



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,

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

$$\begin{aligned} \therefore n(P) &= n(B \cup H \cup F) \\ &= n(B) + n(H) + n(F) - n(B \cap H) - n(H \cap F) - n(B \cap F) + n(B \cap H \cap F) \\ \Rightarrow n(P) &= 21 + 26 + 29 - 14 - 15 - 12 + 8 \\ &= 76 - 41 + 8 \\ &= 43 \end{aligned}$$

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 $P = (H \cup B)$

$$\begin{aligned} \therefore n(P) &= n(H \cup B) \\ &= n(H) + n(B) - n(H \cap B) \\ \Rightarrow 1000 &= 750 + 400 - n(H \cap B) \\ \Rightarrow 1000 &= 1150 - n(H \cap B) \\ \Rightarrow n(H \cap B) &= 1150 - 1000 \\ &= 150 \end{aligned}$$

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

$$\begin{aligned} \therefore n(H) &= n(H - B) + n(H \cap B) \\ \Rightarrow 750 &= n(H - B) + 150 \\ \Rightarrow n(H - B) &= 750 - 150 \\ &= 600 \end{aligned}$$

Hence, 600 people can speak Hindi only

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

$$\begin{aligned} \Rightarrow n(B) &= n(B - H) + n(H \cap B) \\ \Rightarrow 400 &= n(B - H) + 150 \\ \Rightarrow n(B - H) &= 400 - 150 \\ &= 250 \end{aligned}$$

Hence, 250 people can speak Bengali only.

Sets Ex 1.8 Q12

Let,

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

$n(F)$ 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,

$$\begin{aligned}n((F \cup H \cup B)') &= n(P) - n(F \cup H \cup B) \\ \Rightarrow 50 &= 500 - \{n(F) + n(H) + n(B) - n(F \cap H) - n(H \cap B) - n(F \cap B) + n(F \cap H \cap B)\} \\ \Rightarrow 50 &= 500 - \{285 + 195 + 115 - 70 - 50 - 45 + n(F \cap H \cap B)\} \\ \Rightarrow 50 &= 500 - 430 - n(F \cap H \cap B) \\ \Rightarrow 50 &= 70 - n(F \cap H \cap B) \\ \Rightarrow n(F \cap H \cap B) &= 70 - 50 \\ &= 20\end{aligned}$$

Hence, 20 people watch all the 3 games

Number of people who watch only football

$$\begin{aligned}&= 285 - (50 + 20 + 25) \\ &= 285 - 95 \\ &= 190\end{aligned}$$

Number of people who watch only hockey

$$\begin{aligned}&= 195 - (50 + 20 + 30) \\ &= 195 - 100 \\ &= 95\end{aligned}$$

And, number of people who watch only basket ball

$$\begin{aligned}&= 115 - (25 + 20 + 30) \\ &= 115 - 75 \\ &= 40\end{aligned}$$

Number of people who watch exactly one of the three games

$$\begin{aligned}&= \text{number of people who watch either football only or hockey only or} \\ &\quad \text{basket ball only} \\ &= 190 + 95 + 40 \qquad [\because \text{they are pairwise disjoint}] \\ &= 325\end{aligned}$$

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

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