Network visibility

Svetlyo has decided to study computer networks. A computer network is a set of **N** devices (numbered with the numbers from 1 to N), which are connected by $N - 1$ cables. The network has a hierarchical structure – each device except for one (which we call main device) has a direct parent, from which it obtains an ip address.

During his activities he faced the problem to determine how many devices in the network are visible from a given device. We say that a device v is visible from other device u, if and only if one of the following conditions holds:

1) u is the parent of v in the hierarchical network
2) v is a predecessor (indirect parent) of u in the hierarchical network
3) the parent of v is a predecessor of u in the hierarchical network

Svetlyo has recently discovered a novel functionality of the network devices – the operation mode "access point" (AP). When a device is in this mode, it works only as a physical connection between the other devices and is practically invisible for them. Moreover, the devices, which it was the parent of, will now directly establish a connection to the closest their predecessor, which is not in AP, to obtain an ip address. Of course, the main device cannot be in AP mode.

In order to continue to study the network properties, Svetlyo needs a program which can answer **Q** queries of the following types:

1) **T x** – changes the mode of the device with number x (if AP is turned on – it will be turned off, and vice versa)
2) **B x** – the device with number x breaks down (or if it is already broken then it gets replaced with a new one). In case of such a failure the network disintegrates, and new subnetworks are formed, each of which has a main device among those, whose parent was x. If some of these main devices are in AP mode, then it is disabled. Likewise, when a device is replaced its children reconnect to it. Both the device and its children will not be in AP (even if they had been before the failure).
3) **C x** – counts the number of the devices, which are visible form the device with number x in the network. The device in question will never be in AP mode.

Input

On the first line of the input file `visibility.in` are written the numbers N and Q. The second line contains N numbers, the i-th of which is the number of the parent of the device with number i or 0 if it is the main device. Each of the following Q lines describes one query in the abovementioned format.

Output

For each query of third type on a single line of the output file `visibility.out` print one number – the number of the visible devices.

Constraints
$1 < N, Q \le 100\,000$
$1 \le x \le N$

Example

Input	Output
12 10	8
0 1 2 3 3 1 6 6 8 8 10 6	2
C 10	3
C 1	5
C 2	6
T 6	6
C 2	5
C 9	
T 3	
C 2	
B 1	
C 8	

Explanation

The initial state of the network is represented by the picture on right.

After the fourth query, device 6 becomes invisible and 7, 8 and 12 connect directly to 1. The last three become visible for device 2.

After the seventh query, device 3 becomes invisible and 4 and 5 connect directly to 2. That is why, from device 2 there are 6 visible devices, and they are 1, 4, 5, 7, 8 and 12.

After the ninth query, device 1 fails and two new networks are formed, whose main devices will be 2 and 6, respectively. The device with number 6 will no more be in AP. In this situation, the devices visible from 8 are 6, 7, 9, 10 and 12.