NDA 1 2025

LIVE

MATHS

SETS-RELATION FUNCTION

CLASS 1

NAVJYOTI SIR

Crack
EXAMS

02 Oct 2024 Live Classes Schedule

8:00AM	02 OCTOBER 2024 DAILY CURRENT AFFAIRS	RUBY MA'AM
9:00AM	02 OCTOBER 2024 DAILY DEFENCE UPDATES	DIVYANSHU SIR

SSB INTERVIEW LIVE CLASSES

9:00AM	OCT ONLINE COURSE INTRODUCTION	ANURADHA MA'AM

NDA 1 2025 LIVE CLASSES

11:30AM	GK - BIOSPHERE RESERVES & NATIONAL PARKS	RUBY MA'AM
1:00PM	BIOLOGY - PLANT GROWTH	SHIVANGI MA'AM
4:00PM	MATHS - SETS, RELATION & FUNCTION - CLASS 1	NAVJYOTI SIR
5:30PM	ENGLISH - WORD CLASSES - CLASS 2	ANURADHA MA'AM

CDS 1 2025 LIVE CLASSES

11:30AM	GK - BIOSPHERE RESERVES & NATIONAL PARKS	RUBY MA'AM
1:00PM	BIOLOGY - PLANT GROWTH	SHIVANGI MA'AM
2:30PM	MATHS - SI & CI - CLASS 2	NAVJYOTI SIR
5:30PM	ENGLISH - WORD CLASSES - CLASS 2	ANURADHA MA'AM

AFCAT 1 2025 LIVE CLASSES

10:00AM	REASONING - CODING DECODING	RUBY MA'AM
2:30PM	MATHS - SI & CI - CLASS 2	NAVJYOTI SIR
4:00PM	STATIC GK - WORLD CUPS & TROPHIES	DIVYANSHU SIR
5:30PM	NGLISH - WORD CLASSES - CLASS 2	ANURADHA MA'AM

SSBCrack EXAMS

WHAT WILL WE STUDY ?

- Sets
- Types of Sets
- Operations on Sets
- Venn Diagram
- Practise Questions

SETS

Rohit, Virat, Pujara

(objects are distinct and are same for everyone)

→ collection of well-defined objects

Eg

→ collection of best batsman of world.

of a set → capital letter

SETS

$A = \{a, e, i, o, u\}$

element

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

order does not matter

$a \in A$

belongs to

$b \notin A$

does not belongs to

REPRESENTATION OF SETS

List method / Roster form

{1, 2, 3, 4}

Set-builder form

{x : x is a natural number less than 5}

{1, 2, 3, 4}

→ N — set of natural numbers

W — set of whole numbers

→ Z — " integers

→ Q — " " rational numbers

→ R — " " real numbers

C — " " complex numbers

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

$\{x : x \in N, x < 5\}$

TYPES OF SETS

1. EMPTY SET

→ No element

$A = \{\} = \phi$

$\{\phi\}$ → not an empty set.

element / object of a set can also be a set.

$\{0\}$ → not an empty set

2. SINGLETON SET

→ one element only.

$\{a\}, \{b\}, \{\phi\}, \{0\}$

TYPES OF SETS

3. FINITE AND INFINITE SETS

no. of elements is not countable.

no. of elements is fixed / countable.

$B = \{4, 6, 8, 10\} \longrightarrow$ finite set

$N = \{1, 2, 3, 4 \ldots\} \longrightarrow$ Infinite set.

Cardinal Number / Cardinality of a Set

→ number of elements of a set.

$A = \{4, 7, 6, 1, 3\}$

$n(A) = 5$

TYPES OF SETS

4. EQUIVALENT AND EQUAL SETS

$A = \{a, b, c\}$ $\quad B = \{1, 2, 3\}$

$n(A) = 3$
$n(B) = 3$

no. of elements in A = no. of elements in B,

$\Rightarrow$ A & B are equivalent sets.

$A = \{a, b, c\}$ $\quad B = \{a, b, c\} = \{c, b, a\}, \{b, a, c\}$

$\Rightarrow$ A & B are equal sets.

