Numbers

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

DreamGrid has a nonnegative integer n. He would like to divide n into m nonnegative integers $a_1, a_2, \ldots, a_m$ and minimizes their bitwise or (i.e. $n = a_1 + a_2 + \cdots + a_m$ and a_1 OR a_2 OR $\ldots$ OR a_m should be as small as possible).

Input

There are multiple test cases. The first line of input contains an integer T, indicating the number of test cases. For each test case:

The first line contains two integers n and m ($0 \le n < 10^{1000}, 1 \le m < 10^{100}$).

It is guaranteed that the sum of the length of n does not exceed 2×10^4.

Output

For each test case, output an integer denoting the minimum value of their bitwise or.

Example

standard input	standard output
5 3 1 3 2 3 3 10000 5 1244 10	3 3 1 2000 125