**Puzzles**

1. There is a long hallway containing 100 doors numbered 1 to 100. Initially, all doors are closed. 100 people passes through the hallway in such a way that the nth person opens/closes the doors numbered as multiples of n. If a door is open, the person closes it and if the door is closed, they open it. Eg. 1st person opens all doors, 2nd person closes doors numbered as multiples of 2 etc. After all 100 people passes through the hall, which doors are closed and which doors are open?

Ans: All doors will be closed except the ones which are numbered a perfect square. (1, 4, 9, … , 100 will be open as they have odd number of factors).

1. You are given a matchbox and 2 ropes which burns **non-uniformly**, but each rope gets completely burned in exactly one hour. Measure 45min with only the given items. (Up to 3 sec inaccuracy is fine).

Ans: The rope burned halfway does not give 30min since it burns non-uniformly. If both ends of the rope are lit at the same time, then the rope burns completely in 30min. So, one rope is lit at both ends and the other rope is lit at one end. When the first rope burns out, it signals 30min, this is when the other end of the second rope is lit. The second rope burns out in 15min from that point. Hence, 30 + 15 = 45, measures 45min.

1. A prisoner is brought into a room with 2 doors. One door leads to his freedom, but the other leads to instant death. There are 2 guards in the room of which one tells only the truth and the other one tells only lies (Each guard knows about the other). The prisoner knows this fact but does not know which guard tells the truth. He is permitted to ask 1 and ONLY 1 question to any guard of his choice (The guard would definitely answer your question). What question should he ask so that he can attain freedom?

Ans: He should ask any one of the guards the following question, “If I ask the other guard, “which is the door that leads to instant death?”, where would he say it is?”. Go through the door that the guard tells you.

1. There is a building with 100 floors (excluding the ground floor). Each floor has a rare egg of same size and strength, but the higher the location of the egg, the greater is its price. A thief decides to steel the most valuable egg she can possibly steel by dropping it into a truck on the ground. She has 2 replica eggs to test from which floor the fall would not break the egg. She needs to find the optimal floor in minimum number of tries. What is the best way to do so? What is the maximum drops required in the worst case scenario of the best way? (The ground floor does not have any egg).

Ans: If you say answer as min 19 tries, well done, but there is a better way. The first egg is initially dropped from the 14th floor, then the 27th, then 39th, 50th, 60th, 69th, 77th, 84th, 90th, 95th, 99th, 100th. If the first egg breaks in any one of these floors, test each floor in between that floor and the previous floor tried with first egg. Eg. If first egg breaks on 69th floor, use the second egg by testing floors 61, 62, … , 68 till the egg breaks. By using this method, the max tries in worst case scenario is **14.**

1. You are facing poverty and can get huge amount of money by competing with a genius in a certain game. A small robot is placed in the 25th column of a long board with 25 columns (in a straight line), followed by a winning column. You and the genius have a remote control to move the robot 1, 3 or 4 columns. You and the genius take turns to move the robot. You or him cannot move the robot more than once or skip a turn. Whoever can make the robot move into the winning column of the board wins (You or him can’t move the robot past the winning column, eg. If the robot is on column 2, you can’t move it 3 or 4 steps). You can start, how will you win?

Ans: Approach the problem in reverse. If it is your turn and the robot is on columns 1, 3 or 4 then you can win, but if it is on column 2, you lose. So 2 is a losing column. Similarly 5, 6 are winning columns as we can put the robot into column 2. Similarly 7 is losing. According to this pattern the losing columns are multiples of 7 or multiple of 7 plus 2 (7x and 7x + 2). So keep putting the robot into losing columns (Any of 23, 21, 16, 14, 9, 7, 2).

BONUS (VERY COMPLICTED, maybe for final round…..mayyybe)

\*\*6. There is an island controlled by a dictator. The island has 100 people who are perfect logicians. Each of these 100 people has green eyes. The people are not allowed to communicate (There are cameras and guards everywhere). They are trapped in the island. The dictator has proposed the rule that, if a person tells the main security guard that they have green eyes, and if it happens to be the truth, they can leave. But if they tell the guard but don’t have green eyes, then they would be killed. None of the people know their eye colour, so they would not risk telling the guard. One day a wise person came to give a speech to all 100 people. He cannot make the dictator mad, so he told “At least one of you have green eyes”. The dictator did not think it made a difference. But after a 100 days from that day, all 100 of them escaped. How did they do it?

Ans: Can’t type it, if answer is needed, call me.