TYPES OF SETS

5. SUBSET AND SUPERSET

$A = \{1, 3, 5, 7, 9\}$

$B = \{7, 9\}$

B is a subset of A (All elements of B lies in A)

$\Rightarrow B \subset A$ | A is called 'superset')

NUMBER OF SUBSETS

$A = \{1, 2\} \longrightarrow (2)$

$\{1\}$ $\{2\}$, $\{1, 2\}$, $\emptyset$ $\}$ (4)

proper subset

improper subset

$A = \{a, b, c\}$ —— (3)

Subsets of A

$\{a\}$ $\{b\}$ $\{c\}$

$\{a, b\}, \{b, c\}, \{c, a\}$ } (8)

$\{a, b, c\}$ $\emptyset$

If 'n' number of elements are there in a set A,

no. of subsets of $A = 2^n$

no. of proper subsets $= \underline{2^n - 1}$

POWER SET AND UNIVERSAL SET

Set containing all subsets.

$A = \{1, 2\}$

Subsets of $A = \{1\}, \{2\}, \{1, 2\}, \emptyset$

$P(A) = \{\{1\}, \{2\}, \{1, 2\}, \emptyset\}$

$n(P(A)) = 2^n$

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

$C = \{6, 7\}$

$U = \{1, 2, 4, 6, 7\}$

The set acting as superset of all.

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

$Q = \left\{ \frac{p}{q} ;\ p, q \in Z \ \& \ q \neq 0 \right\}$

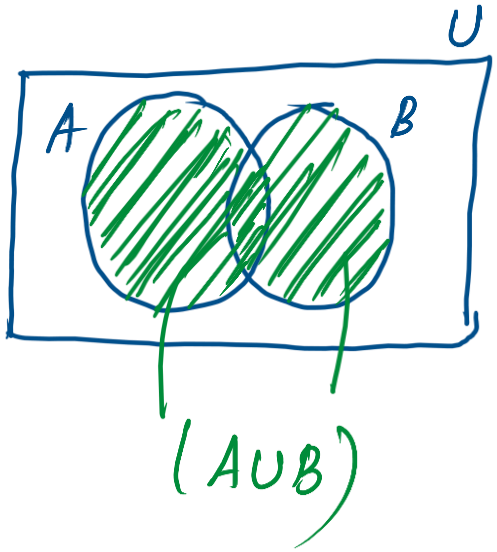
$R = \{$ all real numbers $\}$ ⟶ acts as universal set for N, Q & R.

$(N \subset W \subset Z \subset Q \subset R \subset C)$

OPERATIONS ON SETS

(1) Union

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



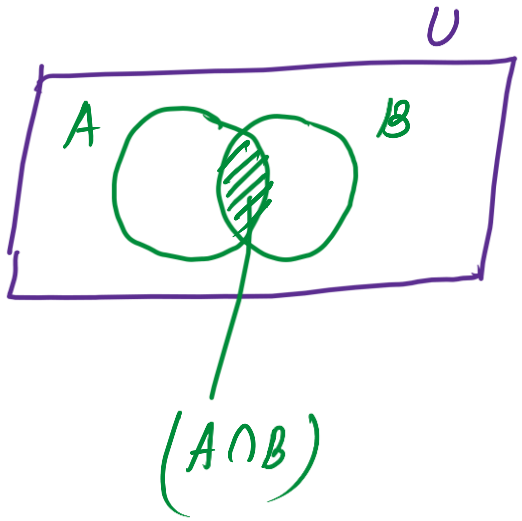
$A \cup B = \{1, 2, 3, 4, 6, 7\}$

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

OPERATIONS ON SETS

② Intersection :

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

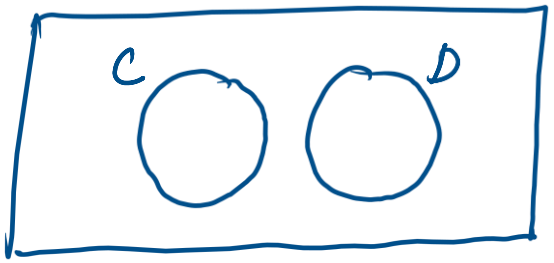


$A \cap B = \{2, 3\}$ common of the sets.

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

$C = \{2, 3, 6, 7\}$ $\quad D = \{9, 1\}$

$C \cap D = \{\} = \emptyset$



$\Rightarrow$ C & D are called disjoint sets.

