Problem A. Hunting leshys

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Leshys are forest spirits that inhabit many regions in Russia, especially in Siberia. Their appearance is almost always masculine and humanoid, but it may appear as an animal or even a mushroom. Sometimes it is depicted with wings and tail, like a demon; other times, as someone familiar to the person with whom he is interacting. His size and social rank can vary independently of his shape and appearance.

Some stories describe the leshy as having wife and kids, like a typical peasant. A single forest may have various leshys, and they form a hierarchical society: each leshy (except for the leshy who is the leader in that forest) has a single leshy to whom he reports.

Leshys were created at the beginning of time, but they do not know each other. At that time, each one believed to be the leader of the forest. It is only when a leshy meets another one that they compare their hierarchies and decide who is inferior to whom.

Leshys are also very lazy. When a leshy sees a threat in the forest, he must report the threat to his superior, which in turns reports to its superior, and so on, until the news reach some leshy who believes to be the leader of the forest. When all the leshy are aware of the threat, the one in charge tasks the least powerful one to deal with the problem. Note that hierarchy and power are distinct attributes for leshys.

In this exercise, you will code a program that simulates a society of leshys. There are n leshys, numbered from 1 to n, and an integer that indicates their power. Initially, each one believes himself to be the leader of the forest.

After that there are m operations, which may be one of two types:

$+\ i\ j$ This indicates that leshys i and j have met, and now leshy j is below leshy i in the hierarchy.

$?\ i$ This indicates that leshy i identified a threat in the forest. In this case, your program must answer with the power of the leshy that must deal with this threat.

Input

The first line has two integers n and m.

After this there are n integers in the second line, $p_1, p_2, \ldots, p_n$. The ith such value is p_i, which indicates the power of leshy i.

After this there are m integers indicating an operation of two leshys meeting or the identification of a threat.

Constraints

- $1 \leq n \leq 10^5$
- $1 \leq m \leq 5 \times 10^5$
- $0 \leq p_i \leq 10^9$
- $1 \leq i, j \leq n$
- You can assume that leshy hierarchies never forms a cycle.

Output

Your output must have an integer for each operation of type ? i, indicating the power of the leshy that should respond to the threat to the forest.

Examples

standard input	standard output
4 6 3 12 5 6 ? 2 + 3 2 ? 2 ? 3 + 4 1 ? 1	12 5 5 3
5 5 5 2 2 1 9 + 4 2 + 3 1 + 5 3 + 1 4 ? 1	2