Problem G
3-A. Nihilation

Tresno teaches class 3-A. In the centre of its classroom stands a tree.

The tree consists of N vertices (numbered from 1 to N) and $N-1$ edges (numbered from 1 to $N-1$). Edge i connects vertices U_i and V_i. Initially, each vertex is occupied by exactly one student.

The tree is hungry for power. Therefore, Tresno wants to prune the tree until only a single vertex remains by annihilating the vertices of the tree one by one. However, Tresno does not want to harm any of his students.

Precisely, Tresno may perform the following operations any number of times, in any order:

- **Annihilate.** Remove a vertex that currently contains no students, together with all edges incident to it. This operation does not sap any energy.
- **Move.** Move **all** students from a vertex to a neighbouring vertex. Each student moved causes the tree to sap 10^{5k} units of energy from the ground, where k is the number of vertices currently remaining. Multiple students may occupy the same vertex after move operations.

Find any sequence of operations that accomplishes Tresno's goal with the minimum possible total energy sapped.

Input

The first line contains an integer N ($2 \le N \le 100\,000$), the number of vertices.

Each of the next $N-1$ lines contains two space-separated integers U_i and V_i ($1 \le U_i, V_i \le N$), describing an edge. It is guaranteed that the edges form a tree.

Output

In the first line, output a single integer Z ($1 \le Z \le 1\,000\,000$), the number of operations.

In each of the next Z lines, output an operation in one of the following formats:

- `A x`: annihilate vertex x.
- `M x y`: move all students from vertex x to vertex y.

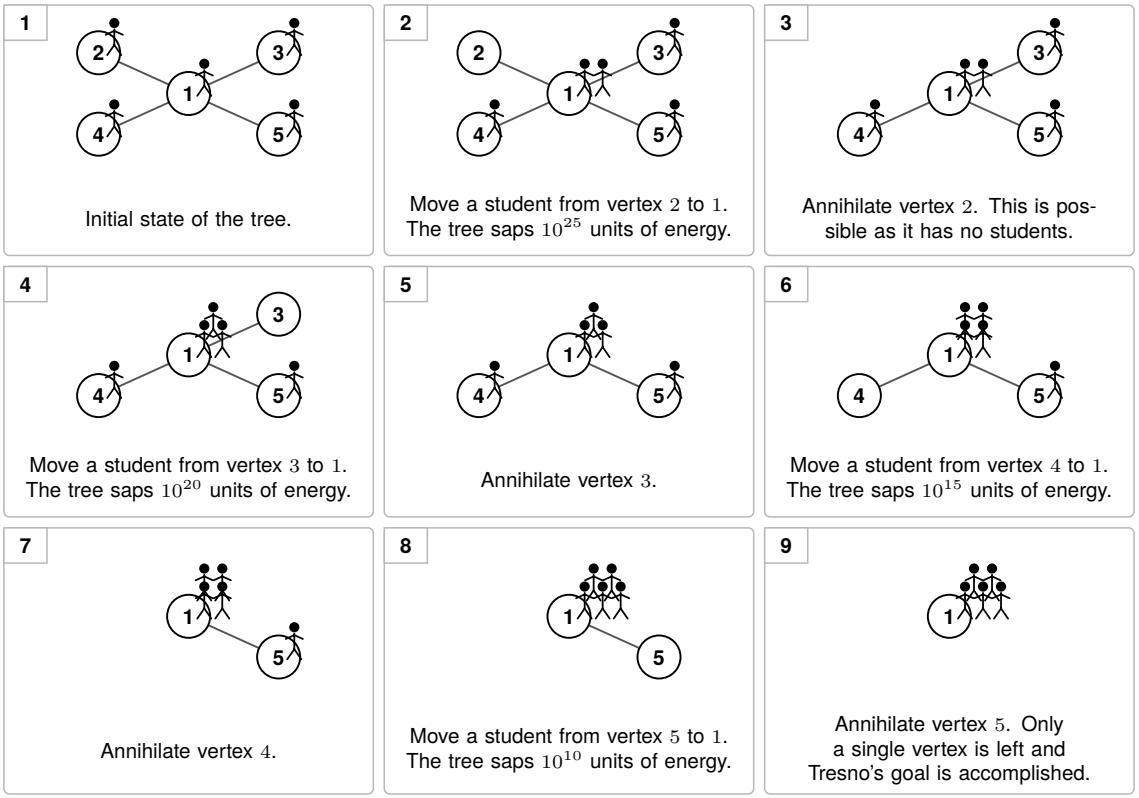
If multiple sequences of operations achieve the minimum possible total energy sapped, output any one of them.