OPERATIONS ON SETS

③ Difference

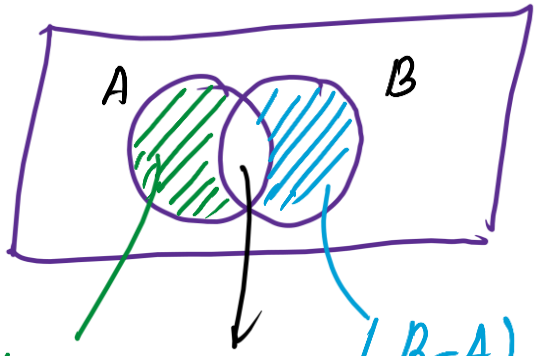
$A = \{1, 4, 7, 8, 9\}$ $\quad B = \{6, 7, 2, 10\}$

$A - B = \{1, 4, 8, 9\}$

$B - A = \{6, 2, 10\}$

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

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



$(A - B)$ $\quad (B - A)$

$A - (A \cap B)$ $\quad B - (A \cap B)$

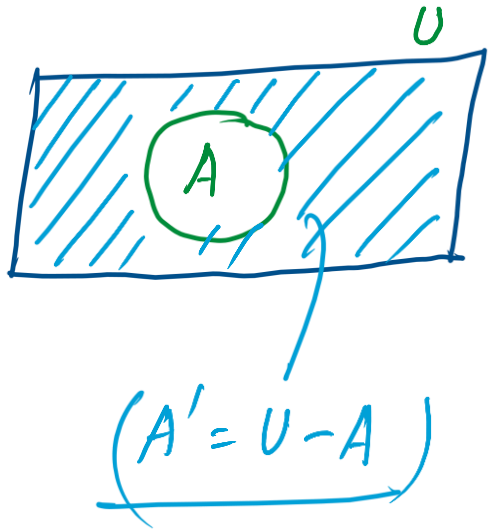
Symmetric difference

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

OPERATIONS ON SETS

(4) Complement :

A' or A^c



$A = \{1, 2, 3, 4, 5\}$ $\quad U = \{1, 2, 3, 4, 5, 6, 7, 8\}$

$A' = A^c = \{6, 7, 8\}$

$A' = \{x : x \in U \text{ but } x \notin A\}$

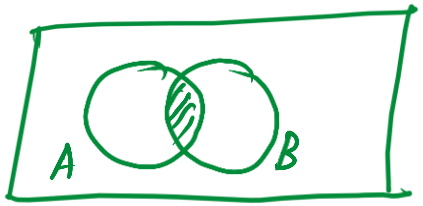
$= U - A$

COMPLEMENT OF SETS

LAW OF ALGEBRA OF SETS

1. Idempotent laws
   (a) $A \cup A = A$ (b) $A \cap A = A$
2. Identity laws
   (a) $A \cup \phi = A$ (b) $A \cap U = A$
3. Commutative laws
   (a) $A \cup B = B \cup A$
   (b) $A \cap B = B \cap A$
4. Associative laws
   (a) $(A \cup B) \cup C = (A \cup B) \cup C$
   (b) $A \cap (B \cap C) = (A \cap B) \cap C$
5. Distributive laws
   (a) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
   (b) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
6. De-Morgan's laws
   (a) $(A \cup B)' = A' \cap B'$ (b) $(A \cap B)' = A' \cup B'$

IMPORTANT RESULTS



If A, B and C are any three finite sets, then

1. $n(A \cup B) = n(A) + n(B) - n(A \cap B)$
2. $n(A \cup B) = n(A) + n(B)$, if and only if $A \cap B = \phi$
3. $n(A - B) = n(A) - n(A \cap B)$
4. $n(A \Delta B) = n(A - B) + n(B - A) = n(A) + n(B) - 2n(A \cap B)$
5. $n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B)$
   $- n(B \cap C) - n(A \cap C) + n(A \cap B \cap C)$
6. $n(A' \cup B') = n(U) - n(A \cap B)$
7. $n(A' \cap B') = n(U) - n(A \cup B)$

EXAMPLE

If in a group of 850 persons, 600 can speak Hindi and 340 can speak Tamil. Then, the number of persons can speak both Hindi and Tamil is

(a) 40 (b) 90 (c) 85 (d) 120

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(a) 40 (b) 90 (c) 85 (d) 120

Ans: (b)

Q) Consider the following statements : **(PYQ – 2024 – I)**

1. The set of all irrational numbers between $\sqrt{2}$ and $\sqrt{5}$ is an infinite set.
2. The set of all odd integers less than 100 is a finite set.

