Riddelicious

Let us riddle on the go!

The unfair tramway

Riddle: Bob lives in Luxembourg City. His two best friends live one in Findel and one in the city centre. To visit them, Bob takes the tramway in Kirchberg (either towards Findel or the city centre). The tram comes regularly and punctually every ten minutes in each direction. Bob always takes the first tram that comes, independently of the direction. He arrives at the tram station each afternoon at a random time. However, it turns out that he visits his friend in Findel way more often than the one in the city centre. Can you imagine why?

Did you know? Luxembourg City is the capital city of Luxembourg. A new tramway is operating in the city. It passes through Kirchberg, which is the finance district of Luxembourg City. The tram will also run to Findel, where the airport is located.

Solution: This is due to the tramway schedule! In each direction, the tram arrives regularly and punctually every 10 minutes. Suppose, for example, that the tram towards the city centre is scheduled to arrive 1 minute after the one towards Findel. Then every 10 minutes there is a 1-minute interval in which the next tram goes to the city centre and there is a 9-minute interval in which the next tram goes to Findel. Thus, it is much more likely that Bob goes to Findel.

Taste the macaron!

Riddle: There are three boxes with macarons: one contains 2 lemon macarons, one contains 2 banana macarons, and the last box contains one lemon and one banana macaron. The boxes are labelled for their content (LL, BB and LB) and you know that all labels are incorrect. You can identify all boxes correctly by tasting only one macaron. From which box do you taste the macaron from?

Solution: You know that the macarons in the LB box have the same flavour (because the label is incorrect). So if you taste one of them you can determine the content of this box. Say you taste one lemon macaron from the LB box. Then the LB box contained 2 lemon macarons.

The two banana macarons cannot be in the BB box, so they must be in the LL box.

Finally, the box containing 1 lemon and 1 banana macaron must be the BB box.

If you tasted a banana macaron instead, you find: the LB box contained 2 banana macarons, the BB box contains 2 lemon macarons, the LL box contains 1 lemon and 1 banana macaron.

Red or golden lion

Riddle: Two soldiers off duty see a jacket in the national colours of Luxembourg in a shop window: it is a unique piece and they both want it. To settle the matter, they play a game with 2 black jackets with a red lion on the back and 1 similar black jacket with a golden lion on the back:

They stand back to back and each of them puts on a jacket with their eyes closed. They turn around one after the other, see the back of the other soldier and can guess if a red lion is on their own back or not: if they guess correctly they win, if they guess wrongly they are out, and they only guess if they are 100% sure. They are both extremely smart. They make a guess as soon as they are sure of what is on their jacket.

The first soldier turns around and says nothing. The other one doesn't even turn around and guesses correctly. What is the correct guess of the second soldier?

Did you know? The red lion appears on the national emblem of Luxembourg.

Solution: The first soldier could have said „Red lion!" if there was a golden lion on the other soldiers' jacket. The second soldier is then sure to have a red lion on the back.

Riddle variation: Now there are three soldiers off duty, 3 black jackets with a red lion on the back and 2 black jackets with a golden lion on the back. The three soldiers make a circle with their backs towards the centre and each of them puts on a jacket with their eyes closed. They turn around one by one, see the backs of the others and can guess if a red lion is on their own back or not (as before).

The first soldier turns around and says nothing. Same for the second soldier. The third one doesn't even turn around and guesses correctly. What is the correct guess of the third soldier?

Solution: The first soldier could have said „Red lion!" if there were two golden lions on the other soldiers' jackets. So, either the second or the third soldier has a red lion. Then the second soldier could have said „Red lion!" if there was a golden lion on the third soldier's jacket. So, the third soldier is sure to have a red lion on the back.

To Count Siegfried, please?!

Riddle: You want to bring an important message to Count Siegfried without disturbing his wife Melusina. In the castle there are two identical doors, which are guarded by two identical guards: one door leads to Count Siegfried, and the other one to Melusina. You can only ask one question to one of the guards to know where you have to go. One guard always tells the truth, the other one always lies, and you don't know who is who. Which question do you ask?

Did you know? There is a tale about Melusina and Count Siegfried: Count Siegfried met Melusina next to a river and fell in love with her. He asked her to marry him, and she agreed, but under one condition: she wants to be left alone during one day of the week which she will spend in the bathroom. Count Siegfried agreed and they got married. This agreement worked perfectly, but at one point Count Siegfried became too curious about what Melusina did in the bathroom, so he peeked through the keyhole of the bathroom door. He saw Melusina in the bathtub, but instead of her legs, there was a long fish tail! Count Siegfried was so surprised that he screamed. When Melusina heard him, she jumped out of the bathroom window and vanished in the river next to the castle. Count Siegfried never saw her again.

