

Minimum Not Divisible

Input file: **standard input**
Output file: **standard output**
Time limit: 1.5 seconds
Memory limit: 64 megabytes

You have a tree (a connected acyclic graph) of N nodes indexed from 1 to N . Each node i has an integer value $V_i > 1$ assigned to it.

You are given Q queries, where each query i consists of two integers A_i and B_i . Your task is to find the minimum value (greater than 1) that is not divisible by any of the assigned values on the path between A_i and B_i , including the values assigned to A_i and B_i .

Input

The first line contains one integer N ($2 \leq N \leq 10^5$), the number of nodes. The second line contains N integers V_1, V_2, \dots, V_N ($2 \leq V_i \leq 10^8$).

Each of the following $N - 1$ lines contains two integers a and b , meaning that there is an edge between a and b .

The next line contains one integer Q ($1 \leq Q \leq 10^5$), the number of queries. Each of the next Q lines contains two integers A_i and B_i , describing a query.

For tests worth 5 points: $N, Q \leq 10^3$ and every node is connected to at most 2 other nodes.

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For tests worth 10 points: $V_i \leq 3$ for each $i = 1 \dots N$ and every node is connected to at most 2 other nodes.

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For tests worth 10 points: All V_i values are unique for $i = 1 \dots N$ and every node is connected to at most 2 other nodes.

For tests worth 15 points: All V_i values are unique for $i = 1 \dots N$.

For tests worth 20 points: Every node is connected to at most 2 other nodes.

For tests worth 25 points: No additional limitations.

Output

For each query, you need to write a single line with an integer representing the answer to that query.

Example

standard input	standard output
9	5
7 25 8 4 1000000 6 11 3 2	2
5 7	3
5 1	
5 6	
7 3	
1 2	
1 4	
6 8	
2 9	
3	
8 9	
3 8	
4 9	

Note

In the **sample case**:

- Node values on the path of the first query are 3, 6, 1000000, 7, 25, 2. The minimum integer not divisible by any of them is 5.
- Node values on the path of the second query are 8, 11, 1000000, 6, 3. The minimum integer not divisible by any of them is 2.
- Node values on the path of the third query are 4, 7, 25, 2. The minimum integer not divisible by any of them is 3.

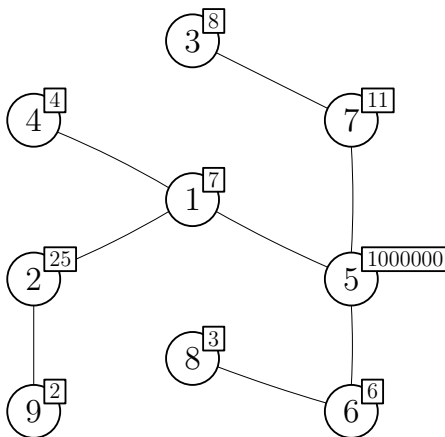


Figure 1: The sample case.