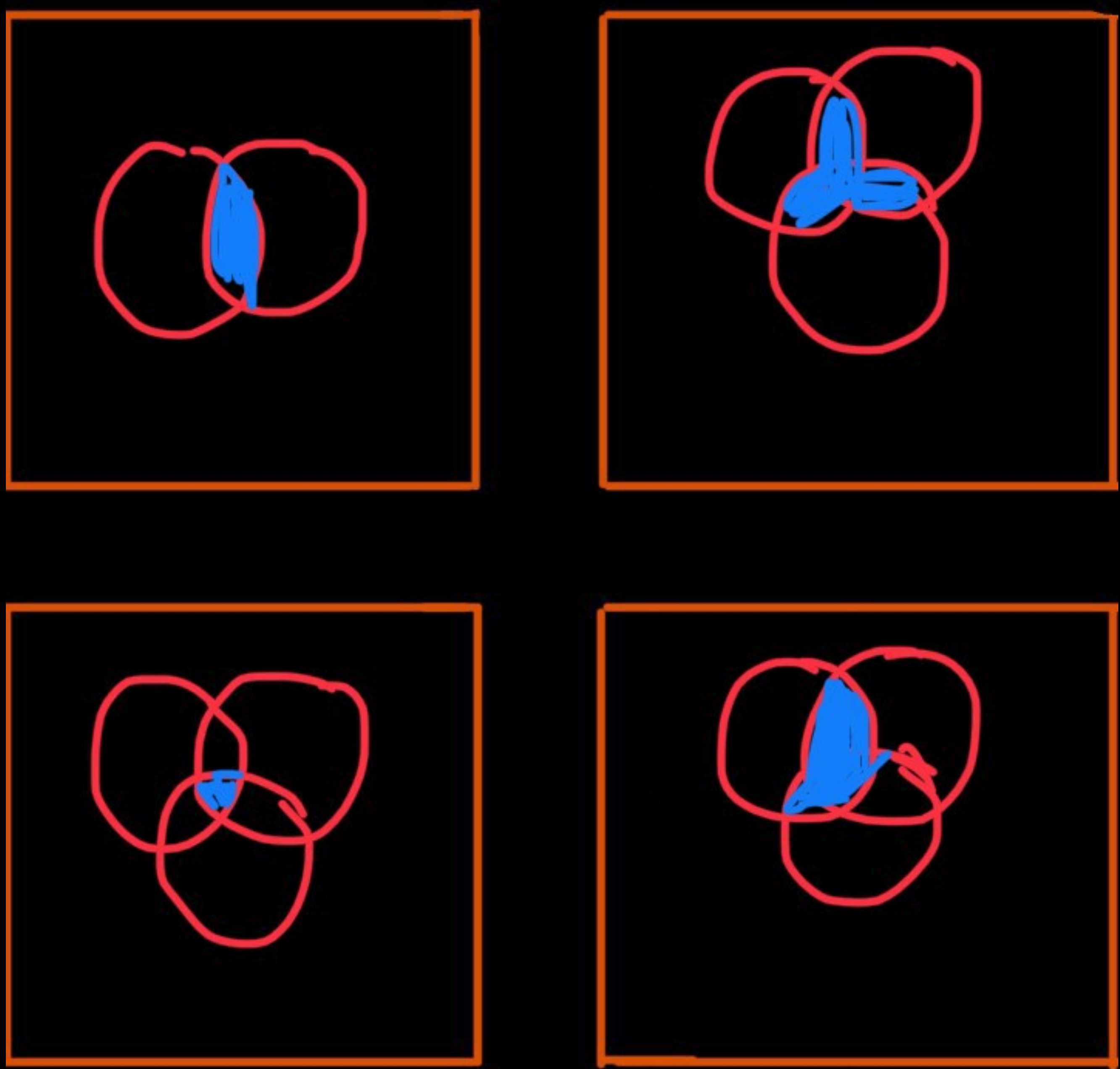
- A’ is the complement set of A . this contain the elements of set A’ ..
- complement set is denoted by A power c..
- $A + A' = U$ ..
- Complement set is a set itself ..
- $A' = \{ x : x \in U \text{ and } x \notin A \}$ ..

