

Sets — Assignment 1

Class 11 Maths · Topic-wise question bank covering every concept of the chapter · Narayan Gurukul Academy

Instructions: (1) Attempt all questions. This worksheet walks through every concept of the chapter, topic by topic.
(2) The interactive MCQ version of these questions (with instant answer reveal) is available on the notes page.
(3) Universal values: $g = 10 \text{ m/s}^2$ unless stated. Give answers with correct SI units.

Sets and Their Representation

MCQ Questions (choose the correct option)

- A collection of well-defined objects is called a
 - set
 - list
 - relation
 - function
- The set $\{1, 2, 3, \dots\}$ is an example of
 - an infinite set
 - a finite set
 - an empty set
 - a singleton set
- The set-builder form of the set of even natural numbers is
 - $\{x : x = 2n, n \in \mathbb{N}\}$
 - $\{x : x = n^2, n \in \mathbb{N}\}$
 - $\{x : x \text{ is a prime}\}$
 - $\{x : x \text{ is odd}\}$
- The roster form of $\{x : x \text{ is a vowel in English}\}$ is
 - $\{a, e, i, o, u\}$
 - $\{a, b, c, d, e\}$
 - $\{a, e, i\}$
 - $\{x, y, z\}$

1 Mark Questions

- Define a set.
- Write the set $\{2, 4, 6, 8\}$ in set-builder form.
- Write the set of vowels of the English alphabet in roster form.

2 Mark Questions

- Write the set $\{1, 4, 9, 16, 25\}$ in set-builder form.
- How is a set represented by the roster and set-builder methods? Give one example of each.

3 Mark Questions

- Explain the roster and set-builder forms of representing a set with two examples of each.
- Write the set $A = \{x : x \text{ is an integer, } -3 \leq x < 4\}$ in roster form and state whether it is finite or infinite.

Types of Sets

MCQ Questions (choose the correct option)

- The set $\{\}$ or $\emptyset$ is called the
 - empty set
 - universal set
 - power set
 - universal set
- A set having exactly one element is called a
 - singleton set
 - null set
 - finite set
 - power set
- The number of subsets of a set with n elements is
 - 2^n
 - n
 - n^2
 - $2n$
- The set of all subsets of a set A is called its
 - power set
 - universal set
 - complement
 - subset

1 Mark Questions

- Define an empty set with one example.
- What is a singleton set? Give an example.
- How many subsets does a set with 3 elements have?

2 Mark Questions

- Write the power set of $A = \{a, b\}$.
- Distinguish between equal sets and equivalent sets with examples.

3 Mark Questions

- Write the power set of $A = \{1, 2, 3\}$ and state the number of elements in it.
- Explain finite, infinite and empty sets with one example of each.

Subsets, Power Set and Universal Set

MCQ Questions (choose the correct option)

- If $A \subseteq B$ and $B \subseteq A$, then
 - $A = B$
 - $A \cup B$
 - $B \cup A$
 - $A \cap B =$
- The empty set is a subset of

- (A) every set
 - (B) no set
 - (C) only the empty set
 - (D) only finite sets
3. If $A = \{1, 2\}$, then the number of subsets of A is
- (A) 4
 - (B) 2
 - (C) 3
 - (D) 8
4. For any set A , $A \cap A$ is
- (A) always true
 - (B) always false
 - (C) sometimes true
 - (D) never defined

1 Mark Questions

1. Write the number of subsets of a set containing 4 elements.
2. Is the empty set a subset of every set? Justify.
3. Define a proper subset.

2 Mark Questions

1. List all the subsets of $A = \{1, 2, 3\}$ and identify the proper subsets.
2. If $n(A) = 3$, find $n(P(A))$.

3 Mark Questions

1. Prove that if $A \subset B$ and $B \subset C$, then $A \subset C$.
2. Write the power set of $A = \{a, b, c\}$ and find how many of its members are proper subsets of A .

