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NCERT Solutions for Class 11 Maths Chapter 1 Sets are prepared by our expert faculty at BYJU’S according to the latest update on the CBSE Syllabus for 2023-24. These NCERT Class 11 Solutions of Maths help the students in solving the problems adroitly and efficiently. Also, BYJU’S focuses on building step-by-step solutions for all NCERT problems in such a way that it is easy for the students to understand. Sets are used to define the concepts of functions and relations, some of which are covered in Chapter 1 of the NCERT textbook. The Class 11 Maths Chapter 1 of NCERT, categorised under the CBSE syllabus, also has some basic definitions and operations involving the sets. It is necessary to get fundamental knowledge on Sets since the study of sequences, geometry, and probability requires it. However, this is an easy chapter among all the chapters of NCERT Class 11 Maths, to score maximum marks in the board examination. These NCERT Solutions of BYJU’S help the students who are looking for a quick and easy way of solving. Access Answers to NCERT Class 11 Maths Chapter 1 – Sets NCERT Solutions for Class 11 Maths Chapter 1 – Sets Download PDF carouselExampleControls112 Previous Next NCERT Solutions for Class 11 Maths Chapter 1 – Sets Exercise 1.1 page: 4 1. Which of the following are sets? Justify your answer. (i) The collection of all 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: (i) The collection of all months of a year beginning with the letter J is a well-defined collection of objects as one can identify a month which belongs to this collection. Therefore, this collection is a set. (ii) The collection of ten most talented writers of India is not a well-defined collection as the criteria to determine a writer’s talent may differ from one person to another. Therefore, this collection is not a set. (iii) A team of eleven best-cricket batsmen of the world is not a well-defined collection as the criteria to determine a batsman’s talent may vary from one person to another. Therefore, this collection is not a set. (iv) The collection of all boys in your class is a well-defined collection as you can identify a boy who belongs to this collection. Therefore, this collection is a set. (v) The collection of all natural numbers less than 100 is a well-defined collection as one can find a number which belongs to this collection. Therefore, this collection is a set. (vi) A collection of novels written by the writer Munshi Prem Chand is a well-defined collection as one can find any book which belongs to this collection. Therefore, this collection is a set. (vii) The collection of all even integers is a well-defined collection as one can find an integer which belongs to this collection. Therefore, this collection is a set. (viii) The collection of questions in this chapter is a well-defined collection as one can find a question which belongs to this chapter. Therefore, this collection is a set. (ix) A collection of most dangerous animals of the world is not a well-defined collection as the criteria to find the dangerousness of an animal can differ from one animal to another. Therefore, this collection is not a set. 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: (i) 5 ∈ A (ii) 8 ∉ A (iii) 0 ∉ A (iv) 4 ∈ A (v) 2 ∈ A (vi) 10 ∉ A 3. Write the following sets in roster form: (i) A = {x: x is an integer and –3 4 So we get C = {–2, –1, 0, 1, 2} (iv) D = {x: x is a letter in the word “LOYAL”} So the elements are D = {L, O, Y, A} (v) E = {x: x is a month of a year not having 31 days} So the elements are E = {February, April, June, September, November} (vi) F = {x: x is a consonant in the English alphabet which proceeds k} So the elements are F = {b, c, d, f, g, h, j} 6. Match each of the set on the left in the roster form with the same set on the right described in set-builder form: (i) {1, 2, 3, 6} (a) {x: x is a prime number and a divisor of 