

# Problem A

## Verify Collatz $3x + 1$ Conjecture

Time limit: 1 seconds

Given a positive integer  $x_0$ . Consider the sequence  $x_0, x_1, x_2, \dots$ , where

$$x_i = \begin{cases} x_{i-1}/2, & \text{if } x_{i-1} \text{ is even} \\ 3x_{i-1} + 1, & \text{if } x_{i-1} \text{ is odd} \end{cases} \quad \text{for } i > 0.$$

This sequence is, in general, infinite. In 1937, German mathematician Lothar Collatz conjectured that this sequence will eventually reach the number 1, regardless of which positive integer is chosen initially. For example, if  $x_0 = 13$ , then the sequence is

$$13, 40, 20, 10, 5, 16, 8, 4, 2, 1.$$

If  $n = 1$ , the sequence is

$$1, 4, 2, 1.$$

Given a positive integer  $x_0$ , write a program to compute the sequence  $x_1, x_2, \dots$ , until  $x_m = 1$  first appears. Print out the index  $m$  where  $x_m = 1$ , and the maximum value of the sequence.

## Input Format

Each test case contains only 1 positive integers  $x_0$  in one line. The value of  $x_0$  is greater than 0 and less than  $2^{32}$ .

Note that the test data file may contain many test cases. The last test case is followed by a line containing a single 0.

## Output Format

The outputs for each test case should be the numbers  $x_0$ , followed by 2 integers  $m$  and  $l$ , where  $m$  is the smallest positive index with  $x_m = 1$ , and  $l$  is the maximum value of the sequence. For example, for  $x_0 = 13$ , print out

13 9 40

since  $x_9 = 1$ , and the maximum value of the sequence is 40.

If the sequence never reach 1 within  $2^{24}$  steps, print out two 0's after  $x_0$ .

## Sample Input

13  
1  
0

## Sample Output for the Sample Input

13 9 40  
1 3 4