Your Next Line Is, "What A Cool Problem!"

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

Joseph loves to predict what his opponent is going to say next. However, he is confident that no one else can do the same to him. So he challenges Caesar to a game of **Hangman**.

In this game, there are two roles:

- The **setter** chooses a hidden word of length l.
- The **guesser** tries to discover this word.

The game is played in turns. In each turn, the guesser selects a single letter. After every guess, the setter must give a **response**:

- If the letter appears in the hidden word, the setter must reveal all positions where it appears.
- If the letter does not appear in the word, it is counted as an **incorrect attempt**.

The guesser wins if he discovers **all letters** of the hidden word before making n incorrect attempts. Otherwise, the setter wins.

Turn	Guessed Letter	Correct?	Current State	Incorrect Attempts Remaining
0	–	–	`______`	2
1	`a`	×	`______`	1
2	`e`	✓	`_e__e_`	1
3	`r`	✓	`_e__er`	1
4	`t`	✓	`_etter`	1
5	`l`	×	`_etter`	0

Таблица 1: Hangman game example for the hidden word `better`.

Caesar believes that Joseph, acting as the setter, may cheat by changing the hidden word during the game. To prevent this, Caesar introduces the following rules:

- Before the game starts, Joseph must reveal an **alphabet** of size a and a **vocabulary** of size v.
  - The alphabet is the set of allowed letters.
  - The vocabulary is a set of words, each using only letters from that alphabet.
- To claim victory at the end of the game, Joseph must show one word from the vocabulary and prove that every response he gave during the game was correct for that word.

Now, Joseph will only play the game if, under these rules, he can guarantee victory. Given the values of a, v, l, and n, determine whether Joseph will play the game.

Input

The first line of the input contains a single integer t ($1 \le t \le 2 \times 10^5$) — the number of test cases.

Each test case consists of a single line containing four space-separated integers a, v, l, and n ($1 \le a, v, l, n \le 26, v \le a^l$) — the size of the alphabet, the size of the vocabulary, the length of the hidden word, and the maximum number of incorrect attempts allowed, respectively.

Output

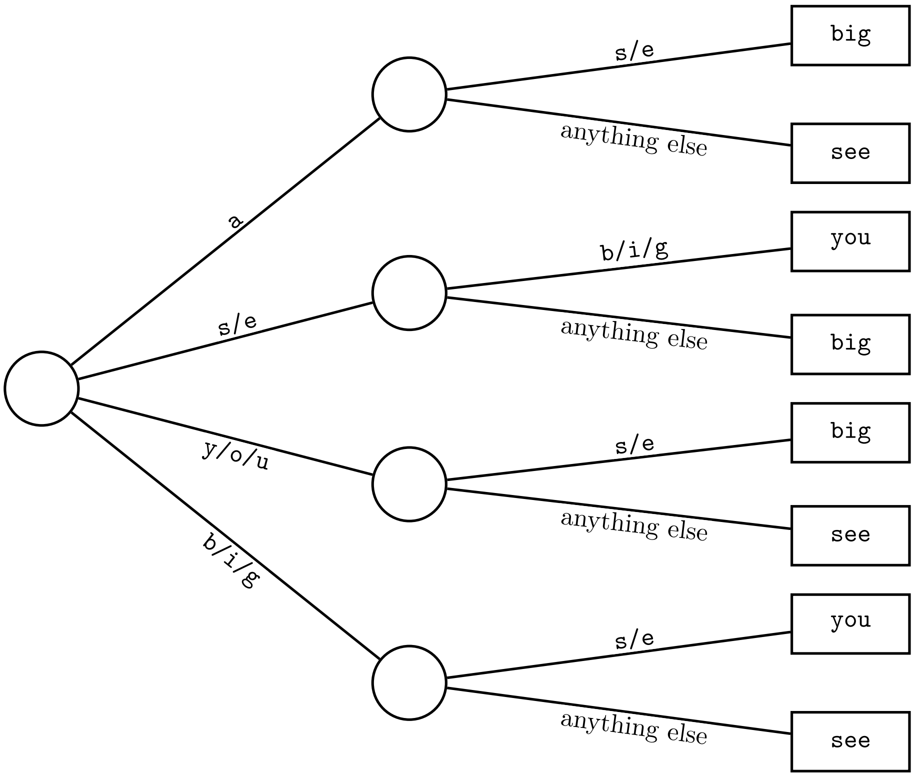
For each test case, output a single string in a line — "YES" if Joseph will play the game, "NO" otherwise.

Example

standard input	standard output
5 9 3 3 2 11 2 6 1 10 5 4 3 26 1 5 3 26 26 26 26	YES YES YES NO NO

Note

In the first test case, Joseph can choose the alphabet {`a`, `e`, `i`, `o`, `u`, `b`, `g`, `s`, `y`} and choose the vocabulary {`you`, `see`, `big`}. Based on Caesar's guesses, Joseph can always change his hidden word to show Caesar that none of his two guesses was correct, thus win the game. The following diagram illustrates Joseph's strategy:



In the second test case, Joseph can choose the alphabet {`a`, `b`, `c`, `d`, `e`, `f`, `g`, `h`, `i`, `j`, `k`} and choose the vocabulary {`abcdek`, `fghijk`}. If Caesar guesses `k`, Joseph will reveal its position as the last letter of the hidden word. No matter which letter Caesar guesses next, Joseph can always find one word in the vocabulary that does not contain that letter, change his hidden word to that word, and win the game. If Caesar does not guess `k` on his first attempt, Joseph can claim victory immediately.

In the third test case, one vocabulary that can allow Joseph to guarantee victory is {`king`, `ping`, `ring`, `sing`, `wing`}.

In the fourth test case, Joseph can keep only one word in the vocabulary. Whatever that word is, Caesar would already know it before the game begins, so he can always guess its letters correctly without making any incorrect attempts.

It can be proven that no alphabet or vocabulary can guarantee victory for Joseph in the fifth test case.