Making Friends

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Making friends is hard. There are N students in a class and $N-1$ pairs of friendship. It is guaranteed that the friendship graph is connected (i.e. a tree).

Student i has t_i units of free time. Each student can distribute their free time arbitrarily to accompany their friends. For every pair (u, v) of friends, if student u spends x units of time on student v and student v spends y units of time on student u (note that x might not be equal to y: some friends might spend only a few seconds to reply your messages with a simple `ok` or emoji while you might spend a lot of time on them). The total happiness of the pair of friends (u, v) is computed as the product xy. The total happiness of the class is the sum of the total happiness of each pair of friends in the class.

What is the maximum total happiness of the class if everyone distributes their time optimally?

Note that a student may choose to spend 0 time on a friend, or a non-integer amount of time on a friend. The only condition is that student i may spend at most t_i time in total.

Input

The first line of input contains a single integer N ($2 \le N \le 100000$).

The next line contains N space-separated integers, the i-th of which denotes t_i ($1 \le t_i \le 10^6$).

The next $N-1$ lines contain 2 space-separated integers each, u_i, v_i ($1 \le u_i \ne v_i \le N$). This denotes that students u_i and v_i are friends.

It is guaranteed that each pair of friendship appears at most once in the input, and the given friendship graph is connected.

Output

Output a single integer, the maximum possible total happiness of the class. It is guaranteed that the testcases are given such that the answer is an integer.

Scoring

Subtask 1 (9 points): $u_i = i, v_i = i + 1$ for all $1 \le i \le N - 1$

Subtask 2 (20 points): Each student has at most 3 friends.

Subtask 3 (22 points): $N \le 1000$, $t_i = 1$

Subtask 4 (49 points): Original Constraints

Examples

standard input	standard output
7 9 4 4 1 9 9 9 1 2 1 3 2 4 3 5 3 6 3 7	72
2 1000000 1000000 1 2	1000000000000

Note

For the first sample, the following distribution works:

Student 1: Spends 9 units of time on student 2.

Student 2: Spends 4 units of time on student 1.

Student 3: Spends $\frac{4}{3}$ units of time on student 5, 6 and 7 each.

Student 4: Spends 1 unit of time on student 2.

Student 5: Spends 9 units of time on student 3.

Student 6: Spends 9 units of time on student 3.

Student 7: Spends 9 units of time on student 3.

The total happiness of the class is $9 \times 4 + 0 \times 0 + 0 \times 1 + \frac{4}{3} \times 9 + \frac{4}{3} \times 9 + \frac{4}{3} \times 9 = 72$.