Example of complement set 👇 :
$U = \{ 1 , 2 , 3 , 4 \ldots\}$ and $A = \{ 2 , 4 , 6 , 8 \ldots \}$ then $A' = \{ 1 , 3 , 5 , 7 \ldots \}$

Properties of complement set

- $A \cup A' = U$ Complement laws
- $A \cap A' = \varphi$
- $(A \cup B)' = A' \cap B'$ De Morgan’s laws
- $(A \cap B)' = A' \cup B'$
- $U' = \varphi$ Complement of and
- $\varphi' = U$
- $(A')' = A$ Law of double complementation

Intersection of two sets🔀



- The intersection of two sets is written as '∩' ..

- Basically Intersection of two sets containing the common elements of both the sets ..

Example of intersection of two sets 👇 :

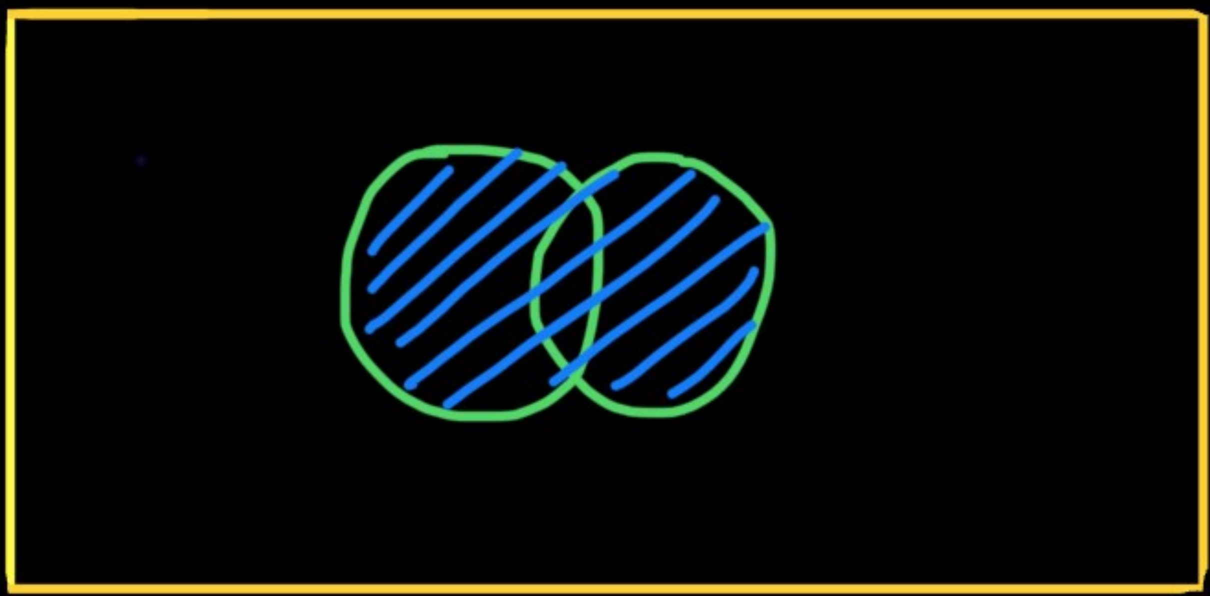
$A = \{ 1 , 2 , 3 , 4 \}$ $B = \{ 3 , 2 , 5 , 8 \}$

Then $A \cap B = \{ 3 , 2 \}$

Properties of intersection of two sets :

• $A \cap B = B \cap A$	Commutative law
• $(A \cap B) \cap C = A \cap (B \cap C)$	Associative law
• $\varphi \cap A = \varphi$	
• $U \cap A = A$	
• $A \cap A = A$	Idempotent law
• $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$	Distributive law

Union of sets🇱🇷



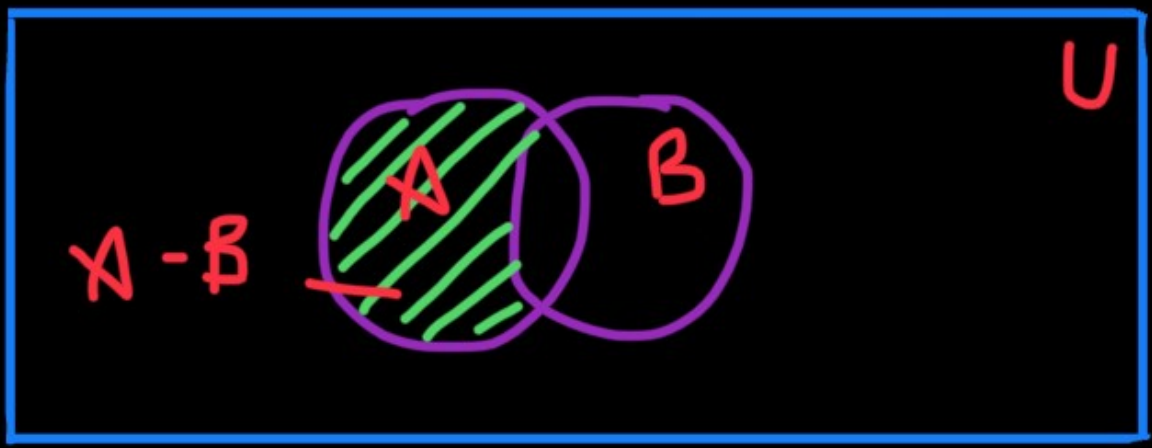
- The union of two set is written as U ..
- Union of two sets containing the elements of two sets both the sets ..

