

6408 Neocortex Order

The surface of the neocortex is partitioned into regions, not unlike the map of the Holy Roman Empire circa 1789. The neocortex in each region, which is approximately 3 mm thick, has six layers. The regions are connected by bundles of fibres that form the white matter of the brain. Each fibre starts in one region and sends signals in one direction to another region where it terminates. The starting and terminating layers may be different.

The connectivity from a region P to a region Q , which we shall describe by $P \rightarrow Q$, is classified into one of the following three classes:

Ascending: ‘A’ if fibres from P terminate in layer four of Q .

Descending: ‘D’ if fibres from P terminate in layers of Q other than layer four.

Lateral: ‘L’ if fibres from P have terminations in all layers of Q .

For the visual and auditory cortices, it should be possible to arrange the regions into a hierarchy of discrete levels, such that for regions P and Q :

- P and Q are placed on the same level if either $P \rightarrow Q$ or $Q \rightarrow P$ are classified as ‘L’.
- P is placed on a strictly lower level than Q if $P \rightarrow Q$ is classified as ‘A’ or if $Q \rightarrow P$ is classified as ‘D’.
- P is placed on a strictly higher level than Q if $P \rightarrow Q$ is classified as ‘D’ or if $Q \rightarrow P$ is classified as ‘A’.

Due to inconclusive experimental data for a given neocortex, the resulting classification of a number of connections may be in disagreement with any possible hierarchy. An ‘L’ connection is in disagreement with a hierarchy if the regions are not on the same level, an ‘A’ connection is in disagreement if the first region is not on a strictly lower level than the second region, and a ‘D’ connection is in disagreement if the first region is not on a strictly higher level than the second region.

Researchers have observed that no more than **five (5)** disagreements may occur. However they would like as few disagreements as possible to be removed to allow for the regions to be arranged into a hierarchy. Your task is to write a program to determine the minimum such number.

Input

The input consists of several test cases. Each test case starts with an integer N , $1 \leq N \leq 25$, on a line by itself.

Each of the following N lines consists of three parts: a string $STR1$, followed by a letter T and then another string $STR2$. The three parts are separated by single spaces, and the two strings consist of letters and digits. The $STR1$ and $STR2$ correspond to two different regions, say $r1$ and $r2$. The letter T has one of the values ‘A’, ‘D’, ‘L’ to indicate the connection type from $r1$ to $r2$. Each line is unique within a test case.

A zero on a line by itself declares the end of input data and should not be processed.

Output

The output consists of a single line, for each test case, which contains the smallest number of connections in disagreement, over all possible arrangements of the regions into a hierarchy.

Sample Input

```
7
V2 A MT
MT D V2
V2 A V4
V4 D V2
V4 A MT
V4 L MT
MT L V4
7
V2 A MT
MT D V2
V2 A V4
V4 D V2
V4 A MT
V4 D MT
MT L V4
2
MT A MSTd
36 D 7a
0
```

Sample Output

```
1
2
0
```