

NCERT Solutions Class 11 Maths

Chapter 1: Sets

EXERCISE 1.2

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Quick Summary: In NCERT Solutions Class 11 Maths Chapter 1 Exercise 1.2, students learn about different types of sets including null sets, finite and infinite sets, and set equality concepts. This exercise covers fundamental set operations and properties that form the foundation for advanced topics like probability, relations, and functions, making it essential for CBSE board exams and competitive tests.

Key Takeaways:

- Empty/Null sets are denoted by \emptyset or $\{\}$ and contain no elements
- Finite sets have countable elements while infinite sets have uncountable elements
- Set equality: Two sets A and B are equal if $A = B$ when they contain exactly the same elements
- Understanding these set types is crucial for solving problems involving unions, intersections, and complements in later chapters

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Question 1

QUESTION

Which of the following are examples of the null set?

- (i) Set of odd natural numbers divisible by 2
- (ii) Set of even prime numbers
- (iii) $\{ x : x \text{ is a natural number, } x < 5 \text{ and } x > 7 \}$
- (iv) $\{ y : y \text{ is a point common to any two parallel lines} \}$

SOLUTION

We need to determine which of the given sets are null sets (empty sets), meaning they contain no elements.

(i) Set of odd natural numbers divisible by 2

Step 1: Consider odd natural numbers. Examples: 1, 3, 5, 7, ...

Step 2: Check divisibility by 2. Any number divisible by 2 is even by definition.

Step 3: An odd number can never be divisible by 2. Therefore, there are no odd natural numbers divisible by 2.

Conclusion: This set is empty, hence it is a null set.

(ii) Set of even prime numbers

Step 1: Recall the definition of a prime number: a number greater than 1 that has only two factors: 1 and itself.

Step 2: Consider even numbers: 2, 4, 6, 8, ...

Step 3: Check if any even number is prime. The number 2 is divisible only by 1 and 2, so it is prime.

Step 4: Any other even number is also divisible by 2, and therefore has more than two factors, so it cannot be prime.

Conclusion: The set contains the element 2. Therefore, it is *not* a null set.

(iii) $\{ x : x \text{ is a natural number, } x < 5 \text{ and } x > 7 \}$

Step 1: Consider the condition $x < 5$. This means x can be 1, 2, 3, or 4 (since x is a natural number).

Step 2: Consider the condition $x > 7$. This means x can be 8, 9, 10, ...

Step 3: We are looking for a natural number that satisfies *both* conditions simultaneously.

Step 4: There is no natural number that is simultaneously less than 5 and greater than 7.

Conclusion: This set is empty, hence it is a null set.

(iv) { y : y is a point common to any two parallel lines }

Step 1: Recall the definition of parallel lines: lines that never intersect.

Step 2: If two lines never intersect, they have no point in common.

Conclusion: This set is empty, hence it is a null set.

Therefore, the examples of the null set are (i), (iii), and (iv).

ANSWER

(i), (iii), (iv)

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Question 2

QUESTION

Which of the following sets are finite or infinite?

- (i) The set of months of a year
- (ii) $\{1, 2, 3, \dots\}$
- (iii) $\{1, 2, 3, \dots, 99, 100\}$
- (iv) The set of positive integers greater than 100
- (v) The set of prime numbers less than 99

SOLUTION

We are asked to determine whether the given sets are finite or infinite. A **finite set** has a limited number of elements, while an **infinite set** has an unlimited number of elements.

(i) The set of months of a year

Step 1: List the elements

The months of a year are: January, February, March, April, May, June, July, August, September, October, November, December.

Step 2: Count the elements

There are exactly 12 months in a year.

Step 3: Conclude

Since the number of elements is limited to 12, the set is finite.

(ii) $\{1, 2, 3, \dots\}$

Step 1: Understand the notation

The ellipsis " \dots " indicates that the pattern continues indefinitely.

Step 2: Analyze the set

This set represents the set of all natural numbers. It starts with 1, 2, 3 and goes on without end.

Step 3: Conclude

Since the set continues indefinitely, it is an infinite set.

(iii) $\{1, 2, 3, \dots, 99, 100\}$

Step 1: Understand the notation

The ellipsis " \dots " indicates that the pattern continues until the number 100.

Step 2: Analyze the set

This set contains all natural numbers from 1 to 100, inclusive.

Step 3: Conclude

Since the set stops at 100, the number of elements is limited to 100. Therefore, it is a finite set.

(iv) The set of positive integers greater than 100

Step 1: List some elements

The set includes numbers like 101, 102, 103, 104, and so on.

Step 2: Analyze the set

There is no upper limit to the positive integers greater than 100. The set continues indefinitely.

