4284 Egyptian Multiplication

Ancient Egyptian multiplication is a systematic method for multiplying two numbers that does not require the multiplication table, only the ability to multiply by 2, and to add. Also known as Egyptian multiplication and Peasant multiplication, it decomposes one of the multiplicands into a sum of powers of two and creates a table of doublings of the second multiplicand. This method may be called mediation and duplication, where mediation means halving one number and duplication means doubling the other number.

This method has three phases: the decomposition, the table and the result.

The **decomposition** of a number N thus consists of finding the powers of two which make it up. The Egyptians knew empirically that a given power of two would only appear once in a number. For the decomposition, they proceeded methodically; they would initially find the largest power of two less than or equal to the number in question, subtract it out and repeat until nothing remained. (The Egyptians did not make use of the number zero in mathematics).

Example of the decomposition of the number $N = 13$:

- the largest power of two less than or equal to 13 is 8, 13 - 8 = 5,
- the largest power of two less than or equal to 5 is 4, 5 - 4 = 1,
- the largest power of two less than or equal to 1 is 1, 1 - 1 = 0

$N = 13$ is thus the sum of the powers of two: 8, 4 and 1.

After the decomposition of the first multiplicand (N), it is necessary to construct a **table** of powers of two times the second multiplicand (M) from one up to the largest power of two found during the decomposition. In the table, a line is obtained by multiplying the preceding line by two.

For example, if the largest power of two found during the decomposition of $N = 13$ is 8 and $M = 238$, the table is created as follows:

Power of 2	$M\times$ **Power of 2**
*1	238
2	476
*4	952
*8	1904
N **= 13**	$N \times M$ **= 3094**

Finally, the **result** is obtained by adding the numbers from the second column for which the corresponding power of two makes up part of the decomposition of N (denoted by a mark).

Thus, the result of the multiplication of 13 × 238 is obtained as the addition of: 1904 + 952 + 238 = 3094 **or** 238 + 952 + 1904 = 3094.

Input

The input consists of multiple test cases. Each test case consists of a single line containing two integers N and M ($0 \leq N, M \leq 1,000,000,000$) that indicate the multiplicands and the *begin addition specification*, that it indicates from that row will initiate the addition by obtained the result. The *begin addition specification* is one of '`u`' or '`b`' referring to up row and bottom row respectively.

The last test case is followed by '`-1`' on a line by itself.

Output

For each test case, print the case number (beginning with 1) followed by the multiplicands (N and M) separated by ' x ', an equal sign, and an expression giving the sum of the multiples of M (numbers from the second column of the table) for which the corresponding power of two makes up part of the decomposition of the multiplicand N of the form indicated by the *begin addition specification*.

Use the format shown in the sample output below. In the event that the values of N or M are 0, then the answer must be only '0'.

Sample Input

```
13 238 u
13 238 b
1000 1 u
1 1000 b
1 1 u
0 10 u
-1
```

Sample Output

```
Case 1: 13 x 238 = 238 + 952 + 1904
Case 2: 13 x 238 = 1904 + 952 + 238
Case 3: 1000 x 1 = 8 + 32 + 64 + 128 + 256 + 512
Case 4: 1 x 1000 = 512 + 256 + 128 + 64 + 32 + 8
Case 5: 1 x 1 = 1
Case 6: 0 x 10 = 0
```