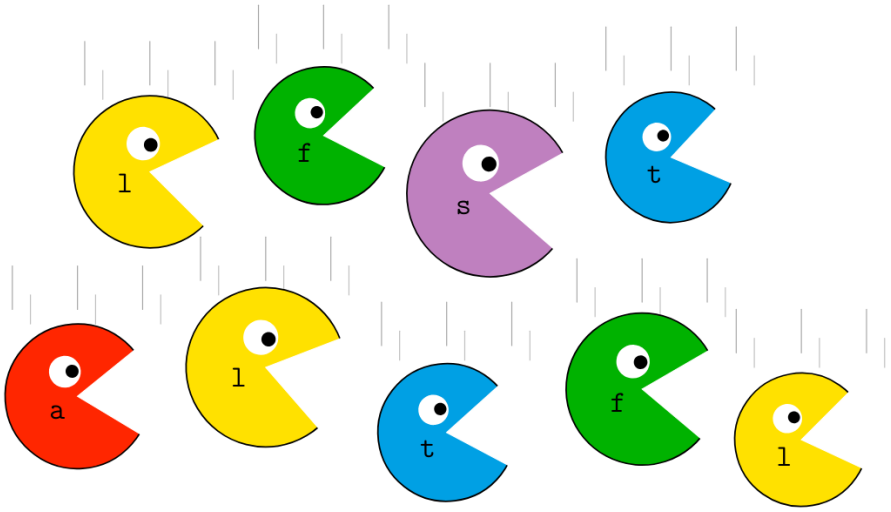
LFS

Input file:	`standard input`
Output file:	`standard output`
Time limit:	7 seconds
Memory limit:	1024 megabytes



You are designing the new videogame Live Fight Simulator. A level is defined by a string s of length n consisting of lowercase English letters, where each letter represents a type of enemy that appears in sequence.

To analyze the gameplay balance, you need to measure how repetitive different parts of the level are. You will consider q specific contiguous segments $s[l, r]$ of the level, with $1 \le l \le r \le n$.

For each of these queries, you want to compute the length of the LFS (Longest Frequent Substring). Formally, for any string t:

- let $f(t)$ be the maximum frequency of any substring in t;
- let $|\text{LFS}(t)|$ be the maximum length of a substring of t that appears exactly $f(t)$ times.

For each query (l, r), you must compute $|\text{LFS}(s[l, r])|$, which represents the maximum length among the most repetitive patterns of enemy spawns in that part of the level.

A string x is a substring of a string y if x can be obtained from y by the deletion of several (possibly, zero or all) characters from the beginning and several (possibly, zero or all) characters from the end.

Input

The first line contains two integers n, q ($1 \le n \le 5 \cdot 10^5$, $1 \le q \le 5 \cdot 10^5$) — the length of the sequence and the number of level segments to analyze.

The second line contains a string s of length n consisting of lowercase English letters.

Each of the next q lines contains two integers l, r ($1 \le l \le r \le n$), representing a query on the substring $s[l, r]$.

Output

Print q lines. The i-th line must contain a single integer: the value of $|\text{LFS}(s[l, r])|$ for the pair (l, r).

Examples

standard input	standard output
5 4 ababa 1 1 1 5 1 4 2 5	1 1 2 2
10 1 aaaaaaaaaa 1 10	1
17 5 deabcabcabdeadede 1 8 1 10 4 9 2 16 1 17	3 2 3 1 2

Note

Explanation of sample 1. In the first example:

- In the first query, the substring is $t = s[1,1] =$ ¨a¨. The maximum frequency of a substring inside ¨a¨ is 1, reached by ¨a¨ itself, whose length is 1. Therefore, the answer is 1.
- In the second query, the substring is $t = s[1,5] =$ ¨ababa¨. The maximum frequency of a substring inside ¨ababa¨ is 3, reached by ¨a¨, whose length is 1. Therefore, the answer is 1.
- In the third query, the substring is $t = s[1,4] =$ ¨abab¨. The maximum frequency of a substring inside ¨abab¨ is 2, reached by ¨a¨, ¨b¨ and ¨ab¨. Among these strings, the one with maximum length is ¨ab¨, whose length is 2. Therefore, the answer is 2.
- In the fourth query, the substring is $t = s[2,5] =$ ¨baba¨. The maximum frequency of a substring inside ¨baba¨ is 2, reached by ¨a¨, ¨b¨ and ¨ba¨. Among these strings, the one with maximum length is ¨ba¨, whose length is 2. Therefore, the answer is 2.