D. Hot Days

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

The official capital and the cultural capital of Berland are connected by a single road running through n regions. Each region has a unique climate, so the i-th $(1 \le i \le n)$ region has a stable temperature of t_i degrees in summer.

This summer a group of m schoolchildren wants to get from the official capital to the cultural capital to visit museums and sights. The trip organizers transport the children between the cities in buses, but sometimes it is very hot. Specifically, if the bus is driving through the i-th region and has k schoolchildren, then the temperature inside the bus is $t_i + k$ degrees.

Of course, nobody likes it when the bus is hot. So, when the bus drives through the i-th region, if it has more than T_i degrees inside, each of the schoolchild in the bus demands compensation for the uncomfortable conditions. The compensation is as large as x_i rubles and it is charged in each region where the temperature in the bus exceeds the limit.

To save money, the organizers of the trip may arbitrarily add or remove extra buses in the beginning of the trip, and between regions (of course, they need at least one bus to pass any region). The organizers can also arbitrarily sort the children into buses, however, each of buses in the i-th region will cost the organizers $cost_i$ rubles. Please note that sorting children into buses takes no money.

Your task is to find the minimum number of rubles, which the organizers will have to spend to transport all schoolchildren.

Input

The first input line contains two integers n and m $(1 \le n \le 10^5; 1 \le m \le 10^6)$ — the number of regions on the way and the number of schoolchildren in the group, correspondingly. Next n lines contain four integers each: the i-th line contains t_i, T_i, x_i and $cost_i$ $(1 \le t_i, T_i, x_i, cost_i \le 10^6)$. The numbers in the lines are separated by single spaces.

Output

Print the only integer — the minimum number of roubles the organizers will have to spend to transport all schoolchildren.

Please, do not use the `%lld` specifier to read or write 64-bit integers in C++. It is preferred to use cin, cout streams or the `%I64d` specifier.

Examples

input
2 10 30 35 1 100 20 35 10 10

output
120

input
3 100 10 30 1000 1 5 10 1000 3 10 40 1000 100000

output
200065

Note

In the first sample the organizers will use only one bus to travel through the first region. However, the temperature in the bus will equal $30 + 10 = 40$ degrees and each of 10 schoolchildren will ask for compensation. Only one bus will transport the group through the second region too, but the temperature inside won't exceed the limit. Overall, the organizers will spend $100 + 10 + 10 = 120$ rubles.