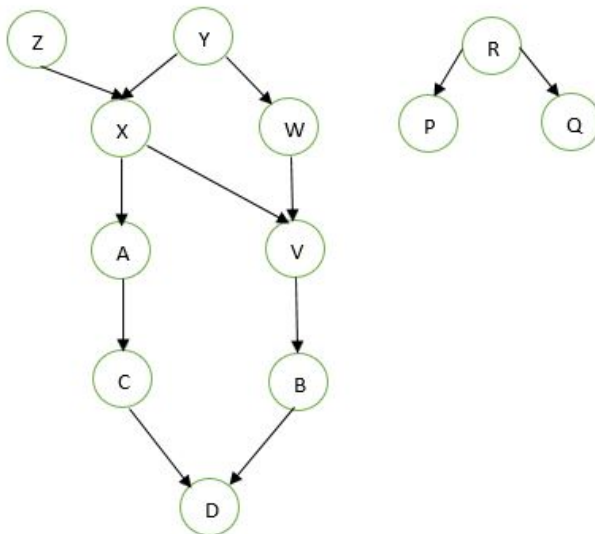


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E. Close Relatives

time limit per test: 6.0 s
 memory limit per test: 256 MB
 input: standard input
 output: standard output

Alex goes to a Thanksgiving party where extended family members gather and meet. He meets a girl and they really like each other. Now they want to make sure they are not close relatives, so they can possibly marry each other. However, everyone at the party only knows who their parents are and before the party ends, Alex was able to ask only a handful of people about their ancestry information. From this set of limited information, can you help Alex decide if they are close-relatives or not? Now, two persons are called close relatives if a path exists between them through a common ancestor and the length of that path is less than or equal to 5. Two persons qualify for an acceptable marriage if no path exists between them through a common ancestor or if such a path exists, the length of that path should be larger than 5. Always consider path between two persons through a common ancestor and never through a common descendant (A->X->V->B is a valid path while A->C->D->B is invalid as shown in figure). Marriages of close-relatives was an old tradition and there might be instances of them in the person's ancestry (X -> V and W->V is an instance of close-relative marriage as shown in figure), but they are no longer considered acceptable for marriages of younger generation. Let's look at some examples to illustrate the problem better. Two persons who share a common grandparent will have a path between them of length 4 (which is less than 5) and hence cannot marry each other. Also, as you can see in the figure, A and B cannot marry each other as there exists a path between them through their common ancestor X and the length of that path is 3 (which is less than 5). On the other hand, A and P can marry each other since they don't have any path between them.



Input

First line contains two integer N ($1 \leq N \leq 10^5$) and M ($1 \leq M \leq 10^5$).

Then N lines of ancestry information follows. Each line is in the format "[Name1] is [Name2]'s [what].", where "Name1" and "Name2" are person names, and "what" is either "father" or "mother". A person's name always starts with a upper case letter and follows with 0 to 9 lower case letters. It is guaranteed that the two names in the same line are different. No two people share the same name and two names cannot refer to the same person. It is also

UW-Madison Thanksgiving Cook Off'18
Private

Participant


Thanksgiving Cook Off 18
Finished

Practice


 → **Submit?**

 Language: Python 3.6

 Choose file: Choose File soln-5.py

Submit

guaranteed that no one can be a mother and a father at the same time. Everyone will have at most one mother and at most one father, and that no one is their own ancestor or descendant.

Then M line of queries follow. Each line is in the format "[Name1] and [Name2]?", where "Name1" and "Name2" are person names in the same format specified as above. It is guaranteed that the two names in the same line are different, and all the names that appear in these M lines appears at least once in the lines of facts.

For 50% of the input, $1 \leq N, M \leq 100$. For 100% of the input, $1 \leq N, M \leq 10^5$.

Output

For each of the queries, output "Yes" or "No" if we have the evidence that the two people are close relatives.

Examples

input	Copy
<pre> 5 3 Alice is Bob's mother. Bob is Charlie's father. Alice is David's mother. David is Ellen's father. Peter is Raj's father. Bob and Alice? Charlie and Ellen? Raj and Ellen?</pre>	
output	Copy
<pre> Yes Yes No</pre>	

input	Copy
<pre> 7 2 Alice is Bob's mother. Alice is Charlie's mother. Charlie is David's father. David is Ellen's father. Bob is Fred's father Georgia is Ellen's mother. Henry is Georgia's father. Ellen and Fred? Henry and Alice?</pre>	
output	Copy
<pre> Yes No</pre>	

input	Copy
<pre> 7 1 Charlie is Fred's father. Alice is Bob's mother. Bob is Charlie's father. Charlie is David's father. Alice is Ellen's mother. Ellen is Fred's mother. Fred is Georgia's father. David and Georgia?</pre>	
output	Copy
<pre> Yes</pre>	

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