Problem E. Taxi

Input file:	*standard input*
Output file:	*standard output*
Time limit:	7 seconds
Memory limit:	512 mebibytes

There are n cities that are connected by $n-1$ roads, forming a tree. Note that each road has a given length.

When you are at city v, you can take a taxi of the local taxi company to any other city w. For this, you have to pay $a_v + d \cdot b_v$ cookies, where d is the distance from v to w. In other words, you have to pay the base cost a_v and additionally b_v for each unit of distance traveled.

You are currently at city 1, and for each other city v, you want to know the minimum cost to get there.

Input

The first line contains one integer n ($2 \le n \le 10^5$) — the number of cities.

The second line contains n integers a_i ($0 \le a_i \le 10^{12}$) — the base costs of the taxis.

The third line contains n integers b_i ($1 \le b_i \le 10^6$) — the cost per distance.

Then $n-1$ lines follow, describing the roads between the cities. Every line contains three integers u, v, and ℓ ($1 \le u, v \le n$, $u \ne v$, $1 \le \ell \le 10^6$) describing a bidirectional road between cities u and v of length ℓ.

Output

Output a single line containing $n-1$ integers. The i-th of them should be the minimum cost to get to city $i+1$.

Examples

standard input	*standard output*
3 0 1 2 8 4 4 1 2 1 1 3 7	8 41
2 353 313 928248 475634 2 1 898027	833591767049

Note

Consider the cost to get to city 3 in the first sample: Driving directly from 1 to 3 would cost $0 + 7 \cdot 8 = 56$. It is better to drive from 1 to 2 with a cost of 8 and take a second taxi from 2 to 3 with a cost of $1 + 8 \cdot 4 = 33$. While the distance traveled is larger, the cost is still smaller.