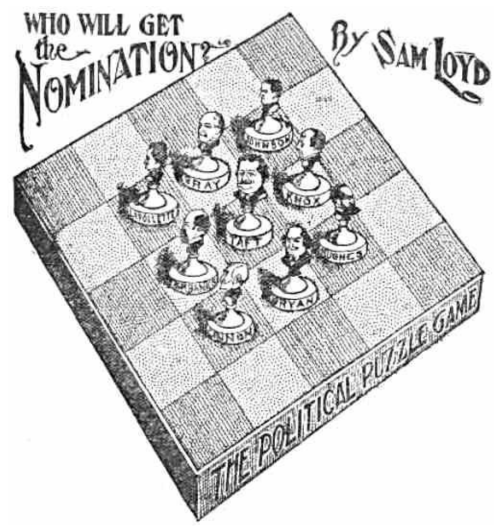
Problem H: Who Will Get the Nomination?

Occasionally during presidential elections puzzles get created for campaign purposes, some of them becoming fervidly popular, like this little game called "The Political Puzzle Game".

It consists of a 5×5 board, and nine pieces, each one representing a different candidate. The object of the game is to "capture" eight of the pieces, and leave the last one (the winner) on the square located at the centre of the board. We are not particularly interested in which candidate wins the game, but in doing this in the minimum number of moves possible.

A move means sliding any piece to an adjacent square, or jumping over another piece, removing the piece that was jumped over. All moves, whether they capture a piece or not, can be performed horizontally, vertically or diagonally. You can capture only one piece in one move, and only if there is a free square directly on the opposite side of the captured piece (the landing square).



The political puzzle game

You receive a description of a board, where a number of pieces (between 1 and 9) are arbitrarily scattered throughout the board. Your task is to determine the minimum number of moves required to win the game with any of its pieces.

Input

Input starts with a positive integer T, that denotes the number of test cases.

Each case starts with a blank line. The next five lines contain five characters each, and they describe the board. Each character of the board will be either a dot (`.`) or an asterisk (*). Dots represent empty squares, and asterisks represent game pieces. The number of pieces will be always between 1 and 9 (inclusive).

$T \leqslant 100$

Output

For each test case, print the case number, followed by the minimum number of moves required to capture all pieces on the board except for one, leaving the winner on the center of the board.

Sample Input	Output for Sample Input
3 ..... .***. .***. .***. ....*... ..*.. ....*.. .***. ..*..	Case 1: 8 Case 2: 2 Case 3: 5

Explanation of Sample Cases

For the first case, consider enumerating the pieces as follows:

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.....
.123.
.456.
.789.
.....
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Then one way to solve it in eight moves can be as follows:

- 2 jumps 6.
- 5 jumps 8.
- 2 jumps 9.
- 7 jumps 2.
- 5 jumps 7.
- 5 jumps 3.
- 5 jumps 1.
- 5 jumps 4.

For the second case, the topmost piece jumps over the other, and then moves back into the center, for a total of 2 moves.

For the third case, there is an interesting way to solve it in 5 moves, which is left as an exercise.