Collatz Conjecture

`collatz.c`, `collatz.C`, `collatz.java`, `collatz.p`

The Collatz Conjecture is an interesting phenomenon. Though its principle is very simple, it still remains among unresolved problems in mathematics, even after many years of study. However, the years of intensive research brought at least some results, which is a huge advantage of the human race against the aliens, because they did not study the conjecture for so many years. We want to keep this advantage.

Imagine a sequence defined recursively as follows: Start with any positive integer x_0 (so-called "starting value"). Then repeat the following:

- if x_i is even, then $x_{i+1} = x_i/2$ ("half ...")
- if x_i is odd, then $x_{i+1} = 3x_i + 1$ ("... or triple plus one")

The Collatz Conjecture says that every such sequence will eventually reach 1. It has still not been proven until today but we already know for sure that this is true for every $x_0 < 2^{58}$. (Never tell this to aliens!)

In this problem, you are given two starting values and your task is to say after how many steps their sequences "meet" for the first time (which means the *first* number that occurs in both sequences) and at which number is it going to happen. For simplicity, we will assume that the sequence does not continue once it has reached the number one. In reality, it would then turn into $1, 4, 2, 1, 4, 2, 1, \ldots$, which quickly becomes boring.

Input Specification

The input contains several test cases. Each test case is described by a single line containing two integer numbers A and B, $1 \leq A, B \leq 1\,000\,000$.

The last test case is followed by a line containing two zeros.

Output Specification

For each test case, output the sentence "A `needs` S_A `steps,` B `needs` S_B `steps, they meet at` C", where S_A and S_B are the number of steps needed in both sequences to reach the same number C. Follow the output format precisely.

Sample Input

```
7 8
27 30
0 0
```

Output for Sample Input

```
7 needs 13 steps, 8 needs 0 steps, they meet at 8
27 needs 95 steps, 30 needs 2 steps, they meet at 46
```