FRACTION IN BASES

Do you know why people use base 10? The answer is so obvious: Human has ten fingers. And on another planet, Alpha, their inhabitants also follow this logic. In fact, they have 45 "fingers", so they use base 45 to calculate everything.

TOU is a very gifted student, who is about to fly to Alpha for scientific purpose next month. He had time to prepare for the trip so he decided to practice to do calculations in base 45. As a very smart student, he quickly realized the general way to do calculations in all bases. He was very confident with his new "skill" and believed that he can solve all Math problems, which he is able to solve in base 10.

Last night, he proudly presented this skill to his classmate, RAF. However, RAF was very skeptical about that. Therefore, he challenged TOU a classic problem that they solved together in base 10: "**Find the *n-th* digit after the decimal point (the dot) of *a/b***", but with a few changes. Instead of base 10, TOU needed to calculate this one in base B. Due to the confidence of TOU, FAR challenged him to solve the problem for T different quadruples (n, a, b, B) in one day.

TOU is now sitting in the room, using all his mind power to solve those challenges but they seem to be too much for him. May you help him overcome this tough challenge?

Input

The first line of the input contains 1 positive integer T ($1 \le T \le 5000$) – the amount of quadruples FAR gave TOU.

Each of the next T lines contains 4 space-separated integers n, a, b, B ($1 \le n, a, b, B \le 10^{18}$ and $B > 1$), **all are given in base 10** (TOU has to convert a and b to base B first)

Output

For each quadruple, print 1 integer on one line, the result TOU has to find. Since it is not convenient to write that number in base B, **you have to convert it to base 10 again**.

Examples

Standard Input	Standard Output
4 4 10 7 10 6 10 7 10 4 10 7 16 6 10 7 16	5 1 6 11

Explanation

In the first 2 quadruples, $\frac{10}{7}_{(10)} = 1.428\mathbf{5}7\mathbf{1}439\ldots$; the fourth and sixth digits after the dot are bolded.

In the last 2 quadruples, $\frac{10}{7}_{(16)} = 1.6db\mathbf{6}d\boldsymbol{b}6\ldots$; the fourth and sixth digits after the dot are bolded. (here we know $b_{(16)} = 11_{(10)}$ and $d_{(16)} = 13_{(10)}$).