Solution: You can ask a question like: "If I would ask your colleague whether the left door leads to Count Siegfried, would I get a positive answer?"
Suppose that the left door leads to Count Siegfried. If the guard you ask tells the truth, the other guard would answer in the negative on whether the left door leads to Count Siegfried. You then get the truthful answer "No".
If the guard you ask lies, the other guard would answer in the affirmative on whether the left door leads to Count Siegfried. You then get the false answer "No".
So, both guards will answer with "No" if the left door leads to Count Siegfried.
In the same logic, both guards answer "Yes" if the right door leads to Count Siegfried.
Hence "No" means you have to take the left door, and "Yes" means you have to take the right door.

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Many business cards

Riddle: At a large networking event in the Neumünster Abbey, each participant exchanges business cards with at least one other person. Are there two participants that have exchanged business cards with the same number of people?

Did you know? The Neumünster Abbey is located next to the Alzette river in Luxembourg City. It is mainly used as an event location.

Solution: Say that there are 100 participants: a participant exchanges business cards with at least 1 and at most 99 people. Then each participant has a number of exchanges from 1 to 99. So, there are 99 possible numbers and 100 participants. Since 100 is larger than 99, at least two participants will have the same number, which means that they have exchanged business cards with the same number of people.

Kettchen, Jos and the wine

Riddle: You have a rowing boat on the Moselle river. You need to transport Kettchen, Jos and a barrel of wine to the other side of the river (one at a time). The problem is that Kettchen and Jos will fight if they are left alone, and that Jos will taste the wine if he is left alone with it. How do you organize the transports?

Did you know? *Kettchen, Kettchen* is a traditional song about a waitress called Kettchen who had to bring more wine from the Moselle region of Luxembourg, which is famous for its wine. Jos is a common Luxembourgish name.

Solution: If you avoid unnecessary transports, then you have the following two options:

1) First transport Jos, then transport Kettchen. Now take Jos back and transport the wine. Finally transport Jos again.

2) First transport Jos, then transport the wine. Now take Jos back and transport Kettchen. Finally transport Jos again.

The wine cellar

Riddle: You work for a winemaker in the Moselle region. One day, a customer wants to buy exactly 0,4 litre of your exclusive and most expensive wine. However, you only have one full bottle of 0,8 litre, an empty 0,5-litre wine carafe and an empty 0,3-litre wine glass. By pouring the wine from one container to another, how can you measure the wine for the customer with only six transfers? You cannot throw away any wine, and there are no marks on the glass, carafe or bottle that can help you.

Solution:

#	Step	0,8l-bottle	0,5l-carafe	0,3l-glass
0		0,8l	0l	0l
1	Bottle to carafe	0,3l	0,5l	0l
2	Carafe to glass	0,3l	0,2l	0,3l
3	Glass to bottle	0,6l	0,2l	0l
4	Carafe to glass	0,6l	0l	0,2l
5	Bottle to carafe	0,1l	0,5l	0,2l
6	Carafe to glass	0,1l	0,4l	0,3l

Strëmp

Riddle: You have 10 blue, 10 white, and 10 red "Strëmp" (socks) in the same drawer, all mixed together. If you pick socks from the drawer without looking, how many do you need to pick to be sure that you have one matching pair?

Did you know? Blue, white and red are the national colours of Luxembourg.

Solution: Picking three socks is not sufficient because the socks could all have different colours. Picking four socks is sufficient because there are more socks than colours and hence at least one colour must be repeated.

The heavy Péckvillchen

Riddle: There are 3 identically looking Péckvillecher and one of them is slightly heavier than the others. Using a balance, what is the smallest number of weighings needed to identify the heavy Péckvillchen?

And what if there are 4 (respectively, 9) identically looking Péckvillecher?

Did you know? Péckvillecher are small bird sculptures made from clay with which you can whistle. There is a celebration called Emaischen every year on Easter Monday for the Peckvillecher. It takes mainly place in Luxembourg city and Nospelt, a small village.

Solution:

For 3 Péckvillecher, you need only 1 weighing: Take 2 Péckvillecher and put them on the balance. If one of the two Péckvillecher is heavier, then it is the heavy Péckvillchen. If the two Péckvillecher have the same weight, then the heavy Péckvillchen is the third bird.

For 4 Péckvillecher, you have two options for the first weighing.

1. If you put two Péckvillecher on the balance (one on each side) and their weights are identical, you have no information on the other two, and either of them could be the heavy Péckvillchen.

