Randomness

Chinese

You're given a string S of N characters. It's known that the string consists of lowercase Latin letters. The string is generated randomly. That means that every symbol is chosen randomly and independently from others from the set {'a', 'b', ..., 'z'}. All the letters have equal probability to appear.

You're given Q queries on this string. Each query is of the form `P C`, where P is an integer between 1 and N (both inclusive) and C is a character from the set {'a', 'b', ..., 'z'}. Both P and C were chosen at random and independently from other queries.

When you have a query of the form `P C` you have to change the P^{th} symbol of S to C. After every change we ask you to output the number of distinct nonempty sub-strings of S.

Input Format

The first line of input consists of two single space-separated integers N and Q, the length of the string S and the number of queries, respectively.

The second line contains string S.

The following Q lines describe the queries in the form `P C`, where P and C are also separated with a single space.

Constraints
$4 \leq N \leq 75000$
$4 \leq Q \leq 75000$

Output Format

Output Q lines. Output the number of distinct substrings of S after the i^{th} query on the i^{th} line of the output.

Sample Input

```
4 4
aaab
1 a
2 b
3 c
4 d
```

Sample Output

```
7
7
9
10
```

Explanation

After replacing the character at the first index with *a*, we still have the original string `aaab`. The total non empty substrings of `aaab` are

```
a b aa ab aaa aab aaab
```

hence 7.

After replacing the character at the second index with *b*, we have the string `abab`. The non-empty substrings of `abab` are

```
a b ab ba aba bab abab
```

hence 7.

After replacing the character at the third index with *c*, we have the string `abcb`. The total non empty substrings of `abcb` are

```
a b c ab bc cb abc bcb abcb
```

hence 9.

After replacing the character at the fourth index with *d*, we have the string `abcd`. The total non empty substrings of `abcd` are

```
a b c d ab bc cd abc bcd abcd
```

hence 10.

Scoring

There are 12 test cases.

The first four test cases `N` = 100 and `Q` = 500
The next four test cases `N` = 75000 and `Q` = 10
The last four test cases `N` = 75000 and `Q` = 75000