

## Problem H. Queries on the Subtree

Input file: *standard input*  
Output file: *standard output*  
Time limit: 5 seconds  
Memory limit: 512 mebibytes

You are given a tree with  $n$  vertices conveniently labeled with  $1, 2, \dots, n$ . The vertex  $i$  is assigned with weight  $w_i$ .

You have to process  $q$  operations. Each operations has one of two types:

1. Change the weight of vertex  $v$  to  $x$  (denoted as “!  $v$   $x$ ”).
2. Find out the total weight of vertices with distance less than or equal to  $d$  from vertex  $v$  (denoted as “?  $v$   $d$ ”).

Note that the distance between vertices  $u$  and  $v$  is the number of edges in the shortest path between them.

You must answer the queries (operations of type 2) in order they are given in the input.

### Input

The first line of the input contains  $n$  and  $q$  ( $1 \leq n, q \leq 10^5$ ). The second line contains  $n$  integers  $w_1, w_2, \dots, w_n$  ( $0 \leq w_i \leq 10^4$ ). Each of the following  $(n - 1)$  lines contains two integers  $a_i$  and  $b_i$  denoting an edge between vertices  $a_i$  and  $b_i$  ( $1 \leq a_i, b_i \leq n$ ).

The following  $q$  lines contains the description of operations. Each operation is described in a separate line: the first character  $t$  is equal to ‘!’ for the first type of operation and ‘?’ for the second type of operation. Then follows  $v$  — the label of a vertex. Finally, the weight  $x$  is given for type 1 and the distance  $d$  is given for type 2 ( $1 \leq v \leq n, 0 \leq x \leq 10^4, 0 \leq d \leq n$ ).

### Output

For each query print a single integer — answer to this query.

### Examples

standard input	standard output
4 3 1 1 1 1 1 2 2 3 3 4 ? 2 1 ! 1 0 ? 2 1	3 2
3 3 1 2 3 1 2 1 3 ? 1 0 ? 1 1 ? 1 2	1 6 6