

Problem H. Luck

Input file: *standard input*
Output file: *standard output*
Time limit: 2 seconds
Memory limit: 256 mebibytes

This is an interactive problem.

Little Lena plays a computer game. Fanya the dark elven paladin is her character in the game. Fanya is going to descend to the next level of the dungeon and continue her quest to fight Chaos.

Fanya was well prepared to the recent battle: her weapons, armor, attributes and intrinsics should have left the enemies no chance. However, to Lena's surprise, a goblin somehow managed to punch through her armor and hit her for a few points of damage, and then Fanya suddenly failed to hit a bulky troll. In the game, death is irreversible, so this got Lena worried: is everything okay with Fanya?

Lena played the game long enough, so she knows that the heroine may possess intrinsics which affect the probabilities of success and misfortune. Many game events can have different outcomes, and some outcomes can feature different quantities. Say, if Fanya attacks a monster with her weapon, she can, for example, miss the monster completely, or hit it and inflict some damage, or score a critical hit. The probabilities of these outcomes, as well as the points of damage inflicted, are affected, in particular, by the following four intrinsics, each of which the heroine may possess or lack independently of the other three: she is doomed, Fate smiles upon her, she is cursed, she is lucky.

Unfortunately, at the moment, Fanya has no potions of insight which could tell her for sure what intrinsics she possesses. However, it may be possible to figure them out indirectly.

Some of Fanya's belongings are of little use. For example, she has 999 identical fletcher sets, but a true paladin does not use arrows. The description of a fletcher set says it can produce $xdy \pm z$ arrows. This means that a symmetric y -sided die with numbers from 1 to y will be rolled x times, the resulting x values will be summed up, and the value $\pm z$ will be added to the sum (the \pm sign means that the sign of z is always present). For example, $1d6+2$ means that the fletcher set will produce three to eight arrows equiprobably. The description $2d4-1$ indicates that one to seven arrows will be produced, and getting, say, four arrows is four times more probable than getting seven.

The description of a fletcher set is given for a common character without intrinsics. For the heroine, the game further acts as follows.

1. If the heroine is doomed, the number of arrows is calculated **thrice** by the description: each time, all dice are freshly rolled; the result is then the **minimum** of the three obtained quantities. Otherwise, the result remains unchanged.
2. If Fate smiles upon the heroine, the number of arrows is calculated **thrice** by the algorithm above: each time, the game takes the minimum of three calculations by description if the heroine is doomed, or just the result by description if not; the result is then the **maximum** of the three obtained quantities. Otherwise, the result remains unchanged.
3. If the heroine is cursed, the number of arrows is calculated **twice** by the algorithm above: taking into account doom and Fate smile; the result is then the **minimum** of the two obtained quantities. Otherwise, the result remains unchanged.
4. Finally, if the heroine is lucky, the number of arrows is calculated **twice** by the algorithm above: taking into account the presence of the three other intrinsics; the result is then the **maximum** of the two obtained quantities. Otherwise, the result remains unchanged.

For example, if the heroine possesses all four intrinsics, the description $2d4-1$ means the game will need to roll the four-sided die $2 \cdot 3 \cdot 3 \cdot 2 \cdot 2 = 72$ times.

So, Lena can use the fletcher sets and see how many arrows appear after each use. How to use this to determine Fanya's intrinsics? Lena put her hands on the keyboard but stopped, thinking.

Solve a generalized version of Lena's problem. Given the description of a fletcher set, conduct the necessary experiments and determine which intrinsic does Fanya the dark elven paladin possess.

Interaction Protocol

The input consists of one or more test cases. The description of each test case starts with a line of the form "You have 999 fletcher sets ($xdy\pm z$).". Here, $1 \leq x \leq 5$, y is one of the numbers 4, 6, 8, 12, and 20, and the value of z is such that, in all possible outcomes, the number of arrows produced will be at least 1 and at most 100. All the given numbers are integers. The case where $z = 0$ is denoted as $+0$.

After reading the description, the solution may choose to conduct 0 to 999 experiments with the fletcher sets. To conduct a single experiment, print a line "Create arrows.". The response will be a line of the form "You create t arrows.", where the integer t is the number of arrows created.

To print the answer to the test case, instead of conducting the next experiment, print a line of the form "Number of luck-related intrinsic: k ". After that, print k lines in any order, one for each intrinsic Fanya possesses. Use the following forms: "You are doomed.", "Fate smiles upon you.", "You are cursed.", and "You are lucky."

After the last test case, the line "Exit." is given as input. After reading this line, the solution must immediately terminate gracefully.

To prevent output buffering, flush the output buffer after each printed line: this can be done by using, for example, `fflush (stdout)` in C or C++, `System.out.flush ()` in Java, `flush (output)` in Pascal, or `sys.stdout.flush ()` in Python.

Each test will contain from 1 to 20 test cases. A solution fails to pass the test if it prints a wrong set of intrinsic for **three or more** test cases. In particular, there are only two test cases in the example, so the solution will pass it by just adhering to the protocol, even if both sets of intrinsic it found are wrong. In each test, all die rolls in all test cases are made and saved in advance, and the jury program just reproduces the requested outcomes.

Example

standard input	standard output
You have 999 fletcher sets (1d6+2). You create 6 arrows. You create 4 arrows. You create 5 arrows.	Create arrows. Create arrows. Create arrows. Number of luck-related intrinsic: 2. You are cursed. You are lucky.
You have 999 fletcher sets (2d4-1). Exit.	Number of luck-related intrinsic: 0.

Note

The game mechanic similar to the one described in the problem is used in old versions of the game "Ancient Domains Of Mystery" (ADOM).