10 The Ghosts on the (Data)Path

Time Limit: 1 Second
Memory Limit: 2 MB

You and your friends dared to trespass on the dreaded hay bale maze of impassable abstract complexity. Your good sense prevailed for a second and you hesitated at the entrance. Your friends rushed ahead of you and you can no longer see or hear them. You hear the occasional scream. You have no choice but to soldier on into the maze.

The maze is populated by the ghosts of all those unfortunate souls who have failed Computer Organization. Once you enter the maze, you need to find your way to the exit point without turning into a ghost yourself.

The maze was built in a sloppy fashion by the ghosts that show the same level understanding of data flow as maze building. Every step you take brings you to an "intersection" of paths where you may choose to go left, right, forward, or backward. You join the ghost brigade if you run into a ghost. You also give up the mortal coil if you go backward twice on a part of the path you already traversed (here, we define a part of the path as a step between 2 "intersections"). Your goal is to make it out of the maze in the fewest possible steps.

10.1 Input

The first line of input is 2 integers 0 <M,N $\leq$ 16000. The following M lines of N characters each will be the maze. The entrance to the maze is denoted by 'S' and the exit is 'E'. Ghosts are marked by 'G'. A traversable spot on the maze is the period '.' character.

10.2 Output

The output is a single integer - the fewest number of steps from the entrance to the exit. Output -1 if no such path exists.

10.3 Sample Input/Output

Sample Input	Sample Output
5 5 S...G .G..G .GG.G .G... ....E	8