Problem F
Color Inversion on a Huge Chessboard

Time Limit: 4 seconds

You are given a set of square cells arranged in a chessboard-like pattern with n horizontal rows and n vertical columns. Rows are numbered 1 through n from top to bottom, and columns are also numbered 1 through n from left to right.

Initially, the cells are colored as in a chessboard, that is, the cell in the row i and the column j is colored black if $i + j$ is odd and is colored white if it is even.

Color-inversion operations, each of which is one of the following two, are made one after another.

Invert colors of a row: Given a row number, invert colors of all the cells in the specified row. The white cells in the row become black and the black ones become white.

Invert colors of a column: Given a column number, invert colors of all the cells in the specified column. The white cells in the column become black and the black ones become white.

The number of distinct *areas* after each of the operations should be counted. Here, an area means a group of directly or indirectly connected cells of the same color. Two cells are said to be directly connected when they share an edge.

Input

The input consists of a single test case of the following format.

$$
\begin{array}{l}
n\ q \\
\mathit{operation}_1 \\
\vdots \\
\mathit{operation}_q
\end{array}
$$

The integer n is the number of rows and columns ($1 \leq n \leq 5 \times 10^5$). The integer q is the number of operations ($1 \leq q \leq 5 \times 10^5$). The following q lines represent operations to be made in this order. Each of them is given in either of the following forms.

- `ROW` i: the operation "invert colors of a row" applied to the row i ($1 \leq i \leq n$).
- `COLUMN` j: the operation "invert colors of a column" applied to the column j ($1 \leq j \leq n$).

Output

Output q lines. The k-th line should contain an integer denoting the number of areas after the k-th operation is made.

Sample Input 1	**Sample Output 1**
3 3 ROW 2 COLUMN 3 ROW 2	3 2 6

Sample Input 2	**Sample Output 2**
200000 2 ROW 1 ROW 1	39999800000 40000000000

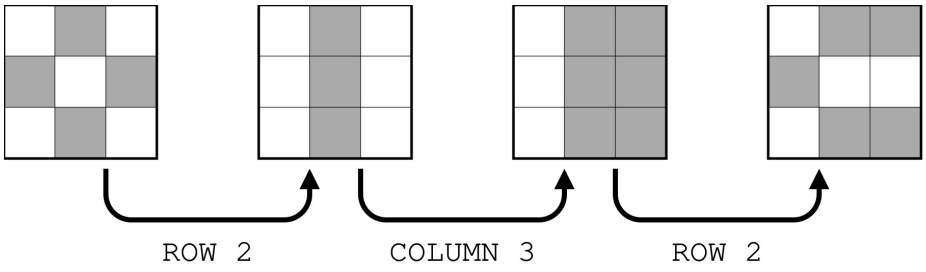


Figure F.1. Illustration of Sample Input 1