Digital Root

Input file:	`standard input`
Output file:	`standard output`
Time limit:	5 seconds
Memory limit:	512 megabytes

Chiaki has a B-based digital string s of length n. She has prepared m queries for the string.

In the i-th query, she would like to know the number of substring $s_{l..r}$ $(1 \le l \le r \le n)$ of s such that after changing at most one digit in $s_{l..r}$ to some digit in the set A_i, the digital root of $s_{l..r}$ equals to x_i.

We should remind you that a digital root $d(x)$ of the B-based digital string x (x may have some leading zeros) is the sum $s(x)$ of all the digits of this number, if $s(x) \le B-1$, otherwise it is $d(s(x))$. For example, a digital root of the number 6543_{10} is calculated as follows: $d(6543_{10}) = d(6_{10} + 5_{10} + 4_{10} + 3_{10}) = d(18_{10}) = 9_{10}$, $d(abcd_{16}) = d(2e_{16}) = d(10_{16}) = 1_{16}$.

Note that in this problem we will use the lowercase English letters from 'a' to 'f' to represent the digits with values from 10 to 15.

Input

The first line contains three integers n, m and B $(1 \le n, m \le 2^{20}, 2 \le B \le 16)$ – the length of the string, the number of queries and the base of the number.

The second line contains a B-based digital string s of length n.

Each of the following m lines contains a character x_i and a B-based string a_i $(1 \le |a_i| \le B)$– the expected value of digital root and the set A_i. All characters in a_i are distinct.

Output

For each query, output an integer denoting the number of substrings.

Examples

standard input	standard output
9 2 10 123456789 9 12 8 123456789	24 45
5 10 5 01234 0 1 1 1 2 1 3 1 4 1 0 1 1 0 2 0 3 0 4 0	1 13 9 9 9 1 10 9 10 6