

Its a Bit Game

Taplu was taught that Binary OR operator is analogous to addition in mathematics. He wondered that there would be many such pairs (x,y) such that:

$$x+y = x | y \text{ ('|' represents Binary OR)}$$

He then started calculating all values of y of a given x . There can be many possible solutions, so Taplu went upto Abhishar to help him find the k th smallest possible solution. Given x and k , help Abhishar to find the k th smallest positive value of y .

Input

First line contains the number of testcases $T(1 \leq T \leq 10)$.

Every testcase contains two numbers x and $k(1 \leq x, k \leq 2 * 10^9)$

Output

For every testcase output the required Number y .

Example

Input:

1

3 1

Output:

4