Profit Maximization

There are n commodities numbered from 1 to n. The commodities are traded at multiple exchanges where each exchange only allows a particular pair of commodities to be exchanged. There are total $n-1$ exchanges. The commodities and the exchanges form a tree structure.

i^{th} exchange charges t_i units as a transaction charge for its services, e.g. say a particular exchange allows trade between commodity a and b, and you are exchanging 10 units from a to b or vice versa and if it charges 2 units, then you can get 8 units of b corresponding to 10 units of a and vice versa. The trader performing the transaction earns p_i profit as a result of transaction.

A trader wants to maximize the profit and is allowed to start with m units of any commodity of his/her choice.

Can you find the maximam profit the trader can earn if he/she can trade with any exchange at most once?

Evaluation Criteria

- Correctness and efficiency. A good solution should be optimized w.r.t both time and memory.

- Code Quality. Good code design and readability is expected.

Input Format

The first line contains two integers n and m. Then $n-1$ lines follow. Each line describes an exchange allowing trade between two commodities It contains four integers, u_i, v_i, t_i and p_i. u_i and v_i are the numbers of two commodities traded at this exchange, t_i is the transaction charge, and p_i is the profit trader makes by trading at this exchange.
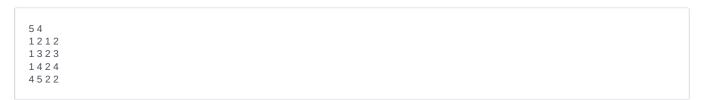
Constraints

- $1 \le n \le 10^5$

- $1 \le m \le 10^9$

- $1 \le u_i, v_i \le n$

- $1 \le t_i \le 10^9$

- $1 \le p_i \le 10^4$

Output Format

An integer which is the maximum profit.

Sample Input

```
5 4
1 2 1 2
1 3 2 3
1 4 2 4
4 5 2 2
```

Sample Output

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7
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Explanation

You start with 4 units of commodity numbered 3 and exchange it with 1 at the expense of 2 units and earning 3 profit.

Then, you exchange 1 with 4 at the expense of remaining 2 units and earning 3 profit. So, total profit earned is 7.