

Chapter 1: Sets Exercise 1.2

NCERT · Class 11 · Maths

Questions

Question 1

Which of the following are examples of the null set?

A.

Set of odd natural numbers divisible by 2

B.

Set of even prime numbers

C.

$\{x: x \text{ is a natural numbers, } x < 5 \text{ and } x > 7\}$

D.

$\{y: y \text{ is a point common to any two parallel lines}\}$

Answer

Correct option: A

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) $\{x: x \text{ is a natural number, } x < 5 \text{ and } x > 7\}$ is a null set, as a number cannot be both less than 5 and greater than 7.

(iv) $\{y: y \text{ is a point common to any two parallel lines}\}$ is a null set, as the parallel lines do not intersect. Therefore, they have no common point.

Question 2

Which of the following sets are finite or infinite?

(v) The set of prime numbers less than 99

A.

The set of months of a year

B.

$\{1, 2, 3 \dots\}$

C.

$\{1, 2, 3 \dots 99, 100\}$

D.

The set of positive integers greater than 100

Answer

Correct option: A

Solution

(i) The set of months of a year is a finite set, as it contains 12 elements.

(ii) $\{1, 2, 3 \dots\}$ is an infinite set because it has an infinite number of natural numbers.

(iii) $\{1, 2, 3 \dots 99, 100\}$ 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.

Question 3

State whether each of the following sets is finite or infinite.

(v) The set of circles passing through the origin $(0, 0)$

A.

The set of lines which are parallel to the x-axis

B.

The set of letters in the English alphabet

C.

The set of numbers which are multiple of 5

D.

The set of animals living on the earth

Answer

Correct option: A

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 an infinite number of circles can pass through the origin.

Question 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) $A = \{2, 4, 6, 8, 10\}$; $B = \{x: x \text{ is positive even integer and } x \leq 10\}$

(iv) $A = \{x: x \text{ is a multiple of } 10\}$; $B = \{10, 15, 20, 25, 30 \dots\}$

Solution

$$(i) A = \{a, b, c, d\}; B = \{d, c, b, a\}$$

The 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 $12 \in A$ but $12 \notin B$.

Therefore, $A \neq B$

$$(iii) A = \{2, 4, 6, 8, 10\};$$

$$B = \{x: x \text{ is a positive even integer and } x \leq 10\} = \{2, 4, 6, 8, 10\}$$

Therefore, $A = B$

$$(iv) A = \{x: x \text{ is a multiple of } 10\}$$

$$B = \{10, 15, 20, 25, 30 \dots\}$$

We know that $15 \in B$ but $15 \notin A$.

Therefore, $A \neq B$

Question 5

Are the following pair of sets equal? Give reasons.

$$(i) A = \{2, 3\}; B = \{x: x \text{ is solution of } x^2 + 5x + 6 = 0\}$$

$$(ii) A = \{x: x \text{ is a letter in the word FOLLOW}\}; B = \{y: y \text{ is a letter in the word WOLF}\}$$

Solution

$$(i) A = \{2, 3\}; B = \{x: x \text{ is solution of } x^2 + 5x + 6 = 0\}$$

$x^2 + 5x + 6 = 0$ can be written as

$$x(x + 3) + 2(x + 3) = 0$$

By further calculation,

$$(x + 2)(x + 3) = 0$$

So, we get

$$x = -2 \text{ or } x = -3$$

Here,

$$A = \{2, 3\}; B = \{-2, -3\}$$

Therefore, $A \neq B$

$$(ii) A = \{x: x \text{ is a letter in the word FOLLOW}\} = \{F, O, L, W\}$$

$$B = \{y: y \text{ is a letter in the word WOLF}\} = \{W, O, L, F\}$$

The order in which the elements of a set which are listed is not significant.

Therefore, $A = B$.

Question 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

$$8 \in A, 8 \notin B, 8 \notin D, 8 \notin E, 8 \notin F, 8 \notin G, 8 \notin H$$

$$A \neq B, A \neq D, A \neq E, A \neq F, A \neq G, A \neq H$$

It can be written as

$$2 \in A, 2 \notin C$$

Therefore, $A \neq C$

$$3 \in B, 3 \notin C, 3 \notin E, 3 \notin F, 3 \notin G, 3 \notin H$$

$$B \neq C, B \neq E, B \neq F, B \neq G, B \neq H$$

It can be written as

$$12 \in C, 12 \notin D, 12 \notin E, 12 \notin F, 12 \notin G, 12 \notin H$$

$$\text{Therefore, } C \neq D, C \neq E, C \neq F, C \neq G, C \neq H$$

$$4 \in D, 4 \notin E, 4 \notin F, 4 \notin G, 4 \notin H$$

$$\text{Therefore, } D \neq E, D \neq F, D \neq G, D \neq H$$

$$\text{Here, } E \neq F, E \neq G, E \neq H$$

$$F \neq G, F \neq H, G \neq H$$

The order in which the elements of a set are listed is not significant.

$$B = D \text{ and } E = G$$

Therefore, among the given sets, $B = D$ and $E = G$.

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