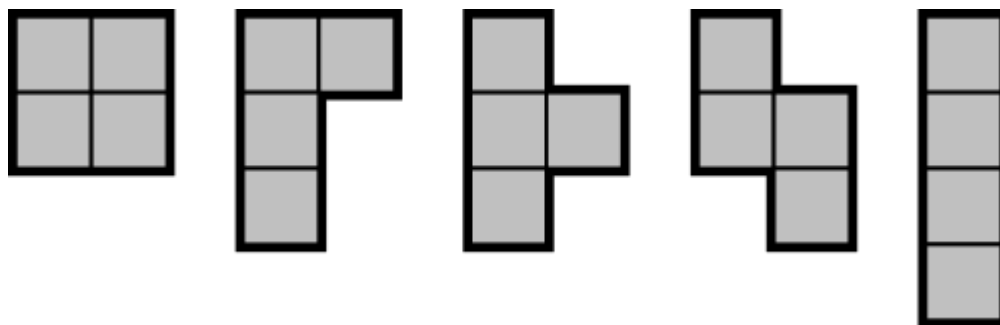


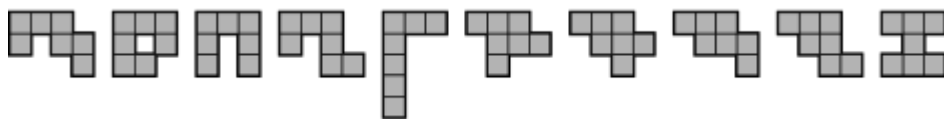
# Ominous Omino

## Problem

An  $N$ -omino is a two-dimensional shape formed by joining  $N$  unit cells fully along their edges in some way. More formally, a 1-omino is a  $1 \times 1$  unit square, and an  $N$ -omino is an  $(N-1)$ -omino with one or more of its edges joined to an adjacent  $1 \times 1$  unit square. For the purpose of this problem, we consider two  $N$ -ominoes to be the same if one can be transformed into the other via reflection and/or rotation. For example, these are the five possible 4-ominoes:



And here are some of the 108 possible 7-ominoes:



Richard and Gabriel are going to play a game with the following rules, for some predetermined values of **X**, **R**, and **C**:

1. Richard will choose any one of the possible **X**-ominoes.
2. Gabriel must use at least one copy of that **X**-omino, along with arbitrarily many copies of any **X**-ominoes (which can include the one Richard chose), to completely fill in an **R**-by-**C** grid, with no overlaps and no spillover. That is, every cell must be covered by exactly one of the **X** cells making up an **X**-omino, and no **X**-omino can extend outside the grid. Gabriel is allowed to rotate or reflect as many of the **X**-ominoes as he wants, including the one Richard chose. If Gabriel can completely fill in the grid, he wins; otherwise, Richard wins.

Given particular values **X**, **R**, and **C**, can Richard choose an **X**-omino that will ensure that he wins, or is Gabriel guaranteed to win no matter what Richard chooses?

## Input

The first line of the input gives the number of test cases, **T**. **T** lines follow. Each contains three space-separated integers: **X**, **R**, and **C**.

## Output

For each test case, output one line containing "Case #x: y", where x is the test case number (starting from 1) and y is either RICHARD (if there is at least one choice that ensures victory for Richard) or GABRIEL (if Gabriel will win no matter what Richard chooses).

## Limits

Memory limit: 1 GB.

### Small dataset

Time limit: 240 seconds.

$T = 64$ .

$1 \leq X, R, C \leq 4$ .

### Large dataset

Time limit: 480 seconds.

$1 \leq T \leq 100$ .

$1 \leq X, R, C \leq 20$ .

## Sample

### Sample Input

```
4
2 2 2
2 1 3
4 4 1
3 2 3
```

### Sample Output

```
Case #1: GABRIEL
Case #2: RICHARD
Case #3: RICHARD
Case #4: GABRIEL
```

In case #1, Richard only has one 2-omino available to choose -- the 1x2 block formed by joining two unit cells together. No matter how Gabriel places this block in the 2x2 grid, he will leave a hole that can be exactly filled with another 1x2 block. So Gabriel wins.

In case #2, Richard has to choose the 1x2 block, but no matter where Gabriel puts it, he will be left with a single 1x1 hole that he cannot fill using only 2-ominoes. So Richard wins.

In case #3, one winning strategy for Richard is to choose the 2x2 square 4-omino. There is no way for Gabriel to fit that square into the 4x1 grid such that it is completely contained within the grid, so Richard wins.

In case #4, Richard can either pick the straight 3-omino or the L-shaped 3-omino. In either case, Gabriel can fit it into the grid and then use another copy of the same 3-omino to fill in the remaining hole.