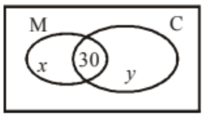
From these, we get
b = 6, a = 15, c = 14 e = 1, d = 2, f = 4 and g = 3
Clearly(a) is not correct
for (b) a + f = 19 $\Rightarrow$ (b)is incorrect
for (c) e = 1 $\Rightarrow$ (c) is correct

21. (b) Given set can be written as
$(A - B) \cup (B - A) = (A \cup B) - (A \cap B)$
(By definition of symmetric difference)
Hence, $(A \setminus B) \cup (B \setminus A) = (A \cup B) \setminus (A \cap B)$

22. (c) $A = \{1, 3, 5, 15\}, B = \{2, 3, 5, 7\}\ C = \{2, 4, 6, 8\}$
$\therefore A \cup C = \{1, 2, 3, 4, 5, 6, 7, 8, 15\}$
$(A \cup C) \cap B = \{2, 3, 5\}$

23. (b) $2^m - 2^n = 112 \Rightarrow 2^n(2^{m-n} - 1) = 16.7$
$\therefore\ 2^n(2^{m-n} - 1) = 2^4(2^3 - 1)$
Comparing we get $n = 4$ and $m - n = 3$
$\Rightarrow n = 4$ and $m = 7$

24. (a) Let the number of students who take only Math be x and only Chemistry be y.



So, from the Venn diagram, we have total number of students who take Math = $x + 30$
and take Chemistry = $y + 30$.
According to question, we have

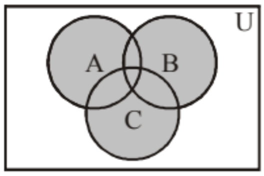
$$30 = \frac{10}{100}(x + 30)$$
$$\Rightarrow x = 270 \text{ and}$$
$$30 = \frac{12}{100}(30 + y)$$
$$\Rightarrow y = 220$$
$$x + y + 30 = 270 + 220 + 30 = 520.$$

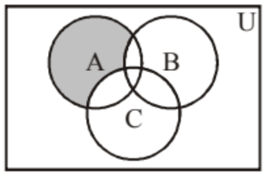
25. (d) $n(A) = 1000, n(B) = 500, n(A \cap B) \ge 1,$
$n(A \cup B) = p$
$n(A \cup B) = n(A) + n(B) - n(A \cap B)$
$p = 1000 + 500 - n(A \cap B)$
$1 \le n(A \cap B) \le 500$
Hence $p \le 1499$ and $p \ge 1000$
$1000 \le p \le 1499$

26. (c) Given set is $\{(a, b) : 2a^2 + 3b^2 = 35, a, b \in Z\}$
We can see that, $2(\pm 2)^2 + 3(\pm 3)^2 = 35$
and $2(\pm 4)^2 + 3(\pm 1)^2 = 35$
$\therefore$ (2, 3), (2, – 3), (–2, – 3), (–2, 3), (4, 1), (4, – 1), (– 4, –1), (–4, 1) are 8 elements of the set . $\therefore$ n = 8.

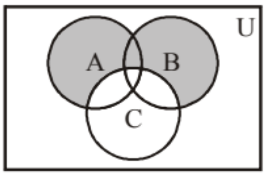
27. (d) We have
$n(A \cup B \cup C) = n(A) + n(B) + n(C) -$
$n(A \cap B) - n(B \cap C) - n(C \cap A) + n(A \cap B \cap C)$
$= 10 + 15 + 20 - 8 - 9 - n(C \cap A) + n(A \cap B \cap C)$
$= 28 - \{n(C \cap A) - n(A \cap B \cap C)\}$ ...(i)
Since $n(C \cap A) \ge n(A \cap B \cap C)$
We have $n(C \cap A) - n(A \cap B \cap C) \ge 0$...(ii)
From (i) and (ii)
$n(A \cup B \cup C) \le 28$ ...(iii)
Now, $n(A \cup B) = n(A) + n(B) - n(A \cap B)$
$= 10 + 15 - 8 = 17$
and $n(B \cup C) = n(B) + n(C) - n(B \cap C)$
$= 15 + 20 - 9 = 26$
Since, $n(A \cup B \cup C) \ge n(A \cup C)$ and
$n(A \cup B \cup C) \ge n(B \cup C)$, we have
$n(A \cup B \cup C) \ge 17$ and $n(A \cup B \cup C) \ge 26$
Hence $n(A \cup B \cup C) \ge 26$ ...(iv)
From (iii) and (iv) we obtain
$26 \le n(A \cup B \cup C) \le 28$
Also $n(A \cup B \cup C)$ is a positive integer
$\therefore n(A \cup B \cup C) = 26$ or 27 or 28

28. (a)





(i) $A \cup B \cup C$ (ii) $(A \cap B^c \cap C^c)$



(iii) C^c
From Fig. (i), (ii) and (iii), we get
$(A \cup B \cup C) \cap (A \cap B^c \cap C^c)^c \cap C^c = (B \cap C^c)$

29. (b) $n(A) = 40\%$ of $10{,}000 = 4{,}000$
$n(B) = 20\%$ of $10{,}000 = 2{,}000$
$n(C) = 10\%$ of $10{,}000 = 1{,}000$
$n(A \cap B) = 5\%$ of $10{,}000 = 500$
$n(B \cap C) = 3\%$ of $10{,}000 = 300$
$n(C \cap A) = 4\%$ of $10{,}000 = 400$
$n(A \cap B \cap C) = 2\%$ of $10{,}000 = 200$
We want to find $n(A \cap B^c \cap C^c) = n[A \cap (B \cup C)^c]$
$= n(A) - n[A \cap (B \cup C)]$
$= n(A) - n[(A \cap B) \cup (A \cap C)]$
$= n(A) - [n(A \cap B) + n(A \cap C) - n(A \cap B \cap C)]$
$= 4000 - [500 + 400 - 200] = 4000 - 700 = 3300.$

30. (b) Both statements are correct but second statement is not proper explaination of statement-1.