CLASS XI CHAPTER 1 SETS EXERCISE 1.6

Q No 1 If X and Y are two sets such that $n(X) = 17$, $n(Y) = 23$ and $n(X \cup Y) = 38$, find $n(X \cap Y)$

Sol. We know that $n(X \cup Y) = n(X) + n(Y) - n(X \cap Y)$

$\Rightarrow \quad 38 = 17 + 23 - n(X \cap Y)$

$\Rightarrow \quad n(X \cap Y) = 40 - 38 = 2.$

Q No 2 If X and Y are two sets such that $X \cup Y$ has 18 elements X has 8 elements and Y has 15 elements; how many elements does $X \cap Y$ have?

Sol: Here $n(X \cup Y) = 18$, $n(X) = 8$, $n(Y) = 15$

Now $n(X \cup Y) = n(X) + n(Y) - n(X \cap Y)$

$\Rightarrow \quad 18 = 8 + 15 - n(X \cap Y)$

$\Rightarrow \quad n(X \cap Y) = 23 - 18 = 5$

$\therefore$ $X \cap Y$ has 5 elements.

Q No 3 In a group of 400 people, 250 can speak Hindi, 200 can speak English. How many people can speak both Hindi and English.

Sol. Let H = Set of people who speak Hindi
E = Set of people who can speak English.

ATQ $n(H) = 250$, $n(E) = 200$ and $n(H \cup E) = 400$

Now $n(H \cup E) = n(H) + n(E) - n(H \cap E)$

$400 = 250 + 200 - n(H \cap E)$

$\Rightarrow \quad n(H \cap E) = 450 - 400 = 50$

Q No 4 If S and T are two sets such that S has 21 elements, T has 32 elements and $S \cap T$ has 11 elements, how many elements does $S \cup T$ have?

Sol: We have $n(S) = 21$, $n(T) = 32$, $n(S \cap T) = 11$

Now $n(S \cup T) = n(S) + n(T) - n(S \cap T)$

$= 21 + 32 - 11 = 53 - 11 = 42$.

Hence $S \cup T$ has 42 elements.

QNo 5: If X and Y are two sets such that X has 40 elements, $X \cup Y$ has 60 elements and $X \cap Y$ has 10 elements, how many elements does Y have?

Sol Here $n(X \cup Y) = 60$, $n(X) = 40$, $n(X \cap Y) = 10$, $n(Y) = ?$

Now $n(X \cup Y) = n(X) + n(Y) - n(X \cap Y)$

$60 = 40 + n(Y) - 10$

$\Rightarrow n(Y) = 60 - 40 + 10 = 30$

$\therefore$ Y has 30 elements.

QNo 6: In a group of 70 people, 37 like coffee, 52 like tea and each person likes at least one of two drinks. How many like both coffee and tea?

Sol Let C = Set of people who like coffee.

and T = Set of people who like tea.

By the question $n(C \cup T) = 70$ $n(C) = 37$, $n(T) = 52$

Now $n(C \cup T) = n(C) + n(T) - n(C \cap T)$

$\Rightarrow 70 = 37 + 52 - n(C \cap T)$

$\Rightarrow n(C \cap T) = 89 - 70 = 19$

Hence 19 people like both coffee and tea.

QNo 7: In a group of 65 people, 40 like cricket, 10 like both cricket and tennis. How many like tennis only and not cricket? How many like tennis?

Sol. Let C = Set of people who like cricket

and T = Set of people who like tennis

ATQ $n(C \cup T) = 65$, $n(C) = 40$, $n(C \cap T) = 10$

$n(C \cup T) = n(C) + n(T) - n(C \cap T)$

$65 = 40 + n(T) - 10.$

$\therefore n(T) = 65 - 40 + 10 = 35$

∴ Number of people who like only tennis

$= n(T) - n(C \cap T) = 35 - 10 = 25$

Hence 25 people like tennis only and not Cricket and 35 people like tennis.

Q No. 8 In a committee 50 people speak French, 20 speak Spanish, 10 speak both spanish and french. How many speak at least one of these two languages?

Sol: Let F = Set of people who speak French.

and S = Set of people who speak Spanish.

By the question $n(F) = 50$ $n(S) = 20$, $n(F \cap S) = 10$

Now $n(F \cup S) = n(F) + n(S) - n(F \cap S)$

$= 50 + 20 - 10 = 60$

Hence 60 people speak at least on of the two languages.

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