C. Kamil and Making a Stream

time limit per test: 4 seconds
memory limit per test: 768 megabytes
input: standard input
output: standard output

Kamil likes streaming the competitive programming videos. His MeTube channel has recently reached 100 million subscribers. In order to celebrate this, he posted a video with an interesting problem he couldn't solve yet. Can you help him?

You're given a tree — a connected undirected graph consisting of n vertices connected by $n-1$ edges. The tree is rooted at vertex 1. A vertex u is called an *ancestor* of v if it lies on the shortest path between the root and v. In particular, a vertex is an ancestor of itself.

Each vertex v is assigned its *beauty* x_v — a non-negative integer not larger than 10^{12}. This allows us to define the beauty of a path. Let u be an ancestor of v. Then we define the beauty $f(u, v)$ as the greatest common divisor of the beauties of all vertices on the shortest path between u and v. Formally, if $u = t_1, t_2, t_3, \ldots, t_k = v$ are the vertices on the shortest path between u and v, then $f(u, v) = \gcd(x_{t_1}, x_{t_2}, \ldots, x_{t_k})$. Here, $\gcd$ denotes the greatest common divisor of a set of numbers. In particular, $f(u, u) = \gcd(x_u) = x_u$.

Your task is to find the sum

$$\sum_{u \text{ is an ancestor of } v} f(u, v).$$

As the result might be too large, please output it modulo $10^9 + 7$.

Note that for each y, $\gcd(0, y) = \gcd(y, 0) = y$. In particular, $\gcd(0, 0) = 0$.

Input

The first line contains a single integer n ($2 \le n \le 100\,000$) — the number of vertices in the tree.

The following line contains n integers $x_1, x_2, \ldots, x_n$ ($0 \le x_i \le 10^{12}$). The value x_v denotes the beauty of vertex v.

The following $n-1$ lines describe the edges of the tree. Each of them contains two integers a, b ($1 \le a, b \le n$, $a \ne b$) — the vertices connected by a single edge.

Output

Output the sum of the beauties on all paths (u, v) such that u is ancestor of v. This sum should be printed modulo $10^9 + 7$.

Examples

input

```
5
4 5 6 0 8
1 2
1 3
1 4
4 5
```

output

```
42
```

input

```
7
0 2 3 0 0 0 0
1 2
1 3
2 4
2 5
```

```
3 6
3 7
```

output Copy

```
30
```

Note

The following figure shows all 10 possible paths for which one endpoint is an ancestor of another endpoint. The sum of beauties of all these paths is equal to 42: