House Cleaning Robot

Minh has just bought a house cleaning robot. The floor of Minh's house can be seen as a square grid of size $(2 \cdot 10^9 + 1) \times (2 \cdot 10^9 + 1)$, divided into 1×1 cells. Each cell is denoted by its coordinates (x, y), where x and y are integers with $|x| \leq 10^9$ and $|y| \leq 10^9$. Initially, Minh places the robot at the cell $(0, 0)$, in the middle of the floor.

The robot is pre-programmed with a string s of n characters, each of which is `U`, `D`, `L` or `R`. In the i-th step, the robot moves from its current cell (x, y) as follows:

- If $s_i =$ `U`, it moves to the cell $(x, y + 1)$.
- If $s_i =$ `D`, it moves to the cell $(x, y - 1)$.
- If $s_i =$ `L`, it moves to the cell $(x - 1, y)$.
- If $s_i =$ `R`, it moves to the cell $(x + 1, y)$.

After a test run, Minh feels that the robot does not visit enough distinct cells, so Minh wants to reprogram it. However, the robot is very complicated, so Minh can only insert a string t of at most 10 characters (also consisting of `U`, `D`, `L` and `R`) at some position in the string s.

Finding the optimal way turns out to be too hard, so Minh decides to try some plans instead. There are q plans. In the j-th plan, Minh inserts the string t_j right after the p_j-th character of s (if $p_j = 0$, t_j is inserted **before** the first character of s). For each plan, Minh wants to know the number of distinct cells the robot visits, including the starting cell $(0, 0)$.

Note that the plans are independent: each plan inserts t_j into the original string s.

Input

The first line contains two integers n and q $(1 \leq n, q \leq 10^5)$ – the length of the string s and the number of plans.

The second line contains the string s of n characters, each of which is `U`, `D`, `L` or `R`.

The j-th of the next q lines contains an integer p_j $(0 \leq p_j \leq n)$ and a string t_j $(1 \leq |t_j| \leq 10)$ consisting of characters `U`, `D`, `L` and `R` – the description of the j-th plan.

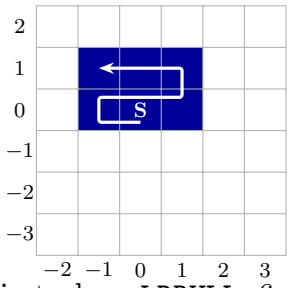
Output

For each plan, print the number of distinct cells the robot visits.

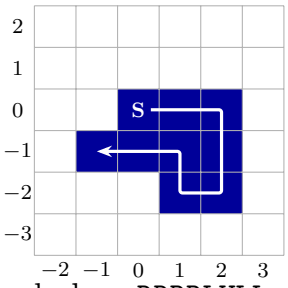
Sample Input 1	Sample Output 1
5 4 RRULL 0 L 2 DDL 3 RD 5 UUU	6 9 6 9

Sample Explanation

The figure below shows the first two plans. The robot starts at the cell marked S, the arrows show its path, and the visited cells are dark blue.



First plan: `LRRULL`, 6 cells



Second plan: `RRDDLULL`, 9 cells