Sets Ex 1.8 Q10

Let,

$n(P)$ denote total number of members,

$n(B)$ denote number of members in the basket ball team

$n(H)$ denote number of members in the hockey team and

$n(F)$ denote number of members in the football team.

Then, $n(B) = 21,\ n(H) = 26,$ and $n(F) = 29$

Also, $n(H \cap B) = 14,\ n(H \cap F) = 15,\ n(F \cap B) = 12,\ n(H \cap B \cap F) = 8$

Now,

$$P = B \cup H \cup F$$

$$\therefore \quad n(P) = n(B \cup H \cup F)$$

$$= n(B) + n(H) + n(F) - n(B \cap H) - n(H \cap F) - n(B \cap F) + n(B \cap H \cap F)$$

$$\Rightarrow \quad n(P) = 21 + 26 + 29 - 14 - 15 - 12 + 8$$

$$= 76 - 41 + 8$$

$$= 43$$

Hence, there are 43 members in all.

Sets Ex 1.8 Q11

Let,

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

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

$n(B)$ the number of people who speak Bengali.

Then, $n(P) = 1000,\ n(H) = 750,\ n(B) = 400$

We have $P = (H \cup B)$

$$\therefore \quad n(P) = n(H \cup B)$$

$$= n(H) + n(B) - n(H \cap B)$$

$$\Rightarrow \quad 1000 = 750 + 400 - n(H \cap B)$$

$$\Rightarrow \quad 1000 = 1150 - n(H \cap B)$$

$$\Rightarrow \quad n(H \cap B) = 1150 - 1000$$

$$= 150$$

Hence, 150 people can speak both Hindi and Bengali now $H = (H - B) \cup (H \cap B)$,
the union being disjoint

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

$$\Rightarrow \quad 750 = n(H - B) + 150$$

$$\Rightarrow \quad n(H - B) = 750 - 150$$

$$= 600$$

Hence, 600 people can speak Hindi only

On a similar lines we have $B = (B - H) \cup (H \cap B)$

$$\Rightarrow \quad n(B) = n(B - H) + n(H \cap B)$$

$$\Rightarrow \quad 400 = n(B - H) + 150$$

$$\Rightarrow \quad n(B - H) = 400 - 150$$

$$= 250$$

Hence, 250 people can speak Bengali only.

Sets Ex 1.8 Q12

Let,

$n(P)$ denote the total number of television vievers,

$n(F)$ be the number of people who watch football,

$n(H)$ be the number of people who watch hockey and

$n(B)$ be the number of people who watch basket ball.

Then, $n(P) = 500$, $n(F) = 285$, $n(H) = 195$, $n(B) = 115$, $n(F \cap B) = 45$, $n(F \cap H) = 70$,
$n(H \cap B) = 50$ and $n(F \cup H \cup B) = 50$

Now,

$$n\left((F \cup H \cup B')\right) = n(P) - n(F \cup H \cup B)$$

$$\Rightarrow \quad 50 = 500 - \left(n(F) + n(H) + n(B) - n(F \cap H) - n(H \cap B) - n(F \cap B) + n(F \cap H \cap B)\right)$$

$$\Rightarrow \quad 50 = 500 - \left(285 + 195 + 115 - 70 - 50 - 45 + n(F \cap H \cap B)\right)$$

$$\Rightarrow \quad 50 = 500 - 430 - n(F \cap H \cap B)$$

$$\Rightarrow \quad 50 = 70 - n(F \cap H \cap B)$$

$$\Rightarrow \quad n(F \cap H \cap B) = 70 - 50$$

$$= 20$$

Hence, 20 people watch all the 3 games

Number of people who watch only football

$$= 285 - (50 + 20 + 25)$$
$$= 285 - 95$$
$$= 190$$

Number of people who watch only hockey

$$= 195 - (50 + 20 + 30)$$
$$= 195 - 100$$
$$= 95$$

And, number of people who watch only basket ball

$$= 115 - (25 + 20 + 30)$$
$$= 115 - 75$$
$$= 40$$

Number of people who watch exactly one of the three games

= number of people who watch either football only or hockey only or basket ball only

$= 190 + 95 + 40$ [$\because$ they are pairwise disjoint]

$= 325$

Hence, 325 people watch exactly one of the three games.

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