

Recommendation Chain

Time Limit per Test : 2 Seconds

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In an online book community, users can recommend books to each other. Each user has a unique username. The book recommendations are represented in the form "user1 recommended book2 to user3," indicating that user1 suggested book2 to user3..

Your task is to determine the depth of book recommendation network. Depth of book recommendation network start with one indexing. Write a program that takes the book recommendations as input and calculates the depth of book recommendation network.

Input

The first line contains an integer n ($1 \leq n \leq 100000$), which represents the number of book recommendations.

The following n lines each contain two usernames separated by spaces, representing the book recommendation relationship.

Last one is t lines ($1 \leq t \leq 10$) of book title.

Output

Print t —lines of each book recommendation network depth.

Examples

Test Case 1

Input

```
5
Sharon recommended book1 to Claudia
Claudia recommended book1 to Jennifer
Claudia recommended book1 to Ivy
Ivy recommended book1 to Donald
Jennifer recommended book1 to Karen
1
book1
```

Output

```
4
```

Explanation

Deepest chain of network is Sharon – > Claudia – > Ivy – > Donald, hence 4 is the output.

Test Case 2

Input

```
5
Teresa recommended book1 to Carolyn
Carolyn recommended book1 to Ryan
Teresa recommended book1 to Kimberly
Teresa recommended book1 to Mary
Mary recommended book1 to Mark
1
book1
```

Output

```
3
```

Explanation

Teresa – > Carolyn – > Ryan, hence 3