

Date: 16-Jul-2026

9th Sets

Marks: 20

Time: 60min

Q.1(A) Choose the correct alternative. (3)

i Which of the following collections is a set ?

- | | |
|--|---|
| ☒ (A) Colours of the rainbow | ☐ (B) Tall trees in the school campus. |
| ☐ (C) Rich people in the village | ☐ (D) Easy examples in the book |

Ans: ["A"]

Explanation:

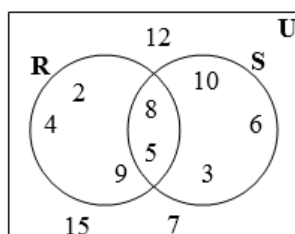
The elements of options B, C and D cannot be definitely and clearly decided.

ii $P = \{1, 2, \dots, 10\}$. What type of set P is ?

- | | |
|--|--|
| ☐ (A) Null set | ☐ (B) Infinite set |
| ☒ (C) Finite set | ☐ (D) None of these |

["C"]

iii For the Venn diagram shown below, $(R \cup S)'$ =



- | | |
|---|--|
| ☐ (A) {8, 5} | ☐ (B) {2, 3, 4, 5, 6, 8, 9, 10} |
| ☒ (C) {12, 15, 7} | ☐ (D) {2, 9, 4, 10, 6, 3} |

Ans: ["C"]

Explanation:

$$(R \cup S) = \{2, 3, 4, 5, 6, 8, 9, 10\}$$

$$\therefore (R \cup S)' = \{12, 15, 7\}$$

Q.1(B) Solve the following questions. (3)

i $A = \{x \mid x \text{ is prime number and } 10 < x < 20\}$ and $B = \{11, 13, 17, 19\}$. Here $A = B$. Verify.

$$A = \{x \mid x \text{ is prime number and } 10 < x < 20\}$$

$$\therefore A = \{11, 13, 17, 19\}$$

$$B = \{11, 13, 17, 19\}$$

∴ All the elements in set A and B are identical.

∴ A and B are equal sets.

$$\text{i.e. } A = B$$

ii **Is the given set an empty set or not?**

$$A = \{x \mid x \in \mathbb{I}, x < 0\}$$

$$A = \{x \mid x \in \mathbb{I}, x < 0\}$$

$$\therefore A = \{\dots, -3, -2, -1\}$$

∴ A is not an empty set.

iii **Write the following set in set builder form.**

$$B = \{5, 10, 15, 20, \dots\}$$

$$B = \{x \mid x = 5n \text{ and } n \in \mathbb{N}\}$$

Q.2(A) Complete the following activity. (2)

i **Write the following set using listing method and classify into empty or non-empty set.**

$$B = \{x \mid x \in \mathbb{N} \text{ and } 2x + 8 = 0\}$$

$$2x + 8 = 0$$

$$\therefore x = \square$$

$$\text{since, } \square \in \mathbb{N}$$

$$\therefore B = \square$$

$$\therefore B \text{ is } \square \text{ set}$$

$$B = \{x \mid x \in \mathbb{N} \text{ and } 2x + 8 = 0\}$$

$$2x + 8 = 0$$

$$\therefore 2x = -8$$

$$\therefore x = -4$$

$$\text{since, } -4 \notin \mathbb{N}$$

$$\therefore B =$$

∴ B is an **empty** set

Q.2(B) Solve the following questions. (Any three) (6)

i **70 trees were planted by Parth and 90 trees were planted by Pradnya on the occasion of Tree Plantation Week. Out of these 25 trees were planted by both of them together. How many trees were planted by Parth or Pradnya?**

i. Let P be the trees planted by Parth and Q be the trees planted by Pradnya

$$\therefore n(P) = 70 \text{ and } n(Q) = 90$$

$$\text{Total number of trees planted by Parth and Pradnya} = n(P \cap Q) = 25$$

ii. Number of trees planted by Parth or Pradnya

$$= n(P \cup Q)$$

$$= n(P) + n(Q) - n(P \cap Q)$$

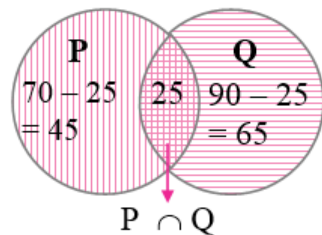
$$= 70 + 90 - 25$$

$$= 135$$

$\therefore$ A total of 135 trees were planted by Parth or Pradnya.

Alternate Method:

Let P be the trees planted by Parth and Q be the trees planted by Pradnya



From Venn diagram

$\therefore$ Total trees planted by parth or pradnya

$$= n(P \cup Q)$$

$$= 45 + 25 + 65$$

$$= 135$$

A total of 135 trees were planted by Parth or Pradnya.

ii **If $n(A) = 8$, $n(B) = 14$, $n(A \cup B) = 18$, then find $n(A \cap B)$.**

$$\text{Here, } n(A) = 8, n(B) = 14, n(A \cup B) = 18$$

$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

$$\therefore 18 = 8 + 14 - n(A \cap B)$$

$$\therefore n(A \cap B) = 8 + 14 - 18$$

$$\therefore n(A \cap B) = 4$$

iii $U = \{1, 2, 3, 7, 8, 9, 10, 11, 12\}$

$P = \{1, 3, 7, 10\}$, then

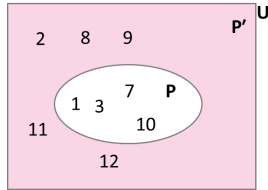
i. show the sets U , P and P' by Venn diagram.

