Problem G
Geometric Greatness

Time limit: 2 seconds

Memory limit: 512 megabytes

Problem Description

*"Do you want the triangles? Again, triangles." "**Yes.**"*

Hank likes triangles. He even listens to a song to which the lyrics contain the above sentence. Since he loves triangles so much, he received a triangle as his birthday present this year. The triangle Hank received is a right triangle with width a, height b, and hypotenuse $\sqrt{a^2+b^2}$. **In this problem, you only need to consider the case where $a = 1$.**

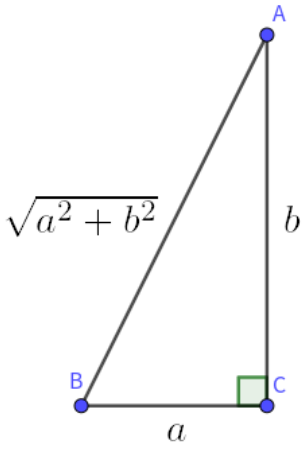

Figure 2: An example of Hank's triangle.

As one triangle is obviously not enough, he wants to construct a sequence of n triangles. The first triangle T_1 of the sequence is the one he received. For $i = 2, 3, \ldots, n$, he creates a new triangle T_i by the following rules:

- T_i's width is the same as T_{i-1}'s perimeter length. The perimeter length of a triangle is the sum of all its side lengths.
- T_i is similar to T_{i-1}. Two triangles X and Y are similar only if their side lengths satisfy
$$\frac{X\text{'s width}}{Y\text{'s width}} = \frac{X\text{'s height}}{Y\text{'s height}} = \frac{X\text{'s hypotenuse}}{Y\text{'s hypotenuse}}.$$

After finishing all n triangles, Hank is curious about the total perimeter length and **twice** the total area of them. Help him write a program to find the answers.

Input Format

The first line contains an integer T, the number of test cases.

Then T lines follow, each representing a test case. On each line, there are three space-separated integers a, b, n.

Output Format

For each test case, output two lines describing the total perimeter length and **twice** the total area of all triangles.

It is guaranteed that each answer can be written in the form $m + k\sqrt{c}$ where m, k are integers and c is a positive integer. If there are multiple possible values for c, choose the representation with minimum positive c. Additionally, if the answer is rational, i.e., $c = 1$, you have to choose $k = 0$.

Print three integers m, k, c on one line for each answer. Since m and k can get really big, output them modulo $10^9 + 7$. You should **not** take the modulo for c.

For example, if the answer is $8+9\sqrt{10}$, you have to print "`8 9 10`" (without quotes). Although $8 + 3\sqrt{90}$ is also correct, you cannot print "`8 3 90`" because the c here is not the minimum positive value for it.

Technical Specification

- $1 \leq T \leq 10^3$
- $a = 1$
- $1 \leq b \leq 10^5$
- $1 \leq n \leq 10^9$

Sample Input 1

```
5
1 2 1
1 2 3
1 4 5
1 4 6
1 5 1
```

Sample Output 1

```
3 1 5
2 0 1
89 39 5
782 348 5
35491 8607 17
97145164 23561160 17
323779 78527 17
85494036 961020353 17
6 1 26
5 0 1
```

Hint

In the first test case, there is only one triangle (the one Hank received).

- Its side lengths are 1, 2 and $\sqrt{1^2 + 2^2} = \sqrt{5}$ so the total perimeter length is $3 + \sqrt{5}$. Therefore, you should print "`3 1 5`" on the first line.
- Its area is $\frac{1}{2} \times 1 \times 2 = 1$ so twice the total area is 2. Therefore, you should print "`2 0 1`" on the second line.