# Class 11 Maths Chapter 1: Sets - Notes, Important Questions and MCQs (2026-27)

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Class 11 Maths Chapter 1, Sets, introduces the language used throughout higher mathematics – from functions and relations to probability.

These notes cover representation of sets, types of sets, subsets and intervals, power set, universal set, Venn diagrams, operations on sets, complement and the laws of set algebra, with worked examples, MCQs and a free PDF.

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## Chapter Overview

A set is a well-defined collection of distinct objects. “Well-defined” means we can decide clearly whether an object belongs to it. For example, the vowels of the English alphabet form a set, but “the five most talented writers of India” does not.

Objects in a set are called elements or members; we write $a \in A$ if a belongs to A and $b \notin A$ if it does not. Standard sets: N (natural numbers), Z (integers), Q (rational numbers), R (real numbers), $Z^+$ (positive integers), $Q^+$, $R^+$.

## Important Topics and Concepts

### Representation of Sets

- Roster or tabular form: elements listed in braces, separated by commas, e.g. {a, e, i, o, u}. Elements are not repeated and order does not matter.

- Set-builder form: elements described by a common property, e.g. {x : x is a natural number less than 6}.
- Example: $\{x : x^2 = 9, x \in Z\} = \{-3, 3\}$.

## Types of Sets

- Empty (null/void) set ∅ or { } – no elements, e.g. {x : x is an even prime greater than 2}.
- Singleton set – exactly one element.
- Finite set – countable number of elements; infinite set – not finite (e.g. N).
- Equal sets – exactly the same elements (A = B).
- Equivalent sets – same number of elements, n(A) = n(B).

## Subsets

- A is a subset of B ($A \subset B$) if every element of A is in B.
- Every set is a subset of itself; ∅ is a subset of every set.
- $A \subset B$ and $B \subset A \Leftrightarrow A = B$.
- If $A \subset B$ and $A \neq B$, A is a proper subset of B.
- $N \subset Z \subset Q \subset R$; irrational numbers $T \subset R$, with $Q \cap T = \emptyset$.

## Intervals as Subsets of R

- Open interval $(a, b) = \{x : a < x < b\}$.
- Closed interval $[a, b] = \{x : a \leq x \leq b\}$.
- $[a, b) = \{x : a \leq x < b\}$ and $(a, b] = \{x : a < x \leq b\}$.
- Length of each interval is $b - a$.

## Power Set and Universal Set

- The power set P(A) is the set of all subsets of A. If n(A) = m, then $n[P(A)] = 2^m$.
- Example: $A = \{1, 2\}$ gives $P(A) = \{\emptyset, \{1\}, \{2\}, \{1, 2\}\}$.
- The universal set U contains all sets under consideration as subsets, e.g. for studying integers, U = Z.

## Venn Diagrams

- Introduced by John Venn; the universal set is shown as a rectangle and subsets as circles inside it.
- Used to visualise union, intersection, difference and complement.

## Operations on Sets

- Union: $A \cup B = \{x : x \in A \text{ or } x \in B\}$.
- Intersection: $A \cap B = \{x : x \in A \text{ and } x \in B\}$. If $A \cap B = \emptyset$, A and B are disjoint.
- Difference: $A - B = \{x : x \in A \text{ and } x \notin B\}$.
- Example: $A = \{1, 2, 3, 4\}$, $B = \{3, 4, 5\}$: $A \cup B = \{1, 2, 3, 4, 5\}$; $A \cap B = \{3, 4\}$; $A - B = \{1, 2\}$; $B - A = \{5\}$.
- Useful result: $n(A \cup B) = n(A) + n(B) - n(A \cap B)$.

## Complement of a Set

- $A' = U - A = \{x : x \in U \text{ and } x \notin A\}$.
- $(A')' = A$; $U' = \emptyset$; $\emptyset' = U$; $A \cup A' = U$; $A \cap A' = \emptyset$.
- De Morgan's laws: $(A \cup B)' = A' \cap B'$ and $(A \cap B)' = A' \cup B'$.

