NCERT Solutions Class 11 Maths
Chapter 1: Sets
EXERCISE 1.1

Quick Summary: In NCERT Solutions Class 11 Maths Chapter 1 Exercise 1.1, students learn the fundamental concepts of Sets and their Representations through 6 comprehensive problems. This exercise covers well-defined collections, set notations, roster and set-builder forms, and membership symbols which form the foundation for advanced topics like De Morgan's Laws and Algebra of Sets essential for CBSE Class 11 exams.

Key Takeaways:

- Understanding well-defined collections and identifying valid sets using clear membership criteria
- Mastering set membership symbols: \in (belongs to) and \notin (does not belong to)
- Converting between roster form \a, b, c\ and set-builder form \x : x \text satisfies property P\
- Proper application of set notation rules for solving CBSE exam problems on sets and their representations

Complete Solutions

Question 1

Which of the following are sets? Justify your answer.

(i) The collection of all the months of a year beginning with the letter J.
(ii) The collection of ten most talented writers of India.
(iii) A team of eleven best-cricket batsmen of the world.
(iv) The collection of all boys in your class.
(v) The collection of all natural numbers less than 100.
(vi) A collection of novels written by the writer Munshi Prem Chand.
(vii) The collection of all even integers.
(viii) The collection of questions in this Chapter.
(ix) A collection of most dangerous animals of the world.

SOLUTION

We need to determine which of the given collections are sets. A set is a well-defined collection of objects. This means that it should be possible to determine definitively whether any particular object belongs to the collection or not.

(i) The collection of all the months of a year beginning with the letter J.

This is a set because we can clearly identify the months: January, June, and July. There is no ambiguity.

(ii) The collection of ten most talented writers of India.

This is *not* a set. The term "most talented" is subjective and varies from person to person. There is no objective criterion to determine who the ten most talented writers are.

(iii) A team of eleven best-cricket batsmen of the world.

This is *not* a set. The term "best" is subjective and depends on various factors and individual preferences. There is no universally accepted criterion to determine the eleven best batsmen.

(iv) The collection of all boys in your class.

This is a set. Assuming the class is well-defined, we can definitively determine who is a boy in the class and who is not.

(v) The collection of all natural numbers less than 100.

This is a set. We can clearly list all the elements: 1, 2, 3, ..., 99. There is no ambiguity.

(vi) A collection of novels written by the writer Munshi Prem Chand.

This is a set. We can determine whether a given book was written by Munshi Prem Chand or not.

(vii) The collection of all even integers.

This is a set. We know exactly what an even integer is (an integer divisible by 2), so we can definitively determine whether any given number belongs to this collection.

(viii) The collection of questions in this Chapter.

This is a set. The chapter is well-defined, and we can identify all the questions within it.

(ix) A collection of most dangerous animals of the world.

This is *not* a set. The term "most dangerous" is subjective and depends on various factors (e.g., number of attacks, severity of attacks). There is no objective criterion to determine which animals are the most dangerous.

Final Answer: (i), (iv), (v), (vi), (vii) and (viii) are sets.

ANSWER

(i), (iv), (v), (vi), (vii) and (viii) are sets.

Question 2

Let A = {1, 2, 3, 4, 5, 6}. Insert the appropriate symbol ∈ or ∉ in the blank spaces:

(i) 5 . . . A
(ii) 8 . . . A
(iii) 0 . . . A
(iv) 4 . . . A
(v) 2 . . . A
(vi) 10 . . . A

SOLUTION

This question tests our understanding of set notation, specifically the meaning of the symbols ∈ (belongs to) and ∉ (does not belong to).

We are given the set A = {1, 2, 3, 4, 5, 6} and we need to determine whether the given numbers are elements of this set.

(i) 5 . . . A

Step 1: Check if 5 is present in the set A.

Step 2: Observe that 5 is indeed an element of the set A = {1, 2, 3, 4, 5, 6}.

Step 3: Therefore, the correct symbol is ∈.

Answer: 5 ∈ A

(ii) 8 . . . A

Step 1: Check if 8 is present in the set A.

Step 2: Observe that 8 is not an element of the set A = {1, 2, 3, 4, 5, 6}.

Step 3: Therefore, the correct symbol is ∉.