6} (ii) {2, 3} (b) {x: x is an odd natural number less than 10} (iii) {M, A, T, H, E, I, C, S} (c) {x: x is a natural number and divisor of 6} (iv) {1, 3, 5, 7, 9} (d) {x: x is a letter of the word MATHEMATICS} Solution: (i) Here the elements of this set are natural number as well as divisors of 6. Hence, (i) matches with (c). (ii) 2 and 3 are prime numbers which are divisors of 6. Hence, (ii) matches with (a). (iii) The elements are the letters of the word MATHEMATICS. Hence, (iii) matches with (d). (iv) The elements are odd natural numbers which are less than 10. Hence, (v) matches with (b). Exercise 1.2 page: 8 1. 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 is a natural numbers, x < 5 and x > 7} (iv) {y: y is a point common to any two parallel lines} Solution: (i) Set of odd natural numbers divisible by 2 is a null set as odd numbers are not divisible by 2. (ii) Set of even prime numbers is not a null set as 2 is an even prime number. (iii) {x: x is a natural number, x < 5 and x > 7} is a null set as a number cannot be both less than 5 and greater than 7. (iv) {y: y is a point common to any two parallel lines} is a null set as the parallel lines do not intersect. Therefore, they have no common point. 2. Which of the following sets are finite or infinite? (i) The set of months of a year (ii) {1, 2, 3 …} (iii) {1, 2, 3 … 99, 100} (iv) The set of positive integers greater than 100 (v) The set of prime numbers less than 99 Solution: (i) The set of months of a year is a finite set as it contains 12 elements. (ii) {1, 2, 3 …} is an infinite set because it has infinite number of natural numbers. (iii) {1, 2, 3 …99, 100} is a finite set as the numbers from 1 to 100 are finite. (iv) The set of positive integers greater than 100 is an infinite set as the positive integers which are greater than 100 are infinite. (v) The set of prime numbers less than 99 is a finite set as the prime numbers which are less than 99 are finite. 3. State whether each of the following set 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: (i) The set of lines which are parallel to the x-axis is an infinite set as the lines which are parallel to the x-axis are infinite. (ii) The set of letters in the English alphabet is a finite set as it contains 26 elements. (iii) The set of numbers which are multiple of 5 is an infinite set as the multiples of 5 are infinite. (iv) The set of animals living on the earth is a finite set as the number of animals living on the earth is finite. (v) The set of circles passing through the origin (0, 0) is an infinite set as infinite number of circles can pass through the origin. 4. 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 is positive even integer and x ≤ 10} (iv) A = {x: x is a multiple of 10}; B = {10, 15, 20, 25, 30 …} Solution: (i) A = {a, b, c, d}; B = {d, c, b, a} Order in which the elements of a set are listed is not significant. Therefore, A = B. (ii) A = {4, 8, 12, 16}; B = {8, 4, 16, 18} We know that 12 ∈ A but 12 ∉ B. Therefore, A ≠ B (iii) A = {2, 4, 6, 8, 10}; B = {x: x is a positive even integer and x ≤ 10} = {2, 4, 6, 8, 10} Therefore, A = B (iv) A = {x: x is a multiple of 10} B = {10, 15, 20, 25, 30 …} We know that 15 ∈ B but 15 ∉ A. Therefore, A ≠ B 5. Are the following pair of sets equal? Give reasons. (i) A = {2, 3}; B = {x: x is solution of x2 + 5x + 6 = 0} (ii) A = {x: x is a letter in the word FOLLOW}; B = {y: y is a letter in the word WOLF} Solution: (i) A = {2, 3}; B = {x: x is solution of x2 + 5x + 6 = 0} x2 + 5x + 6 = 0 can be written as x(x + 3) + 2(x + 3) = 0 By further calculation (x + 2) (x + 3) = 0 So we get x = –2 or x = –3 Here A = {2, 3}; B = {–2, –3} Therefore, A ≠ B (ii) A = {x: x is a letter in the word FOLLOW} = {F, O, L, W} B = {y: y is a letter in the word WOLF} = {W, O, L, F} Order in which the elements of a set which are listed is not significant. Therefore, A = B. 6. 