

## 10837 A Research Problem

A mad researcher was trying to get fund for his research project but it is a pity that after a year he was able to collect 500\$ only. So all his research work has gone to ashtray. The mad researcher now wants his revenge, so he wants you to solve his unfinished research problem within a very limited time. You will be happy to know that his research is related to Eulers phi function.

Euler's phi (or totient) function of a positive integer  $n$  is the number of integers in  $\{1, 2, 3, \dots, n\}$  which are relatively prime to  $n$ . This is usually denoted as  $\phi(n)$ . The table below shows the value of phi function for first few numbers.

<b>integer</b> $n$	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
$\phi(n)$	1	1	2	2	4	2	6	4	6	4	10	4	12	6	8	8

Given the value of  $n$ , it is very easy to find the value of  $\phi(n)$  using the formula below:

$$\phi(n) = n \prod_{p|n} \left(1 - \frac{1}{p}\right) \quad // \text{ Here } p \text{ is prime}$$

According to this formula  $\phi(12) = \phi(2^2 * 3) = 12(1 - \frac{1}{2})(1 - \frac{1}{3}) = 12 * \frac{1}{2} * \frac{2}{3} = 4$ .

But your task is not quite straightforward, given the value of  $\phi(n)$  you will have to find the minimum possible value of  $n$ .

### Input

The input file contains at most 100 lines of input. Each line contains a positive integer  $phi_n$  ( $1 \leq phi_n \leq 100000000$ ). Input is terminated by a line where  $phi_n = 0$ . This line should not be processed.

### Output

For each line of input produce one line of output. This line contains the serial of output followed by two integers  $phi_n$  and  $n$ . The first integer is the integer taken as input and the second integer is the minimum possible value of  $n$ , for which  $\phi(n) = phi_n$ . All the input numbers will be such that for all given input there will be a possible value of  $n$  less than 200000000.

### Sample Input

```
12
24
2280960
5000000
0
```

### Sample Output

```
Case 1: 12 13
Case 2: 24 35
Case 3: 2280960 2283989
Case 4: 5000000 6265625
```