Answer: 8 ∉ A

(iii) 0 . . . A

Step 1: Check if 0 is present in the set A.

Step 2: Observe that 0 is not an element of the set A = {1, 2, 3, 4, 5, 6}.

Step 3: Therefore, the correct symbol is ∉.

Answer: 0 ∉ A

(iv) 4 . . . A

Step 1: Check if 4 is present in the set A.

Step 2: Observe that 4 is an element of the set A = {1, 2, 3, 4, 5, 6}.

Step 3: Therefore, the correct symbol is ∈.

Answer: 4 ∈ A

(v) 2 . . . A

Step 1: Check if 2 is present in the set A.

Step 2: Observe that 2 is an element of the set A = {1, 2, 3, 4, 5, 6}.

Step 3: Therefore, the correct symbol is ∈.

Answer: 2 ∈ A

(vi) 10 . . . A

Step 1: Check if 10 is present in the set A.

Step 2: Observe that 10 is not an element of the set A = {1, 2, 3, 4, 5, 6}.

Step 3: Therefore, the correct symbol is ∉.

Answer: 10 ∉ A

ANSWER

(i) ∈ (ii) ∉ (iii) ∉ (iv) ∈ (v) ∈ (vi) ∉

Question 3

Write the following sets in roster form:

(i) A = {x : x is an integer and −3 ≤ x < 7}
(ii) B = {x : x is a natural number less than 6}
(iii) C = {x : x is a two-digit natural number such that the sum of its digits is 8}
(iv) D = {x : x is a prime number which is divisor of 60}
(v) E = The set of all letters in the word TRIGONOMETRY
(vi) F = The set of all letters in the word BETTER

SOLUTION

This question asks us to convert sets from set-builder form to roster form. In roster form, we list all the elements of the set within curly braces, separated by commas.

(i) A = {x : x is an integer and −3 ≤ x < 7}

Step 1: Understand the condition

The set A contains all integers x such that x is greater than or equal to -3 and strictly less than 7.

Step 2: List the integers

The integers satisfying this condition are -3, -2, -1, 0, 1, 2, 3, 4, 5, and 6.

Step 3: Write in roster form

Therefore, A = {−3, −2, −1, 0, 1, 2, 3, 4, 5, 6}

(ii) B = {x : x is a natural number less than 6}

Step 1: Understand the condition

The set B contains all natural numbers x such that x is less than 6.

Step 2: List the natural numbers

Natural numbers start from 1. The natural numbers less than 6 are 1, 2, 3, 4, and 5.

Step 3: Write in roster form

Therefore, B = {1, 2, 3, 4, 5}

(iii) C = {x : x is a two-digit natural number such that the sum of its digits is 8}

Step 1: Understand the condition

The set C contains all two-digit natural numbers where the sum of the digits equals 8.

Step 2: List the two-digit numbers

We need to find pairs of digits that add up to 8. These are (1, 7), (2, 6), (3, 5), (4, 4), (5, 3), (6, 2), (7, 1), and (8, 0).

Step 3: Form the numbers and write in roster form

Therefore, C = {17, 26, 35, 44, 53, 62, 71, 80}

(iv) D = {x : x is a prime number which is a divisor of 60}

Step 1: Understand the condition

The set D contains all prime numbers that are divisors (factors) of 60.

Step 2: Find the prime factors of 60

The prime factorization of 60 is . The prime factors are 2, 3, and 5.

Step 3: Write in roster form

Therefore, D = {2, 3, 5}

(v) E = The set of all letters in the word TRIGONOMETRY

Step 1: List all letters

The letters in the word TRIGONOMETRY are T, R, I, G, O, N, M, E, T, R, Y.

Step 2: Remove duplicates and write in roster form

We only include each distinct letter once. Therefore, E = {T, R, I, G, O, N, M, E, Y}

(vi) F = The set of all letters in the word BETTER

Step 1: List all letters

The letters in the word BETTER are B, E, T, T, E, R.

