D. Hash Me Out

Time limit : 1 sec
Memory Limit : 256 MB

Problem Statement

You have a container C, which is initially empty. You have to perform 3 types of operation :
1. Add number x to the container C
2. Delete number x from the container C if it is there in the container
3. Compute the hash of the container C
Hash function is defined as :

$$hash = \sum a * P^{rank(a)}$$

where sum iterates over all elements of the container and $rank(a)$ is defined as the number of elements from the container which are not greater than a.

Input

The first line of input contains a two integer denoting the number of operations Q and P ($1 \leq Q, P \leq 10^6$).
Q lines will be followed, each containing one of the following three operations :
A x : add element x to the container ($0 \leq x \leq 10^9$)
D x : delete element x from the container
H : compute the hash of the container

Output

For each operation of type H, output the hash of the container in new line. Since H can be large print H modulo $10^9 + 7$.

Sample Input

6 2
A 1
A 2
H
A 3
D 2
H

Sample output

10
14

Explanation

Third operation will compute the hash as following :
$1 * P^{rank(1)} + 2 * P^{rank(2)} = 1 * 2^1 + 2 * 2^2 = 10$

Similarly sixth operation will compute the hash as following :
$1 * P^{rank(1)} + 3 * P^{rank(3)} = 1 * 2^1 + 3 * 2^2 = 14$

Sample Input

```
11 2
A 3
A 2
A 3
A 2
H
D 2
D 3
H
D 2
A 1
H
```

Sample output

```
112
16
14
```