Que4E:

In a survey it was found that 21 people liked product A, 26 liked product B & 29 liked product C. If 14 people liked products A & B, 12 people liked products C & A, 14 people liked products B & C and 8 liked all the three products. Find how many liked product C only.

Ans:

Let A, B, C be the set of people who like product A, product B & product C respectively

Number of people who liked product A = $n(A) = 21$,

Number of people who liked product B = $n(B) = 26$,

Number of people who liked product C = $n(C) = 29$,

Number of people who liked product A and B = $n(A \cap B) = 14$,

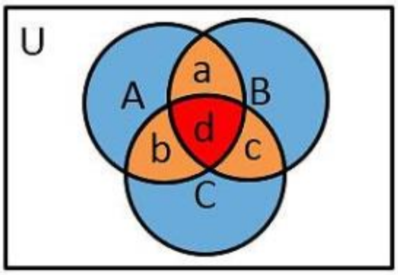
Number of people who liked product C and A = $n(C \cap A) = 12$, Number of people who liked product B and C = $n(B \cap C) = 14$,

Number of people who liked all three products A ,B and C

$$= n(A \cap B \cap C) = 8$$

We have to find how many people liked product C only.

Let us draw a Venn diagram



Let **a** denote number of people who liked product A & B but **not C.**

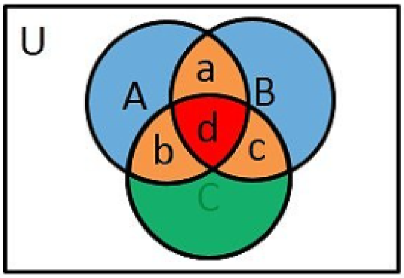
Let **b** denote number of people who liked product A & C but **not B**.

Let **c** denote number of people who liked product B & C but **not A.**

Let **d** denote the number of people who liked **all three products**.

Number of people who liked product C only

$$= n(C) - b - d - c$$



Now, $d = n(A \cap B \cap C) = 8$

Given $n(A \cap C) = 12$

$$b + d = 12$$

Putting d = 8

$$b + 8 = 12$$

$$b = 12 - 8$$

$$b = 4$$

Similarly, $n(B \cap C) = 14$

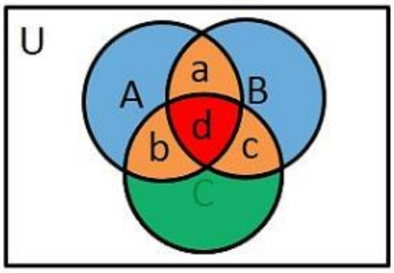
$c + d = 14$

Putting d = 8

$c + 8 = 14$

$c = 14 - 8$

$c = 6$



Number of people who liked product C only $= n(C) - b - d - c$

$= 29 - 4 - 8 - 6$

$= 11$

Hence, number of people who like product C only is **11**