Step 2: Remove duplicates and write in roster form

We only include each distinct letter once. Therefore, F = {B, E, T, R}

ANSWER

(i) A = {−3, −2, −1, 0, 1, 2, 3, 4, 5, 6}
(ii) B = {1, 2, 3, 4, 5}
(iii) C = {17, 26, 35, 44, 53, 62, 71, 80}
(iv) D = {2, 3, 5}
(v) E = {T, R, I, G, O, N, M, E, Y}
(vi) F = {B, E, T, R}

Question 4

QUESTION

Write the following sets in set-builder form:

(i) {3, 6, 9, 12}
(ii) {2, 4, 8, 16, 32}
(iii) {5, 25, 125, 625}
(iv) {2, 4, 6, …}
(v) {1, 4, 9, …, 100}

SOLUTION

This question asks us to express given sets in set-builder form, which means defining the set by a property that its elements share.

(i) {3, 6, 9, 12}

Step 1: Identify the pattern

The elements are multiples of 3: 3 = 3 × 1, 6 = 3 × 2, 9 = 3 × 3, 12 = 3 × 4.

Step 2: Define the variable and the condition

Let be an element of the set. Then can be written as , where is a natural number.

Step 3: Specify the range of

Since the multiples are from 3 × 1 to 3 × 4, ranges from 1 to 4.

Step 4: Write the set-builder form

The set-builder form is $\{x : x = 3n, n \in \mathbb{N} \text{ and } 1 \le n \le 4\}$

(ii) {2, 4, 8, 16, 32}

Step 1: Identify the pattern

The elements are powers of 2: $2 = 2^1$, $4 = 2^2$, $8 = 2^3$, $16 = 2^4$, $32 = 2^5$.

Step 2: Define the variable and the condition

Let be an element of the set. Then can be written as , where is a natural number.

Step 3: Specify the range of

Since the powers are from 2^1 to 2^5, ranges from 1 to 5.

Step 4: Write the set-builder form

The set-builder form is $\{x : x = 2^n, n \in \mathbb{N} \text{ and } 1 \le n \le 5\}$

(iii) {5, 25, 125, 625}

Step 1: Identify the pattern

The elements are powers of 5: $5 = 5^1$, $25 = 5^2$, $125 = 5^3$, $625 = 5^4$.

Step 2: Define the variable and the condition

Let be an element of the set. Then can be written as , where is a natural number.

Step 3: Specify the range of

Since the powers are from 5^1 to 5^4, ranges from 1 to 4.

Step 4: Write the set-builder form

The set-builder form is $\{x : x = 5^n, n \in \mathbb{N} \text{ and } 1 \le n \le 4\}$

(iv) {2, 4, 6, …}

Step 1: Identify the pattern

The elements are even natural numbers.

Step 2: Define the variable and the condition

Let be an element of the set. Then is an even natural number.

Step 3: Write the set-builder form

The set-builder form is $\{x : x \text{ is an even natural number}\}$

(v) {1, 4, 9, …, 100}

Step 1: Identify the pattern

The elements are squares of natural numbers: $1 = 1^2$, $4 = 2^2$, $9 = 3^2$, …, $100 = 10^2$.

Step 2: Define the variable and the condition

Let be an element of the set. Then can be written as , where is a natural number.

Step 3: Specify the range of

Since the squares are from 1^2 to 10^2, ranges from 1 to 10.

Step 4: Write the set-builder form

The set-builder form is $\{x : x = n^2, n \in \mathbb{N} \text{ and } 1 \le n \le 10\}$

ANSWER

(i) $\{x : x = 3n, n \in \mathbb{N} \text{ and } 1 \le n \le 4\}$
(ii) $\{x : x = 2^n, n \in \mathbb{N} \text{ and } 1 \le n \le 5\}$
(iii) $\{x : x = 5^n, n \in \mathbb{N} \text{ and } 1 \le n \le 4\}$

(iv) {x : x is an even natural number}

(v) {x : x = n², n ∈ $\mathbb{N}$ and 1 ≤ n ≤ 10}

Question 5

List all the elements of the following sets:

(i) A = {x : x is an odd natural number}
(ii) B = {x : x is an integer, −1/2 < x < 9/2}
(iii) C = {x : x is an integer, x² ≤ 4}
(iv) D = {x : x is a letter in the word "LOYAL"}
(v) E = {x : x is a month of a year not having 31 days}
(vi) F = {x : x is a consonant in the English alphabet which precedes k}

SOLUTION

This question tests our understanding of set roster notation, where we list all the elements of a set within curly braces. We need to carefully consider the conditions given for each set and identify the elements that satisfy them.

