Sky City
Problem ID: city

There are n buildings and $n-1$ undirected roads connecting the buildings such that the network of roads forms a tree.

Outside every building there is a vehicle that you can rent. The cost of the vehicle at building i is c_i per unit distance travelled, and additionally a base cost of r_i to rent. So if you choose to rent the vehicle and travel d units distance, the rental costs you a total of $dc_i + r_i$.

The problem is to calculate the minimum cost to travel from building 1 to building i for all i. For each travel calculation, you should move through the shortest path, i.e. the simple path from building 1 to i.

Input

Your program will receive input from standard input.

The first line contains a positive integer n representing the number of buildings.

In the following $n-1$ lines, the i-th line contains integers x_i, y_i, and d_i, indicating that there is a road from buildings x_i and y_i of length d_i.
In the following n lines, the i-th line describes the cost parameters of the vehicle outside building i, c_i and r_i, representing the cost per unit distance travelled and cost to rent, respectively.

Output

Your program should write to standard output.

Print exactly one line containing $n-1$ integers. The i-th integer should be the minimum cost required to travel from building 1 to building $i+1$.

Constraints

- $2 \leq n \leq 2 \cdot 10^5$
- $1 \leq x_i, y_i \leq n; 1 \leq d_i \leq 10^4$
- $x_i \neq y_i$
- The given graph forms a tree
- $1 \leq c_i \leq 10^9; 0 \leq r_i \leq 10^9$.

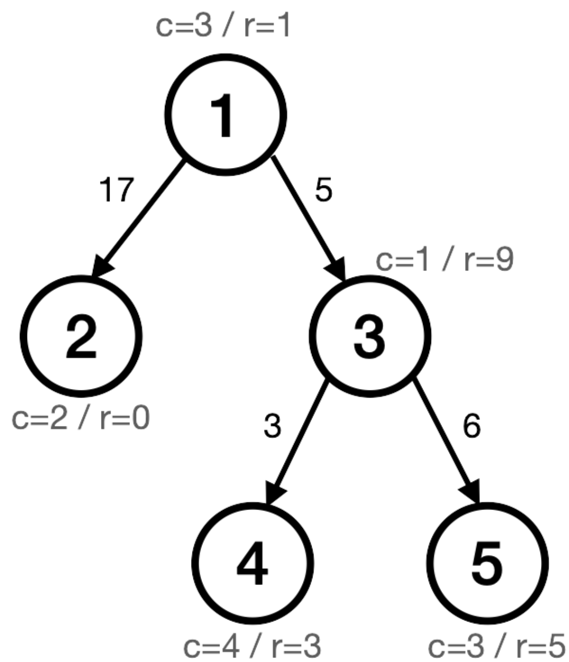
Subtasks

You will get points for each subtask when you pass all of the testcases of the subtask.

1. $n \leq 10^3$ (19 points)
2. The given tree is linear and rooted at building 1 (32 points)
3. No additional constraints (49 points)

Sample Explanation

The city in Sample Input 1 is shown below:



- The minimum cost to travel to building 2 is $1 + 3 \times 17 = 52$.
- The minimum cost to travel to building 3 is $1 + 3 \times 5 = 16$.
- The minimum cost to travel to building 4 is $1 + 3 \times 8 = 25$.
- The minimum cost to travel to building 5 is $16 + 9 + 1 \times 6 = 31$.

Sample Input 1	Sample Output 1
5 2 1 17 1 3 5 3 4 3 5 3 6 3 1 2 0 1 9 4 3 3 5	52 16 25 31