CBSE Class–11 Mathematics
NCERT Solutions
Chapter - 1 Sets
Exercise 1.1

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 batmen 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 the chapter.

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

Ans. (i) The collection of all months of a year beginning with J is {January, June, July}, which is well defined and hence it forms a set.

(ii) The collection of most talented writers of India is not well defined because opinions about 'most talented writers' vary from person to person and hence it does not form a set.

(iii) A team of eleven best-cricket batmen of the world us not well defined because opinion about 'best-cricket batsmen' vary from person to person and hence it does not form a set.

(iv) The collection of all boys in your class is well defined and hence it forms a set.

(v) The collection of all natural numbers less than 100 is {1, 2, 3, ……., 99} which is well defined and hence it forms a set.

(vi) A collection of novels written by the writer Munshi Prem Chand is well defined and hence it forms a set.

(vii) The collection al all even integers is $\{\ldots\ldots, -4, -2, 0, 2, 4, \ldots\ldots\}$ which is well defined and hence it forms a set.

(viii) The collection of questions in this chapter is well defined and hence it forms a set.

(ix) A collection of most dangerous animals of the world is not well defined because opinion about 'most dangerous animals' vary from person to person and hence it does not form a set.

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2. Let A = {1, 2, 3, 4, 5, 6}. Insert the appropriate symbol $\in$ or $\notin$ on the blank space:

(i) 5 _____ A

(ii) 8 _____ A

(iii) 0 _____ A

(iv) 4 _____ A

(v) 2 _____ A

(vi) 10 _____ A

Ans. Given: A = {1, 2, 3, 4, 5, 6}

(i) 5 is an element of set A

$\therefore 5 \in A$

(ii) 8 is not an element of set A

$\therefore 8 \notin A$

(iii) 0 is not an element of set A

$\therefore 0 \notin A$

(iv) 4 is an element of set A

$\therefore 4 \in A$

(v) 2 is an element of set A

$\therefore 2 \in A$

(vi) 10 is not an element of set A

$\therefore 10 \notin A$

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

Ans. (i) A = {$x : x$ is an integer and $-3 < x < 7$ } $\therefore$ A = $\{-2, -1, 0, 1, 2, 3, 4, 5, 6\}$

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

$\therefore$ C = {17, 26, 35, 44, 53, 62, 71, 80}

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

$\therefore$ D = {2, 3, 5}

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

$\therefore$ E = {T, R, I, G, O, N, M, E, Y}

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

$\therefore$ F = {B, E, T, R}

4. Write the following sets in the 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}

Ans. (i) Let A = {3, 6, 9, 12}.

Here all objects of the set are natural numbers that are multiples of 3.

$\therefore$ A = $\{x: x = 3n, n \in \mathrm{N} \text{ and } 1 \le n \le 4\}$

(ii) Let B = {2, 4, 8, 16, 32}

Here all objects of the set are natural numbers that are power of 2.

$\therefore$ B = $\{x: x = 2^n, n \in \mathrm{N} \text{ and } 1 \le n \le 5\}$

(iii) Let C = {5, 25, 125, 625}

Here all objects of the set are natural numbers that are power of 5.

$\therefore$ C = $\{x: x = 5^n, n \in \mathrm{N} \text{ and } 1 \le n \le 4\}$

(iv) Let D = {2, 4, 6, ...}

Here all objects of the set are even natural numbers.

$\therefore$ D = $\{x: x \text{ is an even natural number}\}$

(v) Let E = {1, 4, 9, ..., 100}

Here all objects of the set are perfect square.

$\therefore$ D = $\{x: x = n^2 \text{ and } 1 \le n \le 10\}$

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, $-\frac{1}{2} < x < \frac{9}{2}$ }

(iii) C = {$x: x$ is an integer, $x^2 \le 4$ }

(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}

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

$\therefore$ A = {1, 3, 5, 7, ...}

(ii) B = {$x: x$ is an integer, $-\frac{1}{2} < x < \frac{9}{2}$ }

$\therefore$ B = {0, 1, 2, 3, 4}

(iii) C = {$x: x$ is an integer, $x^2 \le 4$ }

$\therefore$ C = $\{-2, -1, 0, 1, 2\}$

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

$\therefore$ D = {L, O, Y, A}

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

$\therefore$ E = {February, April, June, September, November}

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

$\therefore$ 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 the 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) {!, 3, 5, 7, 9}

(d) {x: x is a letter of word "MATHEMATICS"}

Ans. The sets which are in set-builder form can be written as

(a) {x: x is a prime number and a divisor of 6} = {2, 3}

(b) {x: x is an odd natural number less than 10} = {1, 3, 5, 7, 9}

(c) {x: x is a natural number and divisor of 6} = {1, 2, 3, 6}

(d) {x: x is a letter of word "MATHEMATICS"} = {M, A, T, H, E, I, C, S}

Hence the correct matching is:

(i) $\rightarrow$ (c)
(ii) $\rightarrow$ (a)
(iii) $\rightarrow$ (d)
(iv) $\rightarrow$ (b)