Step 3: Conclude

Since the set continues indefinitely, it is an infinite set.

(v) The set of prime numbers less than 99

Step 1: Recall the definition of prime numbers

A prime number is a natural number greater than 1 that has no positive divisors other than 1 and itself.

Step 2: List some elements

The set includes numbers like 2, 3, 5, 7, 11, ..., 97.

Step 3: Analyze the set

Although it might seem large, there is a largest prime number less than 99, which is 97. We can list all the prime numbers less than 99.

Step 4: Conclude

Since the set has a limited number of elements (all prime numbers less than 99), it is a finite set.

ANSWER

(i) Finite (ii) Infinite (iii) Finite (iv) Infinite (v) Finite

Question 3

QUESTION

State whether each of the following sets is finite or infinite:

- (i) The set of lines which are parallel to the x-axis
- (ii) The set of letters in the English alphabet
- (iii) The set of numbers which are multiple of 5
- (iv) The set of animals living on the earth
- (v) The set of circles passing through the origin (0,0)

SOLUTION

We are asked to determine whether the given sets are finite or infinite. A set is **finite** if it contains a countable number of elements, and **infinite** if it contains an uncountable number of elements.

(i) The set of lines which are parallel to the x-axis

Step 1: Visualize the problem

Imagine the x-axis on a coordinate plane. Lines parallel to the x-axis will have the equation $y = c$, where c is a constant.

Step 2: Determine the possible values of c

The constant can take any real value. For example, $y = 1$, $y = 2$, $y = 3$, are all lines parallel to the x-axis.

Step 3: Conclude

Since there are infinitely many real numbers, there are infinitely many lines parallel to the x-axis. Therefore, the set is infinite.

(ii) The set of letters in the English alphabet

Step 1: List the elements

The English alphabet contains 26 letters: a, b, c, ..., z.

Step 2: Count the elements

The number of elements is 26, which is a finite number.

Step 3: Conclude

Therefore, the set is finite.

(iii) The set of numbers which are multiple of 5

Step 1: List some elements

The multiples of 5 are: ..., -10, -5, 0, 5, 10, 15, ...

Step 2: Observe the pattern

We can express the multiples of 5 as $5n$, where n is an integer.

Step 3: Determine the possible values of n

Since there are infinitely many integers, there are infinitely many multiples of 5.

Step 4: Conclude

Therefore, the set is infinite.

(iv) The set of animals living on the earth**Step 1: Consider the nature of the set**

Although the number of animals on Earth is very large, it is not infinite. It is a large but finite number.

Step 2: Conclude

Therefore, the set is finite.

(v) The set of circles passing through the origin (0,0)**Step 1: Visualize the problem**

Imagine the origin (0,0) on a coordinate plane. We can draw circles of different radii centered at different points such that they all pass through the origin.

Step 2: Consider the possible centers and radii

For any point not equal to (0,0), we can draw a circle centered at that point that passes through the origin. The radius of such a circle would be the distance from the center to the origin.

Step 3: Conclude

Since there are infinitely many points where x and y are real numbers, there are infinitely many such circles. Therefore, the set is infinite.

ANSWER

(i) Infinite (ii) Finite (iii) Infinite (iv) Finite (v) Infinite

Question 4

QUESTION

In the following, state whether $A = B$ or not:

- (i) $A = \{a, b, c, d\}$, $B = \{d, c, b, a\}$
- (ii) $A = \{4, 8, 12, 16\}$, $B = \{8, 4, 16, 18\}$
- (iii) $A = \{2, 4, 6, 8, 10\}$, $B = \{x : x \text{ is positive even integer and } x \leq 10\}$
- (iv) $A = \{x : x \text{ is a multiple of } 10\}$, $B = \{10, 15, 20, 25, 30, \dots\}$

SOLUTION

This question tests the understanding of set equality. Two sets A and B are equal ($A = B$) if and only if they have exactly the same elements, regardless of the order in which the elements are listed.

(i) $A = \{a, b, c, d\}$, $B = \{d, c, b, a\}$

Step 1: Compare the elements of A and B

Set A contains the elements a, b, c , and d .

Set B contains the elements d, c, b , and a .

Step 2: Check if all elements of A are in B and vice versa

All elements of A are present in B , and all elements of B are present in A .

Step 3: Conclude

Since both sets contain exactly the same elements, $A = B$.

Answer: Yes

(ii) $A = \{4, 8, 12, 16\}$, $B = \{8, 4, 16, 18\}$

Step 1: Compare the elements of A and B

Set A contains the elements $4, 8, 12$, and 16 .

