MCD Interactivo

The judge has two hidden positive integers x, y that you must guess. To do this, you can ask the following type of questions: you provide two integers a and b, and in return you get the following value:

$$\text{mcd}\left(|x-a|, |y-b|\right)$$

Where mcd indicates the greatest common divisor (you will get back 0 if $x = a$ and $y = b$).

You must determine x, y by asking a limited number of questions (see Constraints and Subtasks sections for more details).

Input and output

This is an interactive problem. You must refresh the output each time you print data (`cout << endl` or `cout << flush` in C++, `System.out.flush()` in Java, `stdout.flush()` in Python).

To ask a question you must write a line with the format `? a b`, where a, b are the numbers you are asking about. After asking a question, you must read from the input an integer. The integer will be equal to $\text{mcd}(|x-a|, |y-b|)$ if $x \neq a$ or $y \neq b$, or 0 if $x = a$ and $y = b$. **When your program reads a 0, it should terminate immediately without asking any more questions, since the numbers are already considered guessed**.

In case you ask an invalid question or exceed the limit of questions the result you will receive will be -1, if your program reads a -1 it should terminate immediately.

Example

Input:

```
1
4
2
0
```

Output:

```
? 0 0
? -1 0
? 5 2
? 3 4
```

Explanation: In this case, the hidden numbers are $x = 3, y = 4$.

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Constraints

$1 \leq x, y \leq 10^{18}$.

The integers a, b that you write must satisfy $-2 \cdot 10^{18} \leq x, y \leq 2 \cdot 10^{18}$.

A maximum of 250 questions can be asked. The last question asked where $x = a$ and $y = b$ **if** counts as a question for this limit and for calculating the score obtained.

Subtasks

1. (5 points) $x, y \leq 15$.
2. (10 points) $x, y \leq 250$.
3. (15 points) x and y are *5-flat*: they are not divisible by prime numbers other than $2, 3$ or 5.
4. (30 points) $x, y \leq 10^9$.
5. (40 points) No additional restrictions.

Additionally, the score you get in a subtask depends on the number of questions you ask: to get a full score you must ask at most 125 questions and to get a positive score you must ask at most 250 questions. The score of each subtask is multiplied by a multiplier $M(q)$, where q is the maximum number of questions you have asked in the cases of that subtask. The value of $M(q)$ is given by:

$$M(q) = \begin{cases} 0 & q > 250 \\ 0.7 & 250 \geq q \geq 225 \\ 0.7 + \frac{225-q}{500} & 225 > q > 125 \\ 1.0 & 125 \geq q \end{cases}$$