Problem G
Kurt Gödel

Time limit: 10 seconds
Memory limit: 512 megabytes

Problem Description

> Kurt Friedrich Gödel was an Austrian mathematician and philosopher. He was influenced by previous scientist philosophers such as Isaac Newton and Immanuel Kant. And then later he also influenced mathematicians and philosophers such as Bertrand Russell. He utilized something known as the Gödel numbering in the proof of his famous "Incompleteness theorem", a theorem that tests the boundary and limit of mathematics and logic itself. This makes him one of the most important logician in the history among the likes of Aristotle.

Let's see how this Gödel numbering system works. It assigns a number to each symbol, in this case we use capital alphabets (`A` to `Z`) and assign them to natural numbers 1 to 26. So that `A` is assigned to 1, `B` is assigned to 2 and so on. So a word such as `KURT` will become a sequence $(11, 21, 18, 20)$. Then, we represent it as product of prime powers. A sequence $(a_1, a_2, \ldots, a_n)$ should be encoded into $2^{a_1} \cdot 3^{a_2} \cdot \cdots \cdot p_n^{a+n}$ where p_i is the i-th prime number. I.e., the Gödel number of `KURT` is $2^{11} \cdot 3^{21} \cdot 5^{18} \cdot 7^{20} = 652074444016292692118429064843750000000000$.

The Gödel number of a long word might be very large. Your friend Albert would like to leave a message for you by using Gödel numbers, but he is lazy to write all the digits. Albert uses a triple (ℓ, r, p) to represent a Gödel number g where ℓ is the length of the corresponding word, p is a prime, and $r \equiv g \pmod{p}$. However, Albert doesn't notice that two words can generate the same triple. For instance, the Gödel numbers `EA` and `JA` are 96 and 3072 respectively, but Albert may use $(2, 3, 31)$ to represent both of them. Let's try to decode Albert's message!

Input Format

There will be at most 30 test cases. Each test case will be given on a line containing three integers. The first integer ℓ $(1 \le \ell \le 8)$ is the length of this word. The second integer r represents the remainder of the result. The third integer is the prime number p used in modulo operation. We guarantee that $0 \le r < p < 2^{31}$. The input will be terminated with three zeros on a line.

Output Format

Output the word that generates this triple if it is unique. Output "`ambiguous`" if more than one possibility exists. Output "`not a word`" if there exists no word that can produce this triple.

Sample Input

```
1 2 3
3 11385 13339
7 123123123 2089141547
7 0 2089141547
0 0 0
```

Sample Output

```
A
COW
ambiguous
not a word
```

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Problem Description

> 庫爾特・哥德爾是個奧地利數學家、哲學家。他受了艾薩克・牛頓與伊曼努爾・康德等科學家哲學家的影響，也影響了其他數學家與哲學家，如伯特蘭・羅素。他運用了「哥德爾數」的概念來證明著名的「哥德爾不完備定理」，探討了數學與邏輯本身的疆界與極限，這個成就讓他得與亞里斯多德同列於歷史上最重要的邏輯學家之林。

讓我們說明一下哥德爾數的系統如何運作。首先，將所有的符號賦予一個數字。在本題當中，我們只考慮大寫英文字母 (A 到Z)，且給予這些字母，1 到 26 的編號。將A 編為 1、B 編為 2，並以此類推。舉例來說，KURT 將以 $(11, 21, 18, 20)$ 這個數列表示。接下來，將這個數列用質數的乘積來替代：將數列 $(a_1, a_2, \ldots, a_n)$ 以 $2^{a_1} \cdot 3^{a_2} \cdot \cdots \cdot p_n^{a+n}$ 表示，其中 p_i 是第 i 個質數。KURT 所對應的哥德爾數，即是：$2^{11} \cdot 3^{21} \cdot 5^{18} \cdot 7^{20} = 652074444016292692118429064843750000000000$。

對應一個長單字的哥德爾數可能非常大。你朋友阿爾博特想要用哥德爾數留一個訊息給你，但他懶得寫下所有的位數。阿爾博特用了使用三個數 (ℓ, r, p) 來表示一個哥德爾數 g，其中 ℓ 是訊息的英文字母數，p 是個質數，且 $r \equiv g \pmod{p}$。然而，阿爾博特並沒有注意到，兩個相異的字，可能可以產生出相同的 (ℓ, r, p)。舉例來說，EA 跟JA 的哥德爾數分別是 96 與 3072，但阿爾博特可以用 $(2, 3, 31)$ 來表達這兩個數字。請試著解開阿爾博特留給你的訊息吧。

Input Format

輸入資料最多有 30 組測試資料。每組測試資料只有一行。該行有三個整數。第一個是 ℓ $(1 \le \ell \le 8)$ 代表訊息的單字數量。第二個是 r、第三個是 p，要表示的哥德爾數對 p 取餘數得結果為 r，且保證 $0 \le r < p < 2^{31}$。當讀到一行有 0 代表輸入結束。

Output Format

如果 (ℓ, r, p) 所代表的英文單字是唯一的，請輸出該單字。如果能代表的英文單字超過一個，則輸出 “ambiguous”。如果完全沒有辦法代表任何英文單字，則輸出 “not a word”。

Sample Input

```
1 2 3
3 11385 13339
7 123123123 2089141547
7 0 2089141547
0 0 0
```

Sample Output

```
A
COW
ambiguous
not a word
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