

E - Is-A? Has-A? Who Knowz-A?

Source file name: isahasa.c, isahasa.cpp, isahasa.java, or isahasa.py

Two familiar concepts in object oriented programming are the is-a and has-a relationships. Given two classes A and B, we say that A is-a B if A is a subclass of B; we say A has-a B if one of the fields of A is of type B. For example, we could imagine an object-oriented language (call it ICPC++) with code like that in Figure 3, where the class Day is-a Time, the class Appointment is both a DateBook and a Reminder, and class Appointment has-a Day.

```
class Day extends Time    class Appointment extends DateBook, Reminder
{
    ...
}
    private Day date;
    ...
}
```

Figure 3: Two ICPC++ classes.

These two relationships are transitive. For example if A is-a B and B is-a C then it follows that A is-a C. This holds as well if we change all the is-a's in the last sentence to has-a's. It also works with combinations of is-a's and has-a's: in the example above, Appointment has-a Time, since it has-a Day and Day is-a Time. Similarly, if class DateBook has-a Year then Appointment has-a Year, since Appointment is-a DateBook.

In this problem you will be given a set of is-a and has-a relationships and a set of queries of the form A is/has-a B. You must determine if each query is true or false.

Input

Input starts with two integers n and m , ($1 \leq n, m \leq 10000$), where n specifies the number of given is-a and has-a relationships and m specifies the number of queries. The next n lines each contain one given relationship in the form $c_1 \ r \ c_2$ where c_1 and c_2 are single-word class names, and r is either the string "is-a" or "has-a". Following this are m queries, one per line, using the same format. There will be at most 500 distinct class names in the $n + m$ lines, and all class names in the last m lines will appear at least once in the initial n lines. All is-a and has-a relationships between the given classes can be deduced from the n given relationships. Is-a relationships can not be circular (apart from the trivial identity " x is-a x ").

The input must be read from standard input.

Output

For each query, display the query number (starting at one) and whether the query is true or false.

The output must be written to standard output.

Sample Input	Sample Output
5 5 Day is-a Time Appointment is-a Datebook Appointment is-a Reminder Appointment has-a Day Datebook has-a Year Day is-a Time Time is-a Day Appointment has-a Time Appointment has-a Year Day is-a Day	Query 1: true Query 2: false Query 3: true Query 4: true Query 5: true