Watchtowers

In the ancient city of Khiva there are N watchtowers, built during the era of past khanates and preserved to this day. For some mysterious reason all the towers stand on a single straight line. For convenience, imagine them numbered from 1 to N from **West** to **East**.

Each tower can be of one of the following three kinds:

- **Window facing West.** From such a tower every tower lying to its **west** is visible. In other words, if the window of tower i faces West, then it can see every tower j with $j < i$.
- **Window facing East.** From such a tower every tower lying to its **east** is visible. In other words, if the window of tower i faces East, then it can see every tower j with $j > i$.
- **No window.** No other tower is visible from this tower. Historians have yet to discover the purpose of such structures.

Nazarbek manages the towers. When a group of tourists arrives, they play a hide-and-seek game under two strict rules:

- **Distinct towers:** every tourist must choose a different tower—no sharing allowed.
- **Mutual invisibility:** after everyone has climbed their chosen tower, no selected tower may be visible from any other selected tower.

Nazarbek's goal on each day is to host the largest possible group that still satisfies these rules.

Because some towers are under renovation, on day k tourists may climb **only** the towers with indices in the interval $[L_k, R_k]$.

For each of the next Q days output the maximum possible size of a tourist group that Nazarbek can serve while respecting the game's rule.

Input

The first line contains a single integer T — the number of test cases.

For each test case:

The first line contains two integers N and Q — the number of towers and the number of days.
The second line contains a string S of length N. Character S_i is

- **L** if tower i has a window facing West;
- **R** if tower i has a window facing East;

- **A** if tower i has no window.

Each of the next Q lines contains two integers L_k and R_k — the inclusive interval of towers that may be used on day k.

Output

For each day print, on a new line, a single integer — the largest possible number of tourists that can be placed that day without breaking the rules.

Constraints

Let $\sum N$ be the sum of N over all test cases, and $\sum Q$ the sum of Q over all test cases.

- $1 \leq T \leq 2 \times 10^5$
- $1 \leq \sum N, \sum Q \leq 2 \times 10^5$
- $S_i \in \{L, R, A\}$
- $1 \leq L_k \leq R_k \leq N$

Subtasks

1. (9 points) $S_i \in \{A\}$
2. (13 points) $S_i \in \{L, R\}$
3. (21 points) $Q = 1,\ L_1 = 1,\ R_1 = N$
4. (18 points) $N \leq 1000$
5. (39 points) No additional constraints.

Examples

Example 1

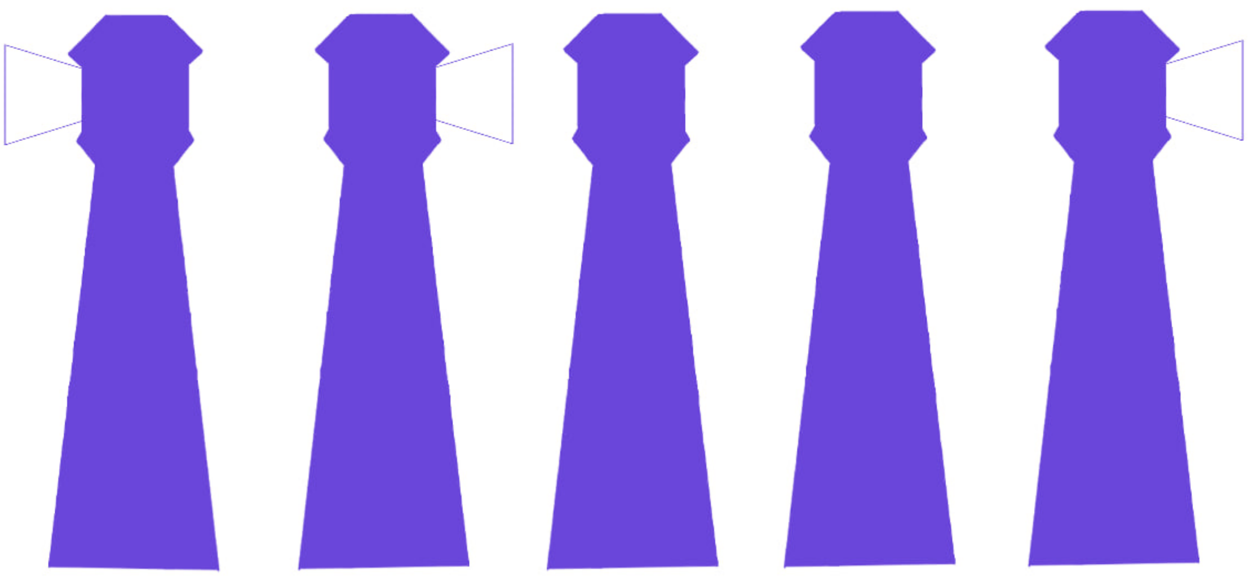
Input

```
3
5 3
LRAAR
1 4
3 4
2 5
4 1
AAAL
4 4
7 3
RRRRARRR
2 5
1 6
5 7
```

