

**Coding Arena**

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A B C D E F G H

**Problem : Identify bases in which a given number representation is prime**

We are familiar with base 10 (also called decimal) representation of numbers. For example, 234 is  $2 \times 100 + 3 \times 10 + 4$ . Numbers can be represented in any base, B. Here, any number is expressed as  $n_1, n_2, \dots, n_k$  representing the value  $n_k + B n_{k-1} + \dots + n_1 B^{k-1}$ . Note that all  $0 \leq n_i < B$ .

The number 10 in decimal representation has value 2 in base 2 representation and value 3 in base 3 representation. Both 2 and 3 are primes even though the decimal representation has a value that is not prime.

Given a representation  $\alpha\beta$  where  $\alpha, \beta$  can be 0, 1, 2, ..., 9, A, B, ..., Z, where A has value 10, B has value 11, and so on up to Z has value 36 (in decimal), we need to find all bases (in the range 2 to 36) in which  $\alpha, \beta$  is a prime number. For example, 2J in base 20 is  $2 \times 20 + 19 = 59$ , a prime number.

**Input Format:**

T an integer indicating the number of test cases

T lines each containing a string of length 2; characters in the string would be from the set 0, 1, 2, ..., 9, A, B, ..., Z

**Output Format:****Output**

T lines each line containing a space separated list of numbers (in the range 2-36) in which the given string has prime value or NONE if no such base exists.

**Constraints:**

None

**Example 1**

Input  
1  
A0

Output  
NONE

**Explanation**

The string A0 is not a valid representation in the bases 2 to 10. In bases from 11 to 36, its value is 10 times the base, and is not a prime. Hence NONE is the output.

**Example 2**

Input  
1  
2J

Output  
20 21 24 26 27 30 32 35

**Explanation**

This representation 2J is not valid in bases 2 through 19.

Value of '2J' in base 20: 59, which is prime \*  
 Value of '2J' in base 21: 61, which is prime \*  
 Value of '2J' in base 22: 63, which is not prime  
 Value of '2J' in base 23: 65, which is not prime  
 Value of '2J' in base 24: 67, which is prime \*  
 Value of '2J' in base 25: 69, which is not prime.  
 Value of '2J' in base 26: 71, which is prime \*  
 Value of '2J' in base 27: 73, which is prime \*  
 Value of '2J' in base 28: 75, which is not prime  
 Value of '2J' in base 29: 77, which is not prime  
 Value of '2J' in base 30: 79, which is prime \*  
 Value of '2J' in base 31: 81, which is not prime  
 Value of '2J' in base 32: 83, which is prime \*  
 Value of '2J' in base 33: 85, which is not prime  
 Value of '2J' in base 34: 87, which is not prime  
 Value of '2J' in base 35: 89, which is prime \*  
 Value of '2J' in base 36: 91, which is not prime

Hence the bases in which '2J' is prime are 20, 21, 24, 26, 27, 30, 32 and 35.

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**Note:**

Please do not use package and namespace in your code. For object oriented languages your code should be written in one class.

**Note:**

Participants submitting solutions in C language should not use functions from <conio.h> / <process.h> as these files do not exist in gcc

**Note:**

For C and C++, return type of main() function should be int.

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