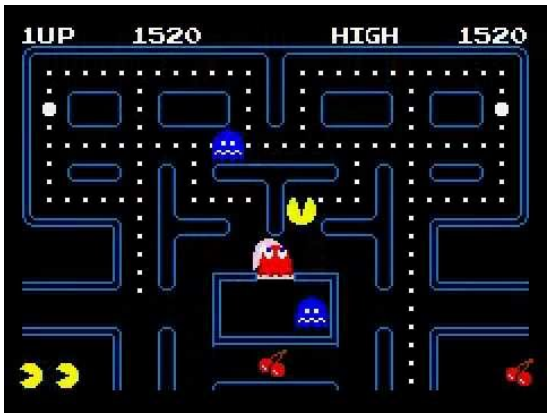

Objective

In this challenge, you have a maze, some ghosts, a hero and an exit. The hero must reach the exit without encountering any ghost.

At each stage, the hero can move by one step, up, right, down or left or remain steady. It's the same for the ghosts. The maze has some walls and neither the hero nor the ghosts can go through a wall. The maze is a bit magic. If the hero or a ghost is on the right hedge and moves one step to the right, he ends up on the left hedge of the same row. In the same way, if a hero or a ghost moves up from the top, he lands on the bottom, in the same column, if he moves down from the bottom, he lands on the top, in the same column and if he moves left from the first column, he ends up in the last column on the same row.

The hero needs to get to the exit without getting caught by the ghosts, but you don't know what will be the ghost movements. A cell of the map is considered a lethal **from a time T onwards** if a ghost can reach that cell a time **T**. You need to find a path that never goes through any cell that is lethal when you go through it. For example, if a cell can only be reached by a ghost in at least 2 moves, it is lethal from time 2 onwards. If the hero goes through that cell at time 3 (or any time greater than or equal to 2), then it is caught.

The exit must not be lethal when the hero reaches reach it. If a ghost can reach the exit before or when the hero reaches it, then it's lost.

You need to determine the shortest path to the exit that avoids going through any cell that is lethal as you go through it.

Data

Input

Row *1*: an integer **N** comprised between *1* and *1000*, representing the width and the height of the map (it's a square).
Row *2* to **N**+*1*: the chart represented by strings of **N** characters. Characters can either be # (wall), or . (free cell), or capital letter for a special position: C for the initial position of the hero , M for a ghost and O for the exit.

There will always be a unique C and a unique O in the map, but there can be 0 or multiple M.

Output

An integer representing the minimum number of steps required to reach the exit while avoiding to go through any cell that is lethal as you go through it. If it is not possible, output 0.

You can download sample input and output data files to work locally by clicking on the link at the bottom of the French version of the question