

Cake

Joy: I ate it: joy.

Leopold and Molly love cake: While Leopold loves eating cake, Molly loves watching Leopold eat cake. Today, they have bought N pieces of seedcake. The pieces are on a narrow plate with N cake piece positions in a row. From left to right, the positions are numbered from 1 to N . Also the pieces are numbered, with piece i on position i .

When eating cake, Leopold considers how delicious the pieces are. For each piece i , he exactly knows about its initial deliciousness value d_i . He starts with some piece a ; then, position a is empty. After that, the next piece he eats is always the least delicious piece next to any empty position. Hence, at any time, all empty positions are from a single closed interval. To make things even more interesting, Molly occasionally adds a topping to some piece to enhance its deliciousness. She will always do so in a way that makes the piece one of the 10 most delicious pieces. At any time, no two pieces will be equally delicious.

Sometimes, Molly wonders how many of the pieces Leopold will eat before he eats a certain piece b —assuming there are no future enhancements. Help Molly and write a program that can process instructions of the form “enhance a piece” or “find the number of pieces Leopold will eat before a certain piece”.

Input

The first line contains the two integers N ($1 \leq N \leq 250\,000$), the number of pieces, and a ($1 \leq a \leq N$), the piece Leopold will eat first. The second line contains N mutually distinct integers $1 \leq d_1, \dots, d_N \leq N$, the initial deliciousness values of the pieces. The third line contains $1 \leq Q \leq 500\,000$, the number of instructions to process. Each of the next Q lines contains an instruction of one of the following two types:

- $E\ i\ e$ (the character “E” followed by two integers $1 \leq i \leq N$ and $1 \leq e \leq 10$): an instruction of this type tells your program that piece i is enhanced so that it becomes the unique e -th most delicious piece. The number of pieces that, before the enhancement, were more delicious than piece i is guaranteed to be at least e .
- $F\ b$ (the character “F” followed by an integer $1 \leq b \leq N$): an instruction of this type requests your program to tell how many pieces Leopold will eat before he eats piece b .

Output

For each instruction of type “F”, in the order as these instructions appear in the input, output a line that contains a single integer: the requested number of pieces.

Constraints

$N \leq 250\,000, Q \leq 500\,000$

Subtask 1 (15 points). $N, Q \leq 10\,000$

Subtask 2 (15 points). $N \leq 25\,000$, and there are at most 500 instructions of type “F”.

Subtask 3 (20 points). $Q \leq 100\,000$, and there are at most 100 instructions of type “E”.

Subtask 4 (50 points). No further constraints.

Sample

Input	Output
5 3	4
5 1 2 4 3	1
17	0
F 1	2
F 2	3
F 3	4
F 4	3
F 5	0
E 2 1	1
F 1	2
F 2	4
F 3	3
F 4	0
F 5	1
E 5 2	2
F 1	
F 2	
F 3	
F 4	
F 5	

Before the first enhancement, cakes 3, 2, 4, 5, 1 would be eaten (in that order). But afterwards, the second cake is too delicious to get eaten quickly. Cakes number 4 and 5 are eaten first. However, the final enhancement of cake number 5 has no influence on the order of eating.

Limits

Time limit: 2 s

Memory limit: 1024 MB

Feedback

There is full feedback given for this task, i.e. the public score shown equals your real score and you are shown the verdicts for all the testcases.