Problem D. Master of Both VI

Time limit: 2.5 seconds
Memory limit: 1024 megabytes

*This is the sixth instance of "Master of Both", so it is only natural that the problem is about **Hex**tech.*

In order to seize the Hexgates and complete his glorious evolution, Viktor is attacking Piltover. There are n crossings in Piltover connected by $n-1$ bidirectional roads such that any two crossings can reach each other by using these roads. In other words, Piltover is a tree.

Viktor uses his Hextech Claw to emit Hextech Rays to attack Piltover, while Jayce invented the Hextech Shield to protect the city. Each attack is quantified by a damage value, and each Hextech Shield has a health value. When an attack with damage value a hits a Hextech Shield with health b, the health is reduced to $b-a$. If the health of a Hextech Shield is less than or equal to zero, the Hextech Shield is considered destroyed.

When a Hextech Shield is attacked, it can overload itself to reduce the damage by half, which means the damage could be a real number. For example, if the damage is initially 3 and the shield overloads, the damage will actually be 1.5. However, the Hextech Shield cannot overload during two consecutive attacks on it, as it would cause the Hextech Gemstone to become unstable, resulting in catastrophic consequences.

Under Viktor's relentless attacks, Jayce created numerous Hextech Shields and deployed them at the crossings to block the incoming damage. Once a Hextech Shield is deployed, it will absorb all the attack damage directed at that crossing. Now there are q events happening in order:

- `A` x y z: Viktor emitted a Hextech Ray to attack all crossings on the shortest path from x to y with damage value z.
- `D` x h: Jayce detected a Hextech Shield at crossing x which **hasn't been destroyed** yet. Due to the chaos on the battlefield, Jayce cannot remember when the Hextech Shield was placed. He only remembers the Hextech Shield initially has a health value of h. You should help him calculate the maximum number of attacks it has taken to help Jayce infer the reliability of this Hextech Shield.

The defense must not fail, so please help Jayce finish the calculations.

Input

The first line contains two integers n, q ($1 \le n \le 5 \cdot 10^5, 1 \le q \le 3 \cdot 10^5$), denoting the number of crossings and the number of events.

Each of the following $n-1$ lines contains two integers u, v ($1 \le u, v \le n$), denoting a bidirectional edge connecting crossings u and v.

The i-th of the following q lines contains an event, starting with a character o_i ($o_i \in \{\texttt{A}, \texttt{D}\}$). If $o_i = \texttt{A}$, then three integers x_i, y_i, z_i ($1 \le x_i, y_i \le n, 1 \le z_i \le 370$) follow, describing an attack event. Otherwise, two integers x_i, h_i ($1 \le x_i \le n, 1 \le h_i \le 10^9$) follow, describing a detection event.

Output

For each event of the detection type, output the answer in a single line.

Example

standard input	standard output
5 7 1 2 1 3 2 4 2 5 A 1 4 2 A 3 5 2 D 1 4 D 2 3 D 2 1 A 5 5 10 D 5 100	2 1 0 2