

4115 Pair of Numbers

You and your friend play this simple number game. First your friend imagines two numbers in the (inclusive) range $[-100, +100]$. You keep asking him questions, and he gives YES/NO replies. Since you are an expert, after each reply, you tell him how many different pairs of numbers he could have possibly thought of.

Though his reply is a simple YES/NO, your questions are rather chosen from a slightly complicated grammar.

Question := “ “ “?”

Subject := “Is the first number” | “Is the second number” | “Are both the numbers” “Is either of the numbers” | “Is the product of the two numbers” | “Is the sum of the two numbers” | “Is the difference of the two numbers”

Condition := “prime” | “composite” | “even” | “odd” | “positive” | “negative” | “beautiful”

- All numbers ≤ 1 are neither prime nor composite.
- Zero is neither positive nor negative.
- Difference of two numbers a and b , is $|a - b|$.
- A number x , is said to be beautiful if digits of $|x|$ obey the following property: Invert zero or more digits of it. By inverting, we mean, replace that digit d , by $9 - d$. Partition the digits into two subsets such that the xor of the digits in either sub-sets are the same. If there exists a way to invert and partition, then x is said to be beautiful. 0 and 9 are considered beautiful numbers.
e.g.: -173 is beautiful because: Digits = {1,7,3}; Invert(7) => Digits = {1,2,3} Partitions = {1,2} and {3}, both partitions xor to 3.
- The number zero is considered to be beautiful.

Input

Input consists of multiple testcases. First line contains the number of test-cases.

First line of each test-case gives the number of question/reply pairs, followed by the question reply pairs, one per line. You may assume there can be atmost 50 pairs per test-case.

Output

Output to each test case must begin with ‘Case #< case – number >:’.

Each test-case must contain exactly one integer per question/reply pair saying the how many different pairs of numbers he could have possibly thought of.

Sample Input

```
3
5
Is the first number even?
YES
```

Is the second number even?

NO

Is the sum of the two numbers prime?

YES

Is the product of the two numbers positive?

NO

Is the product of the two numbers negative?

NO

1

Is either of the numbers composite?

NO

1

Are both the numbers beautiful?

YES

Sample Output

Case #1:

20301

10100

2410

1366

24

Case #2:

16129

Case #3:

1521