Sets Ex 1.8 Q7

(i)

Let,

$n(P)$ denote the total number of persons,

$n(H)$ denote the number of persons who speak Hindi and

$n(E)$ denote the number of persons who speak English.

Then,

$$n(P) = 950,\ n(H) = 750,\ n(E) = 460$$

To find: $n(H \cap E)$

$$n(P) = n(H) + n(E) - n(H \cap E)$$

$\Rightarrow \quad 950 = 750 + 460 - n(H \cap E)$

$\Rightarrow \quad 950 = 2110 - n(H \cap E)$

$\Rightarrow \quad n(H \cap E) = 2110 - 950$

$\quad\quad = 260$

Hence, 260 persons can speak both Hindi and English.

(ii)

Clearly H is the disjoint union of $H - E$ & $H \cap E$

i.e $H = (H - E) \cup (H \cap E)$

$\therefore \quad n(H) = n(H - E) + n(H \cap E) \qquad \left[\begin{array}{l}\because \text{ if } A \,\&\, B \text{ are disjoint then} \\ n(A \cup B) = n(A) + n(B)\end{array}\right]$

$\Rightarrow \quad 750 = n(H - E) + 260$

$\Rightarrow \quad n(H - E) = 750 - 260$

$\quad\quad = 490$

Hence, 490 persons can speak Hindi only.

(iii)

On a similar lines we have

$$E = (E - H) \cup (H \cap E)$$

i.e E is the disjoint union of $E - H$ & $H \cap E$

$\therefore \quad n(E) = n(E - H) + n(H \cap E)$

$\Rightarrow \quad 460 = n(E - H) + 260$

$\Rightarrow \quad n(E - H) = 460 - 260$

$\quad\quad = 200$

Hence, 200 persons can speak English only.

Sets Ex 1.8 Q8

(i)
Let,
$n(P)$ denote the total number of persons,
$n(T)$ denote number of persons who drink tea and
$n(C)$ denote number of persons who drink coffee.

Then, $n(P) = 50$, $n(T - C) = 14$, $n(T) = 30$
To find: $n(T \cap C)$

Clearly T is the disjoint union of $T - C$ and $T \cap C$

$\therefore \quad T = (T - C) \cup (T \cap C)$
$\therefore \quad n(T) = n(T - C) + n(T \cap C)$
$\Rightarrow \quad 30 = 14 + n(T \cap C)$
$\Rightarrow \quad n(T \cap C) = 30 - 14$
$= 16$

Hence, 16 persons drink tea and coffee both.

(ii)
To find: $C - T$
We know $n(P) = n(C) + n(T) - n(T \cap C)$
$\Rightarrow \quad 50 = n(C) + 30 - 16$
$\Rightarrow \quad 50 = n(C) + 14$
$\Rightarrow \quad n(C) = 50 - 14$
$= 36$

New C is the disjoint union of $C - T$ and $T \cap C$

$\therefore \quad C = (C - T) \cup (C \cap T)$
$\Rightarrow \quad n(C) = n(C - T) + n(C \cap T)$
$\Rightarrow \quad 36 = n(C - T) + 16 \qquad [\because n(T \cap C) = n(C \cap T) = 16]$
$\Rightarrow \quad n(C - T) = 36 - 16$
$= 20$

Hence, 20 persons drink coffee but not tea.

Sets Ex 1.8 Q9

(i)
Let $n(P)$ denote total number of people $n(H)$ denote number
of people who read newspaper H $n(T)$ denote number of people
who read newspaper T and $n(I)$ denote number of people who read newspaper I

Then, $n(P) = 60$, $n(H) = 25$, $n(T) = 26$, $n(I) = 26$
$n(H \cap I) = 9$, $n(H \cap T) = 11$, $n(T \cap I) = 8$, $n(H \cap T \cap I) = 3$

We need to find the number of people who read at least one of the
newspaper, i.e., $n(H \text{ or } T \text{ or } I)$, i.e., $n(H \cup T \cup I)$ we know that if A, B, C are 3 sets,
then,
$n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(A \cap C) + n(A \cap B \cap C)$
$\therefore \quad n(H \cup T \cup I) = n(H) + n(T) + n(I) - n(H \cap T) - n(T \cap I) - n(H \cap I) + n(H \cap T \cap I)$
$= 25 + 26 + 26 - 9 - 11 - 8 + 3$
$= 25 + 52 - 28 + 3$
$= 25 + 52 - 25$
$= 52$

Hence, 52 people read at least one of the newspaper.

(ii)

The venn diagram representing people reading newspapers H, T and I is shown above.

The shaded region shows the number of people who read newspaper H only, newspaper T only and newspaer I only respectively.

The number of people who read newspaper H only equals

$$25 - (8 + 3 + 6)$$
$$= 25 - 17$$
$$= 8$$

The number of people who read newspaper T only

$$= 26 - (8 + 3 + 5)$$
$$= 26 - 16$$
$$= 10$$

And, the number of people who read newspaper I only

$$= 26 - (6 + 3 + 5)$$
$$= 26 - 14$$
$$= 12$$

Hence, the number of people, who read exactly one newspaper $= 8 + 10 + 12 = 30$.

*********** END **********