Problem 4: Stockbear
3+4 Points

Problem ID: `chess`

Rank: 2+2

Introduction

Big Ben has decided to avenge Garry Kasparov, and to do that he's decided to make a computer that will beat Deep Blue! First, though, he has to teach a computer to play chess. Which can't be *that* hard. *Surely.*

Problem Statement

You are given a chess board of size $\mathbf{N}$ by $\mathbf{M}$ with a number of pieces $\mathbf{K}$ on it. Each piece will be one of the following:

- Queen (`Q`): moves horizontally, vertically, and diagonally.
- Rook (`R`): only moves horizontally and vertically.
- Bishop (`B`): only moves diagonally.

Further movement details here.

For each piece $\mathbf{P}_i$ and its respective coordinates on the board $\mathbf{P}_{i\mathbf{x}}$ and $\mathbf{P}_{i\mathbf{y}}$, determine how many distinct pairs of pieces $\mathbf{P}_a$, $\mathbf{P}_b$ exist such that $\mathbf{P}_a$ is "attacking" $\mathbf{P}_b$. A piece is "attacking" another piece if the piece can move to the other piece's square without passing through another piece. If two pieces $\mathbf{P}_a$ and $\mathbf{P}_b$ are both "attacking" each other, then $(\mathbf{P}_a, \mathbf{P}_b)$ and $(\mathbf{P}_b, \mathbf{P}_a)$ are considered two distinct instances. It may be the case that a piece can attack multiple pieces, or be attacked by multiple pieces, or both.

The bottom left of the board is given by the coordinates $(1, 1)$.

Input Format

The first line of the input contains a single integer $\mathbf{T}$ denoting the number of test cases that follow.

For each test case:

- The first line contains two space-separated integers $\mathbf{N}$ and $\mathbf{M}$ representing the size of the board.
- The second line contains a single integer denoting the number of pieces on the board, $\mathbf{K}$.
- For each of the next $\mathbf{K}$ lines, the ith line contains three space-separated values $\mathbf{P}_{i\mathbf{t}}$, $\mathbf{P}_{i\mathbf{x}}$, $\mathbf{P}_{i\mathbf{y}}$, where:
  - $\mathbf{P}_{i\mathbf{t}}$ is a character containing either `Q`, `R`, or `B`, denoting the type of piece i.
  - $\mathbf{P}_{i\mathbf{x}}$ and $\mathbf{P}_{i\mathbf{y}}$ are integers denoting the location $(\mathbf{P}_{i\mathbf{x}}, \mathbf{P}_{i\mathbf{y}})$ of the piece.

Output Format

For each test case, output the number of instances of a piece “attacking” another piece.

Constraints

$1 \leq \mathbf{T} \leq 100$
$1 \leq \mathbf{N}, \mathbf{M} \leq 10^9$
$1 \leq \mathbf{P}_{i\mathbf{y}} \leq \mathbf{N}, 1 \leq \mathbf{P}_{i\mathbf{x}} \leq \mathbf{M}$

Main Test Set

$2 \leq \mathbf{K} \leq 500$

Bonus Test Set

$2 \leq \mathbf{K} \leq 2 \cdot 10^5$

Sample Test Cases

Main Sample Input [Download]

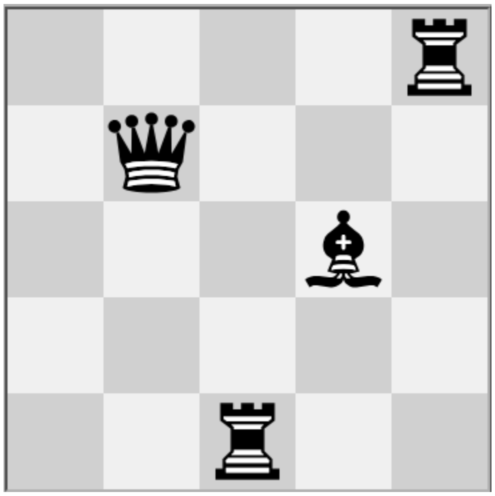
```
5
5 5
4
R 3 1
Q 2 4
R 5 5
B 4 3
6 4
4
Q 1 2
R 5 1
Q 6 3
B 2 4
4 7
6
R 1 5
B 4 2
Q 2 1
R 4 7
Q 4 5
R 2 6
562 723
5
B 539 615
R 359 615
B 359 436
Q 256 332
B 91 497
1 45692
3
B 1 22562
Q 1 11235
R 1 45690
```

Main Sample Output [Download]

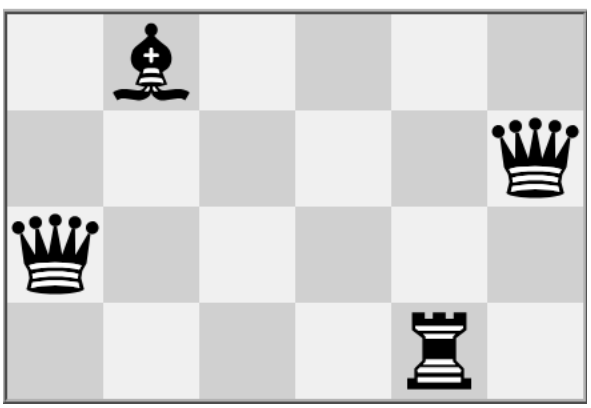
```
0
1
8
6
2
```

Main Sample Explanations

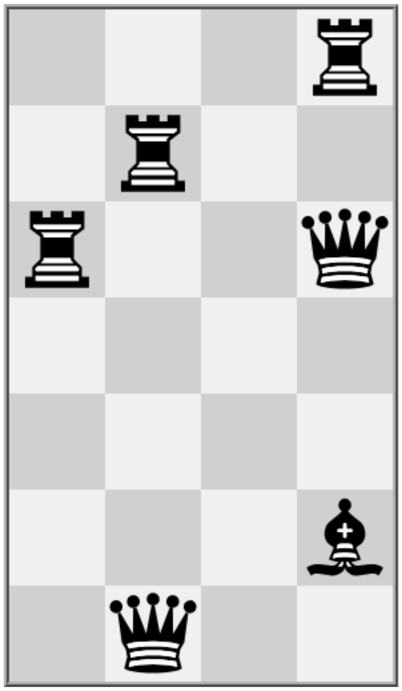
For test case #1, no piece can attack any other piece.



For test case #2, the bishop at `(2,4)` can attack the rook at `(5,1)`, but not vice versa.



For test case #3, the rook at `(2,6)` and the queen at `(2,1)` can attack each other, the rook at `(1,5)` and the queen at `(4,5)` can attack each other, the rook at `(4,7)` and the queen at `(4,5)` can attack each other, the queen at `(4,5)` can attack the bishop at `(4,2)`, and the bishop at `(4,2)` can attack the rook at `(1,5)`.



For test case #4, the queen at `(256,332)` and the bishop at `(539,615)` can attack each other, the queen at `(256,332)` and the bishop at `(91,497)` can attack each other, and the rook at `(359,615)` can attack the bishops at `(359,436)` and `(539,615)`.

For test case #5, the queen at `(1,11235)` can attack the bishop at `(1,22562)`, and the rook at `(1,45690)` can attack the bishop as well. The rook and queen cannot attack each other because the bishop is in between them.