



USACO 2023 US OPEN CONTEST, PLATINUM PROBLEM 1. PAREIDOLIA

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English (en) ▾

****Note: The time limit for this problem is 4s, twice the default. The memory limit for this problem is 512MB, twice the default.****

Pareidolia is the phenomenon where your eyes tend to see familiar patterns in images where none really exist -- for example seeing a face in a cloud. As you might imagine, with Farmer John's constant proximity to cows, he often sees cow-related patterns in everyday objects. For example, if he looks at the string "bqessiyexbesszieb", Farmer John's eyes ignore some of the letters and all he sees is "bessiebessie".

Given a string s , let $B(s)$ represent the maximum number of repeated copies of "bessie" one can form by deleting zero or more of the characters from s . In the example above, $B(\text{"bqessiyexbesszieb"}) = 2$. Furthermore, given a string t , let $A(t)$ represent the sum of $B(s)$ over all contiguous substrings s of t .

Farmer John has a string t of length at most $2 \cdot 10^5$ consisting only of characters a-z. Please compute $A(t)$, and how $A(t)$ would change after U ($1 \leq U \leq 2 \cdot 10^5$) updates, each changing a character of t . Updates are cumulative.

INPUT FORMAT (input arrives from the terminal / stdin):

The first line of input contains t .

The next line contains U , followed by U lines each containing a position p ($1 \leq p \leq N$) and a character c in the range a-z, meaning that the p th character of t is changed to c .

OUTPUT FORMAT (print output to the terminal / stdout):

Output $U + 1$ lines, the total number of bessies that can be made across all substrings of t before any updates and after each update.

SAMPLE INPUT:

```
bessiebessie
3
3 1
7 s
3 s
```

SAMPLE OUTPUT:

```
14
7
1
7
```

Before any updates, twelve substrings contain exactly 1 "bessie" and 1 string contains exactly 2 "bessie"s, so the total number of bessies is $12 \cdot 1 + 1 \cdot 2 = 14$.

After one update, t is "belsiebessie." Seven substrings contain exactly one "bessie."

After two updates, t is "belsiesessie." Only the entire string contains "bessie."

SCORING:

- Input 2: $|t|, U \leq 300$
- Inputs 3-5: $U \leq 10$
- Inputs 6-13: $|t|, U \leq 10^5$
- Inputs 14-21: No additional constraints.

Problem credits: Brandon Wang and Benjamin Qi

Contest has ended. No further submissions allowed.