Weird Tree (`sumtree`)

Filippo has found a weird tree (a connected acyclic graph), with N nodes indexed from 1 to N and $N-1$ edges, each node has a value V_i.

He is studying the tree thoroughly, but is struggling to compute its *Beauty*, which is defined in the following way:

- The *correlation* of a pair of nodes (i, j) is the sum of the values on the path that connects them, including i and j.
- The *beauty* of the tree is the sum of the *Correlation* over all pairs (i, j), such that $i \neq j$ and $\gcd(i, j) \neq 1$.
- The gcd (i.e. the greatest common divisor) of 2 natural numbers a and b is the largest natural number that divides both a and b.

Figure 1: The tree Filippo is studying, upside down.

Help Filippo find the *Beauty* of the weird tree.

> ☞ Among the attachments of this task you may find a template file `sumtree.*` with a sample incomplete implementation.

Input

The first line contains the only integer N. The second line contains N integers $V_1, V_2, \ldots, V_N$.

The following $N-1$ contain two integers a and b each, meaning that there is an edge between a and b.

Output

You need to write a single line with an integer: the *beauty* of the given tree.

Constraints

- $1 \leq N \leq 100\,000$.
- $1 \leq V_i \leq 30\,000$ for each $i = 1 \ldots N$.

Scoring

Your program will be tested against several test cases grouped in subtasks. In order to obtain the score of a subtask, your program needs to correctly solve all of its test cases.

– **Subtask 1** (0 points) Examples.

– **Subtask 2** (10 points) $N \leq 100$.

– **Subtask 3** (20 points) $N \leq 1000$ and every node is connected to at most other 2 nodes.

– **Subtask 4** (20 points) $N \leq 1000$.

– **Subtask 5** (20 points) $V_i = V_j$ for every $i, j = 1 \ldots N$.

– **Subtask 6** (30 points) No additional limitations.

Examples

input	output
4 2 7 14 22 1 2 1 3 2 4	115

Explanation

In the **example case**, the following pairs' values have gcd greater than 1:

- $(1, 3)$: $\gcd(2, 14) = 2$. Their *correlation* (i.e. the sum of the values on the nodes connecting them) is $2 + 14 = 16$.
- $(1, 4)$: $\gcd(2, 22) = 2$. Their *correlation* is $2 + 7 + 22 = 31$.
- $(2, 4)$: $\gcd(7, 14) = 7$. Their *correlation* is $7 + 2 + 14 = 23$.
- $(3, 4)$: $\gcd(14, 22) = 7$. Their *correlation* is $14+2+7+22 = 45$.

The *beauty* of the tree is the sum of these values, which is 115.

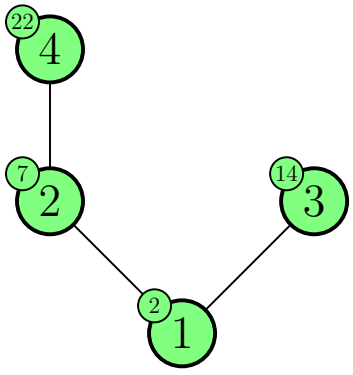

Figure 2: The sample case.