



## Problem of the Week

### Problem B and Solution

#### On the Podium

#### Problem

Gregory, Adam and Paul are athletes who competed in the downhill skiing event in the Winter Olympics. Gregory, Adam and Paul each finished in first, second or third. There were no ties. Each athlete is also from a different country. One is from Canada, one is from France and one is from Japan. Using the following clues, determine who placed first, second and third, and for which country each athlete was competing.

1. Gregory was faster than Adam.
2. Gregory is not Canadian, and he did not finish in second place.
3. The Japanese athlete was faster than the French athlete.
4. Adam is not Japanese and he did not finish in third place.
5. The Canadian athlete was faster than the French athlete.

#### Solution

In our solution, we will go through each clue and update the table based on the information in the clue. We will put an X in a cell if the combination indicated by the row and column for that cell is not possible, or a ✓ if it must be true.

From clue (1), since Gregory was faster than Adam, we know that Adam could not have finished first and that Gregory did not finish third. We can therefore put an X in the cells corresponding to Adam in first and Gregory in third.

From clue (2), we can put an X in the cells corresponding to Gregory being Canadian and also to Gregory in second. The table is updated below.

	Canada	France	Japan	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
Gregory	X				X	X
Adam				X		
Paul						
1 <sup>st</sup>						
2 <sup>nd</sup>						
3 <sup>rd</sup>						

We see that Gregory must have finished first. We can add a ✓ to the corresponding cell in the table. Since Gregory finished first and there were no ties, we know that Paul did not finish first. We can add an X to the corresponding cell in the table. The table is updated and shown on the top of the next page.





	Canada	France	Japan	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
Gregory	X			✓	X	X
Adam				X		
Paul				X		
1 <sup>st</sup>						
2 <sup>nd</sup>						
3 <sup>rd</sup>						

From clue (3), we know the French athlete did not finish first and that the Japanese athlete did not finish third. We can therefore put an X in the cells corresponding to the French athlete in first and the Japanese athlete in third. Since we now know that Gregory came in first, this clue also tells us that Gregory is not French. We can put an X in the corresponding cell. The table is updated below.

	Canada	France	Japan	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
Gregory	X	X		✓	X	X
Adam				X		
Paul				X		
1 <sup>st</sup>		X				
2 <sup>nd</sup>						
3 <sup>rd</sup>			X			

We see that Gregory must compete for Japan. Since Gregory finished first, this also tells us that the Japanese athlete finished first. We can add a ✓ to the corresponding cells in the table.

	Canada	France	Japan	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
Gregory	X	X	✓	✓	X	X
Adam				X		
Paul				X		
1 <sup>st</sup>		X	✓			
2 <sup>nd</sup>						
3 <sup>rd</sup>			X			

Since the athletes are from different countries, we now know that Adam and Paul are not from Japan, and so we can add X's to the corresponding cells in the table. Since we know the Japanese athlete finished first, he could not have finished second too, and the Canadian did not finish first, so we can add X's to the corresponding cells in the table. The table is updated below.

	Canada	France	Japan	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
Gregory	X	X	✓	✓	X	X
Adam			X	X		
Paul			X	X		
1 <sup>st</sup>	X	X	✓			
2 <sup>nd</sup>			X			
3 <sup>rd</sup>			X			





From clue (4), we can add an X in the cells corresponding to Adam finishing in third. The table is updated as follows.

	Canada	France	Japan	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
Gregory	X	X	✓	✓	X	X
Adam			X	X		X
Paul			X	X		
1 <sup>st</sup>	X	X	✓			
2 <sup>nd</sup>			X			
3 <sup>rd</sup>			X			

We can now see that Adam must have finished in second and Paul must have finished in third. We can add the corresponding ✓'s and X's. The table is updated below.

	Canada	France	Japan	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
Gregory	X	X	✓	✓	X	X
Adam			X	X	✓	X
Paul			X	X	X	✓
1 <sup>st</sup>	X	X	✓			
2 <sup>nd</sup>			X			
3 <sup>rd</sup>			X			

From clue (5), we know the Canadian athlete was faster than the French athlete. Since the Japanese athlete finished first, this means the Canadian must have finished second and the French athlete must have finished third. Since Adam finished second and the Canadian athlete finished second, then Adam is the Canadian athlete and Paul is the French athlete. We can add the corresponding ✓'s and X's. The table is updated as follows.

	Canada	France	Japan	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
Gregory	X	X	✓	✓	X	X
Adam	✓	X	X	X	✓	X
Paul	X	✓	X	X	X	✓
1 <sup>st</sup>	X	X	✓			
2 <sup>nd</sup>	✓	X	X			
3 <sup>rd</sup>	X	✓	X			

In conclusion:

Gregory competed for Japan and finished in first place.

Adam competed for Canada and finished in second place.

Paul competed for France and finished in third place.

