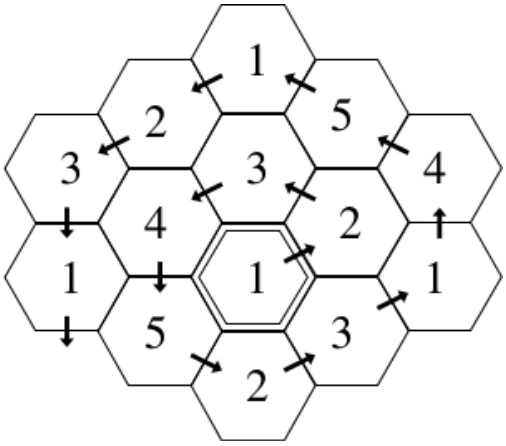
Settlers of Catan

The popular board game "Settlers of Catan" starts by creating a random board. This board consists of hexagonal resource tiles containing five different resources: clay, lumber, wool, grain, and ore. For simplicity, we will denote these by the numbers 1 to 5.
Random boards, however, often have multiple equal resource tiles next to each other. This annoys some players. Therefore, we have invented a new way of creating the playing board. Starting in the middle and spiraling outwards, each time we add a new tile to the board we choose the resource of the tile according to the following rules:

- the new tile must be different from its neighboring tiles on the board so far;
- in case multiple tiles are possible, we choose a resource that occurs the least number of times on the board so far;
- in case multiple tiles are still possible, the new resource must have the lowest number possible.

The figure underneath shows how to spiral outwards and which resource tiles are chosen first. We are curious what the number of the resource is on the n-th tile that is added to the board (starting with $n = 1$).



Input

The first line of the input contains an integer t. t test cases follow.
Each test case consists of a single line with one integer n, the number of the tile we are curious about.

Output

For each test case, output one line containing "Case #i: x" where i is its number, starting at 1, and x is the resource of the n-th tile.

Constraints

- $1 \leq t \leq 20$
- $1 \leq n \leq 10^4$

Sample Input 1	Sample Output 1
4 1 4 10 100	Case #1: 1 Case #2: 4 Case #3: 5 Case #4: 5