

The 27th Annual ACM International Collegiate Programming Contest
ASIA Regional - Taejon

Problem B
Multiply
Input: mult.in

“6 × 9 = 42” is not true for base 10, but is true for base 13. That is, \(6_{(13)} \times 9_{(13)} = 42_{(13)}\) because \(42_{(13)} = 4 \times 13^1 + 2 \times 13^0 = 54_{(10)}\).

You are to write a program which inputs three integers \(p, q, \) and \(r\) and determines the base \(B\) (\(2 \leq B \leq 16\)) for which \(p \times q = r\). If there are many candidates for \(B\), output the smallest one. For example, let \(p = 11\), \(q = 11\), and \(r = 121\). Then we have \(11_{(3)} \times 11_{(3)} = 121_{(3)}\) because \(11_{(3)} = 1 \times 3^1 + 1 \times 3^0 = 4_{(10)}\) and \(121_{(3)} = 1 \times 3^2 + 2 \times 3^1 + 1 \times 3^0 = 16_{(10)}\). For another base such as 10, we also have \(11_{(10)} \times 11_{(10)} = 121_{(10)}\). In this case, your program should output 3 which is the smallest base. If there is no candidate for \(B\), output 0.

Input
The input consists of \(T\) test cases. The number of test cases (\(T\)) is given in the first line of the input file. Each test case consists of three integers \(p, q, \) and \(r\) in a line. All digits of \(p, q, \) and \(r\) are numeric digits and \(1 \leq p, q, r \leq 1,000,000\).

Output
Print exactly one line for each test case. The line should contain one integer which is the smallest base for which \(p \times q = r\). If there is no such base, your program should output 0.

Sample Input
(mult.in)

| 3 6 9 42 11 11 121 2 2 2 |

Output for the Sample Input

| 13 3 0 |