Universal Set and Set Operations

MCQ Questions (choose the correct option)

1. The set containing all the elements under consideration is called the
 - (A) universal set
 - (B) empty set
 - (C) power set
 - (D) subset
2. $A \cup B$ contains elements that belong to
 - (A) A or B (or both)
 - (B) only A
 - (C) only B
 - (D) both A and B
3. $A \cap B$ contains elements that belong to
 - (A) both A and B
 - (B) A only
 - (C) B only

- (D) neither A nor B
4. $A - B$ contains elements that belong to
- (A) A but not B
- (B) B but not A
- (C) both A and B
- (D) neither A nor B

1 Mark Questions

1. Define the union of two sets.
2. Define the intersection of two sets.
3. Define the difference of two sets.

2 Mark Questions

1. If $A = \{1, 2, 3\}$ and $B = \{2, 3, 4\}$, find $A * B$ and $A \cap B$.
2. If $A = \{1, 2, 3, 4\}$ and $B = \{3, 4, 5\}$, find $A - B$ and $B - A$.

3 Mark Questions

1. If $A = \{1, 2, 3, 4\}$, $B = \{3, 4, 5, 6\}$ and $U = \{1, 2, 3, 4, 5, 6, 7, 8\}$, find $A * B$, $A \cap B$ and $(A * B)'$.
2. State and explain the commutative and associative laws of set operations with examples.

Venn Diagrams and De Morgan's Laws

MCQ Questions (choose the correct option)

1. De Morgan's law states that $(A * B)'$ is equal to

(A) $A' \cap B'$

(B) $A' * B'$

(C) $A \cap B$

(D) $A * B$
2. De Morgan's law states that $(A \cap B)'$ is equal to

(A) $A' * B'$

(B) $A' \cap B'$

(C) $A \cap B$

(D) $A * B$
3. In a Venn diagram, the region outside A but inside the universal set represents

(A) A'

(B) A

(C) $A \cap B$

(D) $A * B$
4. If $A \uparrow U$, then $A * A'$ is equal to

(A) U

(B) A

(C)

(D) A'

1 Mark Questions

1. State De Morgan's laws.
2. What does the shaded region outside a circle represent in a Venn diagram?
3. If $A \subseteq U$, what is $A \cap A'$?

2 Mark Questions

1. Verify De Morgan's law $(A \cap B)' = A' \cup B'$ for $A = \{1, 2\}$, $B = \{2, 3\}$, $U = \{1, 2, 3, 4\}$.
2. Verify De Morgan's law $(A \cup B)' = A' \cap B'$ for $A = \{1, 2\}$, $B = \{2, 3\}$, $U = \{1, 2, 3, 4\}$.

3 Mark Questions

1. State and prove De Morgan's laws using Venn diagrams.
2. Using Venn diagrams, verify $(A \cap B)' = A' \cup B'$ and $(A \cup B)' = A' \cap B'$ for sets A and B in a universal set U.

Cardinality and Counting Problems

MCQ Questions (choose the correct option)

1. For any two finite sets A and B, $n(A \cup B)$ is equal to
 - (A) $n(A) + n(B) - n(A \cap B)$
 - (B) $n(A) + n(B)$
 - (C) $n(A) - n(B)$
 - (D) $n(A) \times n(B)$
2. If A and B are disjoint sets, then $n(A \cup B)$ is equal to
 - (A) $n(A) + n(B)$
 - (B) $n(A) - n(B)$
 - (C) $n(A \cap B)$
 - (D) $n(A) \times n(B)$
3. If $n(A) = 12$, $n(B) = 8$ and $n(A \cap B) = 4$, then $n(A \cup B)$ is
 - (A) 16
 - (B) 20
 - (C) 24
 - (D) 14
4. The cardinal number $n(A)$ of a set A denotes
 - (A) the number of elements in A
 - (B) the number of subsets of A
 - (C) the power set of A
 - (D) the complement of A

1 Mark Questions

1. Write the formula for $n(A \cup B)$ for two finite sets A and B.
2. If $n(A) = 5$ and $n(B) = 7$ and A, B are disjoint, find $n(A \cup B)$.
3. Define the cardinal number of a set.

2 Mark Questions

1. In a class of 40 students, 25 play cricket and 20 play football and 10 play both. Use the formula for $n(A \cup B)$ to find how many play at least one game.
2. If $n(A) = 20$, $n(B) = 15$ and $n(A \cup B) = 30$, find $n(A \cap B)$.

3 Mark Questions

1. In a survey of 100 people, 60 read newspaper A, 45 read newspaper B and 25 read both. Find how many read neither newspaper.
2. State and derive the formula $n(A \cup B) = n(A) + n(B) - n(A \cap B)$, and solve a word problem using it.