

Problem F. Fox and Goose

Input file: *standard input*
Output file: *standard output*
Time limit: 1 second
Memory limit: 256 mebibytes

Joe and Marty invented a new game. The game is called «Save the goose» and it is played on a rectangular grid. First, Joe draws a rectangle along the grid lines and then he fills some squares, not all squares, inside the rectangle with light gray color, those squares represent the goose. Next, Marty fills one of the remaining squares inside the rectangle with black color, that square represents the fox. Then they both separately strive to fulfill the objective of the game which is to draw the shortest possible wall around the goose so that the fox cannot reach them. Specifically, the wall has to be drawn along the grid lines and it has to divide the grid into two areas. All goose should be in the area enclosed by the wall while the fox should remain in the area outside the wall. Moreover, next conditions shall be met:

- The wall must fit into the chosen rectangle, it may partially run along the border of the rectangle.
- The wall may go across the same point twice.
- It is forbidden to use the same grid line more than once.
- The fox must not be trapped by the wall. In other words, grid squares outside the rectangle must be accessible to the fox without crossing the wall.

The player who draws the shortest wall, wins. Sometimes, it is not possible to draw the desired wall and in such a case both players lose the game. Your task is to write a program that wins the game whenever it is possible.

Input

There are more test cases. Each case starts with a line containing two integers M, N ($1 \leq M, N \leq 1000$) separated by space which represent the height and the width of the rectangle. Next, there are M lines representing the contents of the rectangle. Each line specifies one row of the rectangle and it contains a string of length N . Each character in the string represents one grid square and it is either capital letter 'X', capital letter 'O' or symbol '.' (dot). Letter 'X' represents the fox, letter 'O' represents the goose and the dot '.' represents an unoccupied square of the grid. Each animal occupies exactly one square in the grid and there is exactly one fox and at least one goose in the rectangle.

Output

For each test case, print a single line with one integer denoting the length of the shortest wall that separates the goose from the fox according to the rules of the game. We suppose that each square side in the grid has unit length. If it is not possible to draw the wall print -1 .

Example

standard input	standard output
5 5	26
.....	-1
..000	12
..OX0	-1
0...0	
..000	
3 5	
..0..	
.OX0.	
..0..	
2 3	
.0.	
OX0	
1 3	
OX0	