ii. Verify $(P')' = P$

i. Here, $U = \{1, 2, 3, 7, 8, 9, 10, 11, 12\}$

$P = \{1, 3, 7, 10\}$

$\therefore P' = \{2, 8, 9, 11, 12\}$



ii. Here, $U = \{1, 2, 3, 7, 8, 9, 10, 11, 12\}$

$P = \{1, 3, 7, 10\}$... (i)

$\therefore P' = \{2, 8, 9, 11, 12\}$

Also, $(P')' = \{1, 3, 7, 10\}$... (ii)

$\therefore (P')' = P$... [From (i) and (ii)]

iv If $P = \{2, 4, 8, 16\}$, $Q = \{2, 8, 6\}$ then is the statement $Q \subseteq P$ true or false. Justify.

$Q = \{2, 8, 6\}$

$P = \{2, 4, 8, 16\}$

$Q \subseteq P$

False

All the elements of Q are not present in P .

Q.3 Solve the following questions.(Any one)

(3)

i For each of the following sets, state with reasons, whether it is a null set or not:

i. $A = \{x | x \in \mathbb{I}, x^2 \text{ is not positive}\}$

ii. $B = \{b | b \in \mathbb{N}, 2b + 1 \text{ is even}\}$

iii. $C = \{c | c \in \mathbb{N}, c \text{ is odd and } c^2 \text{ is even}\}$

i. $A = \{x | x \in \mathbb{I}, x^2 \text{ is not positive}\}$

Whether a number is positive or negative its square is always a positive.

∴ Square of an integer cannot be negative, except zero, whose square is neither positive nor negative.

$$\therefore x = 0$$

$$\therefore A = \{0\}$$

∴ **Set A is not a null set.**

ii. $B = \{b | b \in \mathbb{N}, 2b + 1 \text{ is even}\}$

Here, $2b$ is an even number and 1 is an odd number.

Since, addition of even and odd number is always odd number,

∴ value of $2b + 1$, for any value of $b \in \mathbb{N}$
is an odd number.

∴ **Set B is a null set.**

iii. $C = \{c | c \in \mathbb{N}, c \text{ is odd and } c^2 \text{ is even}\}$

Square of an odd number is always an odd number.

∴ c^2 cannot be even.

∴ **Set C is a null set.**

- ii **240 students in a school were interviewed and their hobbies were noted. 150 students were interested in stamp collection, 80 took delight in reading books, 40 of them do not like either. What is the number of students who liked both stamp collection and reading books?**

Let U be the set of students in the school, S be the set of students who like stamp collection, R be the set of students who like reading books.

$$\therefore n(U) = 240, n(S) = 150, n(R) = 80$$

Since 40 students neither like stamp collection nor reading books.

$$\therefore n(S \cup R) = 240 - 40 = 200$$

$$n(S \cup R) = n(S) + n(R) - n(S \cap R)$$

$$\therefore 200 = 150 + 80 - n(S \cap R)$$

$$\therefore n(S \cap R) = 150 + 80 - 200$$

$$\therefore n(S \cap R) = 30$$

∴ The number of students who liked both stamp collection and reading books is 30.

- i **In an exam 35 students cleared General Knowledge paper, 45 students cleared Logical Aptitude paper and 25 cleared both the papers. 5 students failed in both the papers. Find the number of students appeared in the exam.**

Let U be the set of students who appeared for the exam,

G be the set of students who cleared General Knowledge paper and

L be the set of students who cleared Logical Aptitude paper.

$$\therefore n(G) = 35, n(L) = 45$$

25 students cleared both the papers.

$$\therefore n(G \cap L) = 25$$

$$\begin{aligned} n(G \cup L) &= n(G) + n(L) - n(G \cap L) \\ &= 35 + 45 - 25 \end{aligned}$$

$$\therefore n(G \cup L) = 55$$

5 students failed in both the papers.

$$\text{Number of students who failed in both the papers} = n(U) - n(G \cup L)$$

$$\therefore 5 = n(U) - 55$$

$$\therefore n(U) = 5 + 55$$

$$\therefore n(U) = 60$$

$$\therefore \text{The number of students who appeared in the exam is 60.}$$

- ii **If 50 girls passed in Maths, 60 girls passed in History and 40 girls passed in Maths and History, find the number of girls who passed in either Maths or History.**

Let M be the set of girls who passed in Maths.

$$\therefore n(M) = 50$$

and H be the set of girls who passed in History

$$\therefore n(H) = 60$$

$$\therefore \text{Set of girls who passed in Maths and History} = n(M \cap H) = 40$$

$$\begin{aligned} \therefore \text{Number of girls who passed in either Maths or History} &= n(M \cup H) \\ &= n(M) + n(H) - n(M \cap H) \\ &= 50 + 60 - 40 \\ &= 70 \end{aligned}$$

$$\therefore 70 \text{ girls passed in either Maths or History.}$$

