YOU & MATHS There are 29 people in a room. Of these, 11 speak French, 24 speak English, and 3 speak neither French nor English. How many people in the room speak both French and English?

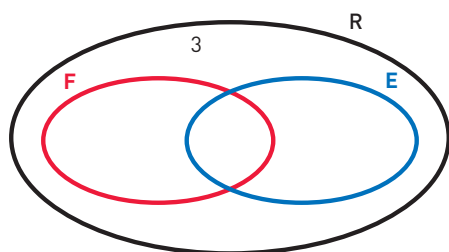**A** 3   **B** 4   **C** 6   **D** 8   **E** 9

(USA *University of South Carolina: High School Math Contest,* 2001)

We can solve this problem using a Venn diagram. Let's identify the sets involved:

- R = {people in the room}   → 29 people;
- F = {French speakers}   → 11 people;
- E = {English speakers}   → 24 people;

with R being our universal set.

The problem says that 3 people speak neither French or English. Those people will then belong to the set $R - (F \cup E)$.

We are asked to find the number of people who speak both French and English, that is, the number of elements of $F \cap E$. To do so, we can use the data given in the instructions.

There are 29 people in the room and 3 of them do not speak either French or English, so that means that:

   $F \cup E$ = {people who speak French or English}   → $29 - 3 = 26$ people.

But we also know that the number of elements in the union of F and E is defined by:

   no. people in $F \cup E$ = no. people in F + no. people in E − no. people in $F \cap E$.

Let's plug in some numbers. We get:

   $26 = 11 + 24 -$ no. people in $F \cap E \rightarrow 26 = 35 -$ no. people in $F \cap E$,

and then:

   no. of people in $F \cap E = 35 - 26 = 9$.

Our final answer is therefore E.