

NCERT CHAPTER 1

Sets

Core definitions, subsets, interval notations, Venn diagrams, De Morgan's laws, and word problems.

🕒 Revision Time: 20 mins 🎯 Target: 4–6 Marks 📖 Textbook: [kcmh101.pdf](#)

⚡ Essential Formulas & Concept Summary

1. TYPES OF SETS & REPRESENTATION

- **Roster (Tabular) Form:** Elements listed inside braces, separated by commas. e.g. $A = \{2, 4, 6, 8\}$. Order does not matter, repetitions are omitted.
- **Set-Builder Form:** Characterizing property. e.g. $A = \{x : x = 2n, n \in \mathbb{N}, n \leq 4\}$.
- **Empty (Null/Void) Set:** Denoted by ϕ or $\{\}$. Note: $\{\phi\}$ is not empty (it contains the element ϕ).
- **Equal Sets:** $A = B \iff$ every element of A is in B and vice versa.

2. SUBSETS & POWER SET

A set A is a subset of B ($A \subseteq B$) if every element of A belongs to B .

$$\text{If } |A| = n, \quad \text{Total number of subsets} = 2^n$$

$$\text{Number of proper subsets} = 2^n - 1$$

$$\text{Power Set } P(A) = \text{set of all subsets of } A, \quad |P(A)| = 2^n$$

3. REAL NUMBER INTERVALS

- **Closed Interval:** $[a, b] = \{x \in \mathbb{R} : a \leq x \leq b\}$ (endpoints included).
- **Open Interval:** $(a, b) = \{x \in \mathbb{R} : a < x < b\}$ (endpoints excluded).
- **Semi-open / Semi-closed:** $[a, b) = \{x \in \mathbb{R} : a \leq x < b\}$, $(a, b] = \{x \in \mathbb{R} : a < x \leq b\}$.

4. SET OPERATIONS & DE MORGAN'S LAWS

Let U be the universal set, $A, B \subseteq U$:

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

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

$$\text{extDifference} : A - B = \{x : x \in A \text{ extand } x \text{ not in } B\} = A \cap B'$$

$$\text{extComplement} : A' = U - A, \quad (A')' = A, \quad A \cup A' = U, \quad A \cap A' = \phi$$

$$(\mathbf{A} \cup \mathbf{B})' = \mathbf{A}' \cap \mathbf{B}' \quad \text{extand} \quad (\mathbf{A} \cap \mathbf{B})' = \mathbf{A}' \cup \mathbf{B}' \quad \text{ext(DeMorgan's Law)}$$

5. CARDINALITY FORMULAS

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

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

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

Top Expected Exam Questions (Step-by-Step Solutions)

Question 1: Survey Word Problem (3 Sets)

4 Marks

In a survey of 60 people, it was found that 25 people read newspaper H, 26 read newspaper T, 26 read newspaper I, 9 read both H and I, 11 read both H and T, 8 read both T and I, and 3 read all three newspapers. Find:

- (i) The number of people who read at least one of the newspapers.
- (ii) The number of people who read exactly one newspaper.

Question 2: Nested Subsets & Elements Distinction

2–3 Marks

Let $A = \{1, 2, \{3, 4\}, 5\}$. State whether each of the following statements is true or false and justify:

- (a) $\{3, 4\} \subset A$
- (b) $\{3, 4\} \in A$
- (c) $\{\{3, 4\}\} \subset A$
- (d) $\{\phi\} \subset A$

Exam Traps & Silly Mistakes

Trap 1: Confusing Element Of ($\in$) and Subset Of ($\subset$)

An element belongs to a set ($x \in A$). A set is a subset of another set ($X \subset A$). Never write $1 \subset \{1, 2\}$; write $\{1\} \subset \{1, 2\}$.

Trap 2: Empty Set Notation

Write ϕ or $\{\}$. Writing $\{\phi\}$ represents a set containing one element (the empty set), which is not empty.

 Quick Self-Check

Quiz 1: If set A has 4 elements, how many non-empty proper subsets does A have?

Quiz 2: State De Morgan's Law for $(A \cap B)'$.