C++ Advanced – Regular Exam – 16 June 2024

Please submit your source code to all below-described problem in Judge.

2. Deep Space

You're space observer in a deep space station, called Deep Space One. As such you get data from complex equipment, which scans the space and detects various objects.

Input

Your input is presented in a matrix, where every single element of the matrix represents part of the visible field. The matrix is defined by number of strings, consisting in combination of the characters below, until you read the word "**end**".

The meaning of that character read is one of the following:

- One single, uppercase letter from the following **O**, **B**, **A**, **F**, **G**, **K**, **M**, **L**, **T**, **Y**, for a segment, where the system detects a star with corresponding type of the letter
- **1..9** for a segment, where the system evaluates there can be from 1 to 9 planets
- **#** for a segment with expected asteroids
- **$** for a segment with expected comets
- **.** for empty segment

Immediately after the "**end**", there will be single "word", which consists of one or more characters from above, for example "**OB$**". Every character from this word shows you the characters in the matrix, which must be replaced with '**+**'.

Output

Your final output must consist of:

- Total number of stars, detected in the **initial** matrix, then a number of stars for each type. Type order should be alphabetic, in increasing order. Please see the output for the precise example of the format.
- Total number of planets detected in the **initial** matrix
- Total number of asteroids and comets from the **initial** matrix.
- The new matrix, after you apply the replacement.

Hints:

1. You do not need to check for the correctness of the input data! The input is guaranteed to be correct, e.g., no unexpected symbols, and always enough input to do your task correctly.
2. You must not just count the planetary segments, but sum the number of planets in each segment. E.g., if you have to segments 1 and 9, the total is not 2 (the number of segments), but 10 (one segment with one planet and 1 segment with 9 planets, for the total of 10 planets).
3. If a given data is not found in the matrix (e.g., no segments for planets and asteroids, or no segment with 'A' stars), then you do not output anything.

Example 1

Input	Output	Explanation
O.B.G 1#A.9 K$M.T end OB$	Stars: 7 - A: 1 - B: 1 - G: 1 - K: 1 - M: 1 - O: 1 - T: 1 Planets: 10 Asteroids/comets: 2 +.+.G 1#A.9 K+M.T	We detect the following stars in the matrix: O, B, G, A, K, M, and T. We detected two planetary segments, one of them had 1, the other 9 planets, for the total of 10 planets. We detected one asteroid # and one comet $, for the total of 2.

Example 2

Input	Output
OB..G .#A#9 K$..T end A	Stars: 6 - A: 1 - B: 1 - G: 1 - K: 1 - O: 1 - T: 1 Planets: 9 Asteroids/comets: 3 OB..G .#+#9 K$..T

Example 3

Input	Output
.... end A	Stars: 0 Planets: 0 Asteroids/comets: 0 ....