

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:

A set is a well-defined collection of objects.

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

The elements of this set are {January, June, July}

ii) The collection of ten most talented writers of India is not a set.

It is not a well-defined collection because criteria may differ from one person to another.

iii) A team of eleven best-cricket batsmen of the world is not a set.

iv) The collection of all boys in your class is a set, because it is well defined.

v) The collection of all natural numbers less than 100 is a set, because it is well defined.

vi) The collection of novels written by the writer Munshi Prem Chand is a set, because it is well defined.

vii) The collection of all even integers is a set, because it is well defined.

viii) The collection of questions in this chapter is a set, because it is well defined.

ix) A collection of most dangerous animals of the world is not a set, because it is not well defined.

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

i) $5 - A$

ii) $8 - A$

iii) $0 - A$

iv) $4 - A$

v) $2 - A$

vi) $10 - A$

Solution:

i) $5 \in A$

ii) $8 \notin A$

iii) $0 \notin A$

iv) $4 \in A$

v) $2 \in A$

vi) $10 \notin A$

3. Write the following sets in roster form:

i) $A = \{x: x \text{ is an integer and } -3 \leq x < 7\}$

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

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

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

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

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

Solution:

i) $A = \{-2, -1, 0, 1, 2, 3, 4, 5, 6\}$

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

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) $\{2, 4, 6, \text{-----}\}$

v) $\{1, 4, 9, \text{-----} 100\}$

Solution:

i) $\{x: x = 3n, n \in N \text{ and } 1 \leq n \leq 4\}$

ii) $\{x: x = 2^n, n \in N \text{ and } 1 \leq n \leq 5\}$

iii) $\{x: x = 5^n, n \in N \text{ and } 1 \leq n \leq 4\}$

iv) $\{x; x = x \text{ is an even natural number}\}$

v) $\{x; x = n^2, n \in N \text{ and } 1 \leq n \leq 10\}$

5. List all the elements of the following sets:

- i) $A = \{x; x \text{ is an odd natural number}\}$
- ii) $B = \{x: x \text{ is an integer, } \frac{-1}{2} < x < \frac{9}{2}\}$
- iii) $C = \{x: x \text{ is an integer, } x^2 \leq 4\}$
- iv) $D = \{x: x \text{ is a letter in the word "LOYAL"}\}$
- v) $E = \{x: x \text{ is a month of a year not having 31 days}\}$
- vi) $F = \{x: x \text{ is a consonant in the English alphabet which precedes k}\}$

Solution:

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

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) $\{x; x \text{ is a prime number and a divisor of } 6\}$
- ii) $\{2, 3\}$ b) $\{x; x \text{ is an odd natural number less than } 10\}$
- iii) $\{M, A, T, H, E, I, C, S\}$ c) $\{x; x \text{ is a natural number and divisor of } 6\}$
- iv) $\{1, 3, 5, 7, 9\}$ d) $\{x; x \text{ is a letter of the word MATHEMATICS}\}$

Solution:

- i) $\{1, 2, 3, 6\} = \{x; x \text{ is a natural number and divisor of } 6\}$
- ii) $\{2, 3\} = \{x; x \text{ is a prime number and a divisor of } 6\}$
- iii) $\{M, A, T, H, E, I, C, S\} = \{x: x \text{ is a letter of the word MATHEMATICS}\}$

iv) $\{1, 3, 5, 7, 9\} = \{x; x \text{ is an odd natural number less than } 10\}$
