Rectangle

You are given n points on the coordinate plane.

Write a program which calculates the largest possible area of a rectangle such that each of its vertices is one of the given points. You may assume that such a rectangle exists.

Input

The input is read from standard input. The first line of input contains an integer n, the number of given points.

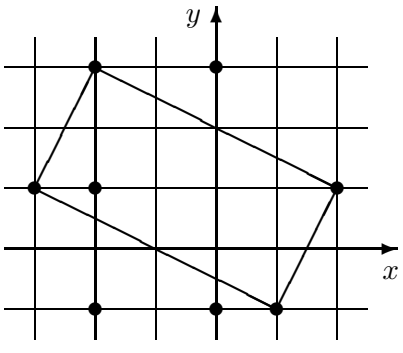
Each of the following n lines contains the coordinates of one point, two integers separated by a space. The coordinates will be between -10^8 and 10^8.

No two points will be located at the same coordinates.

Output

Output should be written to standard output. The first and only line of output should contain a single integer, the largest possible area of a rectangle.

Example

Input	Output	Explanation
8 -2 3 -2 -1 0 3 0 -1 1 -1 2 1 -3 1 -2 1	10	

Constraints

$4 \leq n \leq 1{,}500$.

Grading

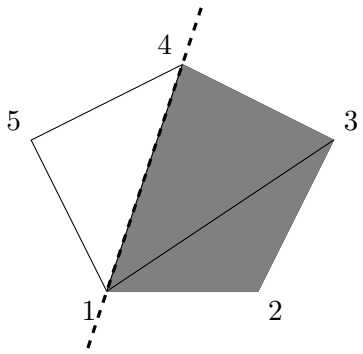
For test cases worth 20% of the total score, $n \leq 500$.

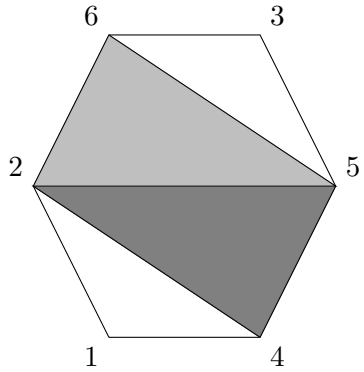
Triangulation

A *triangulation* of a polygon is a set of triangles with vertices at the vertices of a polygon. These triangles must not overlap and must cover the whole polygon.

We define a polygon *cut* as a straight line separating the polygon into two pieces.

Given a triangulated convex polygon, where each triangle has some color, find the maximal number of cuts one can do so that **no** two points of the same color end up in two different pieces.





Input

The input is read from standard input. The first line contains the number of vertices, n. Vertices are numbered with unique integers between 1 and n. Each of the next $n-2$ lines contains four integer numbers a, b, c and d ($1 \leq a, b, c, d \leq n$), meaning that the triangle which has its vertices in a, b and c has the color d. a, b and c are three different vertices. The input always contains data about a proper triangulation of a polygon and all triangles are colored.

Output

The program should write one line to standard output, containing one integer — the maximal number of cuts.

Example 1

Input	Output
5 1 2 3 2 4 5 1 1 3 1 4 2	1

Example 2

Input	Output
6 1 4 2 1 2 4 5 2 6 2 5 3 3 6 5 1	0

Constraints

$3 \leq n \leq 100{,}000$.

Grading

For test cases worth 50% of the total score, $n \leq 5000$

Monument

A Swedish millionaire wants to build a monument for her family. The names of all of her known ancestors (and later, her future descendants) will be inscribed to the sides of the monument. The form of the monument will be a rectangular block with $a \times a$ bottom/top squares and height b. That is, the bottom and top of the block will be $a \times a$ squares, and each of the four sides of the monument is an $a \times b$ rectangle. The values of a and b should be such that the four sides have as much space as possible, in order to fit as many names as possible.

The monument will be cut from a very special $p \times q \times r$ rectangular stone block that has been crystallised in a regular cubic form. That is, we may view the stone as being composed of $1 \times 1 \times 1$ unit blocks (unit cubes). Also the final monument will be composed of such unit cubes. The raw stone may only be cut perpendicular to the x-, y- or z-axis, along the borders between unit cubes.

The raw stone contains pores, in the form of empty unit cubes. The monument is required to be of high quality and is thus not allowed to contain any pores (empty unit cubes). You are given a 3D-map of the raw stone. The map describes which unit cubes are normal and which empty. Your task is to find such values for the size parameters a and b of the monument that

1. it is possible to cut the monument out of the supplied raw stone block, and
2. the monument contains maximal amount of space on its four sides, that is, the value $4ab$ is as large as possible.

Input

The input is read from standard input. The first line contains three positive integers separated by singles space characters: the values p, q and r. This is followed by pq lines, each of which contains r characters (and a new line character, no other white space). Each of the r characters is either `N` (normal) or `P` (pore). The zth character on line $1 + (yp + x - p)$ corresponds to the unit cube with coordinates (x, y, z) within the raw stone, where $1 \leq x \leq p$, $1 \leq y \leq q$ and $1 \leq z \leq r$.

Output

The program should write one line to standard output containing the maximal value of $4ab$.

Example

Input	Output
3 2 5 PNNNN PNNNN NPPNP PNNNP NNNNP PPNNP	24

Constraints

$0 < p, q, r \leq 150$.