## Laws of Set Operations

| Law | Union | Intersection |
|---|---|---|
| Idempotent | $A \cup A = A$ | $A \cap A = A$ |
| Identity | $A \cup \varnothing = A$ | $A \cap U = A$ |
| Commutative | $A \cup B = B \cup A$ | $A \cap B = B \cap A$ |
| Associative | $(A \cup B) \cup C = A \cup (B \cup C)$ | $(A \cap B) \cap C = A \cap (B \cap C)$ |
| Distributive | $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ | $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ |
| Law of U | $A \cup U = U$ | $A \cap \varnothing = \varnothing$ |
| De Morgan | $(A \cup B)' = A' \cap B'$ | $(A \cap B)' = A' \cup B'$ |

## Important Definitions and Terms

| Term | Meaning |
|---|---|
| Set | A well-defined collection of distinct objects. |
| Empty set | A set with no elements, written $\varnothing$. |
| Singleton set | A set with exactly one element. |
| Subset | $A \subset B$ if every element of A is in B. |
| Proper subset | $A \subset B$ with $A \neq B$. |
| Power set | Set of all subsets of a given set. |
| Universal set | Set containing all sets under discussion. |
| Disjoint sets | Sets with no common element. |
| Complement | Elements of U not in A. |
| Interval | A subset of R between two real numbers. |

## Short Answer Questions

Q1. Write $\{x : x \text{ is a positive integer and } x^2 < 40\}$ in roster form.

$\{1, 2, 3, 4, 5, 6\}$, since $6^2 = 36 < 40$ and $7^2 = 49 > 40$.

Q2. Is $\{x : x \text{ is a natural number, } 1 < x < 2\}$ empty?

Yes. There is no natural number strictly between 1 and 2.

Q3. How many subsets does a set with 4 elements have?

$2^4 = 16$ subsets.

Q4. Write the power set of $\{a, b\}$.

$\{\varnothing, \{a\}, \{b\}, \{a, b\}\}$.

Q5. If $A = \{1, 3, 5\}$ and $B = \{1, 2, 3\}$, find $A \cap B$ and $A - B$.

$A \cap B = \{1, 3\}$; $A - B = \{5\}$.

Q6. Write $(-3, 0]$ in set-builder form.

Q7. If U = {1, 2, …, 9} and A = {2, 4, 6, 8}, find A′.

A′ = {1, 3, 5, 7, 9}.

Q8. State De Morgan’s laws.

(A ∪ B)′ = A′ ∩ B′ and (A ∩ B)′ = A′ ∪ B′.

## Long Answer Questions

Q1. Verify De Morgan’s law (A ∪ B)′ = A′ ∩ B′ for U = {1,2,3,4,5,6}, A = {2,3}, B = {3,4,5}.

A ∪ B = {2,3,4,5}, so (A ∪ B)′ = {1, 6}.

A′ = {1,4,5,6} and B′ = {1,2,6}, so A′ ∩ B′ = {1, 6}.

Both sides equal {1, 6}; hence verified.

Q2. In a group of 70 people, 37 like coffee, 52 like tea and each person likes at least one. How many like both?

Let C and T be the sets. n(C ∪ T) = 70, n(C) = 37, n(T) = 52.

Using n(C ∪ T) = n(C) + n(T) − n(C ∩ T): 70 = 37 + 52 − n(C ∩ T).

n(C ∩ T) = 19. So 19 people like both coffee and tea.

Q3. Show that A ∩ B = A ∩ C need not imply B = C.

Take A = {1, 2}, B = {1, 3}, C = {1, 4}.

A ∩ B = {1} and A ∩ C = {1}, so A ∩ B = A ∩ C.

But B ≠ C. Hence the statement is shown.

