

Problem C

Cellophane

Input file: *pc.in*

Time limit: 8 seconds

Problem Description

Cellophane is a thin, transparent sheet made of regenerated cellulose. It is widely used for many purposes, such as decoration and candy wrapping. Due to its diverse usage, it has been made colorful. The most basic and popular colors include red, yellow, and blue. Interestingly, we may obtain other colors by overlaying cellophanes of two different colors. For example, by overlaying red and yellow cellophanes, the color becomes orange; by overlaying red and blue cellophanes, the color becomes purple; and by overlaying yellow and blue cellophanes, the color becomes green. Furthermore, if we overlay cellophanes of all the three basic colors, the color would become black. See Table 1 for a summary.

Shining Star, a cell phone company, plans to decorate all the offices by pasting cellophanes (of basic colors) on the white walls. The manager of Shining Star believes that the work efficiency of his employees can be improved if the colors on the wall are *good* enough. In the manager's opinion, it is good if the area of each color on the wall is neither too large nor too small. The wall and the cellophanes that are going to be pasted are both

Table 1: The mixture of colors.

Red + Yellow = Orange
Red + Blue = Purple
Yellow + Blue = Green
Red + Yellow + Blue = Black

rectangular. When pasting a cellophane, its sides must be parallel to the corresponding sides of the wall. Note that the cellophanes cannot be pasted outside the wall; however, they may coincide on the edges. A valid pasting is given in Figure 1.

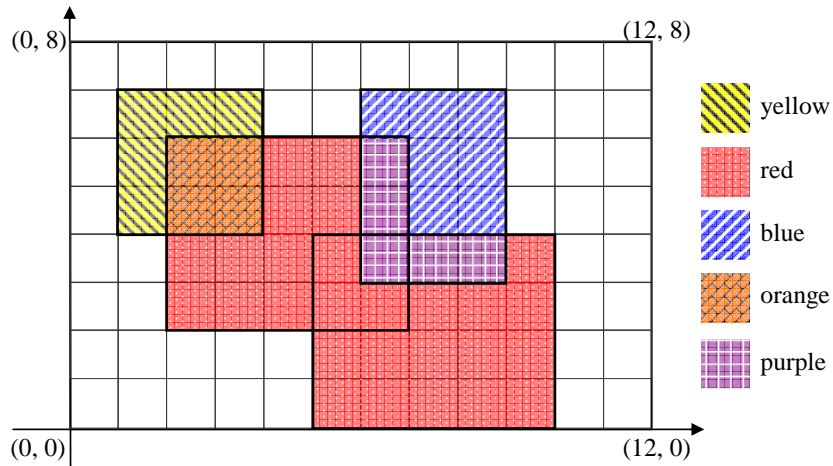


Figure 1: A valid pasting of cellophanes: two red, one yellow, and one blue.

Now, given a valid pasting of cellophanes, the manager of Shining Star asks you to compute the area of each color generated by the cellophanes, so that he can tell if the pasting is good or not. Note that those regions that are not covered by the cellophanes remain white. Consider the example in Figure 1, in which the wall is of size 96 ($= 12 \times 8$) and there are four cellophanes on the wall. In this example, the areas of red, yellow, blue, purple, orange, and white colors are 27, 5, 7, 5, 4, and 48, respectively.

Technical Specification

1. The bottom-left corner of each wall has coordinate $(0, 0)$ and the top-right corner has integer coordinate (w, h) satisfying $10 \leq w, h \leq 10000$.
2. The number of cellophanes, n : $2 \leq n \leq 2000$.
3. Each corner of a cellophane has integer coordinates (x, y) satisfying $0 \leq x, y \leq 10000$. Every cellophane is guaranteed to be completely inside the wall.

Input Format

There are at most 15 test cases. Each test case describes a valid pasting of cellophanes on a wall in a number of lines. The first line contains two integers w and h , $10 \leq w, h \leq 10000$, indicating the coordinate of the top-right corner of the wall. The second line contains an integer n , $2 \leq n \leq 2000$, indicating the number of cellophanes. Then, n lines follow. Each of the n lines consists of a capital letter $c \in \{\text{'R'}, 'Y', 'B'}\}$ followed by four integers x_1, y_1, x_2 , and y_2 ($0 \leq x_1 \leq x_2 \leq w$, $0 \leq y_1 \leq y_2 \leq h$), indicating a cellophane of color c whose bottom-left corner is (x_1, y_1) and top-right corner is (x_2, y_2) . The capital letters 'R', 'Y', and 'B' denote red, yellow, and blue, respectively. The last test case is followed by a line containing two zeroes.

Output Format

For each test case, print a line containing the test case number (beginning with 1) followed by eight integers, indicating the areas of red, yellow, blue, green, purple, orange, black, and white, respectively. The integers are separated by a whitespace. Use the format of the sample output.

Sample Input

```
12 8
4
R 2 2 7 6
Y 1 4 4 7
R 5 0 10 4
B 6 3 9 7
12 10
3
R 0 5 5 10
Y 3 2 8 8
B 4 3 10 9
0 0
```

Sample Output

```
Case 1: 27 5 7 0 5 4 0 48
Case 2: 18 7 15 17 1 3 3 56
```