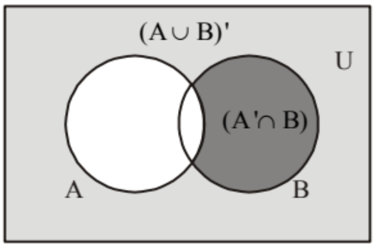
1. **(c)** $\{5\}$ is a subset of A as $5 \in A$
But, $\{1, 2\}$ is not a subset of A as elements $1, 2 \notin A$.

2. **(a)** Let U be the set of consumers questioned X, the set of consumers who liked the product A and Y, the set of consumers who liked the product B. Then $n(U) = 1000$, $n(X) = 720$, $n(Y) = 450$
$n(X \cup Y) = n(X) + n(Y) - n(X \cap Y) = 1170 - n(X \cap Y)$
$\therefore n(X \cap Y) = 1170 - n(X \cup Y)$
Clearly $n(X \cap Y)$ is least
When $n(X \cup Y)$ is maximum.
Now, $X \cup Y \subset U$
$\therefore n(X \cup Y) \le n(U) = 1000$
$\therefore$ the maximum value of $n(X \cup Y)$ is 1000.
Thus the least value of $n(X \cap Y)$ is 170

3. **(d)** For a set S, the partition of S is a set of subsets of S, such that they are pair-wise disjoint and their union is S.
In the options (a) & (b), the subsets are not disjoint.
In the option (c), the subsets are disjoints but their union is not equal to the given set.
Only the option (d) meets with both the requirements.

4. **(a)** From Venn-Euler's Diagram.



$\therefore (A \cup B)' \cup (A' \cap B) = A'$

5. **(d)** $A = \{(n, 2n) : n \in N\}$ and $B = \{(2n, 3n)\} : n \in N$
Listing few members of each set
$A = \{(1, 2), (2, 4), (3, 6), ...\}$
$B = \{(2, 3), (4, 6), (6, 9)......\}$
There is no member common to both these sets, hence.
$A \cap B = \phi$

6. **(a)** $bN = \{bx : x \in \mathbf{N}\}$
$cN = \{cx : x \in \mathbf{N}\}$
$\therefore bN \cap cN = \{x : x$ is multiple of b and c both$\}$
$= \{x: x$ is multiple of l.c.m. of b and c $\}$
$= \{x : x$ is multiple of b c$\}$
[given b and c are relatively prime $\therefore$ l.c.m. of b and c = bc]
$\therefore bN \cap cN = \{bc\,x : x \in \mathbf{N}\} = d\mathbf{N}$ (Given)
$\therefore d = bc$.

7. **(d)** $n(M) = 23, n(P) = 24, n(C) = 19$

$n(M \cap P) = 12, n(M \cap C) = 9, n(P \cap C) = 7$

$n(M \cap P \cap C) = 4$

We have to find $n(M \cap P' \cap C'), n(P \cap M' \cap C')$,

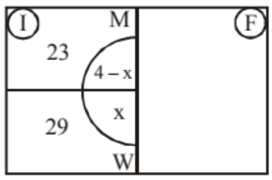
$n(C \cap M' \cap P')$

Now $n(M \cap P' \cap C') = n[M \cap (P \cup C)']$
$= n(M) - n[(M \cap (P \cup C)]$
$= n(M) - n[(M \cap P) \cup (M \cap C)]$
$= n(M) - n(M \cap P) - n(M \cap C) + n(M \cap P \cap C)$
$= 23 - 12 - 9 + 4 = 27 - 21 = 6$
$n(P \cap M' \cap C') = n[P \cap (M \cup C)']$
$= n(P) - n[P \cap (M \cup C)]$
$= n(P) - n[(P \cap M) \cup (P \cap C)]$
$= n(P) - n(P \cap M) - n(P \cap C) + n(P \cap M \cap C)$
$= 24 - 12 - 7 + 4 = 9$
$n(C \cap M' \cap P')$
$= n(C) - n(C \cap P) - n(C \cap M) + n(C \cap P \cap M)$
$= 19 - 7 - 9 + 4 = 23 - 16 = 7$

8. **(c)** We have
$\min n(A \cup B) = \max \{n(A), n(B)\} = \max \{3, 6\} = 6$
$\max n(A \cup B) = n(A) + n(B) = 9$
$\therefore 6 \le n(A \cup B) \le 9$

9. **(b)** $A \Delta B = (A - B) \cup (B - A)$
$= \{1, 2\} \cup \{3, 4, 9\}$
$= \{1, 2, 3, 4, 9\}$

10. **(a)** See the following Venn diagram



$n(I) = 29 + 23 = 52$
$n(F) = 100 - 52 = 48$
$n(M \cup D) = n(M) + n(D) - n(M \cap D)$
$24 = 23 + 4 - n(M \cap D)$
$\therefore n(M \cap D) = 3$
$\therefore n(W \cap D) = 4 - 3 = 1$

11. **(c)** Suppose $a \in X$ and $a \in A$
$\Rightarrow a \in X \cup A \Rightarrow a \in Y \cup A$
$\Rightarrow a \in Y$ and $a \in A$ ($\because X \cup A = Y \cup A$)
$\Rightarrow a \in Y \cap A \Rightarrow Y \cap A$ is non-empty
This contradicts that $Y \cap A = \phi$
So, $X = Y$

12. **(d)** (a) $x \in A - B \Leftrightarrow x \in A$ and $x \notin B$
$\Leftrightarrow x \in A$ and $x \in B' \Leftrightarrow x \in A \cap B'$
$\therefore A - B = A \cap B'$ ...(i)
$x \in A$ and $x \in B'$
$\Leftrightarrow x \notin A'$ and $x \in B' \Leftrightarrow x \in B'$ and $x \notin A'$
$\Leftrightarrow x \in B' - A'$