## MCQs with Answers

1. Which is a set?(a) Good students of a class (b) Vowels of English alphabet (c) Tall buildings (d) Beautiful flowersAnswer: (b) Vowels of English alphabet

2. Number of subsets of {1,2,3}:(a) 3 (b) 6 (c) 8 (d) 9Answer: (c) 8

3. ∅ is a subset of:(a) Only ∅ (b) Every set (c) Only infinite sets (d) No setAnswer: (b) Every set

4. A ∩ A′ equals:(a) A (b) U (c) ∅ (d) A′Answer: (c) ∅

5. [2, 5) contains:(a) 2 and 5 (b) 2 but not 5 (c) 5 but not 2 (d) NeitherAnswer: (b) 2 but not 5

6. If A ⊂ B then A ∪ B =(a) A (b) B (c) ∅ (d) UAnswer: (b) B

7. (A ∩ B)′ =(a) A′ ∩ B′ (b) A′ ∪ B′ (c) A ∪ B (d) A − BAnswer: (b) A′ ∪ B′

8. {x : x² = 4, x ∈ N} =(a) {2, −2} (b) {2} (c) {4} (d) ∅Answer: (b) {2}

9. If n(A)=3, n[P(A)] =(a) 3 (b) 6 (c) 8 (d) 9Answer: (c) 8

10. Sets with no common element are:(a) Equal (b) Equivalent (c) Disjoint (d) UniversalAnswer: (c) Disjoint

## Quick Revision Points

- Set – well-defined collection; $\in$ and $\notin$.
- Roster vs set-builder form.
- Types: empty, singleton, finite, infinite, equal, equivalent.
- $\varnothing \subset$ every set; $A \subset A$.
- $N \subset Z \subset Q \subset R$.
- Intervals: (a,b), [a,b], [a,b), (a,b].
- $n[P(A)] = 2^n$.
- $A \cup B$, $A \cap B$, $A - B$, $A'$.
- De Morgan's laws.
- $n(A \cup B) = n(A) + n(B) - n(A \cap B)$.

## Chapter Summary

Sets are well-defined collections that can be written in roster or set-builder form. Important types include empty, singleton, finite, infinite, equal and equivalent sets. Subsets, intervals and the power set (with $2^n$ elements) describe relationships between sets.

Union, intersection, difference and complement are the basic operations, visualised through Venn diagrams. They obey idempotent, identity, commutative, associative and distributive laws, along with De Morgan's laws.

## Exam Tips and PYQ Pattern

- Always use braces and avoid repeating elements in roster form.
- Check endpoints carefully in interval questions.
- Draw Venn diagrams for word problems – they prevent errors.
- Remember: $\varnothing$ and A itself are subsets of A.
- Verify laws with small example sets in proof-type questions.
- Write set-builder form with the domain ($x \in N$, Z or R).

## Frequently Asked Questions

Is this chapter in the 2026-27 CBSE syllabus?

Yes. It is part of the NCERT Class 11 Mathematics textbook, prescribed in the CBSE 2026-27 syllabus.

Can I download these notes as a PDF?

Yes. Use the free PDF link at the top of this page – no signup needed.

What are the important topics in Class 11 Maths Chapter 1?

Types of sets, subsets, intervals, power set, operations on sets, complement and De Morgan's laws.

How many elements are in the power set of a set with n elements?

$2^n$.

What is the difference between equal and equivalent sets?

## Conclusion

Sets is the foundation of Class 11 Maths. Practise operations and Venn diagrams, revise the laws table and download the free PDF for quick revision.

More Notes: Class 11 Maths Chapter 2: Relations and Functions notes | All Class 11 Maths notes

Author Bio: Written and reviewed by the Nextoper Editorial Team, a group of CBSE maths educators who build chapter notes directly from the NCERT textbook and past board paper patterns.

Freshness Note: These notes follow the NCERT Class 11 Maths textbook, Mathematics (Class XI) (NCERT reprint 2026-27, rationalised syllabus), and the CBSE syllabus for the 2026-27 session. Last checked on 28 November 2026.