Problem J. Just Zeros

Time limit: 1.5 seconds
Memory limit: 1024 megabytes

Julia has a rectangular grid consisting of $h \cdot w$ bits arranged in h rows and w columns, where the number of rows is small ($h \leq 8$). Rows are numbered from 1 to h from top to bottom, and columns from 1 to w from left to right. A bit is a value 0 or 1, and *negating* a bit means flipping its value to the opposite: 0 to 1 or 1 to 0.

The grid allows the following three types of operations:

- `P` i j – negate the bit at the intersection of the i-th row and j-th column,
- `R` i – negate all bits in the i-th row,
- `K` j – negate all bits in the j-th column.

Julia wants to clear the grid, i.e., turn all the bits into 0. The minimum number of operations required to achieve this is called the *difficulty* of the grid.

Mischievous Romek likes to disrupt Julia's plans and performs a total of q operations of one of the three types above. However, Romek doesn't realize that Julia enjoys such challenges. She observes the grid and calculates its difficulty at each of the $q+1$ moments (initially and after each of Romek's operations). Can you also determine these values?

Romek modifies the grid permanently. Julia does not perform any operations herself and does not change the grid.

Input

The first line contains three integers h, w and q ($1 \leq h \leq 8$; $1 \leq w, q \leq 10^5$) denoting the dimensions of the grid and the number of operations performed by Romek.

The next h lines describe the initial grid: each line contains a binary string (characters `0` and `1`) of length w.

The final q lines describe Romek's operations, each in the format: "`P` i j", or "`R` i", or "`K` j" ($1 \leq i \leq h$; $1 \leq j \leq w$).

Output

Output $q+1$ integers (one per line) – the difficulty of the initial grid followed by the difficulty of the grid after each of Romek's q operations.

Example

standard input	standard output
3 4 6 1010 1101 0010 R 2 P 3 1 K 2 P 2 1 K 4 P 3 4	3 2 3 4 3 3 4

Note

The figure illustrates the initial grid and the first few operations by Romek. The initial difficulty of the grid is 3 because Julia can use the following operations: `P 1 1`, `R 2`, `K 3`.

