E. Caisa and Tree

Caisa is now at home and his son has a simple task for him.

Given a rooted tree with n vertices, numbered from 1 to n (vertex 1 is the root). Each vertex of the tree has a value. You should answer q queries. Each query is one of the following:

- Format of the query is "1 v". Let's write out the sequence of vertices along the path from the root to vertex v: $u_1, u_2, ..., u_k$ ($u_1 = 1$; $u_k = v$). You need to output such a vertex u_i that $gcd(value\ of\ u_i, value\ of\ v) > 1$ and $i < k$. If there are several possible vertices u_i pick the one with maximum value of i. If there is no such vertex output -1.
- Format of the query is "2 v w". You must change the value of vertex v to w.

You are given all the queries, help Caisa to solve the problem.

Input

The first line contains two space-separated integers n, q ($1 \leq n, q \leq 10^5$).

The second line contains n integers $a_1, a_2, ..., a_n$ ($1 \leq a_i \leq 2 \cdot 10^6$), where a_i represent the value of node i.

Each of the next n - 1 lines contains two integers x_i and y_i ($1 \leq x_i, y_i \leq n$; $x_i \neq y_i$), denoting the edge of the tree between vertices x_i and y_i.

Each of the next q lines contains a query in the format that is given above. For each query the following inequalities hold: $1 \leq v \leq n$ and $1 \leq w \leq 2 \cdot 10^6$. **Note that**: there are no more than 50 queries that changes the value of a vertex.

Output

For each query of the first type output the result of the query.

Examples

input
```
4 6
10 8 4 3
1 2
2 3
3 4
1 1
1 2
1 3
1 4
2 1 9
1 4
```

output
```
-1
1
2
-1
1
```

Note

$gcd(x, y)$ is greatest common divisor of two integers x and y.