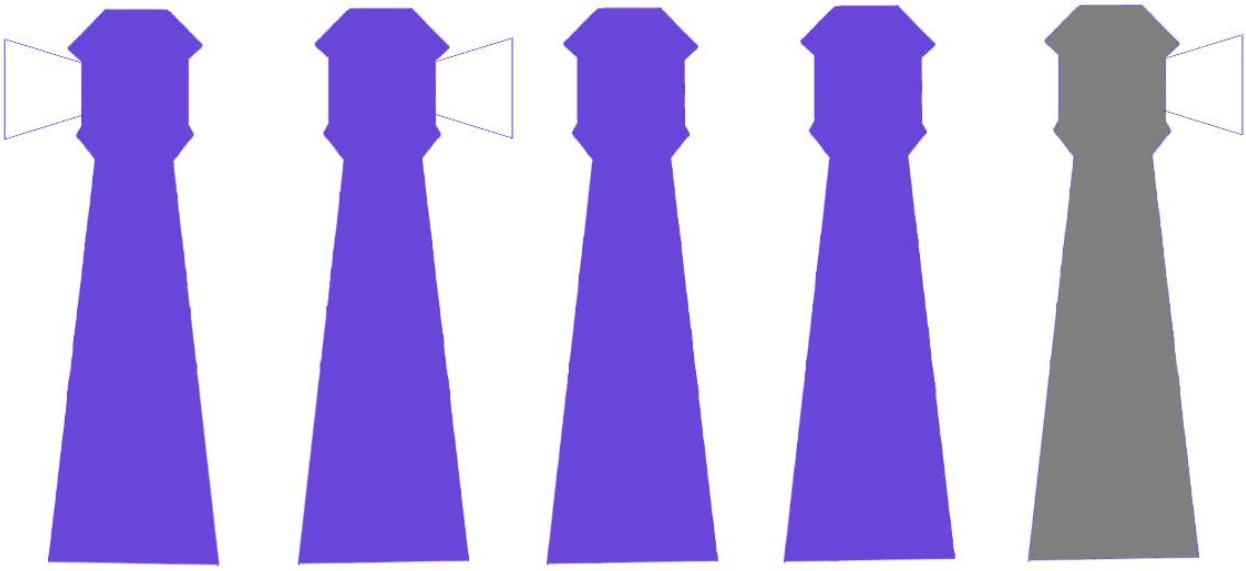
Output

```
3
2
3
1
1
2
2
```

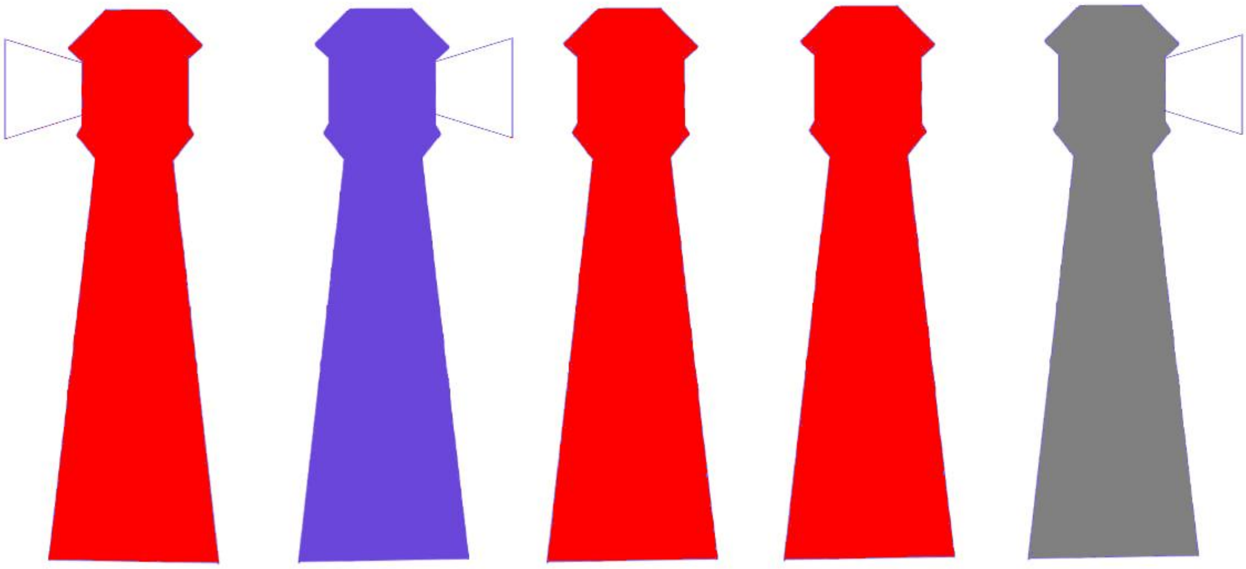
Explanation for the first test case: Here are the towers:



On day 1, only towers in the range $[1; 4]$ can be used (purple):



Nazarbek can host a group with maximum size of 3. Without violating the game rules, tourists can be sent to the following towers (red):



It can be proven that it is impossible to host a group of 4 or more tourists.