



## Problem D Factors

Time Limit: 2 seconds

The fundamental theorem of arithmetic states that every integer greater than 1 can be uniquely represented as a product of one or more primes. While unique, several arrangements of the prime factors may be possible. For example:

$$\begin{aligned} 10 &= 2 \cdot 5 \\ &= 5 \cdot 2 \end{aligned}$$

$$\begin{aligned} 20 &= 2 \cdot 2 \cdot 5 \\ &= 2 \cdot 5 \cdot 2 \\ &= 5 \cdot 2 \cdot 2 \end{aligned}$$

Let  $f(k)$  be the number of different arrangements of the prime factors of  $k$ . So  $f(10) = 2$  and  $f(20) = 3$ .

Given a positive number  $n$ , there always exists at least one number  $k$  such that  $f(k) = n$ . We want to know the smallest such  $k$ .

### Input

The input consists of at most 1 000 test cases, each on a separate line. Each test case is a positive integer  $n < 2^{63}$ .

### Output

For each test case, display its number  $n$  and the smallest number  $k > 1$  such that  $f(k) = n$ . The numbers in the input are chosen such that  $k < 2^{63}$ .

#### Sample Input 1

```
1
2
3
105
```

#### Sample Output 1

```
1 2
2 6
3 12
105 720
```

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