(i) A = {x : x is an odd natural number}

Step 1: Understand the conditions. We need to list all numbers that are both odd and natural.

Step 2: Recall the definition of natural numbers. Natural numbers are positive integers starting from 1: 1, 2, 3, ...

Step 3: Identify odd numbers. Odd numbers are integers not divisible by 2.

Step 4: List the elements. The odd natural numbers are 1, 3, 5, and so on. Since there are infinitely many, we use an ellipsis to indicate the continuation of the pattern.

Answer: A = {1, 3, 5, …}

(ii) B = {x : x is an integer, −1/2 < x < 9/2}

Step 1: Understand the conditions. We need to list all integers that are greater than -1/2 and less than 9/2.

Step 2: Convert the fractions to decimals for easier comparison. -1/2 = -0.5 and 9/2 = 4.5

Step 3: Identify the integers between -0.5 and 4.5. These are 0, 1, 2, 3, and 4.

Answer: B = {0, 1, 2, 3, 4}

(iii) C = {x : x is an integer, x² ≤ 4}

Step 1: Understand the conditions. We need to list all integers whose square is less than or equal to 4.

Step 2: Consider integers around 0 and check their squares.

, , , , ,

Step 3: Identify the integers that satisfy the condition . These are -2, -1, 0, 1, and 2.

Answer: C = {−2, −1, 0, 1, 2}

(iv) D = {x : x is a letter in the word "LOYAL"}

Step 1: Understand the condition. We need to list all the distinct letters in the word "LOYAL".

Step 2: List the letters, ensuring no repetition. The letters are L, O, Y, and A.

Answer: D = {L, O, Y, A}

(v) E = {x : x is a month of a year not having 31 days}

Step 1: Understand the condition. We need to list all months that do not have 31 days.

Step 2: Recall the number of days in each month.

Step 3: List the months that have fewer than 31 days. These are February, April, June, September, and November.

Answer: E = {February, April, June, September, November}

(vi) F = {x : x is a consonant in the English alphabet which precedes k}

Step 1: Understand the condition. We need to list all consonants in the English alphabet that come before the letter 'k'.

Step 2: Recall the English alphabet and identify the consonants before 'k'.

Step 3: List the consonants. These are b, c, d, f, g, h, and j.

Answer: F = {b, c, d, f, g, h, j}

ANSWER

(i) A = {1, 3, 5, ...}
(ii) B = {0, 1, 2, 3, 4}
(iii) C = {−2, −1, 0, 1, 2}
(iv) D = {L, O, Y, A}
(v) E = {February, April, June, September, November}
(vi) F = {b, c, d, f, g, h, j}

QUESTION

Match each of the set on the left in roster form with the same set on the right described in set-builder form:

(i) {1, 2, 3, 6}
(ii) {2, 3, 5, 7, 11}
(iii) {M, A, T, H, E, I, C, S}
(iv) {1, 3, 5, 7}

SOLUTION

This question requires us to match sets given in roster form with their equivalent set-builder form. We need to understand the properties that define each set.

(i) {1, 2, 3, 6} ↔ (c)

Step 1: Analyze the set {1, 2, 3, 6}

The elements are 1, 2, 3, and 6. These are all the positive divisors (factors) of 6.

Step 2: Examine the options on the right

Option (c) states: {x : x is a positive integer and is a divisor of 6}. This matches our analysis.

Therefore, (i) matches with (c).

(ii) {2, 3, 5, 7, 11} ↔ (a)

Step 1: Analyze the set {2, 3, 5, 7, 11}

The elements are 2, 3, 5, 7, and 11. These are prime numbers less than 12.

Step 2: Examine the options on the right

Option (a) states: {x : x is a prime number and a divisor of 13}. This is incorrect. Option (a) states: {x : x is a prime number less than 12}. This matches our analysis.

Therefore, (ii) matches with (a).

(iii) {M, A, T, H, E, I, C, S} ↔ (d)

Step 1: Analyze the set {M, A, T, H, E, I, C, S}

The elements are the letters M, A, T, H, E, I, C, and S. These are the letters forming the word "MATHEMATICS", without repetition.

