

Puzzle – 04

<https://youtu.be/WqvSdOCJxaU>

Q- 100 Doors Interview Puzzle

There are 100 doors in a row, all doors are initially closed. A person walks through all doors multiple times and toggle (which means if door is open then close, if door is close then open) person does this in following way: In first walk, the person toggles every door that is 1, 2, 3, 4, till 100th door In second walk, the person toggles every second door, i.e., 2nd, 4th, 6th, 8th, so on till 100th door In third walk, the person toggles every third door, i.e. 3rd, 6th, 9th, 12th so on till 99 in other words person toggles all doors which are multiple of 3 In 100th walk, the person toggles 100th door. Which doors are open in the end?

My Approach and Solution –

In first walk, the person toggles every door that is 1, 2, 3, 4, till 100th door. Hence after the first walk, every door is open.

In second walk, the person toggles every second door, i.e., 2, 4, 6, 8, so on till 100th door. Hence at the end of second walk, the even doors are closed and the odd ones are opened.

In third walk, the person toggles every third door, i.e., 3, 6, 9, 12th so on till 99th door. In the third time, person will close door 3 (opened from the first pass), open door 6 (closed from the second pass).

So, what we observe is that the numbers which have an even number of factors remain closed after multiple iterations, and the doors which would remain open will be the ones which have odd number of factors i.e. perfect squares.

Therefore, the doors that will remain open in the end are:

1, 4, 9, 16, 25, 36, 49, 64, 81 and 100 as these are perfect squares