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: 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} We know that 8 ∈ A, 8 ∉ B, 8 ∉ D, 8 ∉ E, 8 ∉ F, 8 ∉ G, 8 ∉ H A ≠ B, A ≠ D, A ≠ E, A ≠ F, A ≠ G, A ≠ H It can be written as 2 ∈ A, 2 ∉ C Therefore, A ≠ C 3 ∈ B, 3 ∉ C, 3 ∉ E, 3 ∉ F, 3 ∉ G, 3 ∉ H B ≠ C, B ≠ E, B ≠ F, B ≠ G, B ≠ H It can be written as 12 ∈ C, 12 ∉ D, 12 ∉ E, 12 ∉ F, 12 ∉ G, 12 ∉ H Therefore, C ≠ D, C ≠ E, C ≠ F, C ≠ G, C ≠ H 4 ∈ D, 4 ∉ E, 4 ∉ F, 4 ∉ G, 4 ∉ H Therefore, D ≠ E, D ≠ F, D ≠ G, D ≠ H Here, E ≠ F, E ≠ G, E ≠ H F ≠ G, F ≠ H, G ≠ H Order in which the elements of a set are listed is not significant. B = D and E = G Therefore, among the given sets, B = D and E = G. Exercise 1.3 page: 12 1. Make correct statements by filling in the symbols ⊂ or ⊄ in the blank spaces: (i) {2, 3, 4} … {1, 2, 3, 4, 5} (ii) {a, b, c} … {b, c, d} (iii) {x: x is a student of Class XI of your school} … {x: x student of your school} (iv) {x: x is a circle in the plane} … {x: x is a circle in the same plane with radius 1 unit} (v) {x: x is a triangle in a plane}…{x: x is a rectangle in the plane} (vi) {x: x is an equilateral triangle in a plane}… {x: x is a triangle in the same plane} (vii) {x: x is an even natural number} … {x: x is an integer} Solution: (i) {2, 3, 4} ⊂ {1, 2, 3, 4, 5} (ii) {a, b, c} ⊄ {b, c, d} (iii) {x: x is a student of Class XI of your school} ⊂ {x: x student of your school} (iv) {x: x is a circle in the plane} ⊄ {x: x is a circle in the same plane with radius 1 unit} (v) {x: x is a triangle in a plane} ⊄ {x: x is a rectangle in the plane} (vi) {x: x is an equilateral triangle in a plane} ⊂ {x: x is a triangle in the same plane} (vii) {x: x is an even natural number} ⊂ {x: x is an integer} 2. Examine whether the following statements are true or false: (i) {a, b} ⊄ {b, c, a} (ii) {a, e} ⊂ {x: x is a vowel in the English alphabet} (iii) {1, 2, 3} ⊂ {1, 3, 5} (iv) {a} ⊂ {a. b, c} (v) {a} ∈ (a, b, c) (vi) {x: x is an even natural number less than 6} ⊂ {x: x is a natural number which divides 36} Solution: (i) False. Here each element of {a, b} is an element of {b, c, a}. (ii) True. We know that a, e are two vowels of the English alphabet. (iii) False. 2 ∈ {1, 2, 3} where, 2∉ {1, 3, 5} (iv) True. Each element of {a} is also an element of {a, b, c}. (v) False. Elements of {a, b, c} are a, b, c. Hence, {a} ⊂ {a, b, c} (vi) True. {x: x is an even natural number less than 6} = {2, 4} {x: x is a natural number which divides 36}= {1, 2, 3, 4, 6, 9, 12, 18, 36} 3. Let A= {1, 2, {3, 4}, 5}. Which of the following statements are incorrect and why? (i) {3, 4} ⊂ A (ii) {3, 4}}∈ A (iii) {{3, 4}} ⊂ A (iv) 1 ∈ A (v) 1⊂ A (vi) {1, 2, 5} ⊂ A (vii) {1, 2, 5} ∈ A (viii) {1, 2, 3} ⊂ A (ix) Φ ∈ A (x) Φ ⊂ A (xi) {Φ} ⊂ A Solution: It is given that A= {1, 2, {3, 4}, 5} (i) {3, 4} ⊂ A is incorrect Here 3 ∈ {3, 4}; where, 3∉A. (ii) {3, 4} ∈A is correct {3, 4} is an element of A. (iii) {{3, 4}} ⊂ A is correct {3, 4} ∈ {{3, 4}} and {3, 4} ∈ A. (iv) 1∈A is correct 1 is an element of A. (v) 1⊂ A is incorrect An element of a set can never be a subset of itself. (vi) {1, 2, 5} ⊂ A is correct Each element of {1, 2, 5} is also an element of A. (vii) {1, 2, 5} ∈ A is incorrect {1, 2, 5} is not an element of A. (viii) {1, 2, 3} ⊂ A is incorrect 3 ∈ {1, 2, 3}; where, 3 ∉ A. (ix) Φ ∈ A is incorrect Φ is not an element of A. (x) Φ ⊂ A is correct Φ is a subset of every set. (xi) {Φ} ⊂ A is incorrect Φ∈ {Φ}; where, Φ ∈ A. 4. Write down all the subsets of the following sets: (i) {a} (ii) {a, b} (iii) {1, 2, 3} (iv) Φ Solution: (i) Subsets of {a} are Φ and {a}. (ii) Subsets of {a, b} are Φ, {a}, {b}, and {a, b}. (iii) Subsets of {1, 2, 3} are Φ, {1}, {2}, {3}, {1, 2}, {2, 3}, {1, 3}, and {1, 2, 3}. (iv) Only subset of Φ is Φ. 5. How many elements has P (A), if A = Φ? Solution: If A is a set with m elements n (A) = m then n [P (A)] = 2m If A = Φ we get n (A) = 0 n [P(A)] = 20 = 1 Therefore, P (A) has one element. 6. Write the following as intervals: (i) {x: x ∈ R, –4