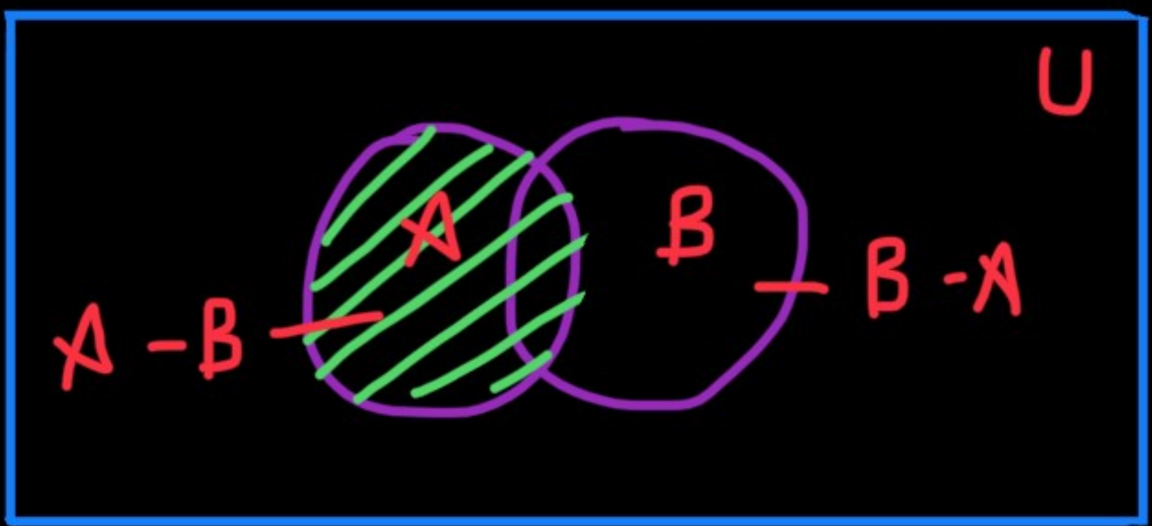
Example of union of sets 👇 :
A = A = { 1 , 2 , 3 , 4 }   B = { 3 , 2 , 5 , 8 }
Then A U B = { 1 , 2 , 3 , 4 , 5 , 8 }

Properties of union of sets :

• A U B = B U A	Commutative law
• (A U B) U C = A U (B U C)	Associative law
• A U φ = A	Law of identity element
• A U A = A	Idempotent law
• A U U = U	Law of universal set

Differences of sets🙆‍♀️🧟‍♀️


U
A
B
A - B


U
A
B
A - B
B - A

- The difference of two sets A and B denoted by A - B ..

- This the set of those elements of A which are not in B ..

Example of difference of sets 👇 :
A = { 1 , 2 , 3 , 4 , 6 , 12 } and B = { 1 , 2 , 4 , 8 , 16 }
A-B = { 3 , 6 , 12 } and B - A = { 8 , 16 }

Question time 📜

Let U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}, A = {1, 2, 5}, B = {6, 7}. Then A ∩ B' is :
(a) A
(b) B
(c) B'
(d) None

Let A and B be two sets then $(A \cup B)' \cup (A' \cap B)$ is equal to

(a) A'

(b) A

(c) B'

(d) None of these

If A and B be two sets such that n (A) = 70, n (B) = 60, and n $(A \cup B)$ = 110. Then n $(A \cap B)$ is equal to

(a) 20

(b) 120

(c) 240

(d) 100

Given the sets A = {1, 2, 3}, B = {3 , 4}, C = {4 , 5, 6}, then $A \cup (B \cap C)$ is

(a) {3}

(b) {1, 2 ,3 , 4, 5, 6}

(c) {1, 2 , 3 , 4}

(d) None of these

KHUSH RAHO 🥳

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