

Problem B - Them Wolves and Minions

Minions are playing around in a mystical land. Little do they know that they are surrounded by the devious wolves and Magical Detonation Devices (MDDs) of the Maximum Wolf Trading Syndicate (MWTS) which owns the land!

The land is described by a grid of dimension $x \times y$. Each cell has one of the following

- * Minions trying to escape! Since the spies of MWTS are hot on their trail, no minion should ever arrive here once the original minion leaves this cell. They can move in any of the four directions - up, down, left and right.
- ~ MDD sites. Minions cannot move onto or through cells that have MDDs, lest they explode.
- . Wolves. In the beginning, all the wolves are sleeping. Once a minion passes through this cell, the wolf gets woken up and so no other minion can use it anymore.
- @ Temporary safe house. These can shelter at most minion at a time but once a minion moves away from here, another can occupy its spot. Since the spies and wolves are hot on their trails, it's in the minions' best interest to move to the magical broomsticks so that they can escape to safety.
- # These are magical broomsticks that can keep minions safe. If there are more than p minions on the broomstick in the end, it fails to cast its magic and is stuck in the land of wolves. Once the minions manage to get to safety on various broomsticks, Jason and Raunak guide them away to enjoy problem solving in 490-Land. Note that a minion can walk onto a broomstick cell without jumping onto a broomstick.

The minions ask you for help!

Input

The first line will contain T , the number of test cases. Each test case will start with 3 integers x, y and p , where $1 \leq x, y \leq 30$ is the dimension of the grid, and $1 \leq p \leq 10$ is the number of minions that each magical broomstick can hold. Following this will be x lines with y characters as described above. It is guaranteed that at most 50% of the total area has a minion.

Output

For each test case, output the maximum number of minions that can survive the dreaded wolves, spies and MDDs.

Sample Input

```
3
3 4 2
*~~#
..@
.~.*
3 5 1
~~*~~
#@.#
~~*~~
1 4 2
**#~
```

Sample Output

2
2
1
