NCERT Solutions for Class-XI Maths

Chapter-1 Exercise-1.1

NCERT Math Class 11

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.

1. (i) The collection of all months of a year beginning with the letter J is a well-defined collection of objects because one can definitely identify a month that belongs to this collection.

Hence, this collection is a set.

(ii) The collection of ten most talented writers of India is not a well-defined collection because the criteria for determining a writer's talent may vary from person to person.

Hence, this collection is not a set.

(iii) A team of eleven best cricket batsmen of the world is not a well-defined collection because the criteria for determining a batsman's talent may vary from person to person.

Hence, this collection is not a set.

(iv) The collection of all boys in your class is a well-defined collection because you can definitely identify a boy who belongs to this collection. Hence, this collection is a set.

(v) The collection of all natural numbers less than 100 is a well-defined collection because one can definitely identify a number that belongs to this collection.

Hence, this collection is a set.

(vi) A collection of novels written by the writer Munshi Prem Chand is a well-defined collection because one can definitely identify a book that belongs to this collection.

Hence, this collection is a set.

(vii) The collection of all even integers is a well-defined collection because one can definitely identify an even integer that belongs to this collection. Hence, this collection is a set.

(viii) The collection of questions in this chapter is a well-defined collection because one can definitely identify a question that belongs to this chapter. Hence, this collection is a set.

(ix) The collection of most dangerous animals of the world is not a welldefined collection because the criteria for determining the dangerousness of an animal can vary from person to person.
Hence, this collection is not a set.

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

(i) $5 \in A$

(ii) $8 \notin A$

(iii) $0 \notin A$

(iv) $4 \in A$

(v) $2 \in A$

(vi) $10 \notin A$

2. Here $\in$ =belongs to

$\notin$ = does not belongs to

(i) 5. . .A

(i) $5 \in A$, since 5 is in the set A

(ii) 8 . . . A

(ii) $8 \notin A$, since 8 is not in the set A

(iii) 0. . .A

(iii) $0 \notin A$, since 0 is not in the set A

(iv) 4. . . A

(iv) $4 \in A$, since 4 is in the set A

(v) 2. . .A

(v) $2 \in A$, since 2 is in the set A

(vi) 10. . .A

(vi) $10 \notin A$, since 10 is not in set 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.

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

The elements of this set are $-2, -1, 0, 1, 2, 3, 4, 5$, and 6 only.

Therefore, the given set can be written in roster form as

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

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

The elements of this set are $1, 2, 3, 4$, and 5 only.

Therefore, the given set can be written in roster form as

$B = \{1, 2, 3, 4, 5\}$

(iii) $C = \{x : x$ is a two-digit natural number such that the sum of its digits is $8\}$ The elements of this set are $17, 26, 35, 44, 53, 62, 71$, and 80 only.

Therefore, this set can be written in roster form as

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

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

$60 = 2 \times 2 \times 3 \times 5$

The elements of this set are 2,3 , and 5 only.

Therefore, this set can be written in roster form as $D = \{2, 3, 5\}$.

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

There are 12 letters in the word TRIGONOMETRY, out of which letters T, R, and O are repeated.

Therefore, this set can be written in roster form as

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

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

There are 6 letters in the word BETTER, out of which letters E and T are repeated.

Therefore, this set can be written in roster form as

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

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}

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

Here the element of the set can be disintegrated as

$3 = 3 \times 1$

$6 = 3 \times 2$

$9 = 3 \times 3$

$12 = 3 \times 4$

The set in the set-builder form is

A= { x:x=3n where n∈N and 1≤n ≤4 }

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

The elements of the set can be disintegrated as

$2 = 2^1$

$4 = 2^2$

$8 = 2^3$

$16 = 2^4$

$32 = 2^5$

The set in the set-builder form is

A= {x:x=2^n , n ∈N and 1≤n ≤5 }

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

The elements of the set can be disintegrated as

$5 = 5^1$

$25 = 5^2$

$125 = 5^3$

$625 = 5^4$

The set in the set-builder form is

A= { x :x= 5^n , n ∈N and 1≤n ≤4}

(iv) {2, 4, 6, . . .}

Natural numbers are 1, 2, 3 , 4, 5, 6……..

Even natural numbers are 2, 4, 6, 8……..

∴ the given set is set of all even natural numbers

The set in the set-builder form is

A= {x:x=2k for unique value of k , k <0}

(v) {1,4,9, . . .,100}

The element of the set can be disintegrated as

$1 = 1^2$

$4 = 2^2$

$9 = 3^2$

..... $100 = 10^2$

The set in the set-builder form is

$A = \{x : x = n^2, n \in N, 1 \leq n \leq 10\}$

Alternatively

A = {x:x is the square of natural number less than or equal to 10}

5. List all the elements of the following sets:

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

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

(iii) $C = \left\{x : x \text{ is an } x^2 \leq 4\right\}$ integer,

(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) $F = \{x : x \text{ is a consonant in the English alphabet which proceeds k}\}$.

5. (i) $A = \{x : x \text{ is an odd natural number }\} = \{1,3,5,7,9\ldots\}$

(ii) $B = \left\{x : x \text{ is an integer; } -\frac{1}{2} < n < \frac{9}{2}\right\}$

It can be seen that $-\frac{1}{2} = -0.5$ and $\frac{9}{2} = 4.5$

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

(iii) $C = \left\{x : x \text{ is an integer; } x^2 \leq 4\right\}$

It can be seen that

$(-1)^2 = 1 \leq 4; (-2)^2 = 4 \leq 4; (-3)^2 = 9 > 4$

$0^2 = 0 \leq 4$

$1^2 = 1 \leq 4$

$2^2 = 4 \leq 4$

$3^2 = 9 > 4$

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

(iv) $D = (x : x \text{ is a letter in the word "LOYAL"}) = \{L, O, Y, A\}$

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

= { February, April, June, September, November }

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

$= \{b, c, d, f, g, h, j\}$

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 natural number and divisor of 6}
(iv) {1, 3, 5, 7, 9}	D. {x : x is a letter of the word MATHEMATICS}.

6. (i) {1, 2, 3, 6} C {x : x is natural number and divisor of 6}

The elements of sets are

6× 1 = 6

3× 2 = 6

{1, 2, 3, 6} is a set of natural numbers and divisor of 6

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

6× 1 = 6

2 × 3 = 6

The divisors of 6 are 1, 6, 2 and 3 out of which 2 and 3 are prime

{2, 3} is the set of prime numbers which are divisor of 6

(iii) {M, A, T, H, E, I, C, S} D. {x : x is a letter of the word MATHEMATICS}.

There are 11 letters in the word MATHEMATICS out of which 3 (M , T, A)are repeating .

{M, A, T, H, E, I, C, S} is a set of letters of the word MATHEMATICS

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

Natural numbers are 1, 2, 3, 4, 5, 6, 7, 8, 9,……..

Odd numbers less than 10 are 1, 3, 5, 7, 9

{1, 3, 5, 7, 9} is a set of odd natural numbers less than 10