It can be proven that under the constraints of this problem, there exists a sequence of at most $1\,000\,000$ operations that minimises the total energy sapped.

Sample 1

Sample Input	Sample Output
5 1 2 1 3 1 4 1 5	8 M 2 1 A 2 M 3 1 A 3 M 4 1 A 4 M 5 1 A 5

Explanation of Sample 1: The sequence of operations can be illustrated as follows.



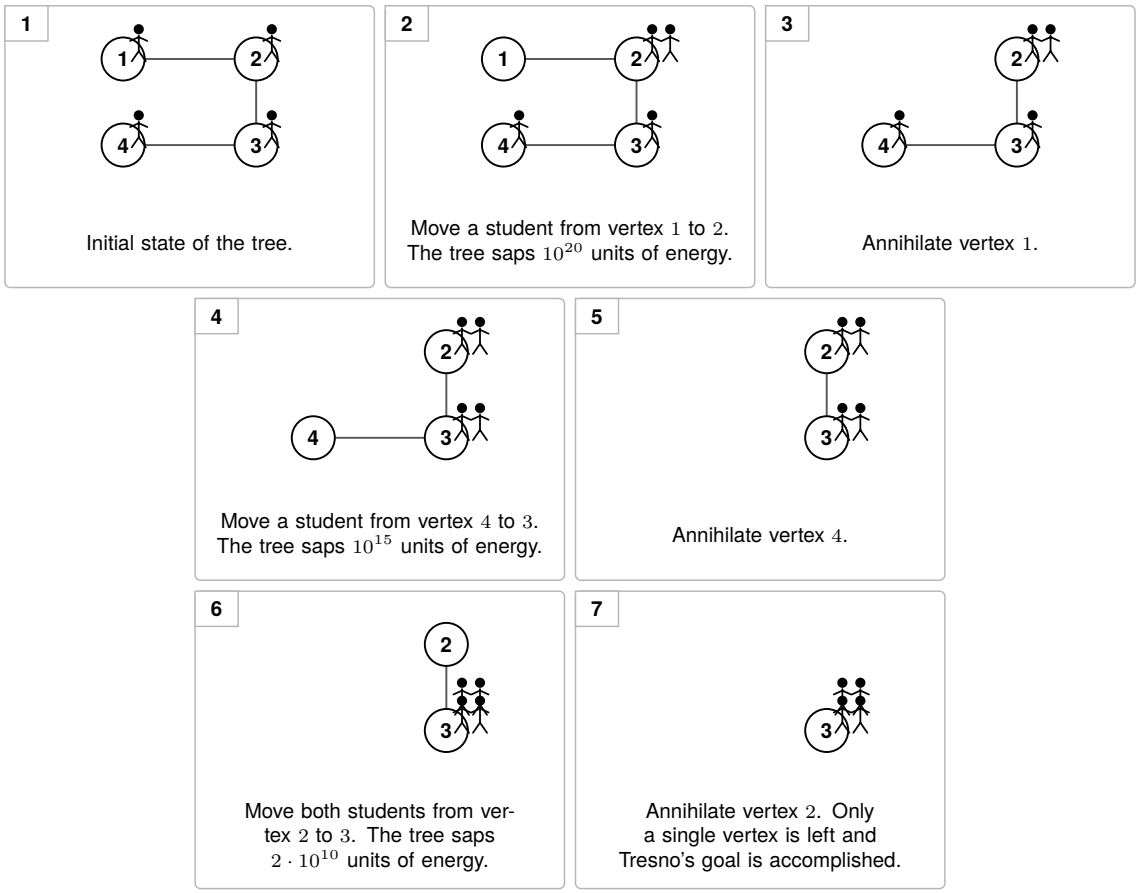
Note that Tresno is not able to move students from vertex 2 to vertex 3 in a single operation because those vertices are not adjacent.

In total, the tree saps $10\,000\,100\,001\,000\,010\,000\,000\,000$ units of energy. It can be shown that this is the minimum possible total sapped energy, so the sequence of operations is optimal.

Sample 2

Sample Input	Sample Output
4 1 2 2 3 3 4	6 M 1 2 A 1 M 4 3 A 4 M 2 3 A 2

Explanation of Sample 2: The sequence of operations can be illustrated as follows.



In total, the tree saps $100\,001\,000\,020\,000\,000\,000$ units of energy. It can be shown that this is the minimum possible total sapped energy.

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