



D • Happy Happy Prime Prime

RILEY VASHTEE: [*reading from display*] Find the next number in the sequence:

313 331 367 ...? **What?**

THE DOCTOR: 379.

MARTHA JONES: What?

THE DOCTOR: It's a sequence of happy primes – 379.

MARTHA JONES: Happy *what?*

THE DOCTOR: Any number that reduces to one when you take the sum of the square of its digits and continue iterating it until it yields 1 is a happy number. Any number that doesn't, isn't. A *happy prime* is both happy and prime.

THE DOCTOR: I dunno, talk about *dumbing down*. Don't they teach recreational mathematics anymore?

Excerpted from “*Dr. Who*”, Episode 42 (2007).

The number 7 is certainly prime. But is it happy?

$$\begin{aligned}7 &\rightarrow 7^2 = 49 \\49 &\rightarrow 4^2 + 9^2 = 97 \\97 &\rightarrow 9^2 + 7^2 = 130 \\130 &\rightarrow 1^2 + 3^2 = 10 \\10 &\rightarrow 1^2 + 0^2 = 1\end{aligned}$$

It is happy ☺. As it happens, 7 is the smallest happy prime. Please note that for the purposes of this problem, 1 is *not* prime.

For this problem you will write a program to determine if a number is a *happy prime*.



Greater New York
Programming Contest
St. Joseph's College
Patchogue, NY



Input

The first line of input contains a single integer P , ($1 \leq P \leq 1000$), which is the number of data sets that follow. Each data set should be processed identically and independently.

Each data set consists of a single line of input. It contains the data set number, K , followed by the happy prime candidate, m , ($1 \leq m \leq 10000$).

Output

For each data set there is a single line of output. The single output line consists of the data set number, K , followed by a single space followed by the candidate, m , followed by a single space, followed by **YES** or **NO**, indicating whether m is a happy prime.

Sample Input	Sample Output
4	1 1 NO
1 1	2 7 YES
2 7	3 383 YES
3 383	4 1000 NO
4 1000	