



### 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:  $n(H \cap E)$

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

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

$$\Rightarrow 950 = 1210 - n(H \cap E)$$

$$\Rightarrow n(H \cap E) = 1210 - 950 \\ = 260$$

Hence, 260 persons can speak both Hindi and English.

(ii)

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

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

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

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

$$\Rightarrow n(H - E) = 750 - 260 \\ = 490$$

$$\left[ \begin{array}{l} \therefore \text{if } A \text{ \& } B \text{ are disjoint then} \\ n(A \cup B) = n(A) + n(B) \end{array} \right]$$

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  $E - H$  &  $H \cap E$

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

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

$$\Rightarrow n(E - H) = 460 - 260 \\ = 200$$

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  $T \cap C$

$$\therefore T = (T - C) \cup (T \cap C)$$

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

$$\Rightarrow 30 = 14 + n(T \cap C)$$

$$\Rightarrow n(T \cap C) = 30 - 14 \\ = 16$$

Hence, 16 persons drink tea and coffee both.

(ii)

To find:  $C - T$

We know  $n(P) = n(C) + n(T) - n(T \cap C)$

$$\Rightarrow 50 = n(C) + 30 - 16$$

$$\Rightarrow 50 = n(C) + 14$$

$$\Rightarrow n(C) = 50 - 14 \\ = 36$$

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

$$\therefore C = (C - T) \cup (C \cap T)$$

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

$$\Rightarrow 36 = n(C - T) + 16$$

$$[\because n(T \cap C) = n(C \cap T) = 16]$$

$$\Rightarrow n(C - T) = 36 - 16 \\ = 20$$

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,

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

$$\therefore n(H \cup T \cup I) = n(H) + n(T) + n(I) - n(H \cap T) - n(T \cap I) - n(H \cap I) + n(H \cap T \cap I)$$

$$= 25 + 26 + 26 - 9 - 11 - 8 + 3$$

$$= 25 + 52 - 28 + 3$$

$$= 25 + 52 - 25$$

$$= 52$$

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

$$\begin{aligned} & 25 - (8 + 3 + 6) \\ &= 25 - 17 \\ &= 8 \end{aligned}$$

The number of people who read newspaper  $T$  only

$$\begin{aligned} &= 26 - (8 + 3 + 5) \\ &= 26 - 16 \\ &= 10 \end{aligned}$$

And, the number of people who read newspaper  $I$  only

$$\begin{aligned} &= 26 - (6 + 3 + 5) \\ &= 26 - 14 \\ &= 12 \end{aligned}$$

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

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