For this etude, I will fill in each table for question to the point where I can answer the associated question. I’ll only put the table once (with all relevant sections filled), but will explain what I did and how I got each value.

# Question 1:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **English** | **History** | **French** | **Maths** | **Science** | **Total Score** |
| **Alan** | 1st | 1st | 1st | 2nd | 1st | 24 |
| **Barbara** |  |  |  | 5th |  | 15 |
| **Charles** | 3rd | 3rd | 3rd | 3rd | 5th | 13 |
| **David** |  |  |  | 4th |  | 12 |
| **Ellen** | 5th | 5th | 5th | 1st | 3rd | 11 |

The clues given are:

1. Alan had an aggregate mark of 24.
2. Charles had the same mark in four out of the five subjects.
3. Ellen had topped Mathematics, and came third in Science.
4. The students’ aggregate marks were in alphabetical order, and no two students had the same aggregate.

We know Ellen topped mathematics and came third in science. If Alan had a score of 24, the only possible combinations of scores he got is four 1st place finish and one 2nd place. This means he must have gotten first in everything except maths, which he got 2nd.

To continue filling this table, let’s examine clue (4), with which we can infer their totals. Let’s say hypothetically Ellen got 5th in the remaining subjects. This means she can have a minimum score of 11. Based on clue (4), we can deduce that:

* Ellen has a minimum score of 11.
* David has a minimum score of 12.
* Charles has a minimum score of 13.
* Barbara has a minimum score of 14.

The total number of marks available is 75 (25 + 20 + 15 + 10 + 5). Adding up these minimum values (and Alan’s score) gives: 11 + 12 + 13 + 14 + 24 = 74, and we know that their scores must add to 75. This means that Ellen has a score of 11, David has a score of 12, Charles has a score of 13, and Barbara must have a score of 15 because this is the only possible combination of scores that adds to 75 whilst keeping the condition (4) true.

Based on this information, Ellen scored last in her remaining subjects. Furthermore, from condition (2), we know that Charles had the same mark for 4 subjects. He can’t have placed 1st or 5th because these have already been allocated to more than one subject. If he placed 2nd in four subjects, his aggregate score would be at least 16 (which is more than his score of 15). If he placed 4th in four subjects, his aggregate score would be at least 8, but we cannot create an aggregate of 15 with this information. Therefore, he must have gotten 3rd in 4 subjects. As Barbara got 3rd in science, all other subjects Charles got 3rd. To achieve Charles’ total, he must have gotten 5th in Science.

Now, we must construct the final entries to satisfy Barbara and David’s total using a combination of 2nds, 4ths and one 5th. As Barbara’s score is odd, she must have gotten 5th in maths as any combination of even numbers (scores from second and fourth are 4 and 2 respectively) cannot create an odd number. Thus, David got 4th in maths.

The remaining entries cannot be deduced. Based on the aggregate scores and what scores are still available, we can deduce that Barbara got 2nd in three remaining subjects and 4th in one, and David got 4th in 3 remaining subjects and 2nd in one, but there are many possible combinations of subjects which satisfy this.

To answer the questions, Barbara’s score was 5th in mathematics (1 mark), Alan (1st), Charles (3rd) and David (4th) all received the same mark in 4 out of the 5 subjects.

# Question 2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Team** | **Played** | **Won** | **Lost** | **Draw** | **G For** | **G Against** | **Points** |
| **A** |  |  |  |  |  | **1** | **4** |
| **B** | **1** |  |  |  |  | 0 |  |
| **C** | 3 | 3 | 0 | 0 | **5** | **0** | **6** |
| **D** |  |  |  |  |  | **4** |  |
| **E** | **4** | 0 | 2 | **2** | 0 | **2** | **2** |

Team E lost 2 games and won 0, as they have a total of 2 points and already have 2 draws. A minimum of 1 goal per game is needed to win, so if they got scored against across 2 games they lost, they can’t have scored any goals. Team E has played all 4 teams. This means team B has only played team E, and either won or drew (conceded 0 goals).

With 6 points, a maximum number of 4 games played, and 0 goals scored against, we can say that team C has either won 3 games out of 3 or won 2 games and draw 2 games (as both would satisfy their points and goals against values). However, if they have played 4 games, then they would have played team B. As team B has only played one game, team C must have only played 3 games (winning all 3).

This also means team C has played team A and beat them. If team A has only one goal against, then team A lost this game 1-0 to team C.

Finally, team C played team D, and beat them. The score for this can be deduced – team C score 1 goal against team E, score 1 goal against team A, to must have scored three goals against team D, without conceding any. Thus, team C played team D and lost 3-0.