



5: Vluchtstrookdانسje

Level: Hard

Time limit: 8 seconds

As you all may know Sasha and Froukje are very good at “het vluchtstrookdانسje” (if you don’t know what it is ask them). That is why they organized a contest during the weekly drinks of **via**. During this all the people present will perform the “vluchtstrookdانس”, this dance is unique since at the end everyone needs to fall on top of each other. You have been appointed as a choreographer and will practise with the contestants each week at the weekly drinks.

The “vluchtstrookdانس” is a form of line dance: a certain number of contests line up and then perform a sequence of moves, where every move is either to the left or to the right. However, Sasha and Froukje decided to make this dance more challenging. They decided that the contest need to increase the length of each move. So the first moth will be of length 1, the second of length 2, the third of length 3 and so on. In the end, everyone needs to fall on top of each other.

Since Sasha and Froukje want the dance to be done perfectly, they have hand-picked the contestants, the starting positions and the location of where they want the dance to end. Since they are not convinced that the dance will be as perfect as they want, they visit the practise moments to decide if they want to make changes. They might replace/add/remove a contestant or change the end position.

At the end of each drinks, they want to see the dance performed in the most efficient way possible, i.e. with the lowest total of moves.

Input

A single line containing two integers $0 \leq n \leq 5000$ and $0 \leq t \leq 10^6$, the initial numbers of contestants and the initial final position. The second line contains n integers $0 \leq p_i \leq 10^6$, the starting positions of the contestants. The following line contains an integer $0 \leq A \leq 10^6$, the number of changes Sasha and Froukje make.

A lines follow, each of them in one of these 3 forms:

- A line of the form $+ i$ indicates that they add a contestant at position i .
- A line of the form $- i$ indicates that they remove a contestant from position i . You are

allowed to assume that at least one contestant started from this position before removing it.

- A line of the form $t\ i$ indicates that they changed the final position to i .

In each case, i is between 0 and 10^6 inclusive. **It is guaranteed that the number of times they add or remove a contestant is at most 5000.**

Output

For each of the A changes, print one line containing the lowest total number of moves of the dance after applying the changes.

Sample input 1

```
2 2
0 3
7
t 0
t 1
t 2
t 3
t 4
t 5
t 6
```

Sample output 1

```
2
4
4
2
4
8
5
```

Sample input 2

```
5 0
2 6 6 5 1
10
t 1
t 2
t 3
t 4
t 5
t 6
t 7
t 8
t 9
t 10
```

Sample output 2

```
14
9
11
12
7
9
13
16
16
20
```

Sample input 3

0 0

7

t 3

+ 5

t 3

+ 6

t 2

- 3

t 1

Sample output 3

0

3

3

5

5

4

5