



## 3639 - Prime Path

Europe - Northwestern - 2006/2007

### Problem G - Prime Path

**Time limit: 1 second**



The ministers of the cabinet were quite upset by the message from the Chief of Security stating that they would all have to change the four-digit room numbers on their offices.

- It is a matter of security to change such things every now and then, to keep the enemy in the dark.
- But look, I have chosen my number 1033 for good reasons. I am the Prime minister, you know!
- I know, so therefore your new number 8179 is also a prime. You will just have to paste four new digits over the four old ones on your office door.
- No, it's not that simple. Suppose that I change the first digit to an 8, then the number will read 8033 which is not a prime!
- I see, being the prime minister you cannot stand having a non-prime number on your door even for a few seconds.
- Correct! So I must invent a scheme for going from 1033 to 8179 by a path of prime numbers where only one digit is changed from one prime to the next prime.

Now, the minister of finance, who had been eavesdropping, intervened.

- No unnecessary expenditure, please! I happen to know that the price of a digit is one pound.
- Hmm, in that case I need a computer program to minimize the cost. You don't know some very cheap software gurus, do you?
- In fact, I do. You see, there is this programming contest going on...

Help the prime minister to find the cheapest prime path between any two given four-digit primes! The first digit must be nonzero, of course. Here is a solution in the case above.

1033  
1733  
3733  
3739  
3779

8779  
8179

The cost of this solution is 6 pounds. Note that the digit 1 which got pasted over in step 2 can not be reused in the last step – a new 1 must be purchased.

## Input

One line with a positive number: the number of test cases (at most 100). Then for each test case, one line with two numbers separated by a blank. Both numbers are four-digit primes (without leading zeros).

## Output

One line for each case, either with a number stating the minimal cost or containing the word `Impossible`.

## Sample Input

```
3
1033 8179
1373 8017
1033 1033
```

## Sample Output

```
6
7
0
```

The 2006 ACM Northwestern European Programming Contest

---

Northwestern 2006-2007

**Problemsetter:** Henrik Eriksson