Şehmettin Ltd. Co. is in the interstellar titanium transportation business. They rent spaceships that can carry $K \text{ m}^3$ of titanium. The company only produces rectangular prism shaped titanium blocks of size $X \times Y \times Z$. So, to transport titanium, you may need to cut the titanium block multiple times.

In one move you can cut the titanium block either from width, length or height into 2 titanium blocks. The dimensions of newly created titanium blocks must be integers (e.g. a $[5 \times 6 \times 7]$ block might be cut into $[5 \times 2 \times 7]$ and $[5 \times 4 \times 7]$ sized 2 blocks, but it cannot be cut into $[5 \times 1.5 \times 7]$ and $[5 \times 4.5 \times 7]$ sized 2 blocks). However, titanium is a hard metal to cut; therefore, the cost of cutting the titanium block is the square of cut surface area (e.g. if a $[5 \times 6 \times 7]$ sized block is cut into $[5 \times 2 \times 7]$ and $[5 \times 4 \times 7]$ sized 2 blocks its cutting cost will be $(5 \times 7)^2 = 1225$).

Your job as an employee of Şehmettin Ltd. Co. is to find the minimum total cost of cutting titanium blocks for given $X$, $Y$, $Z$ and $K$ values.

*The ship can transport multiple titanium blocks but the total volume of the blocks should be $K$. (e.g. if the initial block is $[2 \times 2 \times 2]$ sized and if $K$ is 5, the ship can either transport 1 $[2 \times 2 \times 1]$ block with a $[1 \times 1 \times 1]$ block or it can transport 5 $[1 \times 1 \times 1]$ blocks)*

*The remaining $(X \times Y \times Z - K) \text{ m}^3$ of titanium does not necessarily form a single rectangular prism.*

**Input**

- The first line contains 1 integer, $T$: 
  - $1 \leq T \leq 10^4$, The number of test cases.
- Each one of the $T$ consecutive lines contains 4 integers, $X$, $Y$, $Z$, $K$:
  - $1 \leq X$, $Y$, $Z \leq 10$, dimensions of the titanium block.
  - $0 \leq K \leq \text{min}(50, X \times Y \times Z)$, how many $\text{m}^3$ of titanium the spaceship can carry.

**Output**

For each $X$, $Y$, $Z$ and $K$, print the minimum total cost needed to cut the titanium block, in order to make it possible to transport exactly $K \text{ m}^3$ of titanium.

**Example**

Input:
Output:

21
16
10

Explanation:

First Case:
- The block whose dimension is 2 2 2 can be cut into two pieces. (2 2 2 -> 1 2 2 and 1 2 2). The cost of that move will be 16.
- The block whose dimension is 1 2 2 can be cut into two pieces. (1 2 2 -> 1 1 2 and 1 1 2). The cost of that move will be 4.
- Then, the block whose dimension is 1 1 2 can be cut into two pieces. (1 1 2 -> 1 1 1 and 1 1 1). The cost of that move will be 1.
- To solve this optimally we will use a block of 1 2 2 with a block of 1 1 1. (1 \times 2 \times 2 + 1 \times 1 \times 1 = 5 = K)

The total cost will be 21.

Third Case:
- The block whose dimension is 1 3 3 can be cut like following: 1 3 3 -> 1 3 1 and 1 3 2. The cost of this move will be 9.
- The block whose dimension is 1 3 1 can be cut like following: 1 3 1 -> 1 1 1 and 1 2 1. The cost of this move will be 1.
- To solve this we will need a block of 1 1 1. (1 \times 1 \times 1 = 1 = K)

In the end, we can acquire 1 1 1 cube. The total cost will be 10.