Metro platforms (`metro`)

Since he began his university studies in Milan, Edoardo started commuting by metro everyday. He usually goes to class by metro, but today he is so sleepy that he is not sure from which metro stop he started, nor which direction he took!

It's worth to notice that trains in metro stations don't always open their doors from the same side: sometimes you need to get off from the left side, sometimes from the right side. There is a small map inside the train, which shows the position of the platform (left or right exit). With this information, Edoardo believes he can easily understand from which metro stop he started his commute.
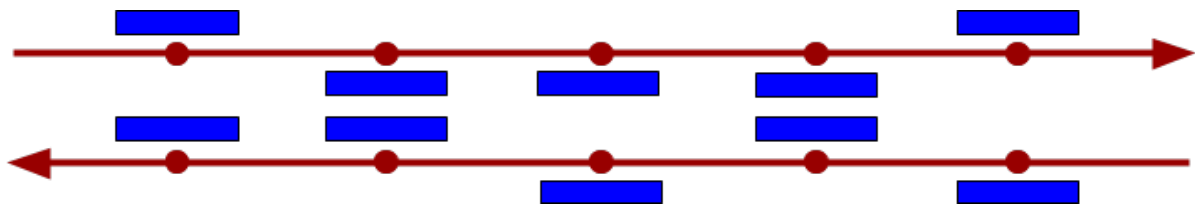

Figure 1: The small map inside the train, showing the location of the platform.

Edoardo paid attention during the last M stops, and for each stop he noted on which side the train opened its doors. Help Edoardo count how many possible starting metro stops are compatible with his observations.

For example let's say that Edoardo remembers that, during the last 3 stops, the train opened its doors on the left side, then right side, then right side again. Using the map above, we can see that this observations are compatible with just 2 stops:
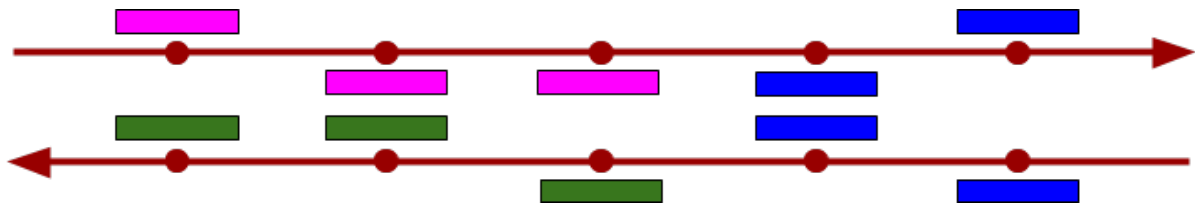
> ☞ Among the attachments of this task you may find a template file `metro.*` with a sample incomplete implementation.

Input

The first line contains a single integer N, the number of stops in the whole metro line. The second and third lines contain N characters each, respectively the description (seen from above, east to west) of where the doors will open for the "forward" and the "backward" metro lines. The next line contains a single integer M, the number of observations made by Edoardo. The last line contains M characters, the description of each observation.

Output

You need to write a single line with an integer: the number of possible starting metro stops in one way or the other.

Constraints

- $1 \leq M \leq N \leq 10\,000\,000$.
- The characters in the descriptions are just `^` or `v`, respectively: the door will open on the left / right (when going east), and right / left (when going west).
- The characters in the observations are just `<` or `>`, respectively: the door opened on the left / right.

Scoring

Your program will be tested against several test cases grouped in subtasks. In order to obtain the score of a subtask, your program needs to correctly solve all of its test cases.

- **Subtask 1** [**0 points**]: Examples.
- **Subtask 2** [**20 points**]: The doors always open on the left.
- **Subtask 3** [**30 points**]: $N \leq 100$.
- **Subtask 4** [**40 points**]: $N \leq 10\,000$.
- **Subtask 5** [**10 points**]: No additional limitations.

Examples

input.txt	output.txt
5 ^vvv^ ^^v^v 3 <>>	2
5 ^^^^^ vvvvv 3 <<<	6

Explanation

The **first sample case** is the example discussed before.

In the **second sample case** the doors always open on the left, so every contiguous sequence of 3 stops identifies a valid starting metro stop.