



## Problem of the Week



### Problem D and Solution

#### Four on the ION

##### Problem

On Tuesday afternoon, Fred, Gerlach, Hamza, and Iuliana got on the same ION light rail train at University of Waterloo station after their band practice. Each person was carrying a different instrument and each person got off at a different station. Using the clues below, determine what instrument each person was carrying, and in which order they got off the train.

- (1) Fred got off the train after Gerlach.
- (2) The person carrying the saxophone was *not* the first to get off the train.
- (3) The person who plays the guitar is *not* Iuliana.
- (4) The person with the tuba was the last to get off the train.
- (5) Fred is *not* the person who plays the tuba.
- (6) Iuliana got off the train before the person with the clarinet.

##### Solution

We can use a table to summarize the information in the clues. We will start by filling in the information from clues (2), (4), and (5). If we know that something does not go in a particular cell, we will also include that in the table.

	1 <sup>st</sup> to get off	2 <sup>nd</sup> to get off	3 <sup>rd</sup> to get off	4 <sup>th</sup> to get off
Name				<i>not</i> Fred
Instrument	<i>not</i> saxophone			tuba

Next we look at clues (3) and (6). From clue (6) we can conclude that the person with the clarinet was not the 1<sup>st</sup> person to get off the train. Since we know that the 1<sup>st</sup> person to get off the train was also not carrying the saxophone, and we have already placed the tuba, we can conclude that the 1<sup>st</sup> person to get off the train was carrying a guitar.

From clue (3), we know that Iuliana was not the 1<sup>st</sup> person to get off the train. From clue (6) we know that Iuliana got off the train before the person with the clarinet. It follows that Iuliana got off the train 2<sup>nd</sup>, and the person with the clarinet got off the train 3<sup>rd</sup>.

	1 <sup>st</sup> to get off	2 <sup>nd</sup> to get off	3 <sup>rd</sup> to get off	4 <sup>th</sup> to get off
Name		Iuliana		<i>not</i> Fred
Instrument	guitar		clarinet	tuba

Finally, since the only instrument not yet placed is the saxophone, we can conclude that Iuliana was carrying a saxophone. From clue (1), it follows that Gerlach got off the train 1<sup>st</sup>, Fred got off the train 3<sup>rd</sup>, and Hamza got off the train 4<sup>th</sup>. The final solution is shown.

	1 <sup>st</sup> to get off	2 <sup>nd</sup> to get off	3 <sup>rd</sup> to get off	4 <sup>th</sup> to get off
Name	Gerlach	Iuliana	Fred	Hamza
Instrument	guitar	saxophone	clarinet	tuba