7262   Xiang Hex

Xiang Hex is a kind of Chinese Chess played on an elongated hexagonal chessboard by black side and red side. The chessboard consists of nine columns with the outer ones having seven cells and the center one having eleven, as shown in figure 1. The "river" is the cells marked with '0'. The "palace" of black side is marked with '1', and the "palace" of red side is marked with '2'. The player's side of the field consists of the cells before the "river".

The rules of Xiang Hex is familiar to Xiangqi. Each side controls some pieces, moves one piece at each turn, and tries to get the opponent's general piece.

On the chessboard, each column was marked from the left to the right with an uppercase character A, B, ..., H, I, and the location of a cell can be described by the character of the column and the number of cells under it in the same column (No space between the character and the number).

For example, on a chessboard below (figure 2), the cell A is marked as 'E0', the cell B is marked as 'A3', and the cell C is marked as 'I6'.

As shown in figure 3 below, suppose a piece is on the cell with '0'. If it moves to cells with '1', we say this kind of move is "orthogonal" because the destination cells share an edge with the original cell. If the piece moves from cell with '0' to cells with '2', we say this kind of move is "diagonal".
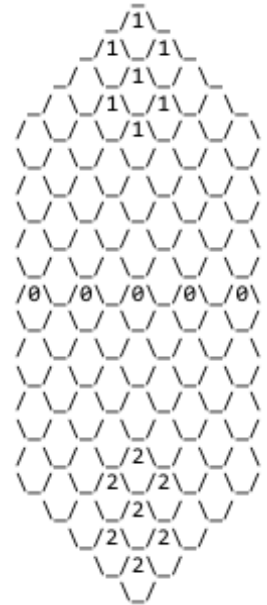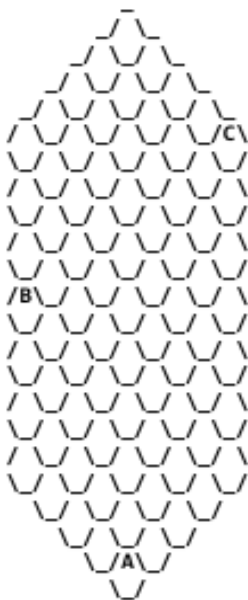

figure 1
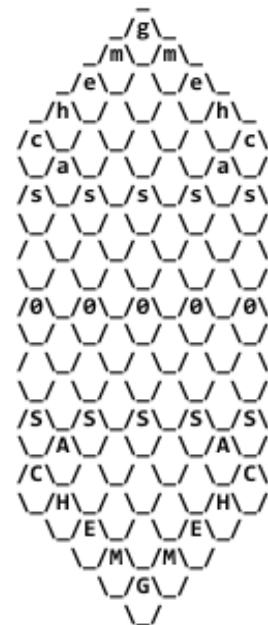

figure 2

figure 3

figure 4

There are seven kinds of pieces in Xiang Hex, and figure 4 shows the layout before game begins: (Lowercase pieces above the river belong to black side and uppercase pieces below the river belong to red side):

1. SOLDIER(`S`, `s`): Figure 5 explains the moving rule of a soldier of red side: it can only step into cell with 1 (one forward) before crossing the river. If it stands in the river or has already cross the river, it can step into cell with 1 (one forward), or cells with 2 (one right forward or left forward). Note that for black side, "forward" means "downward", which is opposite to red side.
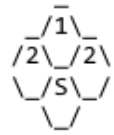

figure 5

2. HORSE(`H`, `h`) : in one move, it can step into one vacant cell orthogonally and then step into another cell diagonally in the same direction. As shown in figure 6, a horse can steps into the vacant cell with 1 first, then jump to one of the cells with 2. If there is a piece on the cell with 1, the horse cannot move to any one of the cells with 2. The horse can also move to cells with 3 if the corresponding orthogonal cell is vacant.
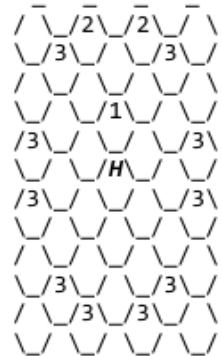
3. CHARIOT(`C`, `c`) can slide any steps orthogonally (forward, right forward, left forward, backward, right backward or left backward), without leaping any pieces (May capture the first piece it meets and stay where the enemy piece is).

4. CANNON(`A`, `a`) can slide any steps orthogonally through vacant cells. It also can leap exactly one piece to capture an enemy piece and stay where the enemy piece is. But it can't leap without capturing.

figure 6

5. ELEPHANT(`E`, `e`) moves two steps diagonally and never cross the "river". When taking the move, the first diagonal cell should be vacant. As shown in figure 7, an elephant steps into the vacant cell with 1 first, then jumps to the cell with 2. If there is a piece on the cell with 1, the elephant cannot move to the cell with 2. The elephant can also move to cells with 3 if the corresponding diagonal cell is vacant. Five cells with 2, 3 or E are the only places can a red side's elephant step into.
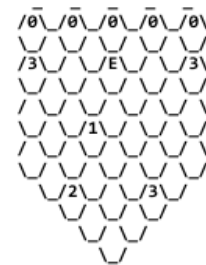

figure 7

6. MANDARIN(`M`, `m`) : moves one step diagonally and never leave the "palace". Figure 8 represents the red side's "palace", and the cells with 1 are the only places can a red side's mandarin step into.
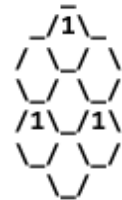
7. GENERAL(`G`, `g`) moves one step orthogonally and never leave the "palace". **Facing the enemy GENERAL in the same column with no intervening pieces is not permitted**.

figure 8

A piece can never move to a cell containing another piece from the same side. If a piece moves to a cell containing a piece from the enemy, the enemy's piece is captured and will be removed from the board.

You can't take such a move that after this move, your enemy can capture your GENERAL just by one move.

Now you are controlling the red side and it is your turn. How many different moves can you take?

Input

The first line contains an integer T ($1 \le T \le 20$) — the number of test cases.

For each case:

The first line contains an integer N ($2 \le N \le 32$) — the number of pieces on the current situation.

Then N lines follow. Each line contains a character P and a cell mark M, separated by a single space, indicating that there is a piece P in the cell marked M. Uppercase pieces belong to red side and lowercase ones belong to black side.
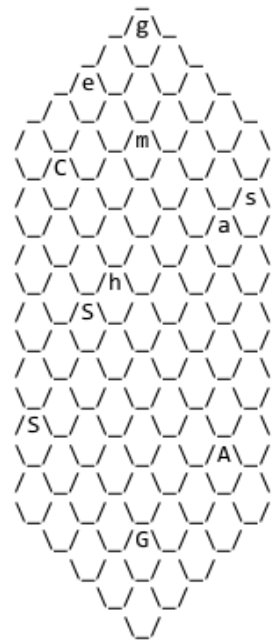
It's guaranteed that in all given cases, you can't capture the black GENERAL just by one move.

Output

For each test case, output an integer on a single line — the number of different moves you can take now.

Hint:

Two chessboards in the sample are shown on the right. For the first chessboard, the only legal move for red side is to step the GENERAL one forward.

Sample Input

```
2
2
g E9
G D0
11
g E10
e C8
m E8
C B6
s I5
a H5
h D5
S C4
S A1
G E1
A H1
```

Sample Output

```
1
42
```