

Word Chain (Hard Version)

Time Limit: 5 Second
Memory Limit: 2048 MB

If you have seen the normal version of this problem in this class before, the only difference between the two versions is the constraints of n .

A word chain is a sequence of words w_1, \dots, w_n such that $\forall i > 1$, the last letter of w_{i-1} is the same as the first letter of w_i . The length of a word chain is the sum over lengths of all words in the sequence. Given a list of words, find out the shortest word chain that contains all words in the list. It is guaranteed that the at least one such chain exists.

Input

The first line of input contains a single integer n ($1 \leq n \leq 20$) - the number of words in the list.

The next n lines describe the words. Each line contains a string s ($1 \leq |s| \leq 100$) denoting a word in the list.

Output

output a single integer denoting the length of the shortest word chain containing all words in the list.

Sample Inputs

```
3
science
economics
education
```

Sample Outputs

```
25
```

Note

The shortest possible word chain is `economics - science - education`.