Problem M. Function and Function

If we define $f(0) = 1, f(1) = 0, f(4) = 1, f(8) = 2, f(16) = 1, \ldots$, do you know what function f means?

Actually, $f(x)$ calculates the total number of enclosed areas produced by each digit in x. The following table shows the number of enclosed areas produced by each digit:

Digit	Enclosed Area	Digit	Enclosed Area
0	1	5	0
1	0	6	1
2	0	7	0
3	0	8	2
4	1	9	1

For example, $f(1234) = 0 + 0 + 0 + 1 = 1$, and $f(5678) = 0 + 1 + 0 + 2 = 3$.

We now define a recursive function g by the following equations:

$$\begin{cases} g^0(x) = x \\ g^k(x) = f(g^{k-1}(x)) & \text{if } k \geq 1 \end{cases}$$

For example, $g^2(1234) = f(f(1234)) = f(1) = 0$, and $g^2(5678) = f(f(5678)) = f(3) = 0$.

Given two integers x and k, please calculate the value of $g^k(x)$.

Input

There are multiple test cases. The first line of the input contains an integer T (about 10^5), indicating the number of test cases. For each test case:

The first and only line contains two integers x and k ($0 \leq x, k \leq 10^9$). Positive integers are given without leading zeros, and zero is given with exactly one '0'.

Output

For each test case output one line containing one integer, indicating the value of $g^k(x)$.

Example

standard input	standard output
6 123456789 1 888888888 1 888888888 2 888888888 999999999 98640 12345 1000000000 0	5 18 2 0 0 1000000000

Note