Which of the statements given above is/are correct ?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

Q) Consider the following statements :

1. The set of all irrational numbers between $\sqrt{2}$ and $\sqrt{5}$ is an infinite set.
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Which of the statements given above is/are correct ?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

Ans: (a)

Directions Consider the information given below and answer the two items that follow

In a class, 54 students are good in Hindi only, 63 students are good in Mathematics only and 41 students are good in English only. There are 18 students who are good in both Hindi and Mathematics. 10 students are good in all three subjects.

Q) What is the number of students who are good in Hindi and Mathematics but not in English?

(a) 18 (b) 12 (c) 10 (d) 8

Q) What is the number of students who are good in Hindi and Mathematics but not in English?

(a) 18 (b) 12 (c) 10 (d) 8

Ans: (d)

Q) What is the number of students who are good in either Hindi or Mathematics but not English?

(a) 99 (b) 107 (c) 125 (d) 130

Q) What is the number of students who are good in either Hindi or Mathematics but not English?

(a) 99 (b) 107 (c) 125 (d) 130

Ans: (c)

Q) If A, B and C are subsets of a given set, then which one of the following relations is not correct?

(a) $A \cup (A \cap B) = A \cup B$
(b) $A \cap (A \cup B) = A$
(c) $(A \cap B) \cup C = (A \cup C) \cap (B \cup C)$
(d) $(A \cup B) \cap C = (A \cap C) \cup (B \cap C)$

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

Ans: (a)

Q) Let $S = \{2, 4, 6, 8, \ldots\ldots, 20\}$.

What are the maximum number of subsets of S?

(a) 10 (b) 20

(c) 512 (d) 1024

Q) Let $S = \{2, 4, 6, 8, \ldots\ldots, 20\}$.

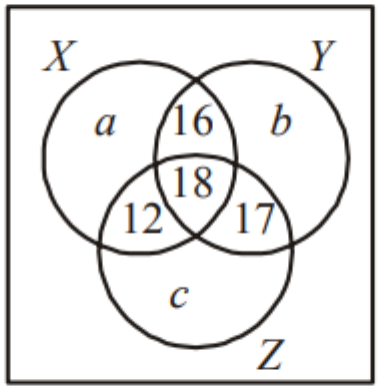
What are the maximum number of subsets of S?

(a) 10 (b) 20

(c) 512 (d) 1024

Ans: (d)

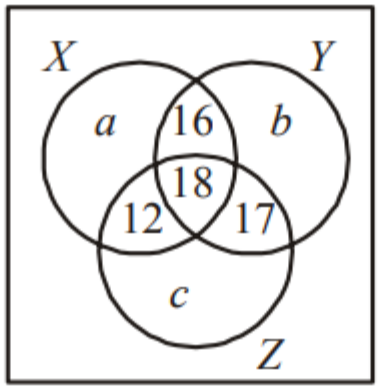
Consider the following Venn diagram, where X, Y and Z are three sets. Let the number of elements in Z be denoted by $n(Z)$ which is equal to 90.



If the number of elements in Y and Z are in the ratio 4 : 5, then what is the value of b? **[NDA/NA 2020-I]**

(a) 18 (b) 19 (c) 21 (d) 23

Consider the following Venn diagram, where X, Y and Z are three sets. Let the number of elements in Z be denoted by $n(Z)$ which is equal to 90.



What is the value of **[NDA/NA 2020-I]**

$$n(X)+n(Y)+n(Z)-n(X\cap Y)-n(Y\cap Z)-n(X\cap Z)+n(X\cap Y\cap Z)?$$

(a) $a+b+43$ (b) $a+b+63$
(c) $a+b+96$ (d) $a+b+106$

If the number of elements belonging to neither X nor Y, nor Z is equal to p, then what is the number of elements in the complement of X? **[NDA/NA 2020-I]**

(a) $p+b+60$ (b) $p+b+40$
(c) $p+a+60$ (d) $p+a+40$

Summary

- Sets
- Types of Sets
- Operations on Sets
- Venn Diagram
- Practise Questions

NDA 1 2025

LIVE

MATHS

SETS-RELATION FUNCTION

CLASS 2

NAVJYOTI SIR

Crack
EXAMS