Set B contains the elements $8, 4, 16$, and 18 .

Step 2: Check if all elements of A are in B and vice versa

Set A contains the element 12 , which is not in B .

Set B contains the element 18 , which is not in A .

Step 3: Conclude

Since the sets do not contain exactly the same elements, $A \neq B$.

Answer: No

(iii) $A = \{2, 4, 6, 8, 10\}$, $B = \{x : x \text{ is positive even integer and } x \leq 10\}$

Step 1: List the elements of set B

Set B is defined as the set of all positive even integers less than or equal to 10. Therefore, $B = \{2, 4, 6, 8, 10\}$.

Step 2: Compare the elements of A and B

Set A contains the elements 2, 4, 6, 8, and 10.

Set B contains the elements 2, 4, 6, 8, and 10.

Step 3: Conclude

Since both sets contain exactly the same elements, $A = B$.

Answer: Yes

(iv) $A = \{x : x \text{ is a multiple of } 10\}$, $B = \{10, 15, 20, 25, 30, \dots\}$

Step 1: List the elements of set A

Set A is defined as the set of all multiples of 10. Therefore, $A = \{10, 20, 30, 40, 50, \dots\}$.

Step 2: Compare the elements of A and B

Set B contains the element 15, which is not a multiple of 10 and therefore not in A.

Step 3: Conclude

Since the sets do not contain exactly the same elements (specifically, 15 is in B but not in A), $A \neq B$.

Answer: No

ANSWER

(i) Yes (ii) No (iii) Yes (iv) No

Question 5

QUESTION

Are the following pair of sets equal? Give reasons.

(i) $A = \{2, 3\}$, $B = \{x : x \text{ is solution of } x^2 + 5x + 6 = 0\}$

(ii) $A = \{x : x \text{ is a letter in the word FOLLOW}\}$, $B = \{y : y \text{ is a letter in the word WOLF}\}$

SOLUTION

This question asks us to determine if two pairs of sets are equal and to provide reasons for our answers. Set equality means that both sets contain exactly the same elements.

(i) $A = \{2, 3\}$, $B = \{x : x \text{ is solution of } x^2 + 5x + 6 = 0\}$

Step 1: Find the elements of set B

Set B is defined as the set of solutions to the quadratic equation . We need to solve this equation.

We can factor the quadratic equation as follows:

This gives us two solutions: and .

Therefore, set B is: $B = \{-2, -3\}$

Step 2: Compare sets A and B

Set A is $\{2, 3\}$ and set B is $\{-2, -3\}$.

The elements of set A are 2 and 3, while the elements of set B are -2 and -3. Since the elements are different, the sets are not equal.

Answer: No, the sets are not equal.

(ii) $A = \{x : x \text{ is a letter in the word FOLLOW}\}$, $B = \{y : y \text{ is a letter in the word WOLF}\}$

Step 1: Find the elements of set A

Set A contains the distinct letters in the word "FOLLOW". We list each letter only once.

$$A = \{F, O, L, W\}$$

Step 2: Find the elements of set B

Set B contains the distinct letters in the word "WOLF". We list each letter only once.

$$B = \{W, O, L, F\}$$

Step 3: Compare sets A and B

Set A is $\{F, O, L, W\}$ and set B is $\{W, O, L, F\}$.

Both sets contain the same elements: F, O, L, and W. The order of elements in a set does not matter.

Therefore, the sets are equal.

Answer: Yes, the sets are equal.

ANSWER

(i) No (ii) Yes

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Question 6

QUESTION

From the sets given below, select equal sets:

$A = \{2, 4, 8, 12\}$, $B = \{1, 2, 3, 4\}$, $C = \{4, 8, 12, 14\}$, $D = \{3, 1, 4, 2\}$
 $E = \{-1, 1\}$, $F = \{0, a\}$, $G = \{1, -1\}$, $H = \{0, 1\}$

SOLUTION

This question asks us to identify equal sets from the given collection of sets. Two sets are considered equal if and only if they contain exactly the same elements, regardless of the order.

Step 1: Define the criteria for equality of sets

Two sets, say A and B , are equal (denoted as $A = B$) if every element of A is an element of B , and every element of B is an element of A . The order of elements does not matter.

Step 2: Compare set A with other sets

$A = \{2, 4, 8, 12\}$. We check if any other set has exactly these elements.

$B = \{1, 2, 3, 4\}$, $C = \{4, 8, 12, 14\}$, $D = \{3, 1, 4, 2\}$, $E = \{-1, 1\}$, $F = \{0, a\}$, $G = \{1, -1\}$, $H = \{0, 1\}$

None of the other sets have the exact same elements as set A . Therefore, A is not equal to any other set.

