Ramen Packs

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Thomas wants to buy n cups of ramen from Liza. She has two brands that he likes: brand A and brand B. Each brand sells packs of ramen in varying sizes. For each integer $k \geq 1$, there is a brand A pack of size k that contains k^2 cups of ramen, and a brand B pack of size k that contains $2k^2$ cups of ramen. Liza has exactly one pack of each type left in stock. Your task is to determine how Thomas can purchase exactly n cups of ramen from Liza, or state that such a thing is not possible.

Note that you do not need to minimize the number of packs.

Input

The first line of the input contains a single integer t ($1 \leq t \leq 10^4$) — the number of test cases. The description of the test cases follows.

Each test case consists of a single line containing one integer n ($1 \leq n \leq 10^9$), the number of ramen cups that Thomas wants from Liza.

Output

For each test case, output a single line.

If it is not possible for Thomas to buy n cups of ramen from Liza, simply print 0.

Otherwise, print a positive integer k, followed by a list of k pack types. A *pack type is a letter (either A or B) indicating the brand of the ramen pack followed by a positive integer indicating its size. The sum of the number of cups over all packs should be n, and no pack type may appear more than once.*

Example

standard input	standard output
4 1 10 12 20	1 A1 2 A1 A3 2 A2 B2 4 A3 B2 B1 A1

Note

In the first test case, Thomas buys just the A1 pack from Liza for a total of $1^2 = 1$ *cups.*

In the second test case, Thomas can buy the A1 and A3 packs from Liza for a total of $1^2 + 3^2 = 10$ *cups.*

In the third test case, Thomas can buy the A2 and B2 packs from Liza for a total of $2^2 + 2 * 2^2 = 12$ *cups.*

In the fourth test case, Thomas can buy the A3, B2, B1, and A1 packs from Liza for a total of $3^2 + 2 * 2^2 + 2 * 1^2 + 1^2 = 20$ *cups.*