Answer on Question #41510 − Math − Algebra

Question. In a survey of a TriDelt chapter with 50 members, 18 were taking mathematics, 33 were taking English, and 5 were taking both. How many were not taking either of these subjects?

Solution. Let
- X be the set of all members,
- M be the subset of X consisting of members taking mathematics,
- E be the subset consisting of members taking English,
- B be the subset consisting of members taking both mathematics and English,
- N be the subset consisting of members taking neither of these subjects.

If we denote by $|Y|$ the number of elements of a set Y, then by assumption

$$|X| = 50, \qquad |M| = 18, \qquad |E| = 33, \qquad |B| = 5.$$

We have to find $|N|$.

Evidently,

$$N = X \setminus (M \cup E),$$

therefore

$$|N| = |X| - |M \cup E|.$$

So we need to compute $|M \cup E|$. Notice that

$$B = M \cap E,$$

and

$$M \cup E = M \cup (E \setminus B).$$

Since the latter two sets are disjoint, we obtain that

$$|M \cup E| = |M| + |E \setminus B|.$$

But

$$|E \setminus B| = |E| - |B|,$$

so

$$|M \cup E| = |M| + |E \setminus B| = |M| + |E| - |B|.$$

Hence

$$\begin{aligned}
|N| &= |X| - |M \cup E| \\
&= |X| - (|M| + |E| - |B|) \\
&= |X| - |M| - |E| + |B| \\
&= |X| + |B| - |M| - |E| \\
&= 50 + 5 - 18 - 33 = 55 - 51 \\
&= 4.
\end{aligned}$$

Answer. Number of members taking neither mathematics nor English is 4.