Escape from the Underground Maze

Problem Description

Bonny Ji is an adventurous explorer who loves to discover ancient ruins and mysterious places. One day, while hiking deep in a dense forest, he notices an unusual stone structure covered in vines and moss. It looks like an entrance to something old and forgotten.

Driven by curiosity, Bonny Ji steps inside and suddenly realizes that he has entered a strange underground maze. As soon as he takes a few steps, the entrance behind him slams shut with a loud thud. He tried to push it open, but it would not move. He is now trapped. Can you help Bonny Ji solve the maze and find his way back to freedom?

Here are the movement rules:

1. Bonny Ji can move up, down, left, or right to an adjacent cell. **Each move costs 1 step**.
2. If Bonny Ji steps onto a magic hole (represented by an uppercase letter), he may optionally teleport to other cell with the same letter. **Teleporting costs 1 step**.
3. Teleportation is optional; Bonny Ji can choose not to teleport.

Input Format

The first line contains two integers M and N, representing the number of rows and columns in the maze. The next M lines each contain exactly N characters without spaces describing the maze layout.

Here are the maze symbols:

- B: Bonny Ji's starting position (appears exactly once).
- E: Exit (appears exactly once).
- $\#$: Wall (impassable).
- $.$: Empty cell (walkable).
- $A - Z$: Magic holes (except B, E).

Output Format

If it is impossible to reach the exit, print -1. Otherwise, print the minimum number of moves from B to E.

Constraints

- The maze contains one B and one E. Each kind of magic hole appears at most 2 times.
- $1 \leq M, N \leq 10000$ ◦

Example Test Case

Sample Input 1

```
3 4
.E.#
#..#
A.AB
```

Sample Output 1

```
4
```

Explanation of Sample 1

We define coordinates as (x, y) = (row, column) with $(0, 0)$ at the top-left. B is at $(2, 3)$, so the shortest path is $(2, 3) \to (2, 2) \to (1, 2) \to (0, 2) \to (0, 1)$.

Sample Input 2

```
3 4
.EA#
...#
#.AB
```

Sample Output 2

```
3
```

Explanation of Sample 2

We define coordinates as (x, y) = (row, column) with $(0, 0)$ at the top-left. B is at $(2, 3)$, so the shortest path is $(2, 3) \to (2, 2) \to (0, 2) \to (0, 1)$.

Sample Input 3

```
3 4
.E.#
#.##
A#AB
```

Sample Output 3

```
-1
```

Explanation of Sample 3

Walls block all possible paths to the exit.