Step 3: Compare set B with other sets

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

Comparing B with $D = \{3, 1, 4, 2\}$, we see that they have the same elements, just in a different order. Therefore, $B = D$.

Comparing B with other sets, we see that none of them contain the exact same elements.

Step 4: Compare set C with other sets

$C = \{4, 8, 12, 14\}$. None of the remaining sets (E, F, G, H) have the same elements.

Step 5: Compare set E with other sets

$E = \{-1, 1\}$.

Comparing E with $G = \{1, -1\}$, we see that they have the same elements, just in a different order. Therefore, $E = G$.

Comparing E with F and H , we see that they do not contain the same elements.

Step 6: Compare set F with set H

$F = \{0, a\}$ and $H = \{0, 1\}$. These are not equal unless $a = 1$, which is not given. Therefore, F and H are not equal.

Final Answer: The equal sets are $B = D$ and $E = G$.

ANSWER

$B = D, E = G$

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Key Formulas

Important Formulas for Exercise 1.2

| Formula / Concept | Description |
|----------------------|--|
| Empty Set (Null Set) | A set that contains no elements is called the empty set or the null set. It is denoted by \emptyset or $\{\}$. |
| Finite Set | A set which is empty or consists of a definite number of elements is called a finite set. |
| Infinite Set | A set that is not finite is called an infinite set. |
| Singleton Set | A set consisting of a single element is called a singleton set. |
| Equal Sets | Two sets A and B are said to be equal if they have exactly the same elements. We write this as $A = B$. |
| De Morgan's Laws | For any two sets A and B: 1. Complement of the union: $(A \cup B)' = A' \cap B'$ 2. Complement of the intersection: $(A \cap B)' = A' \cup B'$ |
| Commutative Laws | For any two sets A and B: $A \cup B = B \cup A$ $A \cap B = B \cap A$ |

| Formula / Concept | Description |
|-------------------|---|
| Associative Laws | For any three sets A, B, and C: $(A \cup B) \cup C = A \cup (B \cup C)$ $(A \cap B) \cap C = A \cap (B \cap C)$ |
| Distributive Laws | For any three sets A, B, and C: $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ |
| Idempotent Laws | For any set A: $A \cup A = A$ $A \cap A = A$ |
| Identity Laws | For any set A and the universal set U: $A \cup \emptyset = A$ $A \cap U = A$ |

7 Top FAQs

Q1. How many questions are in NCERT Solutions for Class 11 Maths Chapter 1 Sets Exercise 1.2 for CBSE 2025-26?

NCERT Solutions for Class 11 Maths Chapter 1 Sets Exercise 1.2 contains exactly 6 questions. These questions cover important concepts like types of sets, finite and infinite sets, and equal sets, which are crucial for CBSE board exam 2025-26 preparation.

Q2. Where can I download free PDF of NCERT Solutions for Class 11 Maths Chapter 1 Sets Exercise 1.2 with step by step solutions?

You can download the free PDF of NCERT Solutions for Class 11 Maths Chapter 1 Sets Exercise 1.2 from the official NCERT website or various educational platforms offering step by step solutions. These PDFs include detailed explanations for all 6 questions and are updated as per the latest CBSE syllabus 2025-26.

Q3. How many marks does Chapter 1 Sets carry in CBSE Class 11 Maths board exam 2025-26 syllabus?

Chapter 1 Sets from NCERT Solutions Class 11 Maths carries 8 marks in the CBSE board exam 2025-26 as part of Unit I - Sets and Functions. Exercise 1.2 focuses on types of sets which forms a fundamental portion of this weightage and is essential for scoring well.

Q4. Which is the most difficult question in Exercise 1.2 of NCERT Solutions for Class 11 Maths Chapter 1 Sets?

Question 6 in NCERT Solutions for Class 11 Maths Chapter 1 Sets Exercise 1.2 is considered the most difficult as it involves complex application of set theory concepts and requires thorough understanding of different types of sets. Students preparing for CBSE board exam 2025-26 should practice this question with step by step solutions multiple times.

Q5. What is De Morgan's Laws in NCERT Solutions for Class 11 Maths Chapter 1 Sets Exercise 1.2?

De Morgan's Laws in NCERT Class 11 Maths Chapter 1 Sets states that $(A \cup B)' = A' \cap B'$ and $(A \cap B)' = A' \cup B'$, where the complement of union equals intersection of complements and vice versa. Though primarily covered in Exercise 1.6, understanding basic set operations in Exercise 1.2 builds the foundation for De Morgan's Laws which is important for CBSE board exam 2025-26.

More Exercises

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