6357   Rectangular Painting

A rectangular painting consists of several rectangles that meet the following conditions:

1. Each rectangle is either completely within another rectangle, or it does not overlap with other rectangles.

2. The two sides of each rectangle are parallel to the x and y axes.

3. The sides of any two rectangles are at least d units apart even if one of them contains the other one.

4. For each rectangle, the smallest rectangle containing it is called its super-rectangle. Rectangles with the same super-rectangles are called co-rectangles. All co-rectangles are aligned either vertically or horizontally. Two co-rectangles are horizontally (vertically) aligned if their bottom (left) edges are co-linear.

5. Each rectangle with no inner rectangle is called a photo-rectangle and is filled with a photo of its size.

6. Each rectangular painting has exactly one rectangle with no super-rectangle. This rectangle is called the root rectangle.

7. The coordinates of the rectangle corners are all integer numbers.

Given the structure of a rectangular painting (see input), we want to find the minimum possible area of the root rectangle by selecting the directions of the alignments of all co-rectangles. Note that the dimensions and orientations of the photo-rectangles are given and cannot be changed.
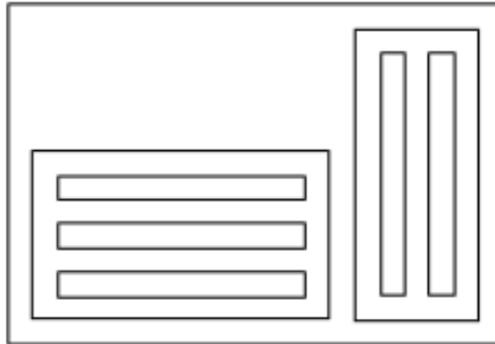
Input

There are multiple test cases in the input. Each test case starts with a line containing $1 \leq n \leq 100$ and $0 \leq d \leq 30$, where n is the number of rectangles in the rectangular painting. In the next n lines, the i-th line is the description of the i-th rectangle (rectangle with id i). The **root**-rectangle id is 1. Let R_i be the id set of rectangles whose super-rectangle is the rectangle with id i. If R_i is not empty, the description of the i-th rectangle is the size of R_i followed by the members of R_i all separated with spaces. Otherwise, the rectangle is a photo-rectangle and its description is of form '0 a b' where $1 \leq a \leq 30$ and $1 \leq b \leq 30$ are the sizes of its x-axis and y-axis sides, respectively.

The input terminates with a line containing '0 0'

Output

For each test case, write a single line containing the minimum area of the **root** rectangle among all possible conformations of the given rectangular painting.

Sample output configuration:

Sample Input

```
8 1
2 2 3
3 4 5 6
2 7 8
0 10 1
0 10 1
0 10 1
0 1 10
0 1 10
0 0
```

Sample Output

```
280
```