

6468 Pisano Periods

In 1960, Donald Wall of IBM, in White Plains, NY, proved that the series obtained by taking each element of the *Fibonacci* series modulo m was periodic.

For example, the first ten elements of the *Fibonacci* sequence, as well as their remainders modulo 11, are:

n		1	2	3	4	5	6	7	8	9	10
F (n)		1	1	2	3	5	8	13	21	34	55
F (n) mod 11		1	1	2	3	5	8	2	10	1	0

The sequence made up of the remainders then repeats. Let $k(m)$ be the length of the repeating subsequence; in this example, we see $k(11) = 10$.

Wall proved several other properties, some of which you may find interesting:

- If $m > 2$, $k(m)$ is even.
- For any even integer $n > 2$, there exists m such that $k(m) = n$.
- $k(m) \leq m^2 - 1$
- $k(2^n) = 3 * 2^{n-1}$
- $k(5^n) = 4 * 5^n$
- $k(2 * 5^n) = 6n$
- If $n > 2$, $k(10^n) = 15 * 10^{n-1}$

For this problem, you must write a program that calculates the length of the repeating subsequence, $k(m)$, for different modulo values m .

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 is a single line that consists of two space separated integer values N and M . N is the data set number. M is the modulo value ($2 \leq M \leq 1,000,000$).

Output

For each data set there is one line of output. It contains the data set number (N) followed by a single space, followed by the length of the repeating subsequence for M , $k(M)$.

Sample Input

```
5
1 4
2 5
3 11
4 123456
5 987654
```

Sample Output

```
1 6
2 20
3 10
4 15456
5 332808
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