Problem G. Bubble Bot's Odyssey

Input file:	*standard input*
Output file:	*standard output*
Time limit:	5 seconds
Memory limit:	1024 mebibytes

In the mystical realm of Aethergrid, the land is woven into a tapestry of N rows and M columns. Each cell within this grid can take on one of the following enchanted forms:

- *Obsidian Ward*, denoted by "`#`", an unyielding magical barrier that cannot be crossed.
- *Ethereal Passage*, denoted by "`.`", an open path free for travel by those who dare venture.
- *Celestial Nexus*, denoted by "`C`", where a Bubble Bot can draw from the ancient energies, restoring its power to full strength.

A Bubble Bot begins its journey at a specific *Ethereal Passage* or *Celestial Nexus* and can move to any of the four neighboring cells (north, south, east, or west) with a single step. Each step drains one fragment of its arcane battery. The Bubble Bot is capable of making at most K moves before its energy is depleted. Stepping upon a *Celestial Nexus* instantly refills its battery to full capacity, allowing it to continue its quest. Stepping upon an *Obsidian Ward* is not allowed.

Your task is to determine, for every possible starting cell, the farthest Manhattan distance a Bubble Bot can traverse from its initial cell. If the starting point is an *Obsidian Ward*, the maximum distance is deemed to be -1.

The Manhattan distance between two cells located at (x_1, y_1) and (x_2, y_2) is measured as $|x_1-x_2|+|y_1-y_2|$, a sacred calculation of proximity through space. Note that this distance ignores all *Obsidian Wards*.

Input

The first line contains three integers N, M, and K: the number of rows, the number of columns, and the maximum number of moves a Bubble Bot can make before needing to recharge ($1 \le N, M, K \le 300$).

Each of the next N lines contains a string of M characters representing the Bubble Grid. Each character is either "`.`" for an *Ethereal Passage* cell, "`#`" for an *Obsidian Ward*, or "`C`" for a *Celestial Nexus*.

Output

Output N lines, each containing M space-separated integers. For each cell in the grid, if the cell is an *Obsidian Ward*, output -1; otherwise, output the maximum Manhattan distance the Bubble Bot can reach from this starting cell, adhering to the movement and charging constraints.

Example

standard input	*standard output*
3 3 1 ... #C# .C.	1 3 1 -1 2 -1 3 2 3

Note

Say that (R, C) denotes the cell in row R, column C. In the example, the furthest squares the Bubble Bot can reach from each starting cell are as follows:

- From cells $(1, 1)$ and $(1, 3)$, the furthest cell is $(1, 2)$ before running out of battery.
- From cell $(2, 2)$, one of the furthest cells is $(3, 1)$ using both chargers in the process.
- From cells $(3, 1)$ and $(3, 3)$, the furthest cell is $(1, 2)$ before running out of battery.
- From cell $(3, 2)$, the furthest cell is $(1, 2)$.
- From cell (1, 2), the furthest cells are (3, 1) and (3, 3).