Arbol-stían

Problem

You are given an integer N and $N-1$ bidirectional edges. These edges connect N vertices in such a way that there is a path[1] between any two vertices (i.e. they form a tree). Additionally, each vertex has a weight. For all paths, we define their weight as the product of the number of edges in it and the **greatest common divisor** of each of the weights of the vertices in the path. Determine the simple path (a path that does not repeat edges) with the maximum weight.

Implementation Details

You must implement the function *Arbol-stian()*. This function receives an integer N, 2 vectors u, v with $N-1$ elements, and a vector w, with N elements. For each $0 \leq i \leq N-2$, $u[i]$ and $v[i]$ are the vertices that are connected by the edge i. For each $0 \leq i \leq N-1$, $w[i]$ is the weight of the vertex i. This function must return an integer, the maximum weight of a path in the tree. Your program should look like this:

```
#include <bits/stdc++.h>
using namespace std;

long long int Arbol-stian(int N, vector<int> u, vector<int> v, vector<int> w) {
    // Implement this function.
}
```

The grader will call the function **multiple** times per test case.

Examples

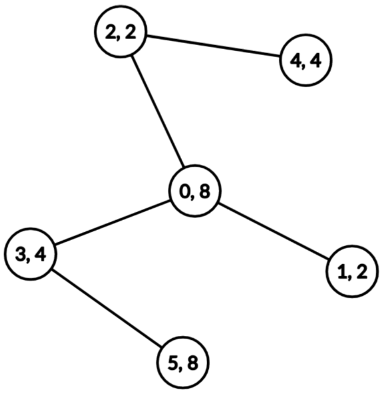
Example 1:

- The grader calls the function

  $$Arbol\text{-}stian(6, \{0, 0, 0, 2, 3\}, \{1, 2, 3, 4, 5\}, \{8, 2, 2, 4, 4, 8\})$$

  the tree in this example is illustrated in the following image:

[1] A path is defined as a sequence of vertices, such that for any two consecutive vertices, there is an edge connecting them.



- The possible paths and their weights in this tree are:

$dist(a,b)$	0	1	2	3	4	5
0	0	2	2	4	4	8
1	2	0	4	4	6	6
2	2	4	0	4	2	6
3	4	4	4	0	6	4
4	4	6	2	6	0	8
5	8	6	6	4	8	0

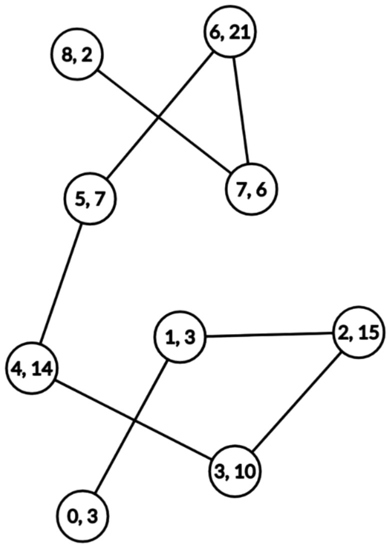
- The correct answer is 8.

Example 2:

- The grader calls the function

  Arbol-stian(9, {0, 1, 2, 3, 4, 5, 6, 7}, {1, 2, 3, 4, 5, 6, 7, 8}, {3, 3, 15, 10, 14, 7, 21, 6, 2})

  the tree in this example is illustrated by the following image:



- The correct answer is 14.

Constraints

- $1 \leq N \leq 2 \times 10^5$.
- The vectors u and v will have exactly $N-1$ elements.
- The vector w will have exactly N elements.
- For each $0 \leq i \leq N-2$, it holds that $0 \leq u[i] \neq v[i] < N$.
- For each $0 \leq i \leq N-1$, it holds that $1 \leq w[i] \leq 10^6$.
- It is guaranteed that the graph formed by the edges is a tree.
- Let S_N be the sum of all values of N across all function calls. It is guaranteed that $S_N \leq 2 \times 10^5$.

Subtasks

- (3 points) $N, S_N \leq 2000$.
- (9 points) For all $0 \leq i \leq N-1$, it holds that $w[i] = 1$.
- (11 points) For all $0 \leq i \leq N-2$, it holds that $\gcd(w[u[i]], w[v[i]])$ is a prime number.
- (22 points) For all $0 \leq i \leq N-1$, it holds that $w[i]$ is a power of 2.
- (22 points) For all $0 \leq i \leq N-2$, it holds that $u[i] = i, v[i] = i+1$.
- (33 points) No additional restrictions.