

## Problem E. Treasure Box

Input file: *standard input*  
Output file: *standard output*  
Time limit: 2 seconds  
Memory limit: 1024 mebibytes

You are playing a VR game about adventures in an ancient world. You were on a journey to find the legendary treasure, and after breaking through several gates, you found a box that was supposed to contain the treasure. But the box had a lock on it with the following message: “To open the box, change the letters under the box well, so that it reads the same forward and backward.”

After looking under the box, you found a string consisting of  $N$  characters in a row. The  $i$ -th character is located at position  $(i, 0)$ , so distances between adjacent characters are 1.

It seems that the box can be opened by replacing the characters under the box and making it a palindrome. To do that, you start at some position, and you can repeatedly move to another position and replace the character at that position by any other character, until the string becomes a palindrome.

Since your HP is limited, you want to gain the treasure using minimum HP. Each position requires a different amount of HP to replace the respective character. Also, it consumes  $C$  HP to move a unit distance. That is, if you were at position  $(i, 0)$ , and you want to move to position  $(j, 0)$  to replace the  $j$ -th character, the movement will decrease your HP by  $C \cdot |j - i|$ .

For each integer  $i$  such that  $1 \leq i \leq N$ , find the minimum HP consumed to obtain the treasure if you start at position  $(i, 0)$ .

### Input

The first line contains an integer  $T$ , the number of test cases ( $1 \leq T \leq 100\,000$ ). The test cases follow.

The first line of each test case contains two integers:  $N$ , the number of characters under the box ( $1 \leq N \leq 1\,000\,000$ ), and  $C$ , the amount of HP consumed when moving a unit distance ( $1 \leq C \leq 10^9$ ).

The second line consists of  $N$  characters. It represents the string under the box. Each letter is an uppercase English letter.

The third line contains  $N$  integers. The  $i$ -th integer represents the HP consumed to replace the  $i$ -th character. Each of these integers is between 1 and  $10^9$ .

The sum of  $N$  over all test cases does not exceed 1 000 000.

### Output

For each test case, print  $N$  integers on a single line. The  $i$ -th integer must be the minimum HP consumed when starting at position  $(i, 0)$ .

### Example

<i>standard input</i>	<i>standard output</i>
2	6 5 6 6 5
5 1	2 1 2 3 4
ABCDE	
7 1 4 5 1	
5 1	
ABCD A	
7 1 4 5 1	

### Note

For the first test case, when the starting position is  $(1, 0)$ , one of the optimal ways is to first move to position  $(2, 0)$  and change “B” to “D”, then move to position  $(5, 0)$  and change “E” to “A”.