Step 2: Examine the options on the right

Option (d) states: {x : x is a letter of the word MATHEMATICS}. This matches our analysis.

Therefore, (iii) matches with (d).

(iv) {1, 3, 5, 7, 9} ↔ (b)

Step 1: Analyze the set {1, 3, 5, 7, 9}

The elements are 1, 3, 5, 7, and 9. These are odd natural numbers less than 10.

Step 2: Examine the options on the right

Option (b) states: {x : x is an odd natural number less than 10}. This matches our analysis.

Therefore, (iv) matches with (b).

Final Answer:

(i) ↔ (c) (ii) ↔ (a) (iii) ↔ (d) (iv) ↔ (b)

ANSWER

(i) ↔ (c) (ii) ↔ (a) (iii) ↔ (d) (iv) ↔ (b)

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📐 Key Formulas

Important Formulas for Exercise 1.1

Formula / Concept	Description
Set	A set is a well-defined collection of distinct objects. Sets are usually denoted by capital letters.
Elements	The objects in a set are called its elements or members. They are enclosed in curly brackets and separated by commas.

Formula / Concept	Description
Roster or Tabular Form	In this form, all the elements of a set are listed, separated by commas, and enclosed within curly braces \ \. The order of the elements does not matter. For example, the set of vowels is V = \a, e, i, o, u\.
Set-Builder Form	In this form, a set is described by a property that all its elements share. The general form is A = \x : P(x)\ or A = \x	P(x)\, which is read as "the set of all x such that x has the property P". For example, A = \x : x \text is a vowel in the English alphabet\.
Belongs to (\in)	The symbol \in is used to denote that an element is a member of a set. For example, if A = \1, 2, 3\, then 2 \in A.
Does not belong to (\notin)	The symbol \notin is used to denote that an element is not a member of a set. For example, if A = \1, 2, 3\, then 4 \notin A.
Empty Set (or Null Set)	A set which does not contain any element 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. For example, the set of days in a week.
Infinite Set	A set that is not finite is called an infinite set. For example, the set of all natural numbers \1, 2, 3, ...\.

Top FAQs

Q1. How many questions are in NCERT Solutions Class 11 Maths Chapter 1 Sets Exercise 1.1 for CBSE 2025-26?

NCERT Solutions for Class 11 Maths Chapter 1 Sets Exercise 1.1 contains exactly 6 questions. These questions cover fundamental concepts of sets and their representations, forming the foundation for understanding set theory in the CBSE board exam 2025-26 syllabus.

Q2. Where can I download free PDF of NCERT Solutions for Class 11 Maths Chapter 1 Sets Exercise 1.1 with step by step solutions?

You can download the free PDF of NCERT Solutions for Class 11 Maths Chapter 1 Sets Exercise 1.1 from the official NCERT website or various educational platforms offering step by step solutions. These PDFs are updated for the CBSE 2025-26 session and include detailed explanations for all 6 questions, helping students understand sets and their representations thoroughly.

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

The Sets chapter (Chapter 1) carries 8 marks in the CBSE Class 11 Maths board exam 2025-26 as part of Unit I - Sets and Functions. These marks are shared with other topics in the unit, making NCERT Solutions for Class 11 Maths Chapter 1 Exercise 1.1 essential for scoring well in board examinations.

Q4. Which is the most difficult question in Exercise 1.1 of NCERT Solutions Class 11 Maths Chapter 1 Sets?

Question 6 in Exercise 1.1 of NCERT Solutions Class 11 Maths Chapter 1 Sets is generally considered the most challenging as it involves matching sets with their descriptions. Step by step solutions help students understand the proper method of identifying set properties and applying the correct set notation for CBSE board exam 2025-26 preparation.

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

De Morgan's Laws in NCERT Class 11 Maths Chapter 1 Sets state that $(A \cup B)' = A' \cap B'$ and $(A \cap B)' = A' \cup B'$, which are fundamental theorems in set theory. These laws, covered in the Algebra of Sets section, are crucial for solving complex set problems in CBSE board exam 2025-26 and are explained with step by step solutions in the chapter.

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