

Substrings II

You are given a string T which consists of 40000 lowercase latin letters at most. You are also given some integers A , B and Q . You have to answer Q queries. For i -th query you are given a string S_i and you need to output how many times S_i appears in T . Immediately after answering the current query you need to add $((A * \text{ans} + B) \bmod 26 + 1)$ -th lowercase symbol of the English alphabet to the end of T where ans is the answer to this query.

Input

The first line of input contains a string T . The next line consists of three integers Q ($1 \leq Q \leq 40000$), A ($0 \leq A \leq 27$) and B ($0 \leq B \leq 26$). The following Q lines contain Q query strings, S_{i-2} on i -th line. Input will not exceed 600 kb.

Output

Output Q lines. Output the answer to the i -th query on the i -th line output.

Example

Input:

```
aaaaa
2 0 0
a
aa
```

Output:

```
5
5
```