Problem of the Week
Problem A and Solution
Surveys and Siblings

**Problem**

Zheng surveys his friends at school and gathers the following information:

- 13 grade 3 students have no siblings
- 16 grade 3 students have exactly one sibling
- 8 grade 3 students have more than one sibling
- 7 grade 4 students have no siblings
- 14 grade 4 students have exactly one sibling
- 2 grade 4 students have more than one sibling

A) Choose the pie chart that properly shows the proportions of students in the school who have no siblings, one sibling, and more than one sibling.

   Justify your answer.
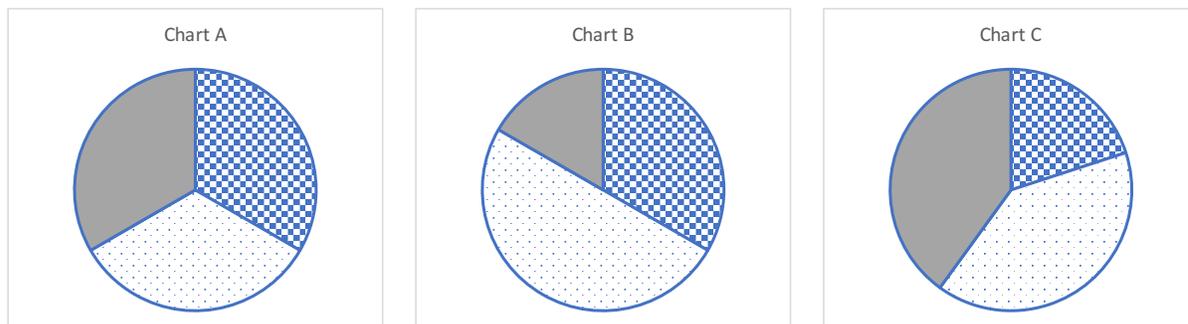
B) Create a legend for the correct pie chart that shows which section represents no siblings, which section represents one sibling, and which section represents more than one sibling.

Solution

A) One way to determine which chart is correct is to collate and analyze the original data. Zheng surveyed a total of $13 + 16 + 8 + 14 + 2 = 60$ students.

We can also calculate the following data:

- A total of $13 + 7 = 20$ students have no siblings.
- A total of $16 + 14 = 30$ students have one sibling.
- A total of $8 + 2 = 10$ students have more than one sibling.

Examining the charts, we can see that the sections of Chart A are all approximately the same size. However, in our data analysis, there are clearly many more students who have one sibling than have more than one sibling. So Chart A cannot be correct. We also notice that half of the students (30 out of 60) have exactly one sibling. In Chart C, none of the sections fill half of the pie. So Chart C cannot be correct. Chart B has one section that fills half of the pie. The other two sections of Chart B are clearly not the same size. Since the number of students who have no siblings and the number of students who have more than one sibling are not equal, this means that Chart B is correct.
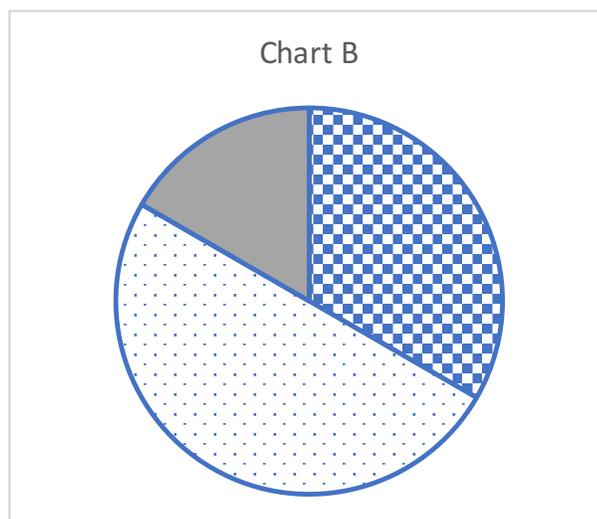
Chart B

B) Since half of the students in the survey said they had one sibling, and since the dotted section of the chart fills half the pie, then that section must be representing the students with one sibling. Since the fewest number of students in the survey indicated that they had more than one sibling, then the smallest section of the chart which has a solid fill, is representing that group. This means that the checker-board filled section of the chart must be representing the students with no siblings.

Teacher's Notes

For this problem, we are given possible answers and expected to determine which one is correct. In mathematics and computer science, producing an answer is only one part of a good solution. Complete solutions to problems usually involve being able to explain how you got the solution and how you know that your solution is correct. Producing a logical argument to support your answer is an important skill in many situations.