

Sample Portfolio Problem Part A

Problem

A. Oscar Peng, Janet Elkins, Shawna Castillo, and Colin Sweeney are employed as pilot, engineer, chef, and sculptor, but not necessarily in that order. You know that

1. The first letters of each person's last name and occupation are different,
2. Colin and the engineer go jogging together, and
3. Oscar lives in the same town as the engineer and the sculptor.

Using a 4-by-4 table, determine each person's occupation. Explain each of your reasoning steps clearly, in complete sentences.

B. What could we conclude if condition 2 above was changed to read "Colin and the chef go jogging together."?

Prescribed Strategy Make a table.

Problem Rubric

	3	2	1	0
Understanding the Problem	Your table had the correct labels for the rows and columns	Your table was not set up in a way that would lead to a correct solution.	You did not use an table.	
Explanations	Your explanations were clear, precise, neat, written in complete sentences. All table entries are explained.	Your explanations are generally good and fairly neat, but either some are missing, or some sentences are either not complete, or not clear.	Your explanations are poorly written, very sloppy, or conflict with your table entries.	No Explanations.
Alternate Condition	You concluded as much as was possible under the alternate condition, and wrote a clear explanation of your conclusion.	You filled out part of the table correctly in this case, but did not write a complete explanation and/or conclusion.	You offered no conclusion or no explanation for your conclusion.	You did not do this part of the problem.
You get one point for stating the correct solutions, for a total of 10 possible points.				

Solution

A. Oscar is the chef, Janet is the sculptor, Shawna is the engineer, and Colin is the pilot. The table is as follows:

	Pilot	Engineer	Chef	Sculptor
Oscar Peng	no (1)	no (3)	yes (3)	no (3)
Janet Elkins	no (6)	no (1)	no (4)	yes (7)
Shawna Castillo	no (6)	yes (5)	no (1)	no (6)
Colin Sweeney	yes (5)	no (2)	no (4)	no (1)

The explanations for the table entries are:

1. Each of the “no” entries along the diagonal are because each person must have a job which begins with a letter different from the first letter of his or her last name.
2. Since Colin and the engineer go jogging together, they can't be the same person.
3. Since Oscar lives in the same town as the engineer and the sculptor, he isn't the engineer or the sculptor; this puts three no's in Oscar's row, so he must be the chef.
4. Since Oscar is the chef, the chef can't be Janet or Colin, so we can fill out the remaining no's in the Chef column.
5. This puts three no's in both Colin's row and the Engineer column, so we can conclude that Colin is the pilot, and Shawna is the engineer.
6. Since Colin is the pilot, we can put no's in the rest of the Pilot column, and since Shawna is the engineer, we can put a no in her entry in the Sculptor column.
7. Finally, by the fact that there are now three no's in Janet's row, or, equivalently, by the fact that there are three no's in the Sculptor column, Janet must be the sculptor.

B. If the alternate condition 2 was in place, the table would look like this after working out the first few steps:

	Pilot	Engineer	Chef	Sculptor
Oscar Peng	no (1)	no (3)	yes (3)	no (3)
Janet Elkins		no (1)	no (4)	
Shawna Castillo			no (1)	
Colin Sweeney			no (2)	no (1)

We can conclude that Oscar is the chef because of the three no's in his row, and can then conclude that Janet is not the chef. Since there are no more rows or columns with three no's, we cannot be certain of any of Janet's, Shawna's, or Colin's occupations.

Comments for Teachers

Using a table helps students organize their thoughts and develop a strategy for problem solving.

In part b) of the problem students should have concluded that there is not enough information to complete the table. This problem could be extended by asking students to create their own clues until the table could be uniquely determined from those clues. Students could trade clues with a partner and use them to fill out the remainder of their table.