2. If you put four Péckvillecher on the balance (two on each side), then the heavy Péckvillchen is one of the two Péckvillecher in the heavier pair, but you do not know which one.

So, you need at least 2 weighings. In fact, 2 weighings are sufficient: With the first weighing you can discard two light Péckvillecher. With a second weighing you determine which one of the two remaining Péckvillecher is the heavy Péckvillchen.

For 9 Péckvillecher, 2 Weighings are enough:

Put 6 Péckvillecher on the balance (three on each side).

If one side is heavier, the heavy Péckvillchen is among these three Péckvillecher.

If no side is heavier than the other one, the heavy Péckvillchen is among the three Péckvillecher not on the balance.

With one additional weighing you can find the heavy Péckvillchen.

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The handshaking Grand-Duc

Riddle: For the Luxembourgish National Day, the Grand-Duc gives a huge banquet. All participants shake hands with at least one other person and clearly shaking hands with oneself does not count. Explain how the following statement can be true:

The number of people shaking hands an odd number of times is even.

Did you know? The Grand-Duc, i.e. Grand Duke, of Luxembourg is the monarchical head of state of Luxembourg. Nowadays he just fulfils a representative role. The Luxembourgish National Day is on June 23 and is always celebrated with big fireworks on the eve.

Solution: Call E the set of people having done an even number of handshakes so far, and call O the set of people having done an odd number of handshakes so far. If two people from E shake hands, they both move to O (the number of people in O increases by 2). If two people from O shake hands, they both move to E (the number of people in O decreases by 2). If a person from E and a person from O shake hands, then they swap sets (the number of people in O stays the same). Thus, the number of elements of O either stays the same or increases/decreases by 2. Since at the beginning (with zero handshakes) the number of elements of O is zero, that number is always even.

The Gënze-Queen

Riddle: Every year on Whit Monday a Gënze-Queen is elected at the Gënzefest. This year, the president in charge of the election makes all five final candidates sit at a round table where the places are marked from 1 to 5 in a circular order. The president says to the candidate at place 1, "Stay.". Then the president moves to the candidate at place 2 and says "Leave." (and the candidate leaves). The president continues in this way: number 3 stays, number 4 leaves, and so on until only one candidate is left. Which place should you pick at the beginning to become Gënze-Queen if you know the president's procedure in advance?

Did you know? The Gënzefest is a parade organized in Wiltz, also known as the capital city of the North of Luxembourg, in honour of the Gënz, a yellow-flowered shrub particularly abundant on the hills of this region.

Solution: You should pick place Nr. 3!

Let us go through the procedure:

Nr. 1 stays. Nr. 2 leaves. Nr. 3 stays. Nr. 4 leaves. Nr. 5 stays.

After the first round, only number 1, 3, and 5 are left. We continue.

Nr. 1 leaves. Nr. 3 stays. Nr. 5 leaves.

After the second round, only number 3 is left and becomes Gënze-Queen.

References

All riddles are variations of classical mathematical riddles: they have been set in a Luxembourgish context, and explanations have been added.

[1] For *The unfair tramway, The heavy Péckvillchen, Strëmp, To Count Siegfried, please?!* and *Taste the macaron!* : Gardner, Martin. (1994) *My best mathematical and logic puzzles.* New York: Dover Publications, Inc., and Gardner, Martin. (1986) *Entertaining mathematical puzzles.* New York: Dover Publications, Inc.

[2] For *Kettchen, Jos and the wine* : Alcuin. (9th century) *Propositiones ad Acuendos Juvenes*, see also: Fox, goose and bag of beans puzzle, `https://en.wikipedia.org/wiki/Fox,_goose_and_bag_of_beans_puzzle` (accessed May 1, 2018).

[3] For *The wine cellar* : GeeksForGeeks. *Puzzle | Measure 4L using given 3 buckets.* `https://www.geeksforgeeks.org/puzzle-measure-4l-using-given-3-buckets/` (accessed May 1, 2018).

[4] For *The handshaking Grand-Duc* and *Many business cards* : MATHEMATICS. *"In a party people shake hands with one another".* `https://math.stackexchange.com/questions/2099740/in-a-party-people-shake-hands-with-one-another` (accessed May 1, 2018).

[5] For *The Gënze-Queen* : The Math Forum. *Knights of the Round Table.* Ask Dr. Math (1998). `http://mathforum.org/library/drmath/view/55862.html` (accessed May 1, 2018).

[6] For *Red or golden lion* : Coldwell, Nigel. *Answer to Riddle # 12: Three Men and Red & Blue Hats.* A Collection of Quant Riddles With Answers. `http://puzzles.nigelcoldwell.co.uk/twelve.htm` (accessed May 1, 2018).