

PUZZLES

Exercise. 1. *Four people come to a river in the middle of night. There is a narrow bridge which can only be crossed by at most two people at a time. It is dark, so they have to use a torch when walking across the bridge. Unfortunately they only have one torch, so the torch needs to be brought back and forth. When two people cross together, they cannot move faster than the slowest of the two.*

Person A can cross the bridge in one minute, B in two minutes, C in five minutes, and D in eight minutes.

Find the least amount of time needed for the four people to cross the bridge and write down a convincing explanation as to why there are no solutions which require less time.

Exercise. 2. *The 100 inhabitants of an island are all logicians. They have all either blue or green eyed, and there is at least one of each. One day it is decided that all blue-eyed logicians are going to move to another island. Every day a ferry arrives and waits for anyone with blue eyed person to get on. The logicians are introverted and so they do not speak to each other or communicate in any other way. They are however able to look into other logicians eyes to determine other logicians' eye colour. There are no mirrors (or anything else) to help them.*

No one gets on the ferry the first day, and the ferry continues to leave without passengers. Then suddenly one day one of the logicians gets on the ferry.

How did the logician manage to figure out that his eyes was blue?

Exercise. 3. *A and B are trying to figure out C's birthday. C gives them a list of 10 possible dates.*

*May 15, May 16, May 19
June 17, June 18
July 14, July 16,
August 14, August 15, August 17*

C tells A the month, and B the day of the month, but A doesn't know the day and B doesn't know the month. The following conversation takes place:

A: I don't know when C's birthday is, but I do know that B doesn't know.

B: At first I didn't know, but I do know now.

A: Then I also know.

When is C's birthday?

Exercise. 4. *You are a ruthless emperor of a medieval empire and it is 24 hours before you are hosting a large banquet. You've acquired 1000 bottles of wine for the occasion, but you find out that one of them is poisoned.*

The poison cannot be detected except by drinking and it takes at least 20 hours for the poison to start working. Being ruthless you decide to test out the wine on 10 prisoners.

Find a way to organise the tasting so that you are guaranteed to discover which bottle is poisoned.

Exercise. 5. *A bowl contains 75 blue marbles and 150 red marbles, and next to the bowl there is a bag of 1000 red marbles.*

You balls from the bowl, one at a time, as follows:

You choose two random marbles from the bowl. If at least one of them is red, you put a red marble in the bag, and the other back in the bowl. If both marbles are blue, they are thrown away, and a red marble is moved from the bag to the bowl.

What is the colour of the last marble in the bowl?