Coprime Paths

HackerRank

You are given an undirected, connected graph, G, with n nodes and m edges where $m = n - 1$. Each node i is initially assigned a value, $node_i$, that has *at most* 3 prime divisors.

You must answer q queries in the form `u v`. For each query, find and print the *number of* (x, y) *pairs* of nodes on the path between u and v such that $gcd(node_x, node_y) = 1$ and the length of the path between u and v is minimal among all paths from u to v.

Input Format

The first line contains two space-separated integers describing the respective values of n and q.
The second line contains n space-separated integers describing the respective values of $node_1, node_2, \ldots, node_n$.
Each of the $n - 1$ subsequent lines contains two space-separated integers, u and v, describing an edge between nodes u and v.
Each of the q subsequent lines contains two space-separated integers, u and v, describing a query.

Constraints

- $1 \le n, q \le 25 \times 10^3$
- $1 \le node_i \le 10^7$
- $1 \le u, v \le n$

Output Format

For each query, print an integer on a new line denoting the *number of* (x, y) *pairs* of nodes on the path between u and v such that $gcd(node_x, node_y) = 1$ and the length of the path between u and v is minimal among all paths from u to v.

Sample Input 0

```
6 5
3 2 4 1 6 5
1 2
1 3
2 4
2 5
3 6
4 6
5 6
1 1
1 6
6 1
```

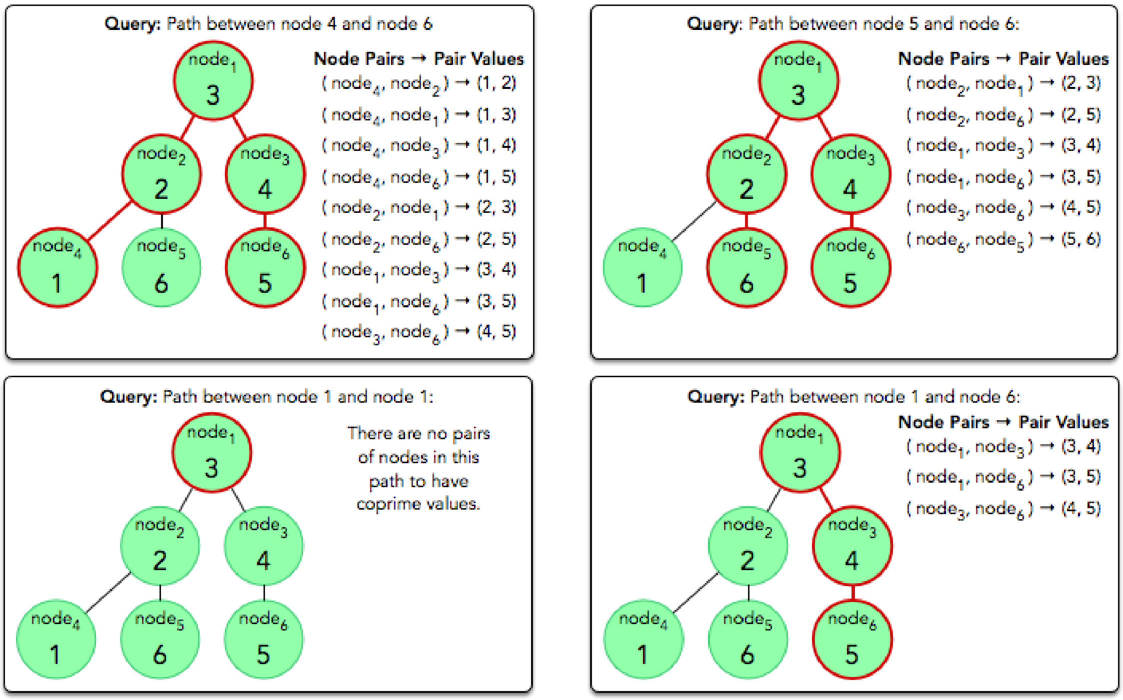
Sample Output 0

```
9
6
0
```

```
3
3
```

Explanation 0

The diagram below depicts graph G and the $u \leftrightarrow v$ paths specified by each query, as well as the *Pair Values* for each path in the form $(node_x, node_y)$:



Recall that, for each queried path, we want to find and print the number of (x, y) pairs of nodes such that $gcd(node_x, node_y) = 1$.