Complexity Bridges

The city of Algorithms is crossed by the beautiful Complexity River. Up to now, the only possible way to travel from one bank of the river to the other is by boat. This is very negative for the city economics, so the mayor wants to build several bridges to connect the two parts of the city that lie on different banks of the Complexity.

He has already decided how many bridges will be built. To reduce costs, bridges should be as short as possible. However, since he wants to really help the citizens, bridges must not be too close to each other.

The mayor has asked for your help and has given you the map of the part of the city that is crossed by the river. To simplify, the map is a grid of characters, where '`#`' represents terrain and '`.`' stands for water. For example, the map could be:

```
####################
..######........##..
....##..............
....................
....................
................#...
..######........##..
####################
```

You may assume that the map has terrain-only on the first and last rows, and that they correspond to different banks. Besides, every piece of terrain is connected to the north or the south bank, but not to both. A piece of terrain is considered to be connected to another if they are next to each other vertically.

The mayor is very old fashioned and has decided that bridges must be built in the north-south direction (vertically, in the grid). So, for example, suppose that the mayor wants to build 3 bridges in the city grid depicted above and that there must be at least 4 units of space (columns) between any two bridges. The solution that minimizes the total length of the bridges is the following, where '`B`' represents "bridge":

```
####################
..######........##..
..B.##.B........B..
..B....B........B..
..B....B........B..
..B....B........#..
..######........##..
####################
```

Notice that there are exactly 4 units of space (columns) between the two leftmost bridges (so they could not be closer). Measuring the length of a bridge by the number of grid cells with water below the bridge, the total length of the 3 bridges is 11 ($4 + 4 + 3$).

Task

Given a grid map, the number of bridges to build, and the minimum space (in columns) between bridges, your task is to calculate the minimum total length of the bridges. You may assume that there is always a way to build the bridges.

Input

The first line contains two integers, R and C, representing the number of rows and the number of columns of the grid map, respectively. The second line has two integers, B and S, where B is the number of bridges to build and S is the minimum space (in columns) between bridges. After that come exactly R lines, each one with C characters, representing the map. Any character is '`#`' or '`.`'.

Constraints

$5 \leq R \leq 1\,000$	(Number of rows)
$5 \leq C \leq 2\,000$	(Number of columns)
$1 \leq B \leq 100$	(Number of bridges)
$1 \leq S \leq C$	(Minimum space between bridges)

Output

A single line, with the minimum total length of the bridges.

Sample Input

```
8 20
3 4
####################
..######........##..
....##..............
....................
....................
................#...
..######........